Please check our wiki for help on navigating the form.

Horizon 2020

Call: H2020-BG-2018-2020

(Blue Growth)

SECOND STAGE

Topic: BG-08-2018-2019

Type of action: RIA

Proposal number: SEP-210522255

Proposal acronym: iAtlantic

Deadline Id: H2020-BG-2018-2

Table of contents

How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the steps in the submission wizard.

1 - General information

Topic	BG-08-2018-2019	Type of Action	RIA
Call Identifier	H2020-BG-2018-2020	Deadline Id	H2020-BG-2018-2

Acronym	iAtlantic
Proposal title	Integrated Assessment of Atlantic Marine Ecosystems in Space and Time

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months	*48*
Fixed keyword 1	Marine ecosystems and processes
Fixed keyword 2	Human impacts and other stressors
Fixed keyword 3	Marine biodiversity monitoring
Fixed keyword 4	Marine ecosystem management
Free keywords	*Deep-sea, Benthic, Pelagic, Oceanography, Modelling, Seabed Mapping, Ecological Timeseries Analysis, Multiple Stressors, Tipping Points, Environmental DNA, Genomics, Marine Policy, Governance*

Abstract

iAtlantic will take an interdisciplinary scientific approach to unifying stakeholder efforts to better inform sustainable management and enhance human and observational capacity throughout the Atlantic. The integration of ecosystem data with major circulation pathways connecting the North and South linked with climatic data and forecasts provides a systematic approach to jointly assess and tackle policy challenges. Ocean physics and ecosystem connectivity will enable high-resolution oceanographic hindcasts and forecasts of future circulation together with ground-truthing genomic data. Advances in eDNA genomics, machine learning and autonomous underwater robotics will be combined with existing data to provide a step-changes in predictive habitat mapping approaches to expand species and biodiversity observations from local to basin-scales. Ecological timeseries, including innovative palaeoceanographic and genomic reconstructions, will provide an unprecedented view of the impacts of climate change on Atlantic ecosystems. Assessment of the impact of multiple stressors will identify key drivers of ecosystem change and tipping points. New data will come from 12 carefully selected regions in the deep sea and open ocean that are of international conservation significance and of interest to Blue Economy and Blue Growth sectors. Innovative and efficient data handling and data publishing approaches will establish a better integrated Atlantic Ocean observation data community. Capacity and cooperation between science, industry and policymakers bordering the Atlantic will be boosted by joint multi-disciplinary research cruises, enhanced S Atlantic monitoring arrays, scientific training events, iAtlantic Fellowships and industry focussed workshops. Results will be used to stimulate dialogue with stakeholders and critically assess current ocean governance frameworks generating increased capacity for Marine Spatial Planning and enabling Blue Growth scenarios to be rapidly evaluated.

Remaining characters 0

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under Horizon 2020 or any other EU programme(s)? ○ Yes ◉ No

Please give the proposal reference or contract number.	
xxxxxx-x	

Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	☒
2) The information contained in this proposal is correct and complete.	☒
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	☒

4) The coordinator confirms:

- to have carried out the self-check of the financial capacity of the organisation on http://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year. Where the result was "weak" or "insufficient", the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	○
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	◉
- as sole participant in the proposal is exempt from the financial capacity check.	○

5) The coordinator hereby declares that each applicant has confirmed:

- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	☒
- they have the financial and operational capacity to carry out the proposed action.	☒

The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in the privacy statement. Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the Privacy statement for the EDES Database.

2 - Participants & contacts

#	Participant Legal Name	Country	Action
1	THE UNIVERSITY OF EDINBURGH	UK	
2	FUNDACAO UNIVERSIDADE DO VALE DO ITAJAI	BR	
3	UNIVERSITY OF THE WESTERN CAPE	ZA	
4	INSTITUTO ESPANOL DE OCEANOGRAFIA	ES	
5	IMAR- INSTITUTO DO MAR	PT	
6	SEASCAPE CONSULTANTS LTD	UK	
7	INSTITUT FRANCAIS DE RECHERCHE POUR L'EXPLOITATION DE LA MER	FR	
8	UNITED KINGDOM RESEARCH AND INNOVATION	UK	
9	HELMHOLTZ ZENTRUM FUR OZEANFORSCHUNG KIEL	DE	
10	HERIOT-WATT UNIVERSITY	UK	
11	UNIVERSITAET BREMEN	DE	
12	UNIVERSIDADE DE SAO PAULO	BR	
13	UNIVERSITY OF KWAZULU-NATAL	ZA	
14	THE SCOTTISH ASSOCIATION FOR MARINESCIENCE LBG	UK	
15	Servicio de Hidrografía Naval	AR	
16	UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK	IE	
17	SOUTH AFRICAN INSTITUTE FOR AQUATIC BIODIVERSITY	ZA	
18	Universidade Federal do Espírito Santo	BR	
19	NELSON MANDELA UNIVERSITY	ZA	
20	GOETEBORGS UNIVERSITET	SE	
21	UNIVERSIDADE FEDERAL DE SANTA CATARINA	BR	

22	UNIVERSITY OF CAPE TOWN	ZA	
23	SEASCAPE BELGIUM	BE	
24	TMG Research gGmbH	DE	
25	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	FR	
26	SORBONNE UNIVERSITE	FR	
27	AARHUS UNIVERSITET	DK	
28	ALFRED-WEGENER-INSTITUT HELMHOLTZ-ZENTRUM FUR POLAR- UND MEERESFORSCHUNG	DE	
29	UNIVERSITY COLLEGE LONDON	UK	
30	Marine and Freshwater Research Institute Iceland	IS	
31	Temple University-Of The Commonwealth System of Higher Education	US	
32	GIANNI MATTHEW	NL	
33	NATIONAL RESEARCH FOUNDATION	ZA	
34	OREGON STATE UNIVERSITY	US	

2 - Administrative data of participating organisations

PIC	***Legal name***
999974941	*THE UNIVERSITY OF EDINBURGH*

Short name: UEDIN

Address of the organisation

Street OLD COLLEGE, SOUTH BRIDGE

Town EDINBURGH

Postcode EH8 9YL

Country United Kingdom

Webpage www.ed.ac.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....12/12/2008 - no

SME self-assessment ..... unknown

SME validation sme.....12/12/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Geosciences ☐ not applicable

☐ Same as proposing organisation's address

Street: King's Buildings, West Mains Road

Town: Edinburgh

Postcode: EH9 3JW

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: (•) Male ( ) Female

First name: **Murray** Last name: **Roberts**

E-Mail: **murray.roberts@ed.ac.uk**

Position in org.: Professor of Applied Marine Biology and Ecology

Department: Geosciences ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: King's Buildings, West Mains Road

Town: Edinburgh Post code: EH9 3JW

Country: United Kingdom

Website: www.ed.ac.uk/geosciences

Phone: +44 131 650 509 Phone 2: +44 7810 772021 Fax: +44 131 650 73

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Cordelia	Lennon	cordelia@modus.ltd	*+447545424248*
Theodora	Lola-Luz	europe@eri.ed.ac.uk	*+xxx xxxxxxxxx*
Eloise	Keating	proposals@modus.ltd	*+447545424704*
Neil	Stewart	neil@modus.ltd	*+xxx xxxxxxxxx*

PIC	***Legal name***
960863959	*FUNDACAO UNIVERSIDADE DO VALE DO ITAJAI*

Short name: UNIVALI

Address of the organisation

Street RUA URUGUAI 458 SANTA CATARINA

Town ITAJAI

Postcode 88302202

Country Brazil

Webpage www.univali.br

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....03/11/2005 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Centro de Ciências Tecnológicas da Terra e do Mar - CTTMar ☐ not applicable

☐ Same as proposing organisation's address

Street: Rua Uruguai, 485

Town: Itajai

Postcode: 88302-901

Country: Brazil

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Jose Angel**

Last name: **Alvarez Perez**

E-Mail: **angel.perez@univali.br**

Position in org.: Professor

Department: Centro de Ciências Tecnológicas da Terra e do Mar - CTTMar ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Rua Uruguai, no. 485

Town: Itajai Post code: 88302-901

Country: Brazil

Website: www.univali.br

Phone: +55 47 3341-7714 Phone 2: +55 47 9217-5515 Fax: +55 47 3341-7715

PIC	***Legal name***
999883373	*UNIVERSITY OF THE WESTERN CAPE*

Short name: UWC

Address of the organisation

Street MODDERDAMM ROAD

Town BELLVILLE

Postcode 7535

Country South Africa

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Biodiversity and Conservation Biology ☐ not applicable

☐ Same as proposing organisation's address

Street: Private Bag X17,

Town: Bellville

Postcode: 7535

Country: South Africa

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: (•) Male ( ) Female

First name: **Albertus** Last name: **Smit**

E-Mail: **ajsmit@uwc.ac.za**

Position in org.: Associate Professor

Department: Biodiversity and Conservation Biology ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Private Bag X17

Town: Bellville Post code: 7535

Country: South Africa

Website: www.uwc.ac.za

Phone: +27 (0)21 959 3783 Phone 2: +27 (0)78 300 6005 Fax: +xxx xxxxxxxxx

Other contact persons

First Name	*Last Name*	*E-mail*	*Phone*
Mark	Gibbons	mgibbons@uwc.ac.za	+xxx xxxxxxxxx

PIC	***Legal name***
999474033	*INSTITUTO ESPANOL DE OCEANOGRAFIA*

Short name: IEO

Address of the organisation

Street CORAZON DE MARIA 8

Town MADRID

Postcode 28002

Country Spain

Webpage www.ieo.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....01/01/1914 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Centro Oceanográfico de Baleares (COB) ☐ not applicable

☐ Same as proposing organisation's address

Street: Moll de Ponent s/n

Town: Palma

Postcode: 07015

Country: Spain

Department 2

Department name: Centro Oceanográfico de Canarias (COC) ☐ not applicable

☐ Same as proposing organisation's address

Street: Vía Espaldón, dársena pesquera, Parcel 8

Town: Santa Cruz de Tenerife

Postcode: 38180

Country: Spain

Department 3

Department name: Instituto Español de Oceanografía. Servicios Centrales ☐ not applicable

☐ Same as proposing organisation's address

Street: C/ Corazón de María 8

Town: Madrid

Postcode: 28002

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: ○ Male ◉ Female

First name: **Covadonga** Last name: **Orejas Saco del Valle**

E-Mail: **cova.orejas@ieo.es**

Position in org.: Senior Researcher

Department: Marine Environment ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Moll de Ponent s/n

Town: Palma Post code: 07015

Country: Spain

Website: www.ieo.es

Phone: + 34 971 708 905 Phone 2: + 34 600 350 279 Fax: + 34 971 404 945

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Iñaki	Armendáriz	unidad.proyectos@ieo.es	*+34 91 342 11 37*
Rafael	Quirós	jamm@ieo.es	*+34 91 342 11 00*

PIC	***Legal name***
999451529	*IMAR- INSTITUTO DO MAR*

Short name: IMAR

Address of the organisation

Street RUA PROF DR FREDERICO MACHADO 4 DEP

Town HORTA

Postcode 9900 138

Country Portugal

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....03/10/1991 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: IMAR - INSTITUTO DO MAR ☐ not applicable

☐ Same as proposing organisation's address

Street: RUA PROF DR FREDERICO MACHADO 4 DEPARTAM

Town: HORTA

Postcode: 9900 138

Country: Portugal

Department 2

Department name: Centro I&D Okeanos – Universidade dos Açores ☐ not applicable

☐ Same as proposing organisation's address

Street: RUA PROF DR FREDERICO MACHADO 4 DEPARTAM

Town: HORTA

Postcode: 9900 138

Country: Portugal

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Telmo** Last name: **Morato**

E-Mail: **t.morato@gmail.com**

Position in org.: Principal Investigator

Department: IMAR - Instituto do Mar ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: RUA PROF DR FREDERICO MACHADO 4 DEPARTAMENTO DE OCEANO

Town: HORTA Post code: 9900 138

Country: Portugal

Website:

Phone: +351 292 200 400 Phone 2: +xxx xxxxxxxxx Fax: +351 292 200 400

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Marina	Carreiro-Silva	carreirosilvamarina@gmail.com	+xxx xxxxxxxxx
Melanie	LaVita	melanie.t.lavita@uac.pt	+xxx xxxxxxxxx

PIC	***Legal name***
952856803	*SEASCAPE CONSULTANTS LTD*

Short name: SC

Address of the organisation

Street BELBINS VALLEY BELBINS

Town ROMSEY HAMPSHIRE

Postcode SO51 0PE

Country United Kingdom

Webpage www.seascapeconsultants.co.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....yes

Enterprise Data

SME self-declared status.....20/10/2010 - yes

SME self-assessment ..... unknown

SME validation sme.....20/10/2010 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Seascape Consultants Ltd ☐ not applicable

☐ Same as proposing organisation's address

Street: Jermyns House, Jermyns Lane

Town: Romsey

Postcode: SO51 0QA

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: ○ Male ◉ Female

First name: **Victoria**

Last name: **Gunn**

E-Mail: **vikki.gunn@seascapeconsultants.co.uk**

Position in org.: Director

Department: Seascape Consultants Ltd ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Jermyns House, Jermyns Lane

Town: Romsey Post code: SO51 0QA

Country: United Kingdom

Website: www.seascapeconsultants.co.uk

Phone: +44 1794 367797 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
David	Johnson	david.johnson@seascapeconsultants.co.uk	*+44 1794 367797*

PIC	***Legal name***
999630300	*INSTITUT FRANCAIS DE RECHERCHE POUR L'EXPLOITATION DE LA MER*

Short name: IFREMER

Address of the organisation

Street 155 rue Jean Jacques Rousseau

Town ISSY-LES-MOULINEAUX

Postcode 92138

Country France

Webpage http://www.ifremer.fr

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....unknown

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Department of Physical Resources and Deep-Sea Ecosystems ☐ not applicable

☐ Same as proposing organisation's address

Street: Technopole de la Pointe du Diable

Town: Plouzane

Postcode: 29820

Country: France

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: ○ Male ◉ Female

First name: **Marjolaine** Last name: **Matabos**

E-Mail: **marjolaine.matabos@ifremer.fr**

Position in org.: Researcher

Department: Department of Physical Resources and Deep-Sea Ecosystems ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Technopole de la Pointe du Diable

Town: Plouzane Post code: 29280

Country: France

Website: www.ifremer.fr/en

Phone: +xxx xxxxxxxxx Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Pierre-Marie	Sarradin	pierre.marie.sarradin@ifremer.fr	*+332.98.22.46.72*
Chiraz	Talbi	projet.europe@ifremer.fr	*+xxx xxxxxxxxx*

PIC	***Legal name***
906446474	*UNITED KINGDOM RESEARCH AND INNOVATION*

Short name: UKRI

Address of the organisation

Street POLARIS HOUSE NORTH STAR AVENUE

Town SWINDON

Postcode SN2 1FL

Country United Kingdom

Webpage https://www.ukri.org/

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: National Oceanography Centre, Marine Geoscience ☐ not applicable

☐ Same as proposing organisation's address

Street: European Way

Town: Southampton

Postcode: SO14 3ZH

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: ○ Male ◉ Female

First name: **Veerle Ann Ida** Last name: **Huvenne**

E-Mail: **vaih@noc.ac.uk**

Position in org.: Subgroup Leader

Department: National Oceanography Centre, Marine Geoscience ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: European Way

Town: Southampton Post code: SO14 3ZH

Country: United Kingdom

Website: www.noc.ac.uk

Phone: +44 2380 59 6575 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Adrian	Brown	adrian.brown@noc.ac.uk	*+44 2380 596008*
Phillip	Worrall	pgwo@noc.ac.uk	*+44 151 795 4842*
Maria	Alonzo	malonzo@noc.ac.uk	*+44 2380 595110*

PIC	***Legal name***
986090458	*HELMHOLTZ ZENTRUM FUR OZEANFORSCHUNG KIEL*

Short name: GEOMAR

Address of the organisation

Street WISCHHOFSTRASSE 1-3

Town KIEL

Postcode 24148

Country Germany

Webpage www.geomar.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....01/01/2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Ocean Circulation and Climate Dynamics ☐ not applicable

☐ Same as proposing organisation's address

Street: Düsternbrooker Weg 20

Town: Kiel

Postcode: 24148

Country: Germany

Department 2

Department name: Dynamics of the Ocean Floor ☐ not applicable

☐ Same as proposing organisation's address

Street: WISCHHOFSTRASSE 1-3

Town: KIEL

Postcode: 24148

Country: Germany

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: (•) Male ( ) Female

First name: **Arne** Last name: **Biastoch**

E-Mail: **abiastoch@geomar.de**

Position in org.: Professor

Department: Ocean Circulation and Climate Dynamics / Theory and Modelling ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Düsternbrooker Weg 20

Town: Kiel Post code: 24105

Country: Germany

Website: www.geomar.de/en/research/

Phone: +494316004013 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Colin	Devey	cdevey@geomar.de	*+494316002257*
Alexandra	Drossou-Berendes	adrossou-berendes@geomar.de	*+494316002808*
Henk-Jan	Hoving	hhoving@geomar.de	*+xxx xxxxxxxxx*
Bjoern	Fiedler	bfiedler@geomar.de	*+xxx xxxxxxxxx*
Timm	Schoening	tschoening@geomar.de	*+xxx xxxxxxxxx*

PIC	***Legal name***
999853400	*HERIOT-WATT UNIVERSITY*

Short name: HWU

Address of the organisation

Street Riccarton

Town EDINBURGH

Postcode EH14 4AS

Country United Kingdom

Webpage www.hw.ac.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....no

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: The Lyell Center, ILES ☐ not applicable

☐ Same as proposing organisation's address

Street: Research Avenue South, Riccarton

Town: Edinburgh

Postcode: EH14 4AS

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Andrew**

Last name: **Sweetman**

E-Mail: **a.sweetman@hw.ac.uk**

Position in org.: Head of Research Group

Department: The Lyell Centre

☐ Same as organisation name

☐ Same as proposing organisation's address

Street: University Avenue South, Riccarton

Town: Edinburgh

Post code: EH14 4AS

Country: United Kingdom

Website: www.hw.ac.uk

Phone: +44 1314513993

Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
RES	Europe	res.eu@hw.ac.uk	+xxx xxxxxxxxx
Jane	Dey	j.dey@hw.ac.uk	+xxx xxxxxxxxx

PIC	***Legal name***
999987454	*UNIVERSITAET BREMEN*

Short name: UNIHB

Address of the organisation

Street Bibliothekstrasse 1

Town BREMEN

Postcode 28359

Country Germany

Webpage www.uni-bremen.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....20/05/2016 - no

SME self-assessment .....20/05/2016 - no

SME validation sme.....28/01/2009 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: MARUM - Center for Marine Environmental Sciences ☐ not applicable

☐ Same as proposing organisation's address

Street: Leobener Str. 8

Town: Bremen

Postcode: 28359

Country: Germany

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr.

Sex: (•) Male ( ) Female

First name: **Andree** Last name: **Behnken**

E-Mail: **abehnken@marum.de**

Position in org.: Research associate

Department: MARUM - Center for Marine Environmental Sciences ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Leobener Str. 8

Town: Bremen Post code: 28359

Country: Germany

Website: www.marum.de

Phone: +49 421 21865597 Phone 2: *+xxx xxxxxxxxx* Fax: +49 421 21865505

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Michael	Diepenbroek	mdiepenbroek@pangaea.de	*+49 421 21865590*
Dierk	Hebbeln	dhebbeln@marum.de	*+49-421-21865650*

PIC	***Legal name***
999844379	*UNIVERSIDADE DE SAO PAULO*

Short name: USP

Address of the organisation

Street RUA DA REITORIA 109 BUTANTA

Town SAO PAULO SP

Postcode 05508 900

Country Brazil

Webpage www.usp.br

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....17/11/2008 - no

SME self-assessment ..... unknown

SME validation sme.....17/11/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Biological Oceanography – Oceanographic Institute ☐ not applicable

☐ Same as proposing organisation's address

Street: Praça do Oceanográfico, 191

Town: São Paulo-SP

Postcode: 05508-030

Country: Brazil

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Paulo**

Last name: **Sumida**

E-Mail: **psumida@usp.br**

Position in org.: Associate Professor

Department: Biological Oceanography Dept – Oceanographic Institute

☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Praça do Oceanográfico, 191

Town: São Paulo-SP

Post code: 05508-030

Country: Brazil

Website: www.lamp.io.usp.br

Phone: +55 11 3091-6543

Phone 2: +55 11 971480895

Fax: +55 11 3091-6607

PIC	***Legal name***
999889290	*UNIVERSITY OF KWAZULU-NATAL*

Short name: UKN

Address of the organisation

Street University Road, Chiltern Hills

Town WESTVILLE

Postcode 3630

Country South Africa

Webpage www.ukzn.ac.za

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....01/01/2004 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Geological Sciences ☐ not applicable

☐ Same as proposing organisation's address

Street: University of KwaZulu-Natal, Westville

Town: Durban

Postcode: 4000

Country: South Africa

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: (•) Male ( ) Female

First name: **Andrew** Last name: **Green**

E-Mail: **greena1@ukzn.ac.za**

Position in org.: Head of Department

Department: Geological Sciences ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: University of KwaZulu-Natal, Westville

Town: Durban Post code: 4000

Country: South Africa

Website: www.ukzn.ac.za

Phone: +27312602516 Phone 2: +xxx xxxxxxxxx Fax: +27312602280

PIC	***Legal name***
999738843	*THE SCOTTISH ASSOCIATION FOR MARINESCIENCE LBG*

Short name: SAMS

Address of the organisation

Street SCOTTISH MARINE INSTITUTE

Town DUNBEG OBAN

Postcode PA37 1QA

Country United Kingdom

Webpage www.sams.ac.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....06/07/2018 - no

SME self-assessment .....28/10/2008 - no

SME validation sme.....28/10/2008 - yes

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Physics ☐ not applicable

☐ Same as proposing organisation's address

Street: SCOTTISH MARINE INSTITUTE

Town: DUNBEG OBAN

Postcode: PA37 1QA

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: (•) Male ( ) Female

First name: **Mark** Last name: **Inall**

E-Mail: **mark.inall@sams.ac.uk**

Position in org.: Professor

Department: Physics ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: SCOTTISH MARINE INSTITUTE

Town: DUNBEG OBAN Post code: PA37 1QA

Country: United Kingdom

Website: www.sams.ac.uk

Phone: +441631 559267 Phone 2: +447795 573475 Fax: +441631 559001

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Stuart	Cunningham	stuart.cunningham@sams.ac.uk	*+441631559000*

PIC	***Legal name***
908039796	*Servicio de Hidrografía Naval*

Short name: SHN

Address of the organisation

Street Avda. Montes de Oca 2124

Town Ciudad Autónoma de Buenos Aires

Postcode C1270ABV

Country Argentina

Webpage http://www.hidro.gov.ar/

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....unknown

Non-profit .....unknown

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....unknown

Research organisation .....unknown

Legal person .....yes

Industry (private for profit).....unknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Oceanografía - Dinámica Oceánica ☐ not applicable

☐ Same as proposing organisation's address

Street: Avda. Montes de Oca 2124

Town: Ciudad Autónoma de Buenos Aires

Postcode: C1270ABV

Country: Argentina

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. | Sex: ○ Male ◉ Female

First name: **Maria Paz** | Last name: **Chidichimo**

E-Mail: **mpchidichimo@hidro.gov.ar**

Position in org.: Researcher

Department: Oceanografía – Dinámica Oceánica ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Avda. Montes de Oca 2124

Town: Ciudad Autónoma de Buenos Aires | Post code: C1270ABV

Country: Argentina

Website: http://www.hidro.gov.ar/

Phone: +54-11-43012590 | Phone 2: +54-11-20555506 | Fax: +xxx xxxxxxxxx

Other contact persons

First Name	*Last Name*	*E-mail*	*Phone*
Alberto	Piola	apiola@hidro.gov.ar	*+54-11-43012590*
Ariel	Troisi	atroisi@hidro.gov.ar	*+54-11-43013091*

PIC	***Legal name***
999975717	*UNIVERSITY COLLEGE CORK - NATIONAL UNIVERSITY OF IRELAND, CORK*

Short name: UCC

Address of the organisation

Street WESTERN ROAD

Town CORK

Postcode T12 YN60

Country Ireland

Webpage www.ucc.ie

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....24/02/2014 - no

SME self-assessment .....24/02/2014 - no

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: School of Biological, Earth & Environmental Sciences ☐ not applicable

☐ Same as proposing organisation's address

Street: Distillery Fields, North Mall

Town: Cork

Postcode: -

Country: Ireland

Department 2

Department name: iCRAG - Irish Centre for Research in Applied Geosciences ☐ not applicable

☐ Same as proposing organisation's address

Street: Distillery Fields, North Mall

Town: Cork

Postcode: -

Country: Ireland

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: (•) Male ( ) Female

First name: **Andy** Last name: **Wheeler**

E-Mail: **a.wheeler@ucc.ie**

Position in org.: Professor of Geology, Head of School, Co-PI iCRAG

Department: School of Biological, Earth & Environmental Sciences ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Distillery Fields, North Mall

Town: Cork Post code: -

Country: Ireland

Website: http://bees.ucc.ie

Phone: +353 21 4904577 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Aaron	Lim	aaron.lim@ucc.ie	*+353-21-4904581*

PIC	***Legal name***
951022727	*SOUTH AFRICAN INSTITUTE FOR AQUATIC BIODIVERSITY*

Short name: SAIAB

Address of the organisation

Street Private Bag 1015

Town Grahamstown

Postcode 6140

Country South Africa

Webpage www.saiab.ac.za

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....yes

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: ACEP Marine Platform ☐ not applicable

☐ Same as proposing organisation's address

Street: 1 King Shaka Avenue, Point

Town: Durban

Postcode: 4001

Country: South Africa

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Errol**

Last name: **Wiles**

E-Mail: **eawiles@yahoo.com**

Position in org.: Geophysics Instrument Scientist

Department: ACEP Marine Platform

☐ Same as organisation name

☐ Same as proposing organisation's address

Street: 1 King Shaka Avenue, Point, Durban

Town: Durban

Post code: 4001

Country: South Africa

Website: www.saiab.ac.za

Phone: +27827687545

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

PIC	***Legal name***
997151465	*Universidade Federal do Espírito Santo*

Short name: UFES

Address of the organisation

Street Av. Fernando Ferrari - Campus Universitário Go

Town Vitória - ES

Postcode 29060970

Country Brazil

Webpage www.ufes.br

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Oceanography and Ecology ☐ not applicable

☐ Same as proposing organisation's address

Street: Av. Fernando Ferrari - Campus Universitá

Town: Vitória - ES

Postcode: 29060970

Country: Brazil

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Angelo**

Last name: **Fraga Bernardino**

E-Mail: **angelofraga@gmail.com**

Position in org.: Assistant Professor

Department: Oceanography

☐ Same as organisation name

☒ Same as proposing organisation's address

Street: Av. Fernando Ferrari - Campus Universitário Goiabeiras 514

Town: Vitória - ES

Post code: 29060970

Country: Brazil

Website: www.bentos.ufes.br

Phone: +55 27 4009 7789

Phone 2: +55 27 992276101

Fax: *+xxx xxxxxxxxx*

PIC	***Legal name***
972567785	*NELSON MANDELA UNIVERSITY*

Short name: NMU

Address of the organisation

Street UNIVERSITY WAY SUMMERSTRAND

Town PORT ELIZABETH

Postcode 6001

Country South Africa

Webpage www.nmmu.ac.za

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....01/01/2005 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Ocean Sciences ☐ not applicable

☐ Same as proposing organisation's address

Street: -

Town: Port Elizabeth

Postcode: 77000

Country: South Africa

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: ○ Male ◉ Female

First name: **Kerry** Last name: **Sink**

E-Mail: **k.sink@sanbi.org.za**

Position in org.: Marine Programme Manager and Principal Scientist

Department: Biodiversity Research, Assessment and Monitoring: Marine Unit ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Kirstenbosch Research Centre, Rhodes Avenue

Town: Newlands Post code: 7700

Country: South Africa

Website: www.sanbi.org

Phone: +27 21 799-8855 Phone 2: +27 21 799 8716 Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Megan	van der Bank	m.vanderbank@sanbi.org.za	*+27 21 799 8716*
Steve	Kirkman	skirkman@environment.gov.za	*+xxx xxxxxxxxx*
Lara	Atkinson	lara@saeon.ac.za	*+xxx xxxxxxxxx*
Prideel	Majiedt	p.majiedt@sanbi.org.za	*+27 217998826*

PIC	***Legal name***
999981925	*GOETEBORGS UNIVERSITET*

Short name: UGOT

Address of the organisation

Street VASAPARKEN

Town GOETEBORG

Postcode 405 30

Country Sweden

Webpage www.gu.se

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....19/08/2008 - no

SME self-assessment ..... unknown

SME validation sme.....19/08/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Marine Sciences ☐ not applicable

☐ Same as proposing organisation's address

Street: BOX 461

Town: Göteborg

Postcode: S-40530

Country: Sweden

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: ○ Male ◉ Female

First name: **Ann** Last name: **Larsson**

E-Mail: **ann.larsson@marine.gu.se**

Position in org.: Associate Professor

Department: Marine Sciences ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Tjärnö

Town: Strömstad Post code: 45296

Country: Sweden

Website: www.gu.se

Phone: +46 31 7869613 Phone 2: *+xxx xxxxxxxxx* Fax: +46 31 7861333

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Grants Office	Ugot	grantsoffice@adm.gu.se	*+xxx xxxxxxxxx*
Maria	Enge	maria.enge@gu.se	*+46317866473*

PIC	***Legal name***
965274452	*UNIVERSIDADE FEDERAL DE SANTA CATARINA*

Short name: UFSC

Address of the organisation

Street CAMPUS UNIVERSITARIO UFSC

Town Florianópolis

Postcode 88040900

Country Brazil

Webpage www.ufsc.br

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....no

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Ecologia e Zoologia ☐ not applicable

☐ Same as proposing organisation's address

Street: UFSC,Campus Trindade, Ed. Fritz Muller,

Town: Florianópolis - SC

Postcode: 88040-970

Country: Brazil

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Alberto** Last name: **Lindner**

E-Mail: **alberto.lindner@ufsc.br**

Position in org.: Associate Professor

Department: Ecologia e Zoologia ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: UFSC, Campus Trindade, Ed. Fritz Muller, ECZ/CCB

Town: Florianópolis - SC Post code: 88040-970

Country: Brazil

Website: www.lindnerlab.ccb.ufsc.br

Phone: +55 48 3721-4744 Phone 2: +55 48 98801-7213 Fax: +55 48 3721-5156

PIC	***Legal name***
999849229	*UNIVERSITY OF CAPE TOWN*

Short name: UCT

Address of the organisation

Street PRIVATE BAG X3

Town RONDEBOSCH

Postcode 7701

Country South Africa

Webpage www.uct.ac.za

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....19/12/1997 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Oceanography ☐ not applicable

☐ Same as proposing organisation's address

Street: Residence Road, Upper Campus

Town: Rondebosch

Postcode: 7701

Country: South Africa

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof. Sex: ○ Male ◉ Female

First name: **Isabelle** Last name: **Ansorge**

E-Mail: **isabelle.ansorge@uct.ac.za**

Position in org.: Head of Department

Department: Oceanography ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Residence Road, Upper Campus

Town: Rondebosch Post code: 7701

Country: South Africa

Website: www.sea.uct.ac.za

Phone: +27 216503280 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Tarron	Lamont	tarron.lamont@gmail.com	+xxx xxxxxxxxx

PIC	***Legal name***
911633161	*SEASCAPE BELGIUM*

Short name: SBE

Address of the organisation

Street KINDERMANSSTRAAT 14 BUS 19

Town BRUSSEL

Postcode 1000

Country Belgium

Webpage www.seascapebelgium.be

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....yes

Enterprise Data

SME self-declared status.....17/05/2017 - yes

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

No department involved

Department name: *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street: *Please enter street name and number.*

Town: *Please enter the name of the town.*

Postcode: *Area code.*

Country: *Please select a country*

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr.

Sex: (•) Male ( ) Female

First name: **Jan-Bart**

Last name: **Calewaert**

E-Mail: **janbartcalewaert@gmail.com**

Position in org.: Managing Director

Department: EMODnet Secretariat

☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Wandelaarkaai 7

Town: Oostende

Post code: 8400

Country: Belgium

Website: -

Phone: +32 0497433371

Phone 2: *+xxx xxxxxxxxx*

Fax: *+xxx xxxxxxxxx*

PIC	***Legal name***
907760630	*TMG Research gGmbH*

Short name: TMG

Address of the organisation

Street EUREF-Campus 6-9, 4. OG

Town Berlin

Postcode 10829

Country Germany

Webpage www.tmg-thinktank.com

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....unknown

Non-profit .....unknown

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....unknown

Research organisation .....unknown

Legal person .....yes

Industry (private for profit).....unknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

No department involved

Department name: *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street: *Please enter street name and number.*

Town: *Please enter the name of the town.*

Postcode: *Area code.*

Country: *Please select a country*

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Sebastian** Last name: **Unger**

E-Mail: **sebastian.unger@tmg-thinktank.com**

Position in org.: Associate

Department: TMG Research GmbH ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: EUREF-Campus 6-9, 4. OG

Town: Berlin Post code: 10829

Country: Germany

Website: www.tmg-thinktank.com

Phone: +49 15112019038 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

PIC	***Legal name***
999997930	*CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS*

Short name: CNRS

Address of the organisation

Street RUE MICHEL ANGE 3

Town PARIS

Postcode 75794

Country France

Webpage www.cnrs.fr

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....18/11/2008 - no

SME self-assessment ..... unknown

SME validation sme.....18/11/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Institut des Sciences de l'Evolution de Montpellier ISEM UMR5554 ☐ not applicable

☐ Same as proposing organisation's address

Street: Place Eugène Bataillon

Town: Montpellier Cedex 5

Postcode: 34095

Country: France

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Nicolas** Last name: **Bierne**

E-Mail: **nicolas.bierne@umontpellier.fr**

Position in org.: Director of Research

Department: Institut des Sciences de l'Evolution de Montpellier ISEM UMR5554 ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Place Eugène Bataillon

Town: Montpellier Cedex 5 Post code: 34095

Country: France

Website: www.isem.univ-montp2.fr

Phone: +33 628688823 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Jerome	Vitre	jerome.vitre@dr13.cnrs.fr	*+33 4 67 61 34 42*
Elodie	Vatonne	elodie.vatonne@dr13.cnrs.fr	*+xxx xxxxxxxxx*
Guillaume	Rochet	rspv@dr13.cnrs.fr	*+xxx xxxxxxxxx*

PIC	***Legal name***
909875521	*SORBONNE UNIVERSITE*

Short name: SU

Address of the organisation

Street 21 RUE DE L'ECOLE DE MEDECINE

Town PARIS

Postcode 75006

Country France

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: UMR 7144 ‘Adaptation et Diversité en Milieux Marins’ (AD2M) ☐ not applicable

☐ Same as proposing organisation's address

Street: Station Biologique de Roscoff

Town: Roscoff

Postcode: 29680

Country: France

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name **Didier** Last name **Jollivet**

E-Mail **jollivet@sb-roscoff.fr**

Position in org.: Senior Scientist

Department: Adaptation et Diversité en Milieux Marins ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Station Biologique de Roscoff, Place Georges Teissier

Town: Roscoff Post code: 29680

Country: France

Website: www.sb-roscoff.fr

Phone: +33 2 98 29 23 67 Phone 2: +33 6 34 13 35 76 Fax: +33 2 98 29 23 24

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Anaïs	Desclos	anais.desclos@sorbonne-universite.fr	*+33144273885*
Fanny	Schultz	fanny.schultz@sorbonne-universite.fr	*+33144275143*

PIC	***Legal name***
999997736	*AARHUS UNIVERSITET*

Short name: AU

Address of the organisation

Street NORDRE RINGGADE 1

Town AARHUS C

Postcode 8000

Country Denmark

Webpage www.au.dk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....20/05/2016 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Department of Bioscience ☐ not applicable

☐ Same as proposing organisation's address

Street: Ny Munkegade 116

Town: Aarhus C

Postcode: 8000

Country: Denmark

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Christian** Last name: **Mohn**

E-Mail: **chmo@bios.au.dk**

Position in org.: Senior Scientist

Department: Department of Bioscience ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Frederiksborgvej 399

Town: Roskilde Post code: 4000

Country: Denmark

Website: www.bios.au.dk

Phone: +45 87158564 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Eva Friis	Møller	efm@bios.au.dk	*+45 87158559*
Helle	Holmberg	hh@au.dk	*+45 87158721*
Jesper Juel	Holst	jjh@au.dk	*+45 30587943*
Rikke	Märcher Rochat	rmr@au.dk	*+xxx xxxxxxxxx*

PIC	***Legal name***
999497507	*ALFRED-WEGENER-INSTITUT HELMHOLTZ-ZENTRUM FUR POLAR- UND MEERESFORSCHUNG*

Short name: AWI

Address of the organisation

Street AM HANDELSHAFEN 12

Town BREMERHAVEN

Postcode 27570

Country Germany

Webpage www.awi.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....31/12/2015 - no

SME self-assessment .....17/03/1986 - no

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Geosciences | Geophysics | Bathymetry ☐ not applicable

☐ Same as proposing organisation's address

Street: Van Ronzelen Str. 2

Town: Bremerhaven

Postcode: D-27568

Country: Germany

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Boris** Last name: **Dorschel**

E-Mail: **boris.dorschel@awi.de**

Position in org.: Head of Bathymetry

Department: Geosciences | Geophysics | Bathymetry ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Van Ronzelen Str. 2

Town: Bremerhaven Post code: 27658

Country: Germany

Website: www.awi.de

Phone: +49-471-48311222 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Simon	Dreutter	simon.dreutter@awi.de	*+49-471-48312041*
Tordis	Hellmann	tordis.hellmann@awi.de	*+49-471-4831-2356*
Nancy	Lange	nancy.lange@awi.de	*+xxx xxxxxxxxx*
Jasmin	Schulz	jasmin.schulz@awi.de	*+xxx xxxxxxxxx*
Maria	Eden	maria.eden@awi.de	*+xxx xxxxxxxxx*

PIC	***Legal name***
999975620	*UNIVERSITY COLLEGE LONDON*

Short name: UCL

Address of the organisation

Street GOWER STREET

Town LONDON

Postcode WC1E 6BT

Country United Kingdom

Webpage http://www.ucl.ac.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....30/05/2008 - no

SME self-assessment ..... unknown

SME validation sme.....30/05/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Geography ☐ not applicable

☐ Same as proposing organisation's address

Street: Pearson Building, Gower Street

Town: London

Postcode: WC1E 6BT

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **David** Last name: **Thornalley**

E-Mail: **d.thornalley@ucl.ac.uk**

Position in org.: Senior Lecturer

Department: Geography ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: GOWER STREET

Town: LONDON Post code: WC1E 6BT

Country: United Kingdom

Website: www.geog.ucl.ac.uk

Phone: +44 20 7679 0506 Phone 2: *+xxx xxxxxxxxx* Fax: +44 20 7679 0565

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Maria	Rodriguez	maria.rodriguez@ucl.ac.uk	*+ 44 20 7679 0511*
Jennifer	Morgan	jen.morgan@ucl.ac.uk	*+44 20 3108 9408*

PIC	***Legal name***
909894145	*Marine and Freshwater Research Institute Iceland*

Short name: MFRI

Address of the organisation

Street Skúlagata 4

Town Reykjavík

Postcode 101

Country Iceland

Webpage www.hafogvatn.is

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status.....01/07/2016 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Demersal Division ☐ not applicable

☐ Same as proposing organisation's address

Street: Skúlagata 4

Town: Reykjavík

Postcode: 101

Country: Iceland

Department 2

Department name: Pelagic Division ☐ not applicable

☐ Same as proposing organisation's address

Street: Skúlagata 4

Town: Reykjavík

Postcode: 101

Country: Iceland

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Stefán** Last name: **Ragnarsson**

E-Mail: **stefan.ragnarsson@hafogvatn.is**

Position in org.: Senior Scientist

Department: Demersal Division ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: Skúlagata 4

Town: Reykjavík Post code: 101

Country: Iceland

Website: www.hafogvatn.is

Phone: +354-5752000 Phone 2: *+xxx xxxxxxxxx* Fax: +354-5752001

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Bjarki	Þór Elvarsson	bjarki.elvarsson@hafogvatn.is	*+354-5752000*
Gísli	Arnór Víkingsson	gisli.vikingsson@hafogvatn.is	*+354-5752000*
Ingibjörg	Jónsdóttir	ingibjorg.g.jonsdottir@hafogvatn.is	*+354-5752000*

PIC	***Legal name***
996564033	*Temple University-Of The Commonwealth System of Higher Education*

Short name: TEMPLE

Address of the organisation

Street N. Broad Street 1601

Town Philadelphia

Postcode 19122

Country United States

Webpage www.research.temple.edu

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Biology ☐ not applicable

☐ Same as proposing organisation's address

Street: Address 1900 N 12th St

Town: Philadelphia PA

Postcode: 19122

Country: United States

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Erik**

Last name: **Cordes**

E-Mail: **ecordes@temple.edu**

Position in org.: Associate Professor and Vice Chair

Department: Biology

☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Address 1900 N 12th St

Town: Philadelphia PA

Post code: 19122

Country: United States

Website: www.sites.temple.edu/cordeslab

Phone: 215-204-8876

Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Hera	Walker	hera.walker@temple.edu	*215-204-1927*

PIC	***Legal name***
950929607	*GIANNI MATTHEW*

Short name: GC

Address of the organisation

Street CLIOSTRAAT 29 2

Town AMSTERDAM

Postcode 1077 KB

Country Netherlands

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....no

Legal person .....yes

Industry (private for profit).....yes

Enterprise Data

SME self-declared status.....18/02/2013 - yes

SME self-assessment ..... unknown

SME validation sme.....18/02/2013 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Gianni Consultancy ☐ not applicable

☐ Same as proposing organisation's address

Street: CLIOSTRAAT 29 2

Town: AMSTERDAM

Postcode: 1077 KB

Country: Netherlands

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr. Sex: (•) Male ( ) Female

First name: **Matthew** Last name: **Gianni**

E-Mail: **matthewgianni@gmail.com**

Position in org.: Director

Department: Gianni Consultancy ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: CLIOSTRAAT 29 2

Town: AMSTERDAM Post code: 1077 KB

Country: Netherlands

Website: -

Phone: +31 646 16 88 99 Phone 2: +31 20 670 1666 Fax: *+xxx xxxxxxxxx*

PIC	***Legal name***
999543194	*NATIONAL RESEARCH FOUNDATION*

Short name: NRF

Address of the organisation

Street MEIRING NAUDE ROAD BRUMMERIA

Town PRETORIA

Postcode 0001

Country South Africa

Webpage www.nrf.ac.za

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....unknown

International organisation of European interest .....unknown

Secondary or Higher education establishment .....unknown

Research organisation .....unknown

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: South African Environmental Observation Network ☐ not applicable

☐ Same as proposing organisation's address

Street: 56 Florence Street, Colbyn

Town: Pretoria

Postcode: 0083

Country: South Africa

Department 2

Department name: South African Environmental Observation Network ☐ not applicable

☐ Same as proposing organisation's address

Street: The Towers South, Hertzog Boulevard

Town: Cape Town

Postcode: 0001

Country: South Africa

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr. Sex: (•) Male ( ) Female

First name: **Wim** Last name: **Hugo**

E-Mail: **wim@saeon.ac.za**

Position in org.: Chief Information Officer

Department: South African Environmental Observation Network ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: 56 Florence Street, Colbyn

Town: Pretoria Post code: 0083

Country: South Africa

Website: www.saeon.ac.za

Phone: +27214023118 Phone 2: +27614533123 Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Juliet	Hermes	juliet@saeon.ac.za	+xxx xxxxxxxxx
Genevieve	Berold	genevieve@saeon.ac.za	+xxx xxxxxxxxx
Leo	Chiloane	leo@saeon.ac.za	+xxx xxxxxxxxx

PIC	***Legal name***
913977651	*OREGON STATE UNIVERSITY*

Short name: OREGON STATE UNIVERSITY

Address of the organisation

Street 312 KERR ADMIN BLDG

Town CORVALLIS

Postcode 97331 2140

Country United States

Webpage http://oregonstate.edu/

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....no

Legal person .....yes

Industry (private for profit).....no

Enterprise Data

SME self-declared status..... unknown

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: College of Earth, Ocean and Atmospheric Sciences ☐ not applicable

☐ Same as proposing organisation's address

Street: Ocean Admn. Bldg. 104

Town: Corvallis

Postcode: 97331-5504

Country: United States

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Ricardo**

Last name: **Matano**

E-Mail: **rmatano@coas.oregonstate.edu**

Position in org.: Professor

Department: College of Earth, Ocean and Atmospheric Sciences ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Ocean Admn. Bldg. 104

Town: Corvallis Post code: 97311-5504

Country: United States

Website: www.ceoas.oregonstate.edu

Phone: +xxx xxxxxxxxx Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

3 - Budget

No	Participant	Country	(A) Direct personnel costs/€	(B) Other direct costs/€	(C) Direct costs of sub-contracting/€	(D) Direct costs of providing financial support to third parties/€	(E) Costs of inkind contributions not used on the beneficiary's premises/€	(F) Indirect Costs / € (=0.25(A+B-E))	(G) Special unit costs covering direct & indirect costs / €	(H) Total estimated eligible costs / € (=A+B+C+D+F+G)	(I) Reimburse-ment rate (%)	(J) Max.EU Contribution / € (=H*I)	(K) Requested EU Contribution/ €
1	The University Of Edinburgh	UK	974651	480563	138186	0	0	363803,50	0	1957203,50	100	1957203,50	1957203,50
2	Fundacao Universidade Do Vale Do	BR	126095	79320	0	0	0	51353,75	0	256768,75	100	256768,75	256768,75
3	University Of The Western Cape	ZA	24840	47160	0	0	0	18000,00	0	90000,00	100	90000,00	90000,00
4	Instituto Espanol De Oceanografia	ES	348503	351400	0	0	250000	112475,75	0	812378,75	100	812378,75	812378,75
5	Imar- Instituto Do Mar	PT	218700	265300	0	0	0	121000,00	0	605000,00	100	605000,00	605000,00
6	Seascape Consultants Ltd	UK	149520	90550	0	0	0	60017,50	0	300087,50	100	300087,50	300087,50
7	Institut Francais De Recherche	FR	459200	146800	0	0	0	151500,00	0	757500,00	100	757500,00	757500,00
8	United Kingdom Research And	UK	541302	198029	71435	0	0	184832,75	0	995598,75	100	995598,75	995598,75
9	Helmholtz Zentrum Fur Ozeanforschu	DE	623310	138040	0	0	12500	187212,50	0	948562,50	100	948562,50	948562,50
10	Heriot-watt University	UK	89127	283660	0	0	0	93196,75	0	465983,75	100	465983,75	465983,75

11	Universitaet Bremen	DE	340200	32800	0	0	0	93250,00	0	466250,00	100	466250,00	466250,00
12	Universidade De Sao Paulo	BR	48000	124000	0	0	0	43000,00	0	215000,00	100	215000,00	215000,00
13	University Of Kwazulu-natal	ZA	51080	17000	0	0	0	17020,00	0	85100,00	100	85100,00	85100,00
14	The Scottish Association For	UK	324278	79700	0	0	0	100994,50	0	504972,50	100	504972,50	504972,50
15	Servicio De Hidrografía Naval	AR	0	105900	0	0	0	26475,00	0	132375,00	100	132375,00	132375,00
16	University College Cork - National	IE	97800	14200	0	0	0	28000,00	0	140000,00	100	140000,00	140000,00
17	South African Institute For Aquatic	ZA	11110	17000	0	0	0	7027,50	0	35137,50	100	35137,50	35137,50
18	Universidade Federal Do Espírito Santo	BR	86400	28800	0	0	0	28800,00	0	144000,00	100	144000,00	144000,00
19	Nelson Mandela University	ZA	0	73752	0	0	0	18438,00	0	92190,00	100	92190,00	92190,00
20	Goeteborgs Universitet	SE	38710	5280	0	0	0	10997,50	0	54987,50	100	54987,50	54987,50
21	Universidade Federal De Santa Catarina	BR	81216	38284	0	0	0	29875,00	0	149375,00	100	149375,00	149375,00
22	University Of Cape Town	ZA	60000	85500	0	0	0	36375,00	0	181875,00	100	181875,00	181875,00
23	Seascape Belgium	BE	116000	4000	0	0	0	30000,00	0	150000,00	100	150000,00	150000,00
24	Tmg Research Ggmbh	DE	95627	27500	0	0	0	30781,75	0	153908,75	100	153908,75	153908,75
25	Centre National De La Recherche	FR	95280	16700	0	0	0	27995,00	0	139975,00	100	139975,00	139975,00

26	Sorbonne Universite	FR	94680	40000	0	0	0	33670,00	0	168350,00	100	168350,00	168350,00
27	Aarhus Universitet	DK	70937	8800	0	0	0	19934,25	0	99671,25	100	99671,25	99671,25
28	Alfred-wegener-institut	DE	0	30000	0	0	0	7500,00	0	37500,00	100	37500,00	37500,00
29	University College London	UK	70481	41519	0	0	0	28000,00	0	140000,00	100	140000,00	140000,00
30	Marine And Freshwater Research	IS	149559	22415	0	0	0	42993,50	0	214967,50	100	214967,50	214967,50
31	Temple University-of The	US	31500	0	0	0	0	7875,00	0	39375,00	100	39375,00	0,00
32	Gianni Matthew	NL	64500	14100	0	0	0	19650,00	0	98250,00	100	98250,00	98250,00
33	National Research Foundation	ZA	36000	12000	0	0	0	12000,00	0	60000,00	100	60000,00	60000,00
34	Oregon State University	US	30000	0	0	0	0	7500,00	0	37500,00	100	37500,00	0,00
	Total		5548606	2920072	209621	0	262500	2051544,50	0	10729843,50		10729843,50	10652968,50

4 - Ethics

1. HUMAN EMBRYOS/FOETUSES		Page
Does your research involve Human Embryonic Stem Cells (hESCs)?	○ Yes ◉ No	
Does your research involve the use of human embryos?	○ Yes ◉ No	
Does your research involve the use of human foetal tissues / cells?	○ Yes ◉ No	
2. HUMANS		**Page**
Does your research involve human participants?	○ Yes ◉ No	
Does your research involve physical interventions on the study participants?	○ Yes ◉ No	
3. HUMAN CELLS / TISSUES		**Page**
Does your research involve human cells or tissues (other than from Human Embryos/ Foetuses, i.e. section 1)?	○ Yes ◉ No	
4. PERSONAL DATA		**Page**
Does your research involve personal data collection and/or processing?	○ Yes ◉ No	
Does your research involve further processing of previously collected personal data (secondary use)?	○ Yes ◉ No	
5. ANIMALS		**Page**
Does your research involve animals?	◉ Yes ○ No	135
Are they vertebrates?	○ Yes ◉ No	
Are they non-human primates?	○ Yes ◉ No	
Are they genetically modified?	○ Yes ◉ No	
Are they cloned farm animals?	○ Yes ◉ No	
Are they endangered species?	◉ Yes ○ No	135

iAtlantic samples will include colony forming corals including gorgonians and black corals. All Scleractinia corals and some black corals belonging to the families Schizopathidae and Aphanipathidae are included in CITES Annex II listed species and as such the partners transferring and receiving scleractinian and black coral samples will fulfill CITES Article IV - Regulation of Trade in Specimens of Species Included in Appendix II and obtain a certificate from a Management Authority of the State of introduction prior to any work being carried out.

6. THIRD COUNTRIES		Page

In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	○ Yes ◉ No	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	◉ Yes ○ No	135
Do you plan to import any material - including personal data - from non-EU countries into the EU?	◉ Yes ○ No	135
iAtlantic involves several non European countries from the North West Atlantic (Canadá, USA), North East Atlantic (Cape Verde), South West (Brazil, Argentina) and South East (South Africa) Atlantic. Samples obtained from cruises in these regions will be imported into the EU.		
Do you plan to export any material - including personal data - from the EU to non-EU countries?	◉ Yes ○ No	135
Samples from cruises in the EU may be exported to out partners in South Africa and Brazil for further analysis.		
In case your research involves low and/or lower middle income countries, are any benefits-sharing actions planned?	○ Yes ◉ No	
Could the situation in the country put the individuals taking part in the research at risk?	○ Yes ◉ No	
7. ENVIRONMENT & HEALTH and SAFETY		Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	○ Yes ◉ No	
Does your research deal with endangered fauna and/or flora and/or protected areas?	◉ Yes ○ No	135
Does your research involve the use of elements that may cause harm to humans, including research staff?	◉ Yes ○ No	136
8. DUAL USE		Page
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	○ Yes ◉ No	
9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS		Page
Could your research raise concerns regarding the exclusive focus on civil applications?	○ Yes ◉ No	
10. MISUSE		Page

Does your research have the potential for misuse of research results?	○ Yes ◉ No	
11. OTHER ETHICS ISSUES		Page
Are there any other ethics issues that should be taken into consideration? Please specify	○ Yes ◉ No	

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents. ☒

How to Complete your Ethics Self-Assessment

5 - Call specific questions

Declarations on stage-2 changes

The full stage-2 proposal must be consistent with the short outline proposal submitted to the stage-1- in particular with respect to the proposal characteristics addressing the concepts of excellence and impact.

Are there substantial differences compared to the stage-1 proposal?	○ Yes	◉ No

Extended Open Research Data Pilot in Horizon 2020

If selected, applicants will by default participate in the Pilot on Open Research Data in Horizon 2020[1] , which aims to improve and maximise access to and re-use of research data generated by actions.

However, participation in the Pilot is flexible in the sense that it does not mean that all research data needs to be open. After the action has started, participants will formulate a Data Management Plan (DMP), which should address the relevant aspects of making data FAIR – findable, accessible, interoperable and re-usable, including what data the project will generate, whether and how it will be made accessible for verification and re-use, and how it will be curated and preserved. Through this DMP projects can define certain datasets to remain closed according to the principle "as open as possible, as closed as necessary". A Data Management Plan does not have to be submitted at the proposal stage.

Furthermore, applicants also have the possibility to opt out of this Pilot completely at any stage (before or after the grant signature). In this case, applicants must indicate a reason for this choice (see options below).

Please note that participation in this Pilot does not constitute part of the evaluation process. Proposals will not be penalised for opting out.

We wish to opt out of the Pilot on Open Research Data in Horizon 2020.	○ Yes	◉ No

Further guidance on open access and research data management is available on the participant portal: http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm and in general annex L of the Work Programme.

[1] *According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.*

Integrated Assessment of Atlantic Marine Ecosystems in Space and Time

iAtlantic

No.	Participant (Beneficiary) Organisation Name	Short Name	Country
1	The University of Edinburgh	UEDIN	UK
2	Fundaçáo Universidade do Vale do Itajaí	UNIVALI	BR
3	University of the Western Cape	UWC	ZA
4	Instituto Español de Oceanografía	IEO	ES
5	IMAR – Instituto do Mar	IMAR	PT
6	Seascape Consultants Ltd	SC	UK
7	Institut Français de Recherche pour L'Exploitation de la Mer	IFREMER	FR
8	United Kingdom Research and Innovation – National Oceanography Centre	UKRI-NOC	UK
9	Helmholtz-Zentrum für Ozeanforschung Kiel	GEOMAR	DE
10	Heriot-Watt University	HWU	UK
11	Universitaet Bremen	UNIHB	DE
12	Universidade de São Paulo	USP	BR
13	University of KwaZulu-Natal	UKN	ZA
14	The Scottish Association for Marine Science LBG	SAMS	UK
15	Servicio de Hidrografía Naval	SHN	AR
16	University College Cork – National University of Ireland Cork	UCC	IE
17	South African Institute for Aquatic Biodiversity	SAIAB	ZA
18	Universidade Federal do Espírito Santo	UFES	BR
19	Nelson Mandela University	NMU	ZA
20	Göteborgs Universitet	UGOT	SE
21	Universidade Federal de Santa Catarina	UFSC	BR
22	University of Cape Town	UCT	ZA
23	Seascape Belgium	SBE	BE
24	TMG Research GmbH	TMG	DE
25	Centre National de la Recherche Scientifique	CNRS	FR
26	Sorbonne Université	SU	FR
27	Aarhus Universitet	AU	DK
28	Alfred-Wegener-Institut Helmholtz Zentrum für Polar und Meeresforschung	AWI	DE
29	University College London	UCL	UK
30	Marine and Freshwater Research Institute Iceland	MFRI	IS
31	Temple University of the Commonwealth System of Higher Education	TEMPLE	US
32	Gianni Consultancy	GC	NL
33	South African Environmental Observation Network	SAEON	ZA
34	Oregon State University	OSU	US
International Partners			
i	Department of Fisheries and Oceans	DFO	CA
ii	National Oceanic and Atmospheric Administration	NOAA	US
iii	Memorial University Newfoundland	MUN	CA
iv	Nova Scotia Community College	NSCC	CA
v	Dalhousie University	DAL	CA
vi	Université de Montréal	UM	CA
vii	Bermuda Institute of Ocean Sciences	BIOS	US/UK
viii	Universidade de Cabo Verde	UniCV	CV
ix	Instituto Nacional de Desenvolvimento das Pescas	INDP	CV
x	University of Adelaide	UA	AU
xi	Centro de Investigación Científica y de Educación Superior de Ensenada	CICESE	MX

* iAtlantic also involves 40 Associated Partners described in Section 6.

Table of Contents

Abbreviations:

ABMT	Area-Based Management Tools
AMOC	Atlantic Meridional Overturning Circulation
AORA	Atlantic Ocean Research Alliance
APEI	Areas of Particular Environmental Interest
ASMIWG	Atlantic Seabed Mapping International Working Group
AUV	Autonomous Underwater Vehicle
BBNJ	Biodiversity Beyond National Jurisdiction
BNDO	Banco Nacional de Dados Oceanográficos
BOEM	Bureau of Ocean Energy Management
COLACMAR	Congresso Latino-Americano de Ciências do Mar
COMREN	Canadian Ocean Mapping Research & Education Network
CBD	Convention on Biological Diversity
CMECS	Coastal and Marine Ecological Classification Standard
COP	Conference of the Parties
CSA	Coordination & Support Action
CTD	Conductivity, Temperature, Depth
DMP	Data Management Plan
DOI	Digital Object Identifier
EBSA	Ecologically or Biologically Significant Marine Areas
eDNA	Environmental DNA
EMODnet	European Marine Observation and Data Network
ENA	European Nucleotide Archive
EOOS	European Ocean Observing System
EUNIS	European Nature Information System
GEBCO	General Bathymetric Chart of the Oceans
GIS	Geographical Information Systems
GPU	Graphics Processing Unit
IOGP	International Association of Oil & Gas Producers
IPCC	Intergovernmental Panel on Climate Change
ISA	International Seabed Authority
LoS	Letter of Support
MSP	Marine Spatial Planning
OAI	Open Archives Initiative
OBIS	Ocean Biogeographic Information System
OGCM	Ocean General Circulation Models
OM	Organic Matter
OSNAP	Overturning in the Subpolar North Atlantic Program
PMH	Protocol for Metadata Harvesting
POC	Particulate Organic Carbon
RAD	Restriction Site Associated DNA
RFMOs	Regional Fisheries Management Organisations
ROV	Remotely Operated Vehicle
SAMOC	South Atlantic Meridional Overturning Circulation
SDGs	Sustainable Development Goals
SEMPIA	Strategic Environmental Management Plan in the Atlantic
UN-SDG	United Nations Sustainable Development Goal
UNCLOS	UN Convention on the Law of the Sea
USGS	United States Geological Survey
VME	Vulnerable Marine Ecosystem

1. EXCELLENCE

1.1 Objectives

iAtlantic creates a new operational framework that is correctly scaled and integrated to assess marine ecosystem status in an era of multiple stressors. The concept is that by bridging ocean observing systems, exchanging data, researchers, and equipment from South to North and East to West, iAtlantic will predict where and when potentially synergistic effects of global change and multiple stressors will occur. iAtlantic's systematic conservation planning will use these integrated ocean-scale predictions and Blue Growth scenarios to identify management solutions that benefit multiple stakeholders. The project will focus on remote ecosystems of the deep sea and open-ocean as these require the strongest alignment of international cooperation and capacity-building to manage them and avoid significant adverse impacts. Previous research and management of these ecosystems were driven by national, regional or sectoral perspectives, leading to a disjointed understanding that cannot scale up to meet today's policy needs for sustainable Blue Growth[1]. By aligning North and South observing systems[2] and integrating these with multidisciplinary measurements of regional ecosystem status (connectivity, distribution, temporal stability, functioning), iAtlantic will create the step-change in scale and integration needed to improve sustainable management and unlock Blue Growth potential in these deep and open-ocean ecosystems.

iAtlantic has five objectives to implement this new assessment framework:

1. Standardise South and North Atlantic Ocean observations to enable short, medium and long-term assessments of Atlantic Ocean circulation and its physico-biogeochemical environment.
2. Map deep and open-ocean ecosystems at basin, regional and local scales.
3. Assess the stability, vulnerability, and any tipping points of deep and open-ocean Atlantic ecosystems to changes in ocean circulation, and effects of single and multiple stressors.
4. Align and enhance human, technological and data inter-operability capacities for cost-effective cooperation and planning across the Atlantic.
5. Define requirements for sustainable management with industry, regulatory and governmental stakeholders to reflect societal needs and inform policy developments that ensure and encourage a sustainable Blue Economy.

iAtlantic's offshore research cruise portfolio allows the project to achieve its all-Atlantic ambitions. **Our portfolio of 32 cruises includes three Flagship Demonstrator Capacity Building Expeditions using the latest underwater robotic and remote sensing technologies to map the seafloor and water column**, bilaterally sharing samples and capacities between partners. This cruise programme is conservatively estimated to be worth over €27M, more than twice the value of the requested H2020 grant funding for iAtlantic. The cruise programme was developed through close cooperation between S and N Atlantic partners to prioritise ecosystems, identify gaps, agree approaches, engage key stakeholders and develop plans for integrated ecosystem assessments and multi-way capacity building. Crucially, these cruises permit ecosystem assessments and conservation planning in the S Atlantic to ensure key international regulatory processes and future legal instruments are finally more inclusive and truly all-Atlantic.

1.2 Relation to the Work Programme

iAtlantic directly addresses call topic BG-08 [B]-2018-2019, *Assessing the status of Atlantic marine ecosystems* (Table 1). **Holistic ecosystem assessments in space and time integrated across multiple disciplines will drive iAtlantic's systematic conservation planning tool for sustainable exploitation.** Ocean-scale integration and planning will strengthen capacity and improve understanding for sustainable ecosystem management by connecting stakeholders, data, expertise, and knowledge across nations bordering the Atlantic and via links to adjacent seas.

1 Wright *et al*. 2018. Protect the neglected half of our blue planet. Nature 554: 163-165

2 South-South Framework for Scientific and Technical Cooperation in the South and Tropical Atlantic and Southern Ocean, 2017. South African Department of Science and Technology and Brazilian Ministry of Science, Technology, Innovations and Communications

Table 1: The relation of iAtlantic to the call topic BG-08 [B]-2018-2019: Assessing the status of Atlantic marine ecosystems.

BG-08-2018 Scope	*iAtlantic Relation to the Call Topic*
Enhance the knowledge on the status and dynamics of Atlantic marine ecosystems.	iAtlantic will extend the scope and coverage of Atlantic Ocean observing capacity to improve knowledge of overturning circulation, ecosystem status and resilience by: (1) aligning physical and biogeochemical measurements on the SAMOC and OSNAP ocean arrays in the S and N Atlantic to understand the importance of ocean-scale and inter-ocean exchange from adjacent oceans and seas (Mediterranean, Gulf of Mexico, Indian, Arctic and Southern Oceans), and (2) mapping ecosystem status and resilience at nested local, regional, and all-Atlantic scales.
Quantify main drivers of short and long-term change.	Temporal analyses of changes to deep and open-ocean ecosystems across the Atlantic will quantify effects of single and combined oceanographic drivers across short (inter-annual) and long-term (multi-decadal to millennial) timescales to seek common drivers and regional differences in the risks posed by future climate change.
Examine the interaction between different stressors, including climate change.	Single and synergistic effects of multiple stressors (climatic and from human activities) on pelagic and benthic organisms will be studied using rigorous hypothesis-led *in situ* and *ex situ* experimental approaches across the Atlantic.
Examine the role of cumulative impacts on ecosystem function and associated services.	*In situ* and *ex situ* experimental approaches will examine effects of multiple global and local stressors on key ecosystem functions such as nutrient remineralisation, carbon sequestration and biogeochemical regulation services to meet ecological and societal needs.
Contribute to improving the sustainable exploitation of marine resources.	New predictive models and tools for data access, storage, dissemination, and planning will inform sustainable development using, e.g., likelihood maps of threats posed by resource exploitation, allowing managers to act to restore ecosystems by avoiding degrading their connectivity and resilience.
Map selected large areas, including relevant marine ecosystems and variables of a different nature.	To capture the full range of patterns and processes driving ecosystems, iAtlantic will map at local, regional and whole Atlantic scales. State-of-the-art oceanographic models will facilitate 3D mapping of the dynamics of Atlantic circulation in response to changing climate whilst Flagship Demonstrator Capacity Building Expeditions will map ecosystems of interest to Blue Growth and management sectors, encompassing their physical and biological environments.
Demonstrate cost-effective approaches to the management and processing of the large quantities of data.	Novel machine learning approaches, massively parallel computing capacity to process Big Data in the field in near real-time, and systematic conservation tools will demonstrate how efficient and more cost-effective these tools are in rapidly delivering science and management plans. EMODnet, PANGAEA and ENA will be used to ensure data generated by iAtlantic meet inter-operability standards and to facilitate coordinated data sharing beyond the end of the project. Collaborations with S Atlantic data managers in South Africa (Partner SAEON) and Brazil (OBIS-Brazil, BNDO) will ensure appropriate management of iAtlantic data an all-Atlantic scale.
Development of improved forecasting capabilities of stressors, tipping points, recovery and changes in ecosystem state.	Climate-based basin-scale forecasts of Atlantic conditions in the next 50 years will inform ecosystem mapping, timeseries analysis and *in situ* and *ex situ* experiments to characterise tipping points from organismal to ecosystem levels and predict future ecosystem connectivity, distribution, and the likelihood of ecosystems being significantly altered.
Engage industrial and regional stakeholders to help define ecosystem-requirements.	Bilateral activities with industrial partners include defining their ecosystem requirements for improving in-house environmental management systems including applying mitigation hierarchies to restore ecosystems and exploring ways to share infrastructure and data. Capacity building and policy dialogue with local universities, community groups and governance stakeholders in Brazil, tropical W Africa and S Africa will help define their ecosystem requirements for improving management and achieving sustainable Blue Growth. iAtlantic will work with the AANCHOR-Coordination and Support Action (CSA) and other initiatives to enhance its stakeholder engagement activities throughout the project.
Deliver capacity building and training within countries bordering the South and Tropical Atlantic Ocean.	Activities encompass training in Brazil, tropical West Africa, and South Africa and include: ecosystem assessment field training and climate-relevant timeseries analysis with local universities, community groups, and industrial associate partners; multi-disciplinary training events, workshops, webinars and online modules ensuring scientific/technical knowledge transfer; joint ocean research expeditions and visits to partner laboratories to share best practices, infrastructure, human capacity, and technology, e.g., iAtlantic's Flagship Demonstrator Capacity Building Expeditions in the S and N Atlantic incorporating at-sea training with both traditional low cost and new robotic and *in situ* technologies.
Ensure coherence with related policy initiatives.	iAtlantic's science policy dialogue with stakeholders and decision-makers during international and regional policy processes will ensure project outcomes are coherent with, and input to: UN Sustainable Development Goal 14; a new legally-binding instrument for the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction; regulations

BG-08-2018 Scope	iAtlantic Relation to the Call Topic
	adopted by regional fisheries management organisations for the management of deep-sea fisheries; environmental regulations being considered by the International Seabed Authority; EU policies and initiatives (e.g. Belém Statement, Galway Statement, International Ocean Governance and Blue Growth agendas, Common Fisheries Policy, Marine Strategy Framework Directive, Marine Spatial Planning Directive and EU deep-sea fisheries regulations).

1.3 Concept and Methodology

1.3.1 Overall Concept

iAtlantic will create correctly scaled and standardised observational frameworks that integrate measurements from different disciplines, so that the status of deep and open-ocean Atlantic ecosystems can be properly assessed, and thus management of Blue Growth activities achieved quickly and cost-effectively.

Over the next century, the magnitude and rates of environmental change in the deep and open Atlantic Ocean are expected to be faster and more severe in some areas than others[3]. Regional understanding and monitoring capacity of how climate change impacts these ecosystems are currently disjointed at larger scales[1], making whole ocean management and governance less effective than it could be if climate-ocean interactions and ecosystem status could be assessed the same way across the Atlantic. Meanwhile, technological innovation and changing markets have modified how humans interact with their environment[4] leading to the expansion of fisheries into new and deeper waters further offshore[5], increasing exploration for deep-sea minerals, bioprospecting from deep-sea organisms, and hydrocarbon extraction in deep frontiers[6]. Ecosystem resilience to the pressures from climate change and human activities depends on ecosystem status (e.g., connectivity, distribution and diversity, temporal stability, functioning), but here too our understanding is disjointed across scientific disciplines and from a strong imbalance in knowledge of deep and open-ocean ecosystems in the North versus South. iAtlantic's concept will advance the scaling and integration of observing frameworks to provide managers with the correct spatial tools to handle and optimise decision-making in an all-Atlantic context characterised by spatiotemporal variations in multiple stressors and ecosystem resilience. iAtlantic will implement disciplinary diversity to account for the inherent multidimensionality of physico-biogeochemical drivers of change and the multitude of possible ecosystem responses[7] so that a common understanding of Atlantic ecosystem stability and resilience can be developed[8].

Fortunately, whole-ocean observing (e.g., via ARGO float and transatlantic instrument arrays) and research programmes, and the expanding network of deep and open-ocean observatories, now offer the foundations to align North and South regional science and policies in line with the South-South Framework for Scientific and Technical Cooperation in the South and Tropical Atlantic and Southern Ocean. iAtlantic's ambitious cruise programme, capacity-building, workshop, outreach and dissemination activities ensure that approaches, methods and definitions are harmonised, and that innovations in technologies are shared.

iAtlantic targets 12 large marine regions in the deep sea and open-ocean, chosen because they are: directly impacted by major circulation pathways, in proximity to ocean arrays for monitoring, of international conservation significance (e.g., to the CBD EBSA process) and of interest to Blue Economy and Blue Growth sectors (Figure 1). iAtlantic will assess ecosystem status and work directly with these sectors to provide the data and tools needed for sustainable management. These regions and ecosystems span the Arctic to Southern Ocean (Figure 1): (1) subpolar Mid-Atlantic Ridge open-ocean ecosystem off Iceland; (2) abyssal plain and deep-sea coral banks from the Rockall Trough to the Porcupine Abyssal Plain (PAP); (3) deep-sea coral and hydrothermal vent ecosystems of the central Mid-Atlantic Ridge; (4) deep-sea canyons and open-ocean ecosystem in the northwest Atlantic; (5) subtropical open-ocean ecosystem of the Sargasso Sea; (6) the tropical open-ocean off equatorial Africa; (7) equatorial open-ocean and deep-sea fracture zones; (8) the continental slope, margin and cold seep ecosystems from Angola to the Congo Lobe; (9) the abyssal plains and deep-sea ridge ecosystems of the Benguela Current from the Walvis Ridge

3 Sweetman *et al*. (2017) Major impacts of climate change on deep-sea benthic ecosystems. Elementa: Science of the Anthropocene 5:4
4 Olsson & Galaz (2012) Social-Ecological Innovation and Transformation. pp 223-247 In: Social Innovation: Blurring Boundaries to Reconfigure Markets (eds. Nicholls & Murdoch). Palgrave MacMillan, Basingstoke, UK
5 Swartz *et al*. (2010) The spatial expansion and ecological footprint of fisheries (1950 to Present). PLoS One 5: e15143
6 Merrie *et al*. (2014) An ocean of surprises – Trends in human use, unexpected dynamics and governance challenges in areas beyond national jurisdiction. Global Environmental Change 27: 19-31
7 Markus *et al*. (2017) Disciplinary diversity in marine sciences: the urgent case for an integration of research. ICES Journal of Marine Science
8 Donohue *et al*. (2016) Navigating the complexity of ecological stability. Ecology Letters 19: 1172-1185

to South Africa; (10) the deep-sea continental slope, banks and cold seep ecosystems off Brazil; (11) the Vitória-Trindade Seamount Chain off Brazil; (12) deep-sea coral banks in the Malvinas Upwelling Current off Argentina.

iAtlantic was designed around key concepts and actions necessary for an integrated coherent approach to ecosystem assessments in these regions (Figure 1).

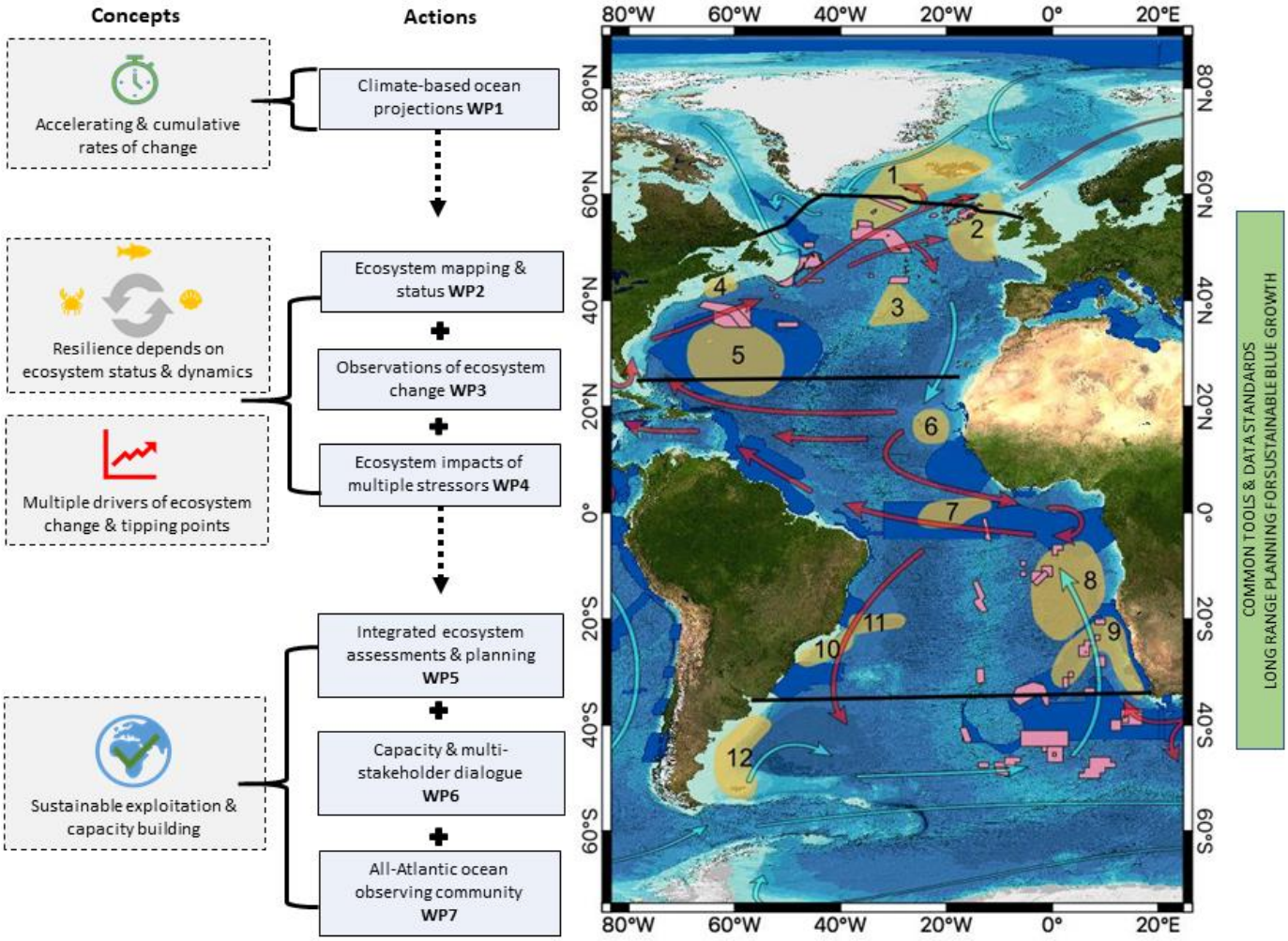


Figure 1: iAtlantic regions (yellow areas) overlay major ocean currents (red/blue arrows, warmer/cooler), monitored by three ocean arrays (black OSNAP [58°N], RAPID [26.5°N] and SAMOC [34.5°S] lines), and are of conservation interest with VMEs and EBSAs (pink and blue areas).

Regions experiencing faster and larger changes over the next century are more likely to undergo shifts and reach tipping points in ecosystem function, and thus the services they provide to humankind. However, ecosystem resilience (encompassing connectivity, distribution, functional diversity, response to cumulative stressors including human activities) can mitigate effects of climate change. Therefore, in some regions, increased resource exploitation may be sustainable over the medium to long-term if there is resilience, provided that Atlantic nations share common monitoring, data standards, and planning tools effectively.

Our ambitious concept is underpinned by a research and mapping cruise programme that includes 32 offshore research cruises (12 approved, 10 proposed and 10 planned) that will be used to support the research and capacity building activities proposed by the project. These expeditions are organised by partners from Argentina, Brazil, France, Germany, Iceland, Ireland, Spain, South Africa, Canada, the UK and the USA. The programme integrates previously untapped S Atlantic data sources and includes Flagship Demonstrator Capacity Building Expeditions using European vessels equipped with underwater robotic vehicles to map, sample and bilaterally share capacities between N and S Atlantic partners (Table 2*)* Of our three Flagship cruises, two will take place in the S Atlantic, the IEO-led cruises *iMirabilis* and *iCorsage*, see LoS from Ministerio para la Tranción Ecológica, and Figure 2 below.

Table 2: iAtlantic cruise programme.

Region	Hydrography	Mapping	Sampling	Technology Testing/Use	Capacity Building	Year	Lead Partner
Flagship Demonstrator Capacity Building Cruises							
2	✓	✓	✓	✓	✓	2020	UEDIN
6,9		✓	✓	✓	✓	2020	IEO
11	✓	✓	✓	✓	✓	2020	IEO
Pan Atlantic Research and Capacity Building Cruises							
3,7,11		✓			✓	2019	AWI
6,9	✓	✓	✓		✓	2020	IEO
South Atlantic Research and Capacity Building Cruises							
7		✓	✓		✓	2019	GEOMAR
9	✓	✓	✓		✓	2019	UCT
9	✓	✓	✓		✓	2020	UCT
9	✓	✓	✓		✓	2021	UCT
9	✓	✓	✓		✓	TBC	UWC
10		✓	✓		✓	2019	USP
10		✓	✓		✓	2020	USP
11		✓	✓		✓	2019	USP
11		✓	✓		✓	2020	USP
SAMOC West	✓		✓		✓	2019	SHN
SAMOC West	✓		✓		✓	2020	SHN
SAMOC West	✓		✓		✓	2021	SHN
8,9,10	✓				✓	2023	SAMS
North Atlantic Research and Capacity Building Cruises							
1		✓	✓		✓	2021	MFRI
2		✓	✓	✓	✓	2019, 2020	UKRI-NOC
2			✓		✓	2019, 2020	HWU/UEDIN
2	✓				✓	2019	SAMS
2		✓			✓	2020, 2021	UCC
2			✓		✓	2020	UKRI-NOC
2		✓			✓	Annual	IFREMER
3		✓				2019	IMAR
3		✓	✓	✓		2020, 2021	IMAR
3		✓	✓		✓	TBC	IFREMER
3 & 4	✓				✓	Annual	SAMS
4 & 5	✓					TBC	DFO
5		✓	✓		✓	TBC	TEMPLE
6			✓		✓	2020	GEOMAR

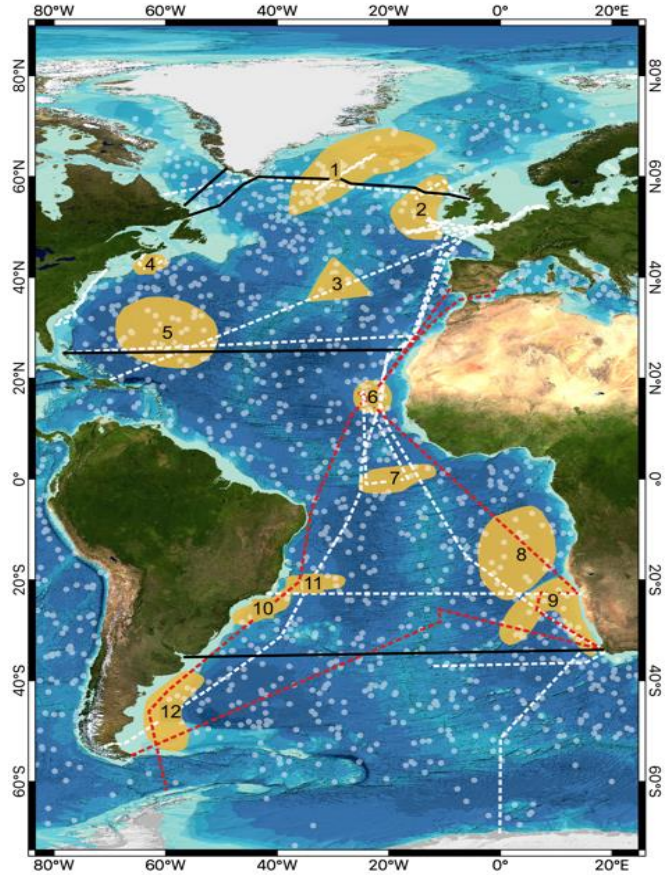


Figure 2: *Chart illustrating the density of ARGO floats (grey circles) and positions of transatlantic monitoring arrays (black lines) providing oceanographic data to iAtlantic. Dashed white lines illustrate tracks of iAtlantic cruises with the two* ***S Atlantic Demonstrator Capacity Building cruises*** iMirabilis ***and*** iCorsage *shown in red. Led by the Spanish Institute of Oceanography (IEO) and named for iconic plants of W Africa and S America, these cruises are dedicated to the iAtlantic consortium.* iMirabilis *targets Regions 6–9 and will bring the UK Autosub6000 AUV equipped with the MAPS eDNA sampler and the Portuguese Luso ROV to the S Atlantic for the first time. The* iCorsage *cruise primarily targets Region 11 where it will conduct extensive mapping of the Vitória-Trindade Seamounts and provide training in the latest shipboard mapping approaches. iAtlantic will run a third Demonstrator Capacity Building cruise on a UK vessel in Region 2. Equipped with Autosub6000 and science-class ROV, this cruise will be open to iAtlantic fellows with dedicated berths for S Atlantic researchers.*

1.3.2 Positioning of the Project

The primary focus of iAtlantic is to generate new knowledge on the status and resilience of Atlantic ecosystems through the coordinated collection, analysis and synthesis of data from across the N and S Atlantic. Project outputs, including new maps, tools, data products and models will inform and facilitate activities of key stakeholders in the Blue Economy including fisheries, aquaculture, the energy sector, mining, biotechnology, maritime and coastal tourism, as well as conservation management and related policy-makers. iAtlantic outputs will also enhance and demonstrate enabling technologies to underpin Blue Growth (Table 3).

Table 3: Current [✓] and expected [X] Technology Readiness Levels of iAtlantic enabling technologies.

Output/TRL	1	2	3	4	5	6	7	8	9
Automated MAPS eDNA sampler operated alongside habitat survey (WP2)				✓	✓	✓	X		
Machine learning to automate processing habitat imagery (WP2)			✓	✓	✓	✓	✓	X	
Low cost stereo cameras for working at depth (WP2)				✓	✓	✓	X		
Hyper Spectral Cameras for monitoring the deep and open-ocean (WP2)								✓	X
iAtlantic GIS Platform (WP5)			✓	✓	✓	✓	✓	✓	X

1.3.3 Research and Innovation Activities Linked with iAtlantic

International project links are at the core of iAtlantic, from its interaction with transatlantic monitoring arrays through to its wider network of associate partners. iAtlantic builds upon foundations established in both on-going and previous EU projects and will work closely with relevant programmes at national and international levels. The consortium will seek to actively collaborate with new initiatives such as those funded under the BG-08 call topic and research and innovation activities supported by the Belmont Forum Collaborative Research Action – Oceans.

Table 4: National and international innovation activities linked to iAtlantic.

Research and Innovation Activity	Link with iAtlantic
ACEP Phuhlisa (SAIAB, UWC, South Africa)	The ACEP Phuhlisa (Development) programme is an NRF/DST supported initiative managed by iAtlantic partner SAIAB. It aims to transform the S African marine science community to become more representative of the demographic ratios in the country. ACEP Phuhlisa has been planned and designed around key impediments which limit entrance or participation in marine science. Marine disciplines are represented by iAtlantic, and graduates from this programme will be encouraged to participate in iAtlantic-related research projects and the iAtlantic Fellowship Scheme.
Abidjan Convention	The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region (Abidjan Convention) covers a marine area from Mauritania to South Africa. iAtlantic will provide ecosystem assessments in four S Atlantic regions under Abidjan's remit (Regions 6–9), and through our links to the STRONG High Seas Project (led by Partner TMG), will help develop innovative governance solutions for the conservation and sustainable use of marine biodiversity in coastal and ABNJ regions, including one of its priority areas the South East Atlantic (see LoS from Abidjan Convention).
Atlantic Regional Environment Management Planning (ISA, United Nations)	The data generated by iAtlantic will be of direct relevance to the ISA's initiative, supported financially by the EU, to develop a regional environmental management plan for the Atlantic (formerly SEMPIA), which is working with ISA and stakeholder groups in relation to deep-sea mining activities on the Mid-Atlantic Ridge. iAtlantic will deliver data in support of these activities through an MoU.
ATLAS (H2020, EU)	iAtlantic will leverage data produced by ATLAS (2016-2020) on N Atlantic deep-sea ecosystem response to projected AMOC change and will enhance and complement datasets from this project with new data from the S Atlantic.
AtlantOS (H2020, EU)	iAtlantic will build upon foundations established by AtlantOS, notably the first high resolution hydrographic transect along 34.5S between South America and South Africa (led by iAtlantic partner GEOMAR).
Benguela Current Commission (Angola, Namibia, South Africa)	The BCC was established with the vision to ensure 'A Benguela Current Large Marine Ecosystem that is sustainably used and managed, conserved, protected and contributes to the wellbeing of the people of the region'. iAtlantic will cooperate closely with BCC to share access to data, offshore expeditions and through joint capacity building activities (see LoS).
BIOIL (USP and Shell, via IOGP, Brazil)	Biology and geochemistry of oil and gas seepages (BIOIL) is a partnership between USP and IOGP member Shell to find and study the ecology and geochemistry of cold seeps in the Campos and Santos basins (Region 10). Two cruises programmed in the next three years with iAtlantic participation.

Research and Innovation Activity	Link with iAtlantic
CLASS (UKRI-NOC, UK)	Climate-Linked Atlantic Sector Science is a £22.3M programme (2018-2023) designed to deliver improved knowledge of the Atlantic to support management, conservation, exploration and economic development. CLASS will link with iAtlantic providing access to ship time and long-term datasets in Region 2 (see LoS).
DeepSearch (BOEM/USGS/NOAA, USA)	DeepSearch is a 4.5-year study of deep-sea coral, canyon, and gas seep ecosystems in the NW Atlantic involving researchers from US universities coordinated by iAtlantic partner Temple University. DeepSearch and iAtlantic will share sampling opportunities, particularly in relation to deep coral and chemosynthetic ecosystems.
Deep Secrets Project (African Coelacanth Ecosystem Programme, South Africa)	The Deep Secrets Project leveraged a high-resolution multibeam bathymetry dataset through a collaboration with IOGP member Anadarko. This dataset reveals a large pockmark field and several previously unmapped submarine canyons on the continental slope off South Africa. The project team will collaborate with iAtlantic to support regional studies of gas seep and canyon ecosystems and facilitate new surveys of chemosynthetic and deep-water coral ecosystems in Region 9. This builds on previous surveys in the SE Atlantic shelf edge and links to WP2. Deep Secrets also has a capacity building component that promotes technical and human capacity development in line with WP6.
DECODE USP and PETROBRAS, via IOGP, Brazil)	The DEep-sea Coral Observatory: Decoding Ecological patterns and dynamics (DECODE) project is a partnership with Petrobras (who are supporting iAtlantic through IOGP, see LoS), involving ecological analyses of industry ROV videos and the installation of a deep-sea lander, which will collect time-lapse stereo images and environmental data from Campos and Santos Basins (Region 10). Four cruises are programmed (2019-2022) with iAtlantic participation.
Global Ocean Biodiversity Initiative (International partnership)	GOBI is an international network of scientists working to promote the conservation of marine biodiversity. In particular, GOBI works very closely with the Convention on Biological Diversity in support of the process to establish Ecologically or Biologically Significant marine Areas (EBSAs), and also with the Convention on Migratory Species (CMS). iAtlantic will work closely with the GOBI community to ensure new scientific knowledge of important Atlantic ecosystems is fed into the CBD's EBSA mechanism to strengthen existing EBSA descriptions and to support the description of potential new areas meeting EBSA criteria.
INTEMARES (EU-LIFE)	'Integrated, innovative and participatory management of the Natura 2000 network in the Spanish marine environment' is one of the largest marine conservation projects in Europe. INTEMARES has a budget of €49.8M and lasts till the end 2024. iAtlantic will cooperate with INTMARES on approaches and outputs (e.g. oceanographic forecasts) relevant to Spain's marine environmental management.
MERCES (H2020, EU)	'Marine Ecosystem Restoration in Changing European Seas' is developing conceptually coherent ecosystem tools and methodologies for deep-sea restoration and assessing their cost-effectiveness including the role of passive restoration, which iAtlantic will integrate with its connectivity models and larval stressor experiments to promote restoration in dialogues with industry.
INCT Mar COI - CNPq (Brazil)	The National Institute of Science and Technology Mar - Center of Integrated Oceanography (INCT Mar COI) (CNPq) subproposal 2 aims to describe, through seafloor imagery, deep-sea habitats and megafauna diversity at the Brazilian continental margin and oceanic seamounts as baselines for future human activities. iAtlantic will provide opportunities to collect new data using state-of-the-art technology and integrate results with other areas and research groups in the Atlantic Ocean.
NOAA-OER and ASPIRE (USA)	NOAA's Office of Ocean Exploration and Research collaborates with iAtlantic particularly through plans for joint work at sea developed through the ASPIRE initiative in Regions 1, 3, 4 and 5. The iAtlantic consortium submitted White Papers on these regions and will attend ASPIRE discussions in November 2018. The Director of OER will join the ATLAS Advisory Board (see LoS from NOAA).
Oceanic Islands' Long-Term Ecological Research Program (PELD-ILOC) (CNPq – CAPES), (Brazil)	The Long-Term Ecological Research Program (PELD) is an initiative funded by CNPq-Brazil since 1999. There are 30 PELD sites in Brazil, and the PELD-ILOC (Oceanic Islands) site includes the only atoll in the S Atlantic (Rocas Atoll) and three oceanic islands: The Trindade Island in particular, still harbours a comparatively high biomass of fish and other marine life, and it is part of the Vitória-Trindade Seamount chain that will be surveyed in the iAtlantic project (Region 11). Since PELD-ILOC and other projects only sample the shallow-water and mesophotic realms of the Vitória-Trindade Seamount chain, iAtlantic will provide pivotal new data on ecosystem status in the deep waters of this region.
SAMOC (NOAA, USA; FAPESP, Brazil; Argentina)	The SW Atlantic Meridional Overturning Circulation is a multi-national effort with contributors in the USA, Brazil and Argentina. iAtlantic will add to the capacity of SAMOC's ocean observing infrastructure to align it with the N Atlantic RAPID and OSNAP arrays.
Sargasso Sea Commission	The Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea established the SCC in 2014 to 'encourage and facilitate voluntary collaboration toward the conservation of the

Research and Innovation Activity	Link with iAtlantic
(Azores, Bahamas, Bermuda, UK, USA)	Sargasso Sea'. iAtlantic's Region 5 is the Sargasso Sea where our work ecosystem status assessment will encompass timeseries analyses directly relevant to SSC and the Hamilton Declaration (see LoS).
Seabed 2030 (Nippon Foundation–GEBCO)	Several iAtlantic partners play key roles in Seabed2030, a 10-year effort to map the world's oceans. These links allow for a two-way flow of knowledge between the programmes. iAtlantic mapping efforts will be guided by Seabed2030 work and vice-versa. Partnerships in Seabed2030 will also provide additional stakeholder access for iAtlantic cooperation and outreach efforts linking to the International Hydrographic Organisation, the Intergovernmental Oceanographic Commission of UNESCO and EMODnet.
SEAmester (South Africa)	SEAmester introduces marine science as an applied and cross-disciplinary field to students in a combined theoretical classroom learning approach with the application of this knowledge through ship-based and hands-on research. Students graduating from SEAmester will participate as student researchers on iAtlantic-linked research programmes. Its long-term vision is aimed at building capacity within the marine sciences by coordinating cross-disciplinary research projects through a highly innovative programme. SEAmester is led by iAtlantic partner UCT and uses the state-of-the-art research vessel, SA Agulhas II, proposed to participate in iAtlantic research cruises.
MEEE-PDSES (CNPq)	The Spatial Management with an Ecosystem Approach for the Demersal Fisheries off southeastern and southern Brazil project is using fisheries and environmental data to design a network of spatial fishing management units off SE-S Brazil. iAtlantic will allow the analysis of deep-sea coral ecosystems status (and associated megafauna) at the continental margin (Region 10) to contribute relevant information to the design of slope bottom fisheries management units.
SponGES (H2020, EU)	iAtlantic will access new results on the distribution and functional ecology of N Atlantic deep-water sponge grounds, notably via the SponGIS compilation of spatial data arising from the project (2016-2020), for mapping at the local, regional and all-Atlantic scales.
STRONG High Seas (Germany)	The Strengthening Regional Ocean Governance for the High Seas project is working with countries in the Abidjan Convention region (SE Atlantic, see LoS) as well as the Permanent Commission for the South Pacific to strengthen regional ocean governance and facilitate development of integrated and cross-sectoral approaches to develop a new legally-binding instrument for the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction (ABNJ).

1.3.4 Methodology

To deliver the integrated assessment of ecosystem status and dynamics in the deep and open Atlantic Ocean, iAtlantic will undertake a programme of work packages (WPs) that target fundamental gaps in our understanding of basin and regional-scale oceanography (WP1) and ecosystem resilience (distribution, connectivity, responses to climate change and multiple stressors; WPs 1–4). iAtlantic's approach is grounded in close collaboration and capacity building between iAtlantic partners and meaningful engagement with key stakeholders (WP6) to inform the project's priorities, standardise and disseminate research data (WP7) and products (WP5) and facilitate uptake of the project results (WP6). These work packages are described in detail below.

WP1 Atlantic Oceanography and Ecosystem Connectivity [Lead GEOMAR; Deputy SU].

Whole-ocean observing programmes can align North and South climate-based predictions of ecosystem impacts from changing ocean conditions. Following the South-South Framework in the South and Tropical Atlantic and Southern Ocean, WP1 extends the coverage and enhances ocean observing programmes in the S Atlantic. WP1 predicts future ocean conditions and ecosystem connectivity and prioritises areas for management with genomics to unify our understanding of Atlantic circulation, connectivity and improve monitoring capacity in the S Atlantic.

Rationale: Marine ecosystem status and dynamics reflect local oceanographic conditions resulting from a combination of large-scale ocean circulation and local air-sea forcing. In the Atlantic, the largest ocean-scale feature is the Atlantic Meridional Overturning Circulation (AMOC), the 'conveyor belt' of temperature (T) and salinity (S) that runs throughout the Atlantic. AMOC is ultimately controlled by basin-scale forcing and dynamics at inter-annual to decadal timescales[9], and nonlinear processes that in turn impact basin-scale gyres and overturning circulation[10].

9 Biastoch *et al*. (2008) Causes of interannual-decadal variability in the meridional overturning circulation of the mid-latitude North Atlantic Ocean. Journal of Climate 21: 6599-6615.

10 Biastoch *et al*. (2009) Increase in Agulhas leakage due to poleward shift of Southern Hemisphere westerlies. Nature 462: 495-498

Inter-annual variability masks a longer-term decline in the AMOC's strength[11], but it is now understood that the AMOC is experiencing its weakest state in the last 1,600 years[12]. By the next century, climate change and coupling to the AMOC will have impacted much of the deep and open-ocean Atlantic[3, 13] (Figure 3), altering not only patterns of T, S but also the carbonate chemistry and the distribution of oxygen in the deep and open-ocean[14]. These changes could radically impact marine ecosystems from the bottom of the food chain, to the microbes and sponges and corals of interest to the Blue Biotechnology sector, to top ocean predators such as tuna and billfish that have high energetic and oxygen demands[15] but which are of great interest to the Maritime and Coastal Tourism sector. Future circulation patterns could also re-shape biological connections between distant ecosystems[16] including interactions with seafloor features, which are essential to maintaining populations and thus ecosystem resilience. It is essential that we identify key sources, pathways and interactions to design effective management tools that are robust to changing oceans.

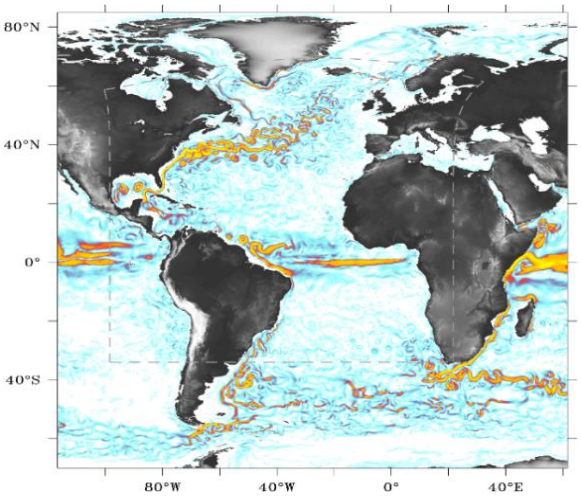


Figure 3: VIKING20X surface current reconstruction showing eddy-rich structures in the Atlantic and around South Africa. Dashed lines indicate the high-resolution nest within the global base model.

Understanding and predicting changes in AMOC require a comprehensive observing system[17], and today AMOC is monitored by three purpose-built arrays (Figure 1): SAMOC/SAMBA (34.5°S), RAPID-MOCHA (26.5°N) and OSNAP (58°N). RAPID-MOCHA is the exemplar array, for its full suite of ecosystem relevant physical and biogeochemical measurements. However, with inter-ocean exchange and Agulhas Current leakage from the Indian Ocean perhaps driving changes in AMOC[18], it is essential that we step up investments to align North and South monitoring programmes such as OSNAP and SAMOC with RAPID. This alignment will capture western and eastern boundary current systems more comprehensively, but also any effects of inter-ocean exchanges on AMOC and ecosystem-relevant parameters such as T, S, currents and oxygen that ultimately determine the distribution of marine resources shared by Atlantic nations.

Ocean-only and coupled climate models provide the correct reference to connect spatio-temporally limited observations from the arrays and other instrumental observations into a mathematically consistent framework. The quality of atmospheric forcing and the horizontal resolution are both crucial for a good degree of model realism. However, to represent mesoscale eddies, scales of just a few km grid size are required to explicitly simulate the details of the circulation and variability. Simulations at more specific sites, e.g. a hydrothermal vent or a seamount, require even more ultra-high-resolution models down to 10 m grid sizes. With the correct models and better N-S alignment in AMOC monitoring capacity, these approaches offer the most robust methods for understanding and predicting inter-annual to decadal dynamics of Atlantic circulation and its response to a changing climate.

Methods: WP1 will develop and **perform unique state-of-the-art high-resolution climate-based predictions of past and future ocean circulation** including regions with environmental extremes, **and ground-truth connectivity using the latest genomic tools**. Our approach begins with using the VIKING[19] and INALT[20] global ocean general circulation models (OGCM): these have eddy-rich nests in the Atlantic and around South Africa and are derived on the basis of

11 Kolstad & Bracegirdle (2008) Marine cold-air outbreaks in the future: an assessment of IPCC AR4 model results for the northern hemisphere. Climate Dynamics 30: 871-885
12 Thornalley *et al*. (2018) Anomalously weak Labrador Sea convection and Atlantic overturning during the past 150 years. Nature 556: 227-230
13 Perez *et al*. (2018) Meridional overturning circulation conveys fast acidification to the deep Atlantic Ocean. Nature 554: 515-518
14 Schmidtko *et al*. (2017) Decline in global oceanic oxygen content during the past five decades. Nature 542: 335-339
15 Stramma *et al*. (2012) Expansion of oxygen minimum zones may reduce available habitat for tropical pelagic fishes. Nature Climate Change 2: 33-37
16 Baltazar-Soares *et al.* (2014) Recruitment collapse and population structure of the European eel shaped by local ocean current dynamics. Current Biology 24: 104-108
17 Ansorge *et al*. (2014) Basin-wide oceanographic array bridges the South Atlantic. Eos, Transactions American Geophysical Union 95: 53-54
18 Biastoch & Böning (2013) Anthropogenic impact on Agulhas leakage. Geophysical Research Letters 40: 1138-1143
19 Böning *et al*. (2016) Emerging impact of Greenland meltwater on deepwater formation in the North Atlantic Ocean. Nature Geoscience 9: 523-527
20 Durgadoo *et al.* (2013) Agulhas leakage predominantly responds to the southern hemisphere westerlies. Journal of Physical Oceanography 43: 2113-2131

the European NEMO model[21]. With resolutions of 1/10° (VIKING10X, INALT10X) to 1/20° (VIKING20X, INALT20), both resolve mesoscale eddies from the tropics to subpolar latitudes. Both configurations will be run in hindcast mode to simulate the past 60 years under realistic forcing[22], thus allowing very detailed comparisons with instrumental observations. The next 50 years will be forecasted by coupling to an active atmosphere, e.g. in runs with global warming scenarios. Models will be complemented by re-analyses of observational AMOC data from the RAPID, OSNAP and SAMOC arrays with additional sourced data[23].

Standard model outputs on the frequency, duration, magnitude and rates of change, as well as the identification of extreme events such as marine heat waves (MHWs; anomalous and persistent warming events in the ocean) will be derived and used for iAtlantic's regional ecosystem assessments. To date, extreme events such as MHWs have only been assessed on the ocean surface and not in its interior, thus, WP1 will significantly advance the state-of-the-art in this domain using a bespoke algorithm[24]. Input data will be both observed and modelled, and look both back in time to 1950, and forward in time to 2100 with IPCC CMIP6 predictions. Temporal principal component analyses of single point (e.g., moored) and geo-spatial time series (e.g., EN4 objective analyses of observations) will be undertaken at pelagic and benthic depth levels. After removing seasonality, dominant mode timeseries will be lag-correlated with each other (for individual regions) and basin indices (e.g., AMOC, subpolar gyre, subtropical gyre indices), and an understanding of dynamical causality of statistically significant relationships developed. Maximum covariance analysis between physical and biogeochemical principal components will be undertaken to investigate co-variation. Local rate-of-change ('velocity') and divergence of pelagic and near-bed parameters will be derived, extending recent work on the velocity of climate change for surface temperature[25]. These approaches will then be spatially and temporally downscaled to reveal physical processes dominating variability of the local ecosystems in iAtlantic's 12 large marine regions.

iAtlantic will enhance the capacities of transatlantic monitoring arrays at both southern and northern boundaries. At the southern boundary, we will extend the SAMOC array by: (i) augmenting the horizontal coverage of the existing SAMOC-West array, involving mooring deployment at the continental shelf in the region of the Brazil Current (measuring temperature, salinity, pressure, and currents); (ii) enhancing the SAMOC-West and SAMOC-East arrays with oxygen sensors, and; (iii) testing the need to have a zonal component in the array (using *in situ* observations in the central S Atlantic 10°W-[27°S-24°S]). At the northern boundary we will continue the enhancement of OSNAP moorings in the North Atlantic Current branch of the AMOC adding oxygen sensors so that we can compute fluxes of carbon, nutrients and oxygen in the upper limb of the AMOC (funded first under the H2020 AtlantOS and ATLAS projects).

iAtlantic's 4D hindcast and forecast model outputs will input to connectivity analyses, conducted through Lagrangian dispersal modelling of drifting organisms (e.g. pelagic larvae, juveniles, marine snow). Lagrangian methods such as ARIANE[26] and OceanPARCELS[27] will simulate the spreading of several million particles on inter-annual to decadal timescales using biologically realistic larval behaviours. A dedicated capacity building workshop in Lagrangian modelling will enhance human capacity in this field (WP6).

However, fine-scale hydrodynamics are not currently accounted for in basin-scale simulations and to overcome this iAtlantic will complete ultra-high-resolution simulations at the Lucky Strike vent field in the N Atlantic (Region 3) and at Walvis Ridge in the S Atlantic (Region 9). These simulations will provide the fine-scale hydrodynamical context to understand the role of these regions in VME connectivity and provide a proof-of-concept applicable to all future studies in the Atlantic and adjacent sea basins. To achieve this, we will use the non-hydrostatic Coastal and Regional Ocean COmmunity model (CROCO-NH), which estimates hydrodynamics down to 10 m grid size and can be forced with realistic atmospheric fluxes, eddies, tides, geothermal flux and sidewall boundary conditions from the basin-scale models.

21 Madec *et al.* (2016) NEMO ocean engine. Note du Pôle de modélisation de l'Institute Pierre-Simon Laplace No. 27

22 Kobayashi *et al*. (2015) The JRA-55 Reanalysis: General Specifications and Basic Characteristics. J. Meteorol. Soc. Japan. Ser. II 93: 5-48

23 Ocean observatories, Met Office EN4 gridded ocean data products, International ARGO and Drifter programme data, Atlantic basin-scale indices, GO-SHIP hydrographic and biochemical data series, OceanSITES mooring data timeseries, Ocean Glider boundary current data, annual underway observations across S Atlantic, Hydrobase3, ICES, EMODnet, NOAA WOD, ECMWF ERAi and ERA5 meteorological data

24 Smit *et al*. (2016) Detect Marine Heat Waves and Marine Cold Spells. 10.13140/RG.2.1.3516.6961

25 Burrows *et al*. (2011) The pace of shifting climate in marine and terrestrial ecosystems. Science 334: 652-655

26 Blanke *et al*. (1999) Warm water paths in the equatorial Atlantic as diagnosed with a General Circulation Model. Journal of Physical Oceanography 29: 2753-2768

27 Lange & van Sebille (2017) Parcels v0.9: prototyping a Lagrangian ocean analysis framework for the petascale age. Geoscientific Model Development 10: 4175-4186

Finally, **WP1 will use genomics approaches to provide powerful new insights** to understand the roles of the Mid-Atlantic Ridge, Romanche Fracture Zone and seamounts, and their interplay with ocean circulation, on ecosystem connectivity. High density genome scans allow major divergence events to be detected and traced back to past ocean changes (tectonic alteration of the oceanic circulation, climate-driven evolution of hydrodynamic regimes etc.) and to produce precise estimates of genetic exchange across populations. Contemporary genetic patterns will be estimated using RAD (restriction-site-associated DNA[28]) tags from a subset of amphi-Atlantic VME indicator species such as reef framework-forming corals (e.g. *Lophelia pertusa*), hydrothermal vent and cold seep organisms (e.g. *Bathymodiolus* spp., shrimps) collected before and during iAtlantic, including from WP2's new eDNA sampler (MAPS). Single Nucleotide Polymorphisms (SNPs) will be identified and subsequently filtered for contemporary population genetics analyses using the software STACKS, with estimates of gene flow between Atlantic localities provided using classical population genetics software such as Genepop, BayesAss, GeneClass. Phylogeographic analyses using high density genome scans of a large number of polymorphic markers randomly sampled from the organism's genome[29] will also be used to reconstruct if and when closely related taxa diverged in order to identify oceanic or topographic drivers of speciation events that disrupted gene flow. The level of population divergence between regions will be compared with the connectivity estimates modelled from our Lagrangian particle tracking analysis, while the vulnerability of this regional connectivity to changing ocean circulation patterns will be highlighted by comparing hindcasts with Lagrangian forecasts.

WP2 Mapping Atlantic Ecosystems [Lead UKRI-NOC; Deputy GEOMAR]

Innovations in the fields of autonomous robotics, environmental genomics, machine-learning and predictive modelling are at the core of WP2. Using these world-leading step-changes in our capacity to map the oceans in 3D allow us to scale-up our understanding of ecosystem status and resilience from the local to a fully Atlantic scale and in a cost-effective manner to fill data gaps in the S Atlantic and selected N Atlantic regions.

Rationale: Historically, **most studies across the Atlantic have been carried out in isolation**, focusing on a single ecosystem or a particular location. Increasingly, marine ecosystem and mapping initiatives are now trying to combine insights and information to obtain a wider perspective (e.g. CoML, EMODnet, AORA, Seabed2030). Despite this, maps of the Atlantic Ocean still illustrate glaring knowledge gaps for even the most basic parameters like seafloor depth, and show a strong imbalance in knowledge between the N and S Atlantic (Figure 4). New ecological insights are obtained with increases in observational resolution[30], especially for ecosystems with abrupt transitions or peaks in environmental conditions (e.g. seabed cliffs, abyssal hills), which can increase biodiversity[31]. Ecological patterns and processes occur across a wide range of scales; thus, there is no single optimal scale at which ecosystems should be studied[32]. Thus, to truly advance knowledge on the status and resilience of Atlantic ecosystems, a range of scales need to be mapped in terms of geomorphology, ecology and biology. But with an area of over 100 million km^2 and an average depth of around 3600 m, the challenge of mapping Atlantic ecosystems at multiple scales is vast. **Recent technological advances in genomics, machine-learning and autonomous observing now provide step-changes** towards achieving this goal.

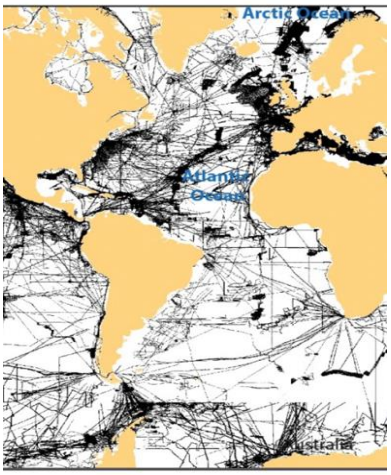


Figure 4: Multibeam bathymetry lines illustrating disparity in surveys between N and S Atlantic. From GEBCO_2014 grid (Jakobsson et al.

The **rapid development of marine autonomous and robotic vehicles** including Remotely Operated Vehicles (ROVs), Autonomous Underwater Vehicles (AUVs) and Unmanned Surface Vehicles (USVs) has increased our volume of marine observations exponentially[33]. The development of new non-invasive sensors for autonomous vehicles has advanced in parallel: prototypes of eDNA (https://www.mbari.org/successful-launch-new-genomic-sensor/),

28 Miller *et al*. (2007) Rapid and cost-effective polymorphism identification and genotyping using restriction site associated DNA (RAD) markers. Genome Research 17: 240-248

29 Luikart, *et al*. 2003. The power and promise of population genomics: from genotyping to genome typing. Nat. Rev. Genet. 4, 981–994.

30 Rengstorf et al. 2012. Towards high-resolution habitat suitability modeling of vulnerable marine ecosystems in the deep-sea: resolving terrain attribute dependencies. Mar Geod 35:343-361

31 Robert *et al*. 2017. New approaches to high-resolution mapping of marine vertical structures. Nature Scientific Reports, 7: 9005.

32 Levin 1992. The problem of pattern and scale in ecology. Ecology 73(6):1992

33 Huvenne *et al*. 2018. ROVs and AUVs. In: Micallef, A., Krastel, S. & Savini, A. (Eds.). Submarine Geomorphology, Springer, Heidelberg, 93-108

nutrient (http://www.senseocean.eu/), and photographic sensors are now being tested. These sensors are at a technology readiness level to observe and measure a multitude of parameters simultaneously, enabling truly integrated investigations of marine ecosystems and their environmental drivers.

Exponential increases in observations create a **new Big Data challenge**: imaging surveys produce many thousands of photographs per day that rely on manual image annotation, a time-consuming and error-prone[34] method that cannot possibly scale to the pace of acquisition. The field of artificial intelligence using deep-learning now enables major advances in automatic object detection and classification tasks in the ecosystem assessments[35], with semi-supervised machine learning, GPU-based image processing and massively-parallel cluster computing drastically reducing the time and costs of data processing[36]. Linking different Big Data domains (e.g. hydroacoustics and optical imaging) now allows centimetre-scale resolution observations to be linked to regional kilometre-resolution features[37] and can potentially remove the bottlenecks in image-based and acoustic survey data processing and analysis by enabling ecosystem properties such as faunal density, diversity, biomass and community structure to be assessed quickly over large areas of the ocean.

Even with these technological leaps it is not feasible to map every deep and open-ocean ecosystem in the Atlantic, but the latest **predictive habitat modelling approaches** allow us to expand species and biodiversity observations by extrapolating to regional and global scales. In the deep sea and open ocean, these models are becoming valuable for determining survey and management priorities[38]. Increasingly, they also focus on the biological traits[39] of the component species of the ecosystem. Traits are perhaps even more informative about future ecosystem status and socioeconomic implications than species or diversity, as traits are strongly linked to ecosystem services, e.g. ocean productivity[40].

Methods: WP2's concept for mapping the deep and open-ocean areas of the Atlantic uses its consortium's world-leading strengths in ocean engineering, artificial intelligence, and predictive habitat modelling to overcome this challenge in scales, in a new hierarchical yet cost-effective approach that provides the advance needed to align N-S mapping programmes and initiatives. Significant developments are anticipated for both the S and N Atlantic, covering geomorphology, biology and ecology, from basin to local scales (Table 5).

Basin-scale (all-Atlantic) mapping: iAtlantic will expand mapping coverage of established databases (e.g. OBIS, GEBCO, PANGAEA, ZENODO) by acquiring new data from its cruise programme, partner collaborations (e.g. with Seabed2030, COMREN and AORA's Atlantic Seabed Mapping International Working Group), and our network of regional stakeholders including our industry partners. Consistent approaches to broad-scale marine landscape classifications[41] using harmonised syntax (e.g. EUNIS, CMEC for habitat types, GOOS for 'Essential Ocean Variables') and basin-scale species distribution modelling will then be applied to further expand mapping coverage and produce a basin-scale inventory or 'atlas'. Our consortium benefits from world-leading expertise and capacity already developed during the EU ATLAS and SponGES projects to predict basin-scale distribution of VME indicator taxa (e.g. cold-water corals, sponges and sea pens) and deep-sea fish species. Consistent modelling algorithms will be agreed from a subset of approaches e.g. GAMs, MaxEnt, Random Forest (RF), and joint models will be explored to account for biological traits into the analysis to understand environmental drivers of ecosystem status at the all-Atlantic scale.

34 Schoening *et al*. (2016) RecoMIA—Recommendations for Marine Image Annotation: lessons learned and future directions. Frontiers in Marine Science 3: 59

35 Durden *et al*. (2016) Perspectives in visual imaging for marine biology and ecology: from acquisition to understanding. Oceanography and Marine Biology: An Annual Review 54: 1-72

36 Schoening *et al*. (2017) Compact-morphology-based poly-metallic nodule delineation. Scientific Reports 7:13338

37 Peukert *et al*. (2018) Understanding Mn-nodule distribution and related deep-sea mining impacts using AUV-based hydroacoustic sensing and optical observations. Biogeosciences 15: 2525-2549

38 Kenchington *et al*. (2016) Delineation of coral and sponge significant benthic areas in eastern Canada using kernel density analyses and species distribution models. DFO Canadian Scientific Advisory Secretariat Research Document 2016/093: vi + 178pp

39 Tikhonov *et al*. (2017) Using joint species distribution models for evaluating how species-to-species associations depend on the environmental context. Methods in Ecology and Evolution 8: 443-452

40 Snelgrove *et al*. (2018) Global carbon cycling on a heterogeneous seafloor. Trends in Ecology & Evolution 33: 96-105

41 Hogg *et al*. (2016) Landscape mapping at sub-Antarctic South Georgia provides a protocol for underpinning large-scale marine protected areas. Scientific Reports 6: 33163

Table 5: Data provision and mapping products that will be produced for the iAtlantic study areas.

Study Area	Data			Products			
	Bathymetry	Other Environmental	Benthic Ecology	Habitat Maps	Confidence Maps	VME Prediction & Functional Traits	Identification of Main Habitat Drivers
1. Subpolar Mid-Atlantic Ridge, off Iceland	MFRI, GEOMAR	MFRI	MFRI	MFRI	MFRI	MFRI	MFRI
2. Rockall Trough to PAP	UKRI-NOC, UCC, IFREMER	UKRI-NOC, UCC, IFREMER	UKRI-NOC, UCC, IFREMER	UKRI-NOC, UCC, IFREMER	UKRI-NOC, UCC, IFREMER	UKRI-NOC, UCC, IFREMER	UKRI-NOC, UCC, IFREMER
3. Central mid-Atlantic Ridge	IMAR, IFREMER	IMAR,	IMAR,	IMAR,	IMAR,	IMAR,	IMAR, IFREMER
4. NW Atlantic, Gully Canyon	DFO, MUN, NSCC	DFO,	DFO,	DFO, MUN, NSCC	DFO, MUN, NSCC	DFO, MUN, NSCC	DFO, MUN, NSCC
5. Sargasso Sea	NOAA			NOAA	NOAA		
6. Eastern Tropical North Atlantic, Cape Verde	GEOMAR UKRI-NOC, IEO	IEO	IEO	GEOMAR, IEO	GEOMAR		
7. Equatorial Atlantic, Romanche Fracture Zone	GEOMAR, AWI			GEOMAR	GEOMAR		
8. Slope & margin off Angola & Congo Lobe	IFREMER		IFREMER	IFREMER	IFREMER		
9. Benguela Current, Walvis Ridge to South Africa	UKN, SAIAB, UKRI-NOC, IEO	UKRI-NOC, IEO	UKRI-NOC, IEO	UKN, SAIAB, UKRI-NOC, IEO	UKRI-NOC, IEO	UKRI-NOC, IEO	UKN, SAIAB, UKRI-NOC, IEO
10. Brazil margin & Santos and Campos Basin	UFSC, USP, UNIVALI, Petrobras	UFSC, USP, UNIVALI, Petrobras	UFES, UFSC, USP, UNIVALI, IFREMER, Petrobras	UFES, UFSC, USP, UNIVALI, IFREMER, Petrobras	UFES, UFSC, USP, UNIVALI, IFREMER,	UFES, UFSC, USP, UNIVALI, IFREMER	UFSC, USP, UNIVALI
11. Vitória-Trindade Seamount Chain	UFSC, IOUSP, UNIVALI, IEO	UFSC, IOUSP, UNIVALI, IEO	UFSC, IOUSP, UNIVALI, IEO	UFSC, IOUSP, UNIVALI, IEO	UFSC, IOUSP, UNIVALI, IEO	UFSC, IOUSP, UNIVALI, IEO	UFSC, IOUSP, UNIVALI, IEO
12. Malvinas Current	SHN, IEO			SHN, IEO	SHN, IEO		

Regional scale (100-1000 km): Habitat maps and associated confidence maps based on regional bathymetry data will be produced for all 12 regions (Table 5). At selected regions, **highly integrated water column and seafloor mapping** operations will combine collection of data across multiple technologies and platforms. Ship-borne multibeam bathymetry and sub-bottom profiler data will be integrated with AUV-based bathymetry and/or sidescan sonar (SSS) surveys for extensive high-resolution 3D mapping (Figure 5), while water column characteristics (e.g. T, S, turbidity, and oxygen) will be measured through a combination of CTD and glider deployments. Seafloor communities and substrate types will be mapped with novel AUV-based image surveys covering ~100 km/day, or towed video surveys using low-cost camera solutions, in addition to **eDNA-based analysis conducted from samples collected by multicore and a Marine Autonomous Plankton Sampler** (MAPS, TRL4, UKRI-NOC). This novel instrument collects cells from ≤5 litres of seawater on 0.22µm filters, then preserves these with RNAlater (Figure 5). The MAPS can collect >300 water column samples per deployment and will be integrated on the 6000 m rated Autosub6000 for iAtlantic to conduct 3D water column and near-bed mapping using genomic inventories of eDNA harvested from the samples.

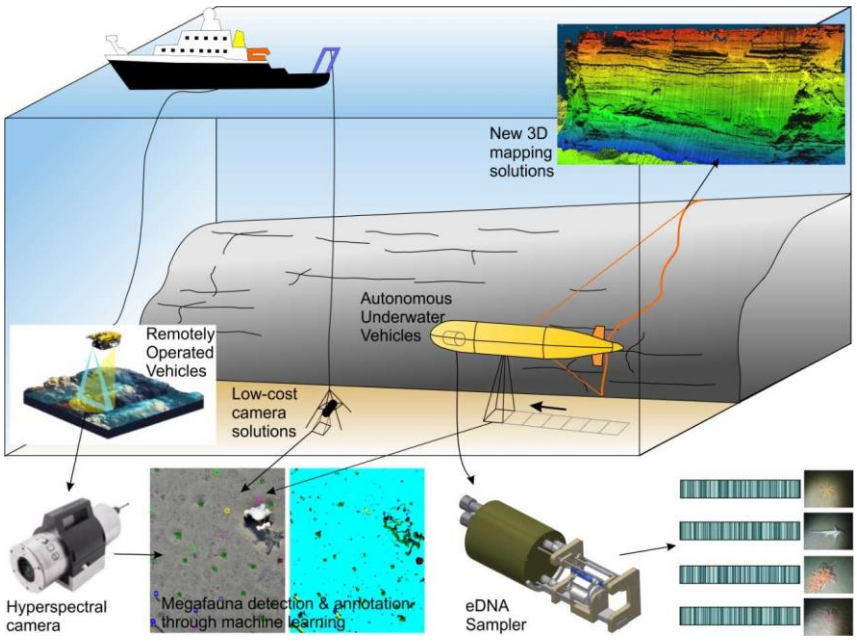


Figure 5: Latest technologies deployed in WP2.

Automated classification of acoustic data using Object-Based Image Analysis will support habitat mapping work. New image processing workflows and integrated, semi-supervised and machine learning solutions will be applied to underpin quantitative analysis of extensive imagery datasets from AUVs

and ROVs. Together with eDNA and morphological approaches, image analysis will contribute to community analyses of species and environmental relationships and new predictive models of functional trait distribution.

Local-scale ecosystem structure through ultra-high-resolution mapping (<1-10 km): Ultra-high-resolution (metre-scale) integrated mapping activities will be carried out at selected regions. Acoustic surveys (MB bathymetry, SSS, and where possible multi-spectral backscatter) will be carried out using ROVs and AUVs and where necessary, include sideways mapping of vertical and overhanging seafloor cliffs to obtain full 3D ultra-high-resolution bathymetric maps. Seafloor characteristics and communities will be studied with a combination of video data (from ROV or towed platforms; where possible deploying new multi- and hyper-spectral cameras) and targeted samples (ROV and sediment cores). Photogrammetry using structure-from-motion techniques (SfM) will be applied to create 3D maps of deep ecosystems to underpin habitat suitability and species-environment models. Automated GIS techniques to discriminate seabed mounds (e.g. CWC reefs) and depressions (e.g. pockmarks) will be applied to datasets in the S Atlantic to enhance iAtlantic's ability to derive statistical information on seabed topography[42].

WP3 Drivers of Ecosystem Change and Tipping Points [Lead UEDIN; Deputy IFREMER]

Temporal changes in iAtlantic's regional ecosystems will be examined for links to climate change and evidence of tipping points. Timeseries across years to millennia will be created in collaboration with regional stakeholders and by applying the latest techniques including SfM photogrammetry, mark-recapture methods, hydroacoustics, geochemistry and recovery of ancient DNA. Rigorous statistical analysis standardised to WP1 projections allows WP3 to scale-up our understanding of drivers of change and regions at risk of 'tipping' into a new ecosystem state.

Rationale: By identifying place-based risks and tipping points, managers can enhance monitoring and mitigation measures as the likelihood of ecosystem change increases. This thinking drove the development of seafloor observatories that are now operating in various ecosystems across European seas (e.g. EMSO)[43], contributing to climate change assessments[44] and to monitoring ecosystem change across short (inter-annual) and long (multi-decadal) timescales. However, it is critical we first distinguish impacts of climate change from significant adverse impacts caused directly by human activity, and to assess whether increased resource exploitation could push, or 'tip', an ecosystem towards a permanent change in structure, functioning, or provisioning of ecosystem services for the Atlantic socioeconomy. Significant changes in ecosystem state may sometimes be heralded by early warning signals that appear as generic phenomena[45] including a critical slowing down of recovery time between different states, increasing spatial variance, and more autocorrelation[46]. But for deep and open-ocean ecosystems not covered by EMSO, the current state of knowledge on drivers of ecosystem change and even the existence of tipping points is fragmented, and studies lack standardisation[47] so cannot be scaled up. Yet these drivers and the concept of ecosystem tipping points both need to be explored because these provide the novel framework needed for Atlantic stakeholders to understand ecosystem stability and resilience[48].

Methods: WP3 uses an **empirical approach to quantify drivers of ecosystem change and search for tipping points**. The scope of biological timeseries will differ across regions to reflect the focal ecosystem(s) and range from datasets on bacteria and primary producers to the VME species, whales, swordfish and sharks of great conservation interest and value to the Atlantic socioeconomy. In each case the timeseries will be examined for evidence of rapid change or tipping points. Temporal trends in 'classical' datasets from a region's focal ecosystem will be analysed, e.g. annual fisheries surveys, plankton tows, repeat camera surveys, as well as data collected from sustained ocean observatories such as EMSO-Azores, PAP-SO, and BATS. New research expeditions, including iAtlantic's Flagship Demonstrator Capacity-Building cruises off South Africa, Cape Verde, and Brazil, will extend the

42 De Clippele *et al*. (2017) Using novel acoustic and visual mapping tools to predict the small-scale spatial distribution of live biogenic reef framework in cold-water coral habitats. Coral Reefs 36: 255-268
43 Ruhl *et al*. (2011) Societal need for improved understanding of climate change, anthropogenic impacts, and geo-hazard warning drive development of ocean observatories in European Seas. Progress in Oceanography 91: 1-33
44 Best *et al*. (2016) The EMSO-ERIC pan-European consortium: Data benefits and lessons learned as the legal entity forms. Marine Technology Society Journal 50: 8-15
45 Scheffer *et al*. (2009) Early warning signals for critical transitions. Nature 461: 53-59
46 Scheffer *et al*. (2001) Catastrophic shifts in ecosystems. Nature 413: 591-596
47 Glover *et al*. (2010) Temporal change in deep-sea benthic ecosystems: a review of the evidence from recent time-series studies. Advances in Marine Biology 58: 1-95
48 Donohue *et al*. (2016) Navigating the complexity of ecological stability. Ecology letters 19: 1172-1185

reach of existing national programmes such as the PELD-ILOC. Notably, five new methods for creating timeseries will expand our biological scope (Figure 6).

1. Structure from motion photogrammetry: 3D benthic community temporal reconstructions will be created using photomosaics from repeated ROV imaging surveys on the central mid-Atlantic ridge at the Lucky Strike hydrothermal vent field[49] (Region 3). Temporal trends in vent communities at metre- and tens of metre scales will be studied from high-definition camera images acquired daily from EMSO-Azores over the last 10 years and Structure for Motion methods (as in WP2). SfM aligns geo-referenced points from images to visually reconstruct the whole vent at a point in time[50] to measure community changes.

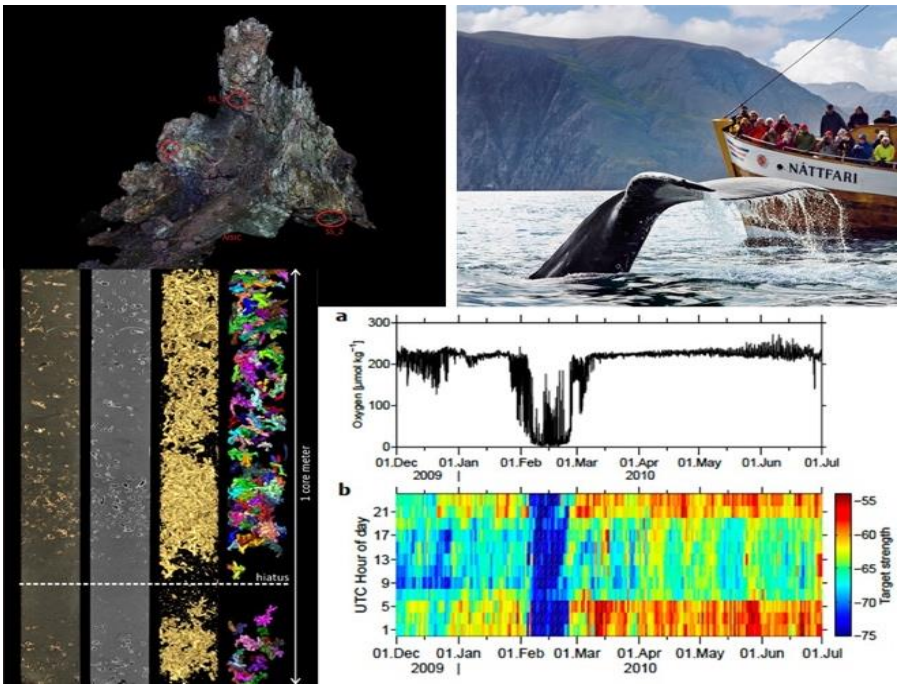


Figure 6: Examples of novel methods to create ecosystem timeseries. Clockwise from top left: 3D reconstruction of benthic communities at the Lucky Strike hydrothermal vent using photomosaics; whale fluke identifications from Iceland and Bermuda to reconstruct temporal changes in population size; inter-annual changes in oxygen (a) and effects on zooplankton (b) derived from ADCP from the CVOO off Cape Verde (Karstensen et al., 2015); sediment core from Mauritania with periods of coral growth and hiatuses from Wienberg & Titschack (2017).

2. Mark-recapture methods: Mark-recapture mathematical models will be used on the northern mid-Atlantic ridge off Iceland and in the Sargasso Sea (Regions 1 and 5) to estimate inter-annual changes in population sizes of humpback whales. Existing image catalogues of tails (flukes) with their characteristic markings and shapes (Figure 6) will be analysed to match images of individual whales to estimate whale abundance each year standardised by survey effort. Timeseries are created by modelling number of individuals across multiple sampling years using either the Peterson estimator or Jolly-Seber algorithm, assuming either a closed or open population model, respectively. External collaborations with the University of Iceland and Whales Bermuda are key to gathering and analysing these data (see LoS from UIH and Whales Bermuda).

3. Water column hydroacoustics: The use of ADCPs for collecting hydroacoustic data from the water column for pelagic open-ocean ecosystems will also be demonstrated at GEOMAR's Cape Verde Ocean Observatory (CVOO) in tropical West Africa (Region 6). This opportunity will be strengthened by a dedicated **capacity-building and training event at the Ocean Science Center Mindelo (OSCM) in the Cape Verdes islands** with the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) consortium. OSCM is jointly operated by Cape Verde's Fisheries Institute, the Instituto Nacional de Desenvolvimento das Pescas (INDP) and GEOMAR (see LoS from INDP and UniCV). ADCPs are routinely deployed in oceanographic surveys but scientifically underexploited in terms of the longer-term ecosystem changes they can record. Acoustic backscatter determined by the ADCP is a by-product of doppler-shift estimated velocity of sound-scattering particles and indicates the distribution of biomass in the size range determined by the respective frequency. WP3 proposes that the temporal development of, e.g. area-integrated backscatter as a proxy of plankton biomass and the monitoring of inter-annual changes in vertical migration behaviour make it a valuable system for monitoring ecosystem change[50]. External collaborations with INDP, the University of Cape Verde and WASCAL are important to data collection and capacity-building in this region (see LoS from UniCV and INDP).

4. Geochemistry: To reconstruct possible drivers of ecosystem change beyond ecological observational periods, geochemistry and complementary methods will be applied in nine regional timeseries, particularly in the South

49 Escartín *et al*. (2008) Globally aligned photomosaic of the Lucky Strike hydrothermal vent field (Mid-Atlantic Ridge, 37°18.5'N): Release of georeferenced data, mosaic construction, and viewing software. Geochemistry, Geophysics, Geosystems 9: Q12009
50 Karstensen *et al*. (2015) Open ocean dead zones in the tropical North Atlantic Ocean. Biogeosciences 12: 2597-2605

Atlantic where more classical timeseries are lacking (Regions 1,4,5 and 7–12). The implementation of geochemical techniques of **palaeoceanographic reconstruction** and dating (uranium-thorium series and radiocarbon) using marine sediments and deep-sea corals **gives iAtlantic an unprecedented view of the impacts of long-term past climate change on marine ecosystems**. A broad range of geochemical techniques will be used to constrain past ocean conditions[51] [52] including: neodymium and stable carbon isotope ratios (indicators of water mass distribution and circulation); foraminiferal magnesium/calcium and stable oxygen isotopes (ocean temperature and salinity proxy); foraminiferal boron/calcium (carbonate saturation state) and cadmium/calcium (nutrient content); and coral stable carbon, nitrogen and oxygen isotopes (to understand changes in growth and food supply in deep-sea corals[53] including anthropogenic impacts)[54]. Insight into past fluxes of organic matter from the surface ocean will be constrained using geochemical analysis of carbon and nitrogen and their stable isotope ratios in organic matter[55], and sediment grain size analysis enabling reconstruction of deep-sea current flow speed[56]. Coupling these techniques with faunal assemblage data and coral community composition will allow the relationship between climate-circulation coupling and ecosystem change on centennial-millennial timescales to be examined.

5. Ancient environmental DNA (aDNA): WP3 will also run pilot studies that test the success of eDNA methods and metabarcoding to **reproduce temporal changes in pelagic foraminifera from sediment cores** in three open-ocean ecosystems (Regions 1,4,5). Sediment cores will be examined for ancient DNA (aDNA) preservation in different sediment types, water depths and sediment age, before conducting more detailed analysis on the most suitable/promising cores. DNA will be extracted using protocols optimised for aDNA recovery from marine sediments, and metagenomic libraries prepared, at a dedicated, ultra-clean ancient DNA facility in collaboration between UCL and International Partner UA (see LoS from UA). Bioinformatic analyses will be performed using optimised computational workflows. This work will examine the (dis)similarity between broad community composition at key time intervals identified from other palaeoceanographic proxy work and compared with microfossil assemblage data. Verification of the reliability of the sedimentary aDNA can be confirmed by analysis of the planktic foraminifera assemblage recorded by the microfossils compared to the aDNA signals. This method would offer a spatiotemporal archive of the overlying water column[57] in some of iAtlantic's key regions resolved over millennia that would give complementary insight into climate drivers of ecosystem change.

Inventories of focal ecosystem timeseries into a fully Atlantic-scale database will then be coupled with WP1 oceanographic hindcasts and forecasts. The statistical toolbox to analyse relationships between biological and oceanographic change is vast. Univariate measures such as abundance or biomass may require regressive-type methods (multiple regression, analysis of variance) while time-frequency domain methods (wavelet analysis, Fourier transform) are more suitable for noisier datasets. Multivariate timeseries such as community composition data require a family of new methods, spatial eigenfunction analyses[58] e.g. distance-based Moran's eigenvector maps. Each biological timeseries will be assessed for generic signals of tipping points[48], or whether there are more system-specific signals of ecosystem change[59], e.g. slower coral accumulation rate in a sediment core as AMOC slows down. Local beta diversity components (LCBDs[60]) can also be used to identify tipping points because they locate specific times with large changes in community composition. Likewise, Temporal Beta diversity Indices (TBI)

51 Lynch-Stieglitz (2003) Tracers of past ocean circulation. In: The Oceans and Marine Geochemistry. Elderfield *et al.* (eds). Vol 6, pp433-451

52 Lea (2003) Elemental and isotopic proxies of past ocean temperatures. In: The Oceans and Marine Geochemistry. Elderfield *et al.* (eds). Vol 6, pp365-390

53 Sherwood *et al*. (2011) Nutrient regime shift in the western North Atlantic indicated by compound-specific δ15N of deep-sea gorgonian corals. Proceedings of the National Academy of Sciences 108: 1011-1015

54 Prouty *et al*. (2014) Deep-sea coral record of human impact on watershed quality in the Mississippi River Basin. Global Biogeochemical Cycles 28: 29-43

55 Thibodeau *et al*. (2006) Recent eutrophication and consequent hypoxia in the bottom waters of the Lower St. Lawrence Estuary: Micropaleontological and geochemical evidence. Marine Geology 231: 37-50

56 McCave *et al*. (2017) Relation of sortable silt grain-size to deep-sea current speeds: Calibration of the 'Mud Current Meter'. Deep-sea Research Part I: Oceanographic Research Papers 127: 1-12

57 Morard *et al*. (2017) Planktonic foraminifera-derived environmental DNA extracted from abyssal sediments preserves patterns of plankton macroecology. Biogeosciences 14: 2741-2754

58 Legendre and Gauthier (2014) Statistical methods for temporal and space-time analysis of community composition data. Proceedings of the Royal Society Bn 281:2013-2728

59 Boulton *et al*. (2013) Early warning signals of simulated Amazon rainforest dieback. Theoretical Ecology 6: 373-384

60 Legendre & De Cáceres (2013) Beta diversity as the variance of community data: dissimilarity coefficients and partitioning. Ecology Letters 16: 951-963

identify degrees of change in community composition and species abundance before and after disturbances[61]. To help identify critical threshold levels beyond which ecosystem compartments are significantly affected, WP3 will explore the utility of univariate (URT) or multivariate regression trees (MRT), which split a response variable or dataset along gradient(s) of explanatory variable(s) including time. A bespoke expert-led capacity-building workshop (see LoS from UM) will be held in the Cape Verdes islands in association with the WASCAL consortium after the training workshop on ADCP hydroacoustics. The aims of this **second capacity-building workshop will be to strengthen the human capacity in the equatorial African region to conduct statistically robust temporal analyses**. Maps of the likelihood that climate-based predictions of ocean change will result in significant ecosystem shifts and tipping points being reached will be produced as GIS products for WP5, with critical threshold levels being shared with WP6 to advice policy-makers for stepping up investments in monitoring for those regions.

WP4 Impact of Multiple Stressors [Lead HWU; Deputy IMAR-UAz]

Fully Atlantic comparisons of ecosystem and species responses to multiple stressors will be enabled by targeted *in situ* and *ex situ* experimental studies. Impacts of changes to organic matter, oxygen levels, sea temperatures and ocean acidification will be for the first time evaluated against the backdrop of increasing pressures from Blue Economy sectors such as fishing and seabed mining. Multidisciplinary approaches to evaluating responses (e.g., stable isotopes, gene expression, food web models, larval behaviour) will evaluate impacts on some of the Atlantic's most vulnerable benthic and pelagic ecosystems.

Rationale: Since the mid-20th century, pressure from fishing has increased along continental margins and offshore banks and seamounts, with many pelagic and benthic ecosystems having already been heavily impacted by trawling and related sediment plume disturbance. Future exploitation from mining for seafloor massive sulphide (SMS) deposits could have further significant adverse impacts through the generation of mine tailings and sediment plume dispersing across vast areas[62]. Encroaching human activities will therefore be happening in parallel with ocean warming, acidification, and in some regions, reduced oxygen levels, food supply and quality to the ocean's interior (Figure 7). Without sustainable management, **multiple stressors stand to dramatically alter ecosystem services** provided by the deep and open-ocean. These including fundamental regulating services such as contributing to the global carbon cycle and supporting services such as the creation and connectivity of habitats with unique or high biologically diversity.

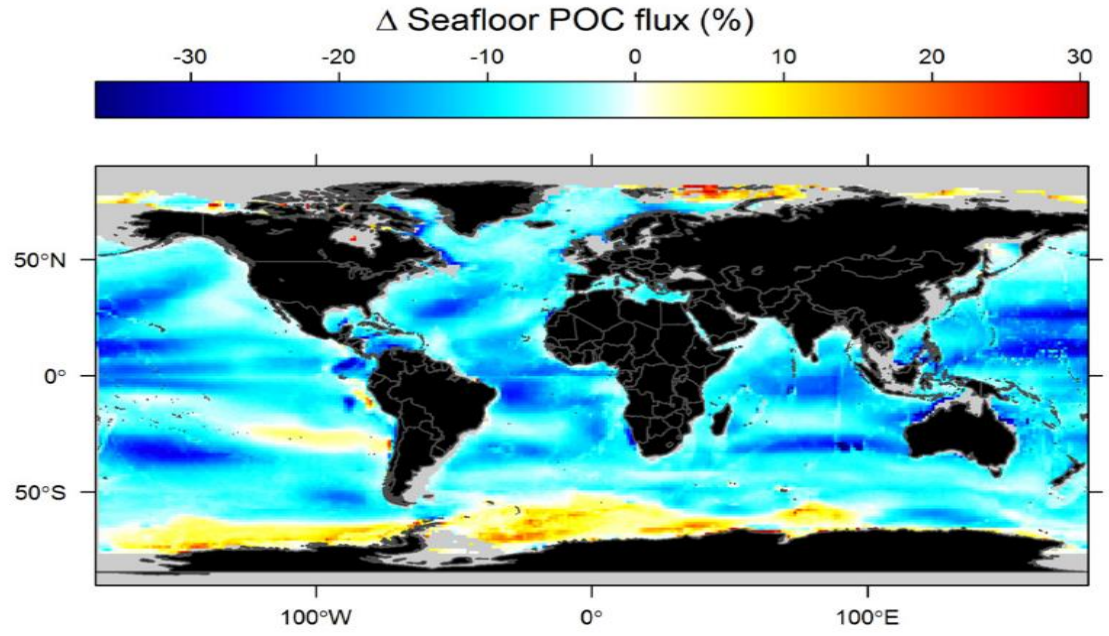


Figure 7: Relative environmental changes at the deep seafloor in the year 2100. Relative change (%) in seafloor POC flux (mg C m^{-2} d^{-1}) conditions that could be seen at the deep (> 200 m) seafloor by 2100 relative to present-day conditions (Sweetman et al. 2017).

61 Winegardner *et al*. (2017) Diatom diversity patterns over the Past c.150 years across the conterminous United States of America: identifying mechanisms behind beta diversity. Global Ecology and Biogeography 26: 1303-1315

62 Levin *et al*. (2016) Defining "Serious Harm" to the marine environment in the context of Deep-Seabed Mining. Marine Policy 74: 245-259

Our understanding of how multiple stressors could lead to deleterious ecological consequences is poor[63]. This is in large part because ecosystem functioning of many deep and open ocean Atlantic ecosystems, and their roles in specific functions such as nutrient remineralisation, carbon cycling, and precipitation of minerals, remain largely unknown. Basic information on how functioning naturally varies over the Atlantic is missing: this limits our ability to predict how multiple stressors will alter ecosystem functioning and services. The knowledge that does exist is largely restricted to the NE Atlantic, mostly from seamounts and canyons, or from single stressor experiments on cold-water corals. Synergistic effects are poorly studied in general, and when it comes to deep and open-ocean pelagic ecosystems, there are even bigger knowledge gaps with regards to how these systems will respond[64]. Even less is known about impacts on larval stages of VME species, yet maintaining larval connectivity is vital to marine ecosystem restoration[65]. This overall lack of knowledge prevents robust ecosystem-based management since the animals and bacteria that live in the deep and open Atlantic Ocean may be highly vulnerable to climate change and resource exploitation. Thus, the key challenge is to understand the synergies between different stressors associated with climate change and those linked to direct human impacts on Atlantic ecosystems.

Methods: In WP4, we will adopt *in situ* and *ex situ* approaches to examine the effects of different climate and man-made stressors on key deep pelagic and benthic organisms, using larvae through to adult stages to understand and predict how and where multiple stressors could drastically impact ecosystem functions and services. Our experimental organisms have wide depth distributions from the mesopelagic to hadopelagic zone, and in many cases wide geographic distributions, allowing us to generalise results to many of the deep and open-ocean areas in the Atlantic. WP4 proposes a series of four *in situ* and *ex situ* approaches in the N and S Atlantic.

(1) Baseline in situ *regional ecosystem investigations across natural gradients:* WP4 will use autonomous *in situ* lander platforms, field sampling and food web models to examine how ecosystem processes and functioning vary across three types of natural environmental gradients that substitute for time to predict stressor effects[66].

(A) Pelagic and benthic ecosystem functions will be compared across select regions in the N and S Atlantic, across eutrophic (Regions 2 and 12, with latter at SAMOC-West at 34.5°S) to oligotrophic (Regions 6 and 10) systems characterised by different food flux and oxygen conditions. Climate change is predicted to reduce nutrient input to upper ocean layers causing a shift in phytoplankton assemblages from fast-sinking diatoms to slow-sinking picoplankton[67]. This would enhance metabolism in the water column and reduce the amount and quality (i.e. lability) of organic matter (i.e., food) arriving at the seafloor[68], which is likely to severely modify benthic community composition, structure and ecosystem function. Given the natural variability in pelagic productivity and POC flux across the Atlantic and the strong relationship between ecosystem processes and POC flux[69], we expect that deep-sea assemblages will be impacted differently in oligotrophic and eutrophic deep-sea basins. Regions 2 and 12 also naturally experience different oxygen levels (>230 µmol per litre at PAP in Region 2, and 190-200 µmol per litre in the Argentinian Basin in Region 12), so comparing benthic processes at both eutrophic regions will also provide information on how changes in oxygenation from climate change will alter ecosystem processes. Seafloor micro-profiling and respirometer landers will be deployed in each region to measure sediment respiration and C-cycling. Abyssopelagic and demersal fauna will be sampled using net tows and baited traps to quantify biomass, food-web structure and trophic interactions using stable isotope analyses of $\delta^{15}N$ and $\delta^{13}C$. Linear Inverse Modelling[70] will help to elucidate how energy transfer through the food-chain varies across the gradients.

(B) Deep-sea ecosystems situated close to land partially rely on the export of organic matter, such as kelp detritus, from the coastal zone for C and energy[71]. Coastal climate change (e.g. wave climates and warming temperatures)

63 Philippart *et al*. (2011) Impacts of climate change on European marine ecosystems: observations, expectations and indicators. Journal of Experimental Marine Biology and Ecology 400: 52-69

64 St John *et al*. (2016) A dark hole in our understanding of marine ecosystems and their services: perspectives from the mesopelagic community. Frontiers in Marine Science 3: 31

65 Puckett *et al*. (2018) Integrating larval dispersal, permitting, and logistical factors within a validated habitat suitability index for oyster restoration. Frontiers in Marine Science 5: 76

66 Blois *et al*. (2013) Space can substitute for time in predicting climate-change effects on biodiversity. Proceedings of the National Academy of Sciences 110: 9374-9379

67 Morán *et al*. (2010) Increasing importance of small phytoplankton in a warmer ocean. Global Change Biology 16: 1137-1144

68 Buesseler *et al*. (2007) Revisiting carbon flux through the ocean's twilight zone. Science 316: 567-570

69 Smith *et al*. (2008) Abyssal food limitation, ecosystem structure and climate change. Trends in Ecology & Evolution 23: 518-528

70 van Oevelen *et al*. (2010) Quantifying food web flows using linear inverse models. Ecosystems 13: 32-45

71 Harrold *et al*. (1998) Organic enrichment of submarine canyon and continental-shelf benthic communities by macroalgal drift imported from nearshore kelp forests. Limnology & Oceanography 43: 669-678

may change the flux of organic matter to the deep sea by altering the abundance of kelp along the coast. Such climate changes affect the dynamics that drive natural mortality and export by changing the intensity and strength of physical oceanographic phenomena, including dense-water cascade events, that often transport this material to the deep sea[72]. To understand how climate change could impact one such deep-sea ecosystem, benthic fauna from Region 9 off the SW margin of South Africa will be collected during one of the iAtlantic demonstrator cruises, as well as the dominant kelp species (*Ecklonia maxima* and *Laminaria pallida*) and phytoplankton material from the nearby coast. The fauna, kelp, and phytoplankton will then be analysed for compound specific biomarkers and stable isotopes (C, N, S) and the importance of kelp material to the diets of deep-sea slope and submarine canyon fauna assessed using isotope and mixing model analysis.

(C) Ecosystem functioning of hard-substrate VME ecosystems will be compared in N and S Atlantic cold-water coral reef ecosystems (Regions 1,3,9 and 10) across natural gradients of carbonate chemistry, temperature, oxygen, and POC flux. This allows us to assess how coral ecosystems may change in future in relation to changing environmental conditions. Coral size and the ratio of live:dead parts of the colonies will be measured from existing and new data collected during iAtlantic cruises to assess coral health. Carbonate chemistry and samples of live, recently dead, and long-dead corals will be used to assess coral density and bio-erosion under different regional environments to assess carbonate budgets.

(2) Ex situ *studies to assess single and multiple stressors effects on hard-bottom species (adult and pelagic larval life stages).* Short and long-term exposure experiments will be used to measure effects of IPCC projected changes in temperature, pH and O_2, inert and seafloor massive sulphides (SMS) mine tailings to simulate plumes from deep-sea mining[73] and sediments to simulate fishing plumes. Impacts on adult scleractinian corals, gorgonians, sponges, and vent mussels will be studied and their pelagic life stages as larvae. Experimental organisms will be collected during iAtlantic cruises in Regions 2 and 3, but also the Norwegian and the Galician deep sea, and maintained in aquaria, and corals spawned *ex situ* where possible. For vent mussels, pre-competent larvae will be collected using larvae traps placed at the Lucky Strike hydrothermal vent field (Region 3) during yearly IFREMER cruises. Three stressor treatments and one control treatment will run for 3-6 months for adult organisms. Treatments include: (a) CO_2 levels are raised to 750 ppm, oxygen levels are reduced by 0.5 ml l^{-1} and temperature raised + 2^{o}C); (b) exposure to zero, low, medium and high concentrations of inert and SMS mine tailings simulating realistic concentrations for the type of mining that would take place in that area and local environmental conditions[73], and to seafloor sediments in concentrations up to three times higher than background levels; (c) a combination of (a) and (b). Growth, survival, respiration, skeletal density, rates of calcification, protein and gene expression will all be measured at monthly time points. Larval studies will use the same experimental treatments and control but assessed using a two-step approach. First, the effects of single stressors will be tested in short (~ 2 weeks) experiments. Effects of all multiple stressors will then be evaluated in longer-term experiments (~ 1-2 months) to assess their combined effect on larvae. Larval survival time, O_2 consumption, embryogenesis, development and duration of larval stages will be assessed by light and scanning electron microscopy, while larval activity (swimming speed and time spent swimming) and ontogenic migration patterns will be studied using video. Protein and gene expression involved in key metabolic and stress responses will be assessed along with the nutritional condition of the larvae (i.e. lipid content and composition).

(3) Ex situ *studies to assess single and multiple stressor effects on soft-sediment ecosystems*. WP4 will assess the single and cumulative impacts of increased temperature and organic matter quality on soft sediment ecosystems using incubation experiments in eutrophic and oligotrophic ecosystems (Regions 6 and 10, respectively). By adding isotopically labelled picoplankton or diatoms of different labilities (e.g. fresh vs. degraded) to the sediments, changes in carbon mineralisation and the incorporation of plankton carbon into different benthic size-classes (microbes, meiofauna, macrofauna) can be measured to see how these stressors will affect carbon mineralisation, sequestration, and food-web dynamics. Sediment samples from Regions 6 and 10 will be collected by box core during iAtlantic cruises and incubated in benthic chambers under different treatments. These will be either isotopically labelled (^{13}C) freshly grown diatoms, picoplankton, or algae where the cells have been artificially aged, or incubations with no algae added as experimental controls. Experiments will be run under present-day temperature conditions and 1-4^{o}C above present-day temperatures Effects on oxygen consumption, CO_2 production, and nutrient fluxes will be assessed to quantify C-uptake by the macrofauna, meiofauna and microbial

72 Canals *et al*. (2006) Flushing submarine canyons. Nature 444: 354-357

73 Murphy *et al*. (2016) Register of main impacts and causative factors (from deep-sea mining). MIDAS project deliverable 7.3

community. Benthic lander experiments to measure background respiration and nutrient flux rates will be conducted in parallel during the regional ecosystem investigations to ground-truth organic matter mineralisation rates in the experimental control.

(4) Ex situ *experiments assessing effects of multiple stressors on deep open-ocean pelagic ecosystems*. WP4 will examine how deep-sea pelagic fauna (e.g. copepods, gelatinous zooplankton) and microbial communities will respond to changes in ocean temperature and pH, and how sediment/ particle plumes created during deep-sea mining will additionally impact these organisms. Water samples will be collected by shipboard CTD (in association with the NANSEN programme and iAtlantic cruises to Region 9) to evaluate response of mesopelagic communities to predicted changes in ocean pH and temperature. Biological responses will be quantified from changes in water column O_2 consumption and CO_2 production. Stable isotopic labelled algae will be introduced into mesocosms to measure feeding rates of pelagic calanoid copepods change in response to these stressors. Deep pelagic gelatinous jellyfish (*Periphylla periphylla* jellyfish) will also be sampled from a Norwegian fjord (Lurefjorden) using custom zooplankton samplers from the JAGO submersible. Live jellyfish will be transferred to a laboratory in Bergen, Norway where they will be incubated in the dark in respiration chambers under present and future temperature conditions (temp increased by 1-4^{o}C), as well as zero, low, medium and high concentrations of inert mine tailings particles to simulate a mining plume based on exercises carried out during the MIDAS project. The response of the jellyfish to these scenarios will be measured from changes in jellyfish O_2 consumption and CO_2 production. Notably, this innovative experiment will be the first impact study of mine tailing dispersal on this key component of the mesopelagic zone.

WP5 Spatial and Temporal Management and Protection [Lead IMAR-UAz; Deputy EMODnet Secretariat, SBE]

New and more cost-effective systematic conservation planning and optimisation tools will analyse ecosystem status in relation to projected climate change and human activities. Crucially, these tools will finally be correctly scaled and integrated across ecosystem measurements to facilitate Atlantic capacity for Marine Spatial Planning and to enable Blue Growth scenarios to be rapidly evaluated.

Rationale: Place-based approaches underpin ecosystem-based management[74]. Impacts are not heterogeneously distributed across the marine environment and, as such, solutions applied in a blanket manner will be inefficient and less effective. Area-based management refers to the integrated, sustainable, cross-sectoral management of human activities occurring in a spatially defined area. Applied in the context of an ecosystem approach, area-based management provides tools to respond to multiple stressors and cumulative impacts. Area-based management tools (ABMT) include marine spatial planning (MSP), marine protected areas (MPAs) and ecological networks, dynamic management measures, and 'other effective area-based conservation measures' including indigenous, community and privately managed areas. ABMTs also include sectoral tools, such as closure of certain vulnerable areas to fishing, shipping or mining. While no universally accepted definition exists, ABMTs are generally expected to improve sustainability of exploitation of marine resources. They may also result in higher protection for an area than exists in the surrounding area due to more stringent regulation of one or more human activities. Critically, ABMTs are not a goal in themselves, but are tools to address the ecological, socioeconomic or cultural impacts generated by anthropogenic activities. Thus, management may have a variety of objectives, and depending of what those objectives are, different types of tools and stringency of regulation may be employed. For example, MPAs may range from strictly protected marine reserves to areas where uses compatible with the MPA objectives are allowed.

Systematic conservation planning (SCP), or similar processes, are frequently used to support transparent development of ABMTs and overall visions for the sustainable development of an area. SCP offers a framework to help meet societal values as described in conservation and sustainable management objectives[75]. Previous efforts using SCP have demonstrated the benefit of a systematic approach to cross-sectoral planning and management[76,77,78]. Ban et al. 2014 describe the key benefits of systematic planning relative to sector-specific or *ad*

74 McLeod *et al*. (2005) Scientific consensus statement on marine ecosystem-based management. Communication Partnership for Science and the Sea. Signed by 221 scientists and policy experts

75 Margules & Pressey (2000) Systematic conservation planning. Nature 405: 243-253

76 Pressey *et al*. (2003) Formulating conservation targets for biodiversity pattern and process in the Cape Floristic Region, South Africa. Biological Conservation 112: 99-127

77 Fernandes *et al*. (2005) Establishing representative no-take areas in the Great Barrier Reef: large-scale implementation of theory on marine protected areas. Conservation Biology 19: 1733-1744

hoc approaches, including "transparency (e.g. defined goals, explicit analyses of data, quantitative objectives), inclusiveness (e.g. engaged stakeholders, consideration of known elements of biodiversity), integration (e.g. complementarity of selected areas and actions, spatial connectivity), and efficiency (e.g. costs to users and implementers are minimized"[79]. Work Package 5 will build on the new spatiotemporal data streams developed by WP1-4 by (1) ensuring access to those data through data storage and dissemination mechanisms, (2) combining them with existing biogeographic and human-use data in map overlays of how biodiversity and multiple stressors interact in the Atlantic, and (3) applying tools to generate planning scenarios to inform sustainable development in the Atlantic based on site prioritisation techniques.

Methods: The ultimate goal of WP5 is to produce transparent ocean basin scale management scenarios for the whole Atlantic using the tools developed in WP5 and the data collated and processed by iAtlantic. To this end WP5 will develop and maintain an advanced web-based GIS-tool based on an open source GEONODE platform. GEONODE[80] provides a scalable platform for deploying spatial data infrastructures, providing a geospatial content management system that is easy to set-up, adapt and use. The platform will be used to store and visualise existing data on regions of interest within the Atlantic, including areas of conservation interest and areas that are currently or may in the future be commercially exploited. In collaboration with WP6, links will be established with industry partners and data repositories to facilitate data sharing and collect the necessary data to populate the platform. These data will then be complemented by data from iAtlantic's work packages including observational and model hindcast and forecast fields (e.g. temperature, salinity and velocity at 1/20 degree spatial resolution), forecasts of climate change, and larval dispersal tracking (WP1), environmental (bathymetry, substrate type, temperature, salinity) and biological (species occurrence and distribution models) data (WP2), georeferenced layers of the likelihood of change under future ocean conditions (WP3), and present and future risk maps showing the greatest convergence of stressors in the pelagic and benthic zone (WP4). To ensure the GIS-tool is fit for purpose, layers are standardised and support the flow of spatial data to iAtlantic GIS (WP5) we have nominated partners as dedicated GIS contacts in each work package (Table 6).

Table 6: Data layers to be provided to the iAtlantic web-GIS tool and corresponding WP.

WP	Partner	Data layers to be provided
WP1	SAMS	Observational and model hindcast and forecast fields (e.g. temperature, salinity and velocity at 1/20 degree spatial resolution), forecasts of climate change, and larval dispersal tracking outputs
WP2	GEOMAR	Environmental (bathymetry, substrate type, temperature, salinity) and biological (species occurrence and distribution models) data
	IEO	Bathymetry and morphometric descriptors of the seabed, including those related with internal waves interaction. Compilation of already mapped and probable location of fluid venting spots; hydrothermal venting and cold seeps. Predictive maps for heat and mass exchange between ocean and lithosphere
WP3	SAMS	Georeferenced colour coded layers of the likelihood of and area to change under future ocean conditions
WP4	HWU	Present and future multiple stressor maps showing where the greatest convergence of stressors in the pelagic and benthic zone
	IEO	Presence and absence data of selected species, and data output from laboratory experiments

The spatial and temporal data available on the platform will then be used to map the interaction between these layers (e.g. biodiversity + climate change, fishing, deep-sea mining, and shipping) and generate sustainable development scenarios for the Atlantic basin. Spatial numerical optimisation tools (e.g. Marxan[81], Marxan with Zones[82], Zonation[83], PrioritizR[84]) will be used to provide a set of focal area scenarios based on these integrated datasets. The Systematic Conservation Prioritization in R (PrioritizR) tool is currently the most effective integer linear programming technique to solve large-scale problems in short periods of time. These scenarios will represent

78 Lombard *et al*. (2007) Conserving pattern and process in the Southern Ocean: designing a Marine Protected Area for the Prince Edward Islands. Antarctic Science 19: 39-54
79 Ban *et al*. (2014) Systematic conservation planning: a better recipe for managing the high seas for biodiversity conservation and sustainable use. Conservation Letters 7: 41–54
80 http://geonode.org/
81 Ball *et al*. (2009) Marxan and relatives: Software for spatial conservation prioritisation. Ch14, pp185-195 Spatial Conservation Prioritisation: Quantitative methods and computational tools. Eds Moilanen *et al.* Oxford University Press, Oxford, UK
82 Watts *et al*. (2009) Marxan with Zones: software for optimal conservation based land- and sea-use zoning. Environmental Modelling & Software 24: 1513-1521
83 Moilanen *et al*. (2005) Prioritizing multiple-use landscapes for conservation. Proceedings of the Royal Society B 272: 1885-1891
84 Hanson 2018. Prioritizr: Systematic Conservation Prioritization in R. R package version 4.0.2.4. https://github.com/prioritizr/prioritizr

a range of optimisation targets that integrate habitat data, asymmetric spatial connectivity[85], species distributions, and human stressor data. Within each scenario these optimisation tools will be used to identify distinct zones where different management regimes can be applied. An advantage of the newer optimisation packages (e.g. PrioritizR) is their ability to arrive at solutions more quickly than previous approaches (e.g. Marxan) and to choose between several different objective functions, not just the minimum set objective used by Marxan. In addition, PrioritizR allows users to quantify an optimality gap or specify how far an acceptable solution can be from the optimum. This allows for more rapid exploration of complex problem-sets, like the challenge of producing basin-scale scenarios for the Atlantic.

To inform Europe's MSFD and MSP directives and aid MSP in all Atlantic nations, WP5 will develop multiple scenarios at an ocean basin scale, apply rigorous assessment and prioritisation techniques based on assumptions laid out in the scenarios, and visualise the multiple outputs in a comparative manner. Management organisations and policy fora will thus be able to evaluate how assumptions in the original scenarios affect potential MSP under a range of conditions. Assessments and prioritisation will be done using transparent criteria that will be agreed through stakeholder engagement. The process may lead to the identification of an optimum scenario for development, but the objective is provision of information to guide management and policy decisions, not a prescriptive result that 'should' be implemented.

Systematic planning provides a structured, transparent process for agreeing to a set of conditions and management objectives. A stakeholder meeting will be critical to facilitate consensus across the broad range of actors on potential scenarios for spatial planning. As one of two organisations that facilitated and supplied technical support for all 13 CBD regional expert workshops to describe EBSAs, the Marine Geospatial Ecology Laboratory at Duke University has global expertise and a long history of facilitating such meetings. MGEL will facilitate WP5's stakeholder meeting to create an opportunity to develop a common vision for the Atlantic and to offer feedback on potential options for communicating results of the MSP process to management organisations. Feedback will also be sought on how models are communicated and how uncertainty is propagated through the models and displayed in a manner that is transparent, but useful.

WP6 Capacity Building, Policy, Stakeholder Engagement and Outreach [Lead SC; Deputy TMG].

WP6 bridges human capacities in the Atlantic across multiple disciplines from South to North and East to West and steps up ocean governance in a whole ocean framework informed by N and S stakeholder participation so policies are more inclusive and ocean literacy is enhanced. A new community of **iAtlantic Fellows** will be created, providing a comprehensive training and capacity building programme.

Background: On the international stage, a number of initiatives, Directives, and Agreements have emerged in recent years to tackle issues threatening the health of ocean ecosystems, and the conservation and sustainable use of deep-sea ecosystems and biodiversity, including - amongst others - the UN's 2030 Agenda for Sustainable Development and associated Sustainable Development Goals (SDGs), the UNFCCC 2016 Paris Agreement on Climate Change, the CBD's Biodiversity Strategy and Aichi Targets, FAO Deep-sea Fisheries Guidelines, the EU's Marine Strategy Framework and Marine Spatial Planning Directives, the EU's Deep-Seas Fisheries Agreement, and the recent decision to start negotiations on an international legally binding instrument for the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction (BBNJ) under the UN Convention on the Law of the Sea (UNCLOS).

In addition, processes have been put in place by regional fisheries management organisations (RFMOs) and bodies in the Atlantic to **manage deep-sea fisheries on the high seas** to protect deep-sea ecosystems through the implementation of UN General Assembly resolutions and FAO International Guidelines on deep-sea fisheries. These are continually being reviewed in light of new scientific information on the status of deep-sea ecosystems. More recently, EU regulation 2016/2336 was adopted for the management of deep-sea fisheries within EU waters as well as for EU vessels fishing on the high seas of the central eastern Atlantic, a regulation that requires annual review of scientific information on the impact of bottom fisheries on deep-sea ecosystems. Both the EU regulations and the international fisheries bodies have been called on to manage deep-sea fisheries in light of the cumulative impacts from anthropogenic activities. Compounding these existing pressures, the **impacts of deep-sea mining** as regulated by the International Seabed Authority (ISA) may place further stress on deep-sea and open-ocean ecosystems. The

85 Beger *et al*. (2010) Incorporating asymmetric connectivity into spatial decision making for conservation. Conservation Letters 3: 359-368

regulatory system for future exploitation of deep-sea minerals in the Area ('Mining Code') is currently being developed by the ISA.

Overarching these issues, are the **Sustainable Development Goals (SDGs)** part of the United Nation's 2030 Agenda for Sustainable Development. For iAtlantic **SDG14**, Life Below Water, which aims to "*conserve and sustainably use the oceans, seas and marine resources*" is particularly relevant. It specifically calls for an increase in scientific knowledge, research capacity and marine technology transfer to improve ocean health and to enhance the contribution of marine biodiversity to economic development, particularly in developing nations. As a further supporting mechanism to help countries achieve the 2030 Agenda, the UN recently declared a **Decade of Ocean Science for Sustainable Development (2020-30)**. Key objectives of this initiative include enhancing the sustainable use of marine resources, expanding knowledge about marine conditions, supporting the development of the ocean economy, sustainable management of coastal ecosystems, increasing scientific knowledge about impacts of cumulative stressors on the marine environment, and achieving integrated observations and data sharing. These key objectives are in very close alignment with the overarching objectives of iAtlantic.

Approach: Against this backdrop, the concept of iAtlantic is to generate new knowledge to inform the development of responsible environmental protection policies and sustainable strategies for Blue Growth. This knowledge will be rapidly exploited and made available through direct dialogue with the relevant fora, but also via the new **iAtlantic GIS tool** developed in WP5 by EMODnet and secured for the long term. New knowledge, products and insights from iAtlantic will feed into and support the development of responsible ocean management approaches and sustainable Blue Growth strategies at national, regional and international levels. WP6 will be the main conduit for information dissemination ensuring knowledge and results from iAtlantic reach the broader Atlantic stakeholder community at international, regional and national levels, including the wider scientific community and the general public. It will promote the project at relevant fora, ensure visibility of project results and outcomes, and facilitate effective transfer of best practice, protocols and recommendations to end-users, including policy-makers, industry, conservation groups and civil society.

A common thread in sustainable development and environmental conservation strategies at international, regional and national level is the **urgent requirement for capacity building**. To deliver on their commitments to these strategies and develop their blue economies in a sustainable manner, developing nations require support to develop capabilities in marine data acquisition, analysis and interpretation, including improved access to technologies, techniques and best practice, and the translation of scientific knowledge into effective management measures and policy decisions. Capacity building is a key pillar of the UN BBNJ treaty negotiations and is an integral part of the SDGs. Regional and sectoral bodies also urgently need access to new information generated by scientific research programmes in order to better manage their respective activities and fulfil their mandates. Capacity building is implicit in both the Belém Statement and the South-South Framework for Scientific and Technical Cooperation in the South and Tropical Atlantic and Southern Oceans.

Figure 9: iAtlantic capacity building framework

Figure 8: Meeting of the 11-nation strong WASCAL graduate research programme

iAtlantic places capacity building at the core of its mission. Alongside the recruitment of a significant cohort of early career researchers (PhD students, postdoctoral researchers) who will collectively form a community of **iAtlantic Fellows**, a comprehensive training and capacity building programme will optimise the learning opportunities provided by the project's scientific activities. This programme includes hands-on training at sea, instrumentation

and technology transfer, analytical techniques and data interpretation, mentoring programme, and the transfer of knowledge to the wider stakeholder community and policy makers.

We have made capacity building an inherent component of all iAtlantic work packages facilitated by WP6 through a programme of training courses, technical workshops, seminars and hands-on knowledge transfer activities throughout the project. Our capacity building plans operate in all directions, for instance with expertise from S America in marine taxonomy transferred to N Atlantic partners via taxonomy training workshops to be run by specialists in Brazil. Workshops and events will be carefully organised to maximise participation from South America, Africa and equatorial Atlantic countries, and two multi-disciplinary regional capacity building workshops will be held. The workshop in Cape Verdes (with strong participation from the WASCAL consortium that pools expertise from Bénin, Burkina Faso, Côte d'Ivoire, The Gambia, Germany, Ghana, Mali, Niger, Nigeria, Sénegal and Togo (Figure 8), and the second at COLACMAR (Congresso Latino-Americano de Ciências do Mar) in Brazil. The iAtlantic capacity building programme will revolve around 5 key themes:

(1) transfer of technologies, facilities and experimental techniques
(2) researcher mobility (seagoing opportunities; researcher exchange)
(3) analytical techniques, dataset manipulation and integration
(4) policy and governance
(5) transferable skills.

Researchers engaged in our capacity building programme form the iAtlantic Fellowship. To increase the number and diversity of training opportunities our iAtlantic Fellows can access we have secured agreement in principle from our Industry Associate partners to provide *additional* in kind and financial sponsorship to enhance the iAtlantic Fellowship scheme (see LoS from IOGP). These iAtlantic Fellowship Enhancement Grants will be managed through a dedicated governance structure overseen by the Project Coordinator and administered by the iAtlantic Project Office. In summary, Enhancement Grants will be awarded following a competitive selection process. Candidates will fill in an application outlining: (1) A brief case for support explaining proposed activities and their relevance to iAtlantic's objectives and industry partnerships [60%]; (2) Ethical statement and plans (e.g. use of CITES listed species, work in MPAs, research including personal data) [10%]; (3) Data management plan and contractual arrangements for use of any commercially sensitive data [10%]; (4) Risk management and assessment plan [10%]; (5) Summary of any matched funding to support application [10%]. Proposals for fellowships will be submitted to the Project Office and circulated to four non-conflicted iAtlantic senior researchers to be reviewed. These researchers will score proposals as outlined above and return their reviews to the Project Office. Based upon these independent reviews the Steering Committee and a representative of the sponsors will award fellowship enhancement funding to the highest scoring proposals. We plan a series of calls for proposals 4-6 months before key iAtlantic capacity building events (e.g. training workshops and demonstrator research cruises). Funding decisions will then be made on a rolling basis throughout the year during the monthly online meetings of the Steering Committee. We reiterate that these enhancement grants represent added-value to iAtlantic and are not required for the project to deliver the workshops and other training activities proposed here.

Training will encompass the full suite of offshore survey and sampling techniques used in multidisciplinary research expeditions, including pre-cruise planning, sampling strategies, experimental design and shadowing of principal scientists during cruises - essential skills for the next generation of expedition leaders. The *iMirabilis* and *iCorsage* Flagship Demonstrator Capacity-Building cruises present particularly good opportunities for capacity building and outreach to children and their parents. As well as placements for researchers on the science expeditions themselves, iAtlantic will proactively seek opportunities for seabird and marine mammal observers to join the research ships during transit legs, which are usually considered to be science 'downtime'. This will allow collection of valuable but rarely available observational data on seabirds and marine mammals in the open ocean, critical for the better understanding and conservation of these species, as well as providing hands-on experience for trainee observers (see LoS from BirdLife International). Port calls before, during and after project cruises will be used as outreach opportunities to engage with local communities and raise awareness of the importance of Atlantic ecosystems and iAtlantic's work in expanding our scientific knowledge of the region's natural marine resources. iAtlantic will engage directly with all relevant organisations to maximise the outreach benefit of its port calls, e.g. by inviting industries active in the area and political leaders from Ministries linked to the expedition. See LoS from BP, IOGP, Ministerio para la Tranción Ecológica.

In addition, iAtlantic will collaborate with and contribute to ongoing capacity building and ocean literacy initiatives across the Atlantic region, such as the SEAmester programme (South Africa, led by UCT); AORA's Working Group on

Ocean Literacy (Atlantic); the Deep Ocean Stewardship Initiative's working group on capacity development (international); the capacity building elements of marine projects funded under the International Climate Initiative, such as STRONG High Seas (SE Atlantic), Mami Wata (western, central and southern Africa) and MARISMA (Benguela Current Convention region); and training events implemented under the CBD's Sustainable Oceans Initiative and the IOC's Capacity Development programme (e.g. see LoS from Benguela Current Commission and CBD Secretariat).

Table 7: Summary of key capacity building events in iAtlantic, many of which will be implemented within the scientific work packages and facilitated through WP6.

Workshop/Event	WP	Lead	Location	Participants	Timing
Habitat Classification and Species Distribution Modelling: Workshop to define common methods for ocean mapping at basin, regional and local scale	2	UKRI-NOC	EU	15-20	M01
Machine Learning: Workshop bringing together users and developers of machine learning methods to address benthic image data interpretation bottlenecks	2	GEOMAR	Canada	50	M04
OGCM Analysis and Lagrangian Modelling Techniques: Practical training in running OGCM models	1	GEOMAR	EU	30-40	M06
Cold-water Coral Husbandry: Workshop on laboratory rearing of cold-water coral larvae and conducting experiments in the lab	4	IMAR	Azores	20	M08
Handling, Harvesting and Analysing Big Data: Practical training in methods to manage and analyse big data	7	UNIHB	EU	35	M12
Hands-on Training in Multibeam Mapping: Ship based training in multibeam data collection	2	IEO	S Atlantic	10*	M18
Regional Capacity Building: Targeted capacity building workshop for South American participants	6	SC, GC, UNIVALI	Brazil	20-25	M24
Taxonomy of Deep-Water Corals: Workshop on the in taxonomy and biodiversity of deep-water corals	4	UFSC	Brazil	15-20	M24
Regional Capacity Building: Targeted capacity building workshop for participant from Africa	6	SC, GEOMAR	Cape Verde	15-20	M26
Statistical Approaches for Timeseries and Tipping Points: Expert workshop to define common statistical approaches for timeseries and tipping points analysis	3	UEDIN, IFREMER, GEOMAR	Cape Verde	15-20	M26
Transferable Skills Workshop: Practical training in project management, media engagement, presentation skills	6	SC	EU	20	M36
Spatial Assessment of Environmental Data: Practical training on the use of spatial planning and optimisation tools to inform management activities	5	IMAR	EU	15-20	M38
Multibeam Data Processing: Workshop on methods to process multibeam data	2	AWI, GEOMAR	EU	15-20	M38
Ocean Governance Issues: Workshop on global governance processes for ocean sustainability	6	TMG	Africa	15-20	M40
Translation of Science to Inform Policy: Practical training in approaches to translate science to inform policy, in relation to biodiversity beyond national jurisdiction	6	NMU	South Africa	15-20	M42

*10 berths will be available on the *iCorsage* Flagship Demonstrator Capacity-Building cruise, further berths on other iAtlantic cruises will also be made available to meet additional demand and provide training in other techniques.

Dialogue with stakeholder groups including international Agreements, regional Conventions, sectoral regulators, regional and national authorities, industry, NGOs, civil society and the research community has been initiated (see LoS) and will be expanded throughout the project by WP6. The WP6 team will prepare Policy Briefs tailored to relevant stakeholder group meetings and international policy fora to promote iAtlantic's work, ensure feedback from those processes into relevant iAtlantic work packages including setting ecosystem requirements, exploring how iAtlantic results will be used by different end-users, and where the different sectoral groups may be able to contribute knowledge, data and expertise to iAtlantic. A mapping exercise to determine priority stakeholder groups and meetings (both regional and sectoral) will be undertaken at the outset of the project building upon scoping at proposal stage (e.g. see LoS from CBD, Sargasso Sea Commission, Benguela Current Commission). Key events will include the UN BBNJ treaty negotiation meetings, the annual Conferences of Parties (COPs) of UN conventions such as CBD, meetings of RFMOs and bodies in the Atlantic, meetings of the International Seabed Authority relevant to

the regulation of exploration and mining in the Atlantic, meetings of the relevant regional conventions, and multi-sector conferences such as the UN Oceans conference and the Our Oceans meetings.

WP6 will critically assess current ocean governance frameworks applicable to management of human activities affecting Atlantic marine ecosystems under conditions of change to identify opportunities for improving management approaches and ensure iAtlantic's research best meets the need of policy makers throughout the Atlantic. WP6 will also interface directly with our industry associate partners, for example by using their advanced offshore monitoring capacities (e.g. the DELOS seabed ecosystem observatories off W Africa operated by BP) to supplement iAtlantic's ecosystem resilience research outputs (WPs1-5). Through this close dialogue between iAtlantic and industry the project will contribute to prevent adverse ecosystem impacts from industry by strengthening ecosystem resilience and acting for ecosystem restoration e.g., through dialogue on corporate mitigation hierarchies to avoid, mitigate or restore ecosystems that are vulnerable to multiple stressors.

A series of high-level Stakeholder Dialogue Meetings will be organised for invited stakeholder representatives, including policy-makers, industry bodies, regulators, IGOs/NGOs, fisheries organisations, the European Commission, government ministries and representatives from related research programs. Results from iAtlantic will be presented to stakeholders to get their feedback with regard to needs for conservation, sustaining ocean health and identifying pathways towards a sustainable Blue Economy. Dialogue meetings will be organised three times during the course of the project. Locations of these meetings will be linked to major meetings/conferences to minimize travel for participants (e.g. meeting during Oceanology to engage industry) and to ensure S Atlantic participation (e.g. meeting during COLACMAR in Brazil). A report of each meeting will be produced. iAtlantic will also work with the new BG08 AANCHOR-CSA on stakeholder engagement planning.

New knowledge, methods and technologies developed in iAtlantic will have direct relevance for evolving governance structures and policies for sustainable management of Atlantic ecosystems. WP6 will communicate to relevant audiences using appropriate language and tools to maximise uptake and impact of project results. It will establish a clear project identity, web presence, project literature and key communication pathways such as social media (Twitter), newsfeeds, podcasts, project newsletters, and media articles (see Section 2.2).

Dissemination activities will also be supported through the iAtlantic Project Office in collaboration with WP8 including a project website with research cruise and partner blogs, appropriate use of social media and production of iAtlantic project videos. Scientific dissemination will primarily be via presentations at scientific symposia and peer-reviewed publication.

WP7 Data Management [Lead UniHB]

As well as creating a sustainable data infrastructure to manage, process and store iAtlantic data, WP7 drives forward an enhanced All Atlantic data sharing community through (1) a new Atlantic GEOSS community site, (2) expanded resources for EMODnet's Atlantic user-base and (3) training iAtlantic Fellows through our Big Data Workshop. WP7 is a collaboration between long-term data repositories in the N and S Atlantic committed to the FAIR principles of data management.

Rationale: To maximise the impact of results generated by iAtlantic, it is essential that state-of-the-art data management techniques are adopted, which adhere to international standards, provide efficient and flexible workflows and use appropriate long-term data repositories. To achieve this, PANGAEA (Germany), SAEON (South Africa) and the harvesting EMODnet portals are the designated long-term data repositories for iAtlantic. In addition, WP7 will use the international collaboration between these repositories to drive forward an All Atlantic synergy in efforts to enhance access to and discoverability of relevant Atlantic data from otherwise widely dispersed sources. To achieve this iAtlantic proposes a new Atlantic Ocean Observation Community site in GEOSS. This is important because the scale of the Atlantic Ocean and number of bordering countries have previously hindered long-term coordinated observation strategies. Projects like AtlantOS (H2020) make significant contributions to growing an Atlantic community around monitoring ocean health and Blue Growth, but the trans-regional activities initiated through such projects cease once the projects end and a more sustainable solution is needed. The GEOSS Portal (www.geoportal.org) developed by the 'Group on Earth Observations' as an international one-stop shop for earth observations has been an EU priority in terms of data access and international cooperation. GEOSS has recently expanded its functionality to include focal communities (and other larger initiatives) on so called mirror sites. While AtlantOS has a mirror site in the GEOSS Portal, it only contains links to data funded directly through AtlantOS, omitting a large fraction of the data AtlantOS and other Atlantic H2020 projects use. AtlantOS also has a mirror site and dashboard running on EMODnet Physics and EMODnet's central portal has a dedicated section for Atlantic data users and stakeholders. To overcome these issues, iAtlantic

will create an international GEOSS Atlantic Ocean Observation Community site, where we will bundle, display and disseminate information from the community of Atlantic Flagship projects, other Atlantic research initiatives (e.g. AORA), major European marine data sharing initiatives such as EMODnet, research infrastructures and industry. Finally, WP7 will help run a **'Big Data Workshop'** led by GEOMAR to train iAtlantic Fellows and early career researchers in data management and curation techniques.

Approach: WP7 will ensure use of **unique identifiers** for iAtlantic researchers, experiments, datasets, physical samples etc. (e.g. DOI, ORCID, IGSN). Zenodo will be used to archive project related documents (presentations etc.). PANGAEA is an active partner in the community driving developments to extend the current system of such persistent identifiers (e.g. to include identifiers for proposals, funding agencies etc.) and will ensure iAtlantic adopts the latest best practices in such process archiving. Through its Data Warehouse function PANGAEA will also ensure iAtlantic achieves highly efficient retrievals and compilations of time slices or surface data matrices on any measurement parameters produced by the consortium.

All activities in WP7 will take place under the umbrella of the **H2020 Open Research Data Pilot**, which aims to improve and maximise access to and re-use of research data generated by projects. To achieve this, iAtlantic data will have to be archived in our nominated long-term open-access repositories PANGAEA and SAEON with appropriate crosslinking to ENA and other relevant repositories. Through EMODnet's role in WP5 we ensure further dissemination via their Atlantic Community areas.

WP7 will produce a **H2020 Data Management Plan (DMP)** describing handling procedures for iAtlantic data. The DMP will follow the FAIR principles, making data **F**indable, **A**ccessible, **I**nteroperable and **R**e-usable. iAtlantic will use state-of-the-art data management techniques, specific curation standards and workflows including: (1) Persistent identifiers for datasets (Digital Object Identifier, DOI); (2) Standardised metadata and use of specific dissemination protocols; (3) Cross-linking between data and literature to support open science via the framework for scholarly link exchange[86].

PANGAEA will also enhance iAtlantic with a number of **innovative data handling and data publishing approaches**, starting with an automated data ingestion workflow using the JIRA ticket system. PANGAEA's Data Curators ensure data quality and speedy publication of datasets and are available for communication with all data providers. Each dataset in PANGAEA receives a unique DOI making it citable and re-usable and published under a Creative Commons License. PANGAEA offers a standardised metadata harvesting protocol (OAI-PMH)[87], used for further dissemination to infrastructures including EMODnet[88]. PANGAEA cross-links with literature to connect scientific publications and their underlying data. PANGAEA's involvement in projects like OpenAire, THOR and FREYA ensure Open Science and use of Open Identifiers for discovery and use of research resources become an integral part of the consortium. **iAtlantic's data management workflow** will also benefit from PANGAEA's activities with regard to interconnecting datasets and samples:

- A link between sequence data archived in the European Nucleotide Archive (ENA[89]) and its accompanying environmental data archived in PANGAEA will be established. This new approach will link the DOI issued for PANGAEA datasets to the accession number issued for ENA datasets, and vice versa. A brokering service established with the GFBio project[90] will be used to achieve this.
- PANGAEA has established an automated software interface to the IGSN (International Geo Sample Number) metadata store (https://doidb.wdc-terra.org/igsn/), thereby enabling a fully automated registration process for IGSN's issued for specific samples.
- A workflow to connect to Biosamples (https://www.ebi.ac.uk/biosamples/) is under construction

In addition, PANGAEA offers data 'beyond the project', i.e. data that have different sources but might be used on top of iAtlantic data to create or enhance data products or models. This is exemplified through our plan to create a new **GEOSS Atlantic Ocean Observation Community site**. iAtlantic will network with other projects funded under this and previous calls, major European data sharing initiatives such as EMODnet and Copernicus Marine (CMEMS), international observation networks and initiatives, research infrastructures, government agencies and industry

86 http://www.scholix.org/
87 https://www.openarchives.org/pmh/
88 http://www.emodnet.eu/
89 https://www.ebi.ac.uk/ena
90 http://www.gfbio.org

involved in Atlantic observations to build a community site for data providers and users in GEOSS (see LoS from ESA). Through this strategy, iAtlantic will build best practice, encourage both harmonization of observation strategies and better centralisation and open access to data using a long-term instrument that is not linked to the lifetime of this or other projects. Complementary information and appropriate cross-references will be made between the GEOSS Atlantic Community site and the Atlantic stakeholder pages of EMODnet's central portal to ensure widest possible number of users/stakeholders are informed and find and retrieve all relevant data and observation resources which are openly available.

Finally, the iAtlanticGIS developed through WP5 will showcase the project to the EMODnet community as well as wider users/stakeholders who could use iAtlantic's outputs and resources. Building upon this, iAtlanticGIS will be used in WP7 both to act as an interface for the iAtlantic consortium and support EMODnet's mission to establish long-term marine data and information portals ensuring that suitable data layers are made available via their data portals and the European Atlas of the Seas for wider dissemination to diverse stakeholders. This approach will be used as a hands-on case study during the 'Big Data Workshop' that WP7 will deliver with GEOMAR (see Task 7.3).

WP8 Coordination and Management [Lead UEDIN; Co-leads UNIVALI (Brazil), UWC (South Africa)]

Supporting all activities WP8 will provide coordination for management, reporting and dissemination components as well as the extensive iAtlantic cruise programme through a dedicated Project Office and will facilitate iAtlantic engagement with other Blue Growth projects and related initiatives. WP8 will convene the General Assembly (all beneficiaries) Steering Committee (Coordinator, WP leaders, Regional Coordinators and Cruise Coordinator), External Advisory Board (Coordinator with representatives from industry, policy, science and government) and Independent Science Council. The Steering Committee will meet online every month, with all Beneficiaries and International and Associate Partners meeting at annual General Assemblies. Cruise coordination and arrangements for ROVs and AUVs will also be coordinated by WP8.

1.3.5 Gender issues

iAtlantic research is designed to assess the status of Atlantic marine ecosystems, and we are not proposing research with human subjects. Where studies of live animals are planned, iAtlantic researchers are fully aware of the need to understand gender influences on experimental results. In the case of the invertebrate corals and sponges studied by iAtlantic, basic reproductive biology is known in some cases and techniques exist to discriminate between sexes, or to see whether the organisms are hermaphroditic. Similarly, biologists responsible for compiling marine mammal timeseries are fully aware of the need to factor the animal's sex into analyses.

The importance of gender analysis in natural resource management and Marine Spatial Planning have been recognised[91] but is often neglected. Public perception of climate change may also be gendered, and we take this into account in iAtlantic by recognising that men and women may view ecological and ocean health issues differently and by considering gender aspects in public outreach efforts and any surveys undertaken. Gender will be a standing agenda item at all General Assembly meetings to ensure good practice from schemes such as the UK's Athena Swan initiative is adopted throughout the consortium. Gender issues will be specifically considered in all iAtlantic activities to promote equal female/male participation in events, courses, and seminars. At events where the project is represented on a panel we will endeavour to put forward a balanced gender of leaders to represent the project. Gender indicators will be established, monitored and reviewed throughout the project.

In terms of assuring gender balance and fair assignment of roles and responsibilities in the iAtlantic consortium we will promote equality between females and males in all activities. The iAtlantic consortium has been carefully constructed with gender balance at its core and views diversity as one of the strengths in our consortium. There are four female and four male work package leaders. Importantly, the cruise coordinator is female and the iAtlantic will be led by a Steering Committee composed of 7 females and 6 males. Over the course of the project iAtlantic will strive to maintain a balanced gender ratio across all working groups and sub-committees, and from our knowledge of the consortium at proposal stage we believe this can be achieved. The Project Coordinator will ensure that all partners are aware of the H2020 model Grant Agreement and that requirements regarding all forms of parental leave and flexible working will be strictly enforced. The coordinator will ensure that all partners are aware of both the requirements of H2020 and the Commission's general policy on gender/equality issues.

91 Torre-Castro *et al*. (2017) Gender analysis for better coastal management – Increasing our understanding of social-ecological seascapes. Marine Policy 83: 62-74

1.4 Ambition

The ambition of iAtlantic is to apply a multidimensional area-based integrated ecosystem approach to produce a step change in our understanding of which Atlantic regions and ecosystems are under the greatest risk of substantial change, and thus which regions and ecosystems need to be the focus of management measures to ensure economic activities in these regions are developed in a sustainable manner.

1.4.1 Advances Beyond the State of the Art

iAtlantic will advance today's limited static knowledge of distribution and function of Atlantic ecosystems to create a new understanding of their dynamics in space and time. It will achieve this by upscaling the latest cost-effective and innovative approaches from the N Atlantic and use them to demonstrate and conduct ecosystem assessments across the whole Atlantic. These include **autonomous robotic ecosystem mapping** incorporating water column **eDNA sampling**, **artificial intelligence** to process large volumes of ecosystem data, **novel *in situ* and *ex situ* assessments** of multiple stressor impacts, **basin-scale genomics, circulation and particle-tracking**, and **new biogeochemical sensors on *in situ* ocean arrays** to monitor ecosystem-relevant fluxes and predict changes and tipping points. Archives of ecosystem data, held by both iAtlantic's S Atlantic academic and industry partners, will also be exploited in new ways for whole-ocean ecosystem assessments, e.g. effects of AMOC variability on deep-sea coral ecosystems. These advances will transform current deep-sea and open-ocean governance and resource management because policy-makers will have the science and spatial tools to underpin conservation planning and to prioritise regions and ecosystems at most risk of multiple stressors. They will also allow regional managers and local communities to pre-emptively respond to forecasted environmental changes and feed into the process via iAtlantic's open-access data portals (see WP7). Through bridging between observational systems, exchanging data, researchers and equipment from South to North and East to West[2], iAtlantic will test, for the first time, the cumulative and potentially synergistic effects of global change and multiple stressors on deep-sea and open ocean ecosystems.

The number of marine species that remain to be described is poorly known but certainly vast[92] and morphological inventories using conventional techniques would require several thousand years to complete[93,94]. The now exponential increase in use of next generation sequencing, and methods to sample and sequence environmental DNA (eDNA) create a step-change to tackle this issue[52]. Although techniques are still in development, eDNA has the potential to deliver estimates of diversity or indices of impact much quicker and equally well compared to morphologically based inventories and offers exciting potential to detect species in the water column including early life stages such as larvae[95,96].

Over the past decade, basin-scale ocean modelling has reached a degree of realism that allows simulating the large-scale horizontal and overturning circulation with explicitly resolved mesoscale. The next step, to connect ocean to atmospheric models to make combined predictions, is still missing on a routine basis and is only possible for a few coordinated (HighResMIP) experiments performed by large modelling centres. The use of ocean nesting (VIKING, INALT) in coupled ocean-atmosphere-sea/ice experiments allows us to bridge the gap and to perform computationally efficient integrations, e.g. to test a series of scientific hypotheses. In addition to this innovative concept, iAtlantic will take a significant step towards even smaller scales by connecting the basin-scale models with regional models at unprecedented scales down to 10 m. This combination will allow us to refine the influence from basin-scale circulation dynamics on the regional scale and vice versa, which will be an important step to connect the targeted marine ecosystems through the gyre circulation and AMOC.

Furthermore, the iAtlantic GIS portal will visualise and communicate high-resolution model results and highlight the complexity of flows and particle motions in the deep ocean. The proposed observations will provide pioneering and ground-breaking observations by (i) direct observations of the Brazil Current transport variability upstream of the Brazil/Malvinas Confluence and (ii) dissolved O_2 time series at sensitive gateways of the South Atlantic subtropical gyre.

92 Ramirez-Llodra *et al*. (2010) Deep, diverse and definitely different: unique attributes of the world's largest ecosystem. Biogeosciences 7: 2851-2899

93 Appeltans *et al*. (2012) The magnitude of global marine species diversity. Current Biology 22: 2189-2202

94 Costello *et al*. (2012) Predicting total global species richness using rates of species description and estimates of taxonomic effort. Systematic Biology 61: 871-883

95 Thomsen *et al*. (2012) Detection of a diverse marine fish fauna using environmental DNA from seawater samples. PLoS One 7: e41732

96 Arellano *et al*. (2014) Larvae from deep-sea methane seeps disperse in surface waters. Proceedings of the Royal Society B 281: 20133276

1.4.2 Innovation Potential

iAtlantic will use and develop state-of-the-art technologies for ocean monitoring, ecosystem assessment and conservation planning at ocean basin scale to provide managers with the new knowledge and tools to enhance the effectiveness of current monitoring activities integrated across the N and S Atlantic. A major bottleneck in advancing the Blue Economy is the availability of key enabling technologies, data and information to inform spatial planning and environmental protection processes[97]. iAtlantic will contribute to overcoming this bottleneck by demonstrating new, technology driven, imaging, mapping and data analysis methodologies that will have direct applicability in the marine survey industry, a sector which underpins environmental assessments for commercial activities in the deep and open ocean (see letters of support from IOGP, Proceano, BP, Petrobras and Kongsberg). iAtlantic will deliver a proof of concept that low-cost stereo camera systems can reliably produce data on the health and status of deep-water ecosystems, map the seabed with hyperspectral scanning, generate the first eDNA dataset from autonomously-collected samples in the deep sea and demonstrate that enhanced analysis of large volumes of photographic data from mapping and surveying is possible using semi-supervised machine learning, GPU-based image processing and massively-parallel cluster computing[36].

The low-cost camera system that will be developed by IMAR is expected to cost €5-10k, is providing a versatile new solution for fast seabed imaging and ground-truthing of deep-water habitat maps. These custom-made drop-down camera systems, constructed by assembling small action cameras, powerful lights and an umbilical to send the video signal to the surface will provide high-impact results with significant innovation potential. Construction, including the steel frames for deployment, is relatively simple and requires limited engineering work to set up the live-view feed from the camera to the surface. Although the quality and amount of information that can be extracted from ROV footage will frequently be higher, using custom-made stereo drop-down camera systems incorporates several advantages; operability from variety of vessels, making it very versatile and low operating budget (more affordable daily rates on smaller vessels and no requirement of trained staff to use it). The area explored can be very large, compared to that typically surveyed by ROVs; using a stereo system enables the determination of the area explored and the size of the organisms. iAtlantic will also test and assess the degree of some of the potential shortcomings of this camera system, including: depth limitation, control of camera orientation, operation in complex topographies (e.g. steep walls and seamounts), degree of taxonomic resolution and identification of habitats, operability in highly fished areas (e.g. entanglement in lost fishing gear).

The new multi- and hyper-spectral cameras developed by associate partner Ecotone (Figure 10) will be tested for the first time in deep ocean surveying by IFREMER. It has been used in a range of applications including detecting species such as corals and sponge, identification of sediment types and cuttings from drilling operations, and identification of minerals for deep sea mining. In iAtlantic a proof-of-concept study will be performed to assess the accuracy of this technology for deep-sea environmental mapping and monitoring and the detection of changes in health status of marine organisms.

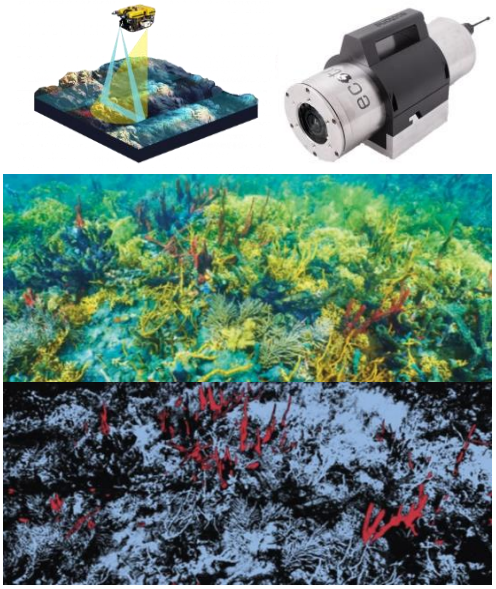


Figure 10: Ecotone underwater hyperspectral imager concept: showing Ecotone's underwater hyperspectral imager deployed from an ROV and two example images illustrating how hyperspectral data allows benthic species to be detected and highlighted.

A new environmental DNA (eDNA) sampler, currently at Technology Readiness Level 6 and undergoing final testing by UKRI-NOC, has been developed for the high-resolution collection of marine samples for eDNA analysis. This could represent a new tool for 21st century ecological studies as molecular biodiversity identification is emerging as a high throughput and cost-effective alternative to traditional specimen sampling approaches and in particular, the analysis of eDNA provides an opportunity to measure biodiversity in space and time at unprecedented scales, ideally suited to the whole Atlantic.

These demonstrations will aim to lead early commercial adopters into the market such as IOGP, BP, Woodside and Petrobras, encouraging investment in fully commercialising these technologies by marine technology businesses

97 European Commission (2017) Report on the Blue Growth Strategy. Towards more sustainable growth and jobs in the blue economy. SWD(2017) 128

such as associated partners Kongsberg Maritime which is considered a benchmark company in the offshore industry, particularly in the development of underwater acoustics and marine systems. Their participation in iAtlantic also provides the opportunity to enhance the quality and capability of their products for the maritime research and commercial community around the whole Atlantic.

To enhance exploitation opportunities, associate partners will have full access to these technologies for potential uptake and integration in their business operations and services. For example, ETME Limited are particularly interested in the new eDNA sensor and camera systems for platforms they aim to develop for offshore environmental and oceanographic monitoring activities. The results of iAtlantic on tipping points and multiple stressors is of specific interest for exploitation in the consultancy services they provide.

Innovations in systematic conservation planning at ocean basin scale will provide managers with the new knowledge and optimisation tools to enhance the effectiveness of current monitoring activities integrated across the N and S Atlantic. For the first time, iAtlantic will use data on the composition and distribution of remote deep and open-ocean Atlantic ecosystems, including indicators of the frequency by which ecosystem components change, to produce planning scenarios for the whole Atlantic. These scenarios will be developed in the context of detailed understanding of growing human activities in a changing ocean allowing iAtlantic to address conservation planning both at whole ocean basin scale and will consider and in context of multi-regulatory processes. This allows us to provide the wider policy community with the best available information for large scale management. Systemic planning tools and optimisation algorithms will be evolved in their ability to more quickly solve optimisation problems with larger and more diverse datasets, and at higher spatial resolutions. Given ongoing advances in computing speed, these tools can now be implemented at ocean basin scale for the first time. Coupled with reproducible science practices, these approaches build transparency and improve understanding of the resulting scenarios. The tools and products produced by iAtlantic will therefore set the scene for innovation to realise a transformative shift from static to dynamic data portals, and to help to operationalise adaptive management in the Atlantic by identifying priority areas in the North and South for management and protection.

2. IMPACT

2.1 Expected Impacts

iAtlantic will directly inform integrated regional and basin-scale policies[2] to enable sustainable Blue Growth in the North and South Atlantic and support the implementation of the EU-Brazil-South Africa Belém Statement (Table 8). New levels of cooperation between 80 key stakeholders around the Atlantic basin will improve our understanding of the oceans importance in the context of increasing human activities in a changing ocean. The project will massively advance our understanding and capabilities to avoid significant adverse impacts by predicting and adapting to change with new knowledge generated on the basin-wide and local drivers at play in marine ecosystems and services included in the UN SDG14 targets (Table 9). New international links will be forged through joint research activities spanning the South and North Atlantic creating enduring relationships between research, Blue Growth and policymaking stakeholders around and across the Atlantic basin, including Small Island Developing States (SIDS) and Least Developed Countries (LDCs). New levels of cooperation between more than 40 key stakeholders around the Atlantic will improve our understanding of the ocean's importance in the context of increasing human activities at a time of rapid climatic change. iAtlantic will massively advance our ability to avoid significant adverse impacts by predicting and adapting to change with new knowledge generated on the basin-wide and local drivers at play in marine ecosystems.

Currently disparate, vast and unconnected data sources will be shared and integrated together with new analytical resources provided to enhance the knowledge needed to learn from the past, understand the present and predict the future state of the Atlantic Ocean. New insights to the physics and historic and future dynamics of the Atlantic's overturning circulation and how it influences marine ecosystems will be uncovered, enabled by the development of readily adoptable and affordable new technologies developed in iAtlantic, serving to significantly increase capacity to fill in the large gaps in our knowledge of Atlantic ecosystems by use of enriched, open, integrated, basin scale data, forecasting models and systems.

In the long-term iAtlantic's greatest legacy will stretch beyond the data and understanding generated by the project to the enhanced human capacity achieved through our training programmes and the strong cohort of iAtlantic Fellows as they move forward through their careers.

2.1.1 Call Topic Expected Impacts

Table 8 iAtlantic's relation to call topic expected impacts.

Topic Expected Impact	iAtlantic Expected Impacts	Related Del and MS
1: Contribute to the implementation of the EU-Brazil-South Africa Belém Statement on Atlantic Ocean Research and Innovation cooperation.	✓ Enhanced cooperation between BR, AG, SA, EU, USA and CA including sharing of data, infrastructure (arrays, ship time, facilities) and bilateral capacity building. ✓ New knowledge on the status of Atlantic marine ecosystems to improve monitoring, forecasting and sustainable management of the whole Atlantic. ✓ Enhanced SAMOC arrays integrated with new sensors to improve observations and understanding of S Atlantic dynamics and circulation. ✓ Creation of an unprecedented inter-disciplinary and trans-continental framework to deepen our knowledge of the interrelations between oceans and climate change, and between major components of the Atlantic's circulation system. ✓ Generation of South-to-North and North-to-South human, technological and ocean observing capacities. ✓ Optimised and efficient shared research infrastructure and data across European, South African and Brazilian data repositories.	D1.1, D1.2, D2.1, D4.1, D4.2, D4.3, D6.3
2: Contribute to create the right conditions for the development of better and accurate monitoring, modelling, planning, management and prediction capacities in the whole Atlantic.	✓ Predictive insights and filling of major gaps in important geological, chemical, biological, and ecological knowledge understanding of whole Atlantic Ocean health and its links to ecosystem services. ✓ Enhanced capacity for ocean observation, mapping and modelling/forecasting across the whole Atlantic. ✓ Habitat maps of the Atlantic, at local regional and basin scale resolutions to support MSP. ✓ Baseline data on ecosystem functioning to underpin planning, monitoring, exploitation and management in the deep and open-ocean. ✓ Enhance key observatories and data portals including SAEON, the European Ocean Observing System (EOOS) driven by European Marine Board, EuroGOOS and EMODnet, OBIS and a dedicated GEOSS Atlantic Community Portal.	D1.1, D1.2, D2.1, D2.2, D2.5, D3.1., D5.1, D5.2, D5.3
3: Develop ecosystem assessments and forecasts as well as a deeper understanding of vulnerabilities and risk including those relating to the global climate system and the impacts of climate change.	✓ New data on connectivity, ecosystem change, and the impact of multiple stressors including climate change across the whole Atlantic. ✓ Baseline data on deep and open-ocean ecosystem functioning for integration in predictive global biogeochemical and climate models. ✓ Enhanced understanding of which Atlantic regions and ecosystems are under the greatest risk of substantial change. ✓ Fundamental understanding of the interactions of stressors and the deleterious effects on ecosystems to support science-based MSP. ✓ Use of a correctly scaled and integrated ecosystem assessment framework coherent across the Atlantic and informed by climate-based. predictions to highlight priority management areas in the N and S Atlantic over short and long-term timescales. ✓ Identified hotspots of ecosystem sensitivity and vulnerability to change to strengthen capacity to manage risks now and in the future. ✓ New insights into the synergistic effects of stressors on marine ecosystems.	D2.2, D3.2, D3.3, D4.2, D5.3.
4: Increase the competitiveness of the EU's Blue Economy by developing new technologies to service societal needs and new value chains.	✓ New scientific data available to inform the management plans and policy decisions that enable Blue Growth. ✓ Enhancement and piloting of autonomous eDNA sampling to facilitate non-invasive ecosystem assessments will provide data and new protocols to support uptake of eDNA as an effective monitoring tool in a wide number of fields relevant to the Blue Economy including fisheries management, bioprospecting and biodiversity monitoring. ✓ Demonstration of novel machine learning solutions for application at sea, which will be of direct benefit to the marine survey sector, in terms of faster data processing and development of more robust products. These advances are likely to be broadly applicable in other sectors. ✓ New technology-driven solutions for *in situ* environmental monitoring, imaging and data processing along with standardised data collection and integrated data management and archiving between the N and S Atlantic. ✓ Reduced cost of obtaining and processing marine data and opportunities realised for its use and increased uptake.	D2.4., M2.2, MS2.3.
5: Contribute to the sustainable management and	✓ Use of new management planning tools supporting the storage, dissemination and spatiotemporal analysis of marine data. ✓ Identification of the environmental factors that should be closely monitored to progress our capacity to predict ecosystem change. ✓ Development of Area-Based Management Tools (ABMT) to facilitate marine spatial planning (MSP) in areas beyond national jurisdiction	D5.1, D5.2, D6.4

Topic Expected Impact	iAtlantic Expected Impacts	Related Del and MS
protection of marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and act for their restoration to achieve healthy and productive oceans.	(ABNJ) to avoid significant adverse impacts and improve management of the Atlantic in the context of deep-sea mining (APEIs-ISA) and sustainable fisheries (VME-RFMOs). ✓ Improved environmental assessment and monitoring approaches by key industries. ✓ Identification of genetic stepping stones and new area-based management options to inform management and policy processes including maintaining connectivity for restoring ecosystems. ✓ Improved understanding of the resilience of ecosystems by Regional Fisheries Management Organizations (RFMOs). ✓ Better mapping of potential VMEs and improved description of EBSAs by the CBD. ✓ Increased capacity, ocean literacy and understanding of the value and importance of Atlantic habitats, highlighting the threats to their sustainability and actions needed to protect them.	
6. Contribute to the development of ecosystem services to ensure the long-term sustainable management of marine resources (UN SDG 14).	✓ Enhanced knowledge of marine ecosystems in deep and open portions of the Atlantic where knowledge is least developed is therefore a fundamental contribution towards SDG14 (see Table 9, iAtlantic contributions to SDG14 targets). ✓ Enhanced understanding of the status and dynamics of the whole Atlantic, facilitating socio-economic evaluation of resources and the development of ecosystem services frameworks to quantify the value of deep and open ocean habitats, while supporting improved marine management, sustainable development and protection. ✓ Improved data on the range and distribution of Atlantic habitats will enhance the educational and scientific value of the Atlantic and increase the understanding and value of the cultural services the Atlantic provides.	D1.1, D1.2, D2.1, D2.2, D2.5, D3.1., D5.1, D5.2, D5.3, MS1.8
7. Increase EU leadership in ocean technology developments.	✓ Accelerated development and adoption of new enabling technologies (MAPS eDNA sampler, machine learning, deep-sea LIDAR mapping and autonomous underwater systems such as AUVs and gliders developed by EU partners) to provide fast, cost-effective and accurate information on the status and health of deep and open- ocean ecosystems at unprecedented scales and economies. ✓ Leadership in marine spatial management adoption of new knowledge and technologies. ✓ Integrated data from the N and S Atlantic deposited in European data portals, providing fully Atlantic-scale data that create opportunities for innovation and potentially resulting in new products and services.	D2.4., MS2.2, MS2.3.
8. Improve the professional skills and competences of those working and being trained to work within the Blue Economy.	✓ New links between N and S Atlantic and equatorial Africa fostered by researcher exchanges, and enhanced mobility of students and trainers. ✓ Increased multi-disciplinary and transferrable skills particularly in mapping technologies, modelling, ecosystems and data management through training exchange of knowledge and upskilling. ✓ Expanded and extended national and regional competencies in ocean sciences, which will help inform decision making and implement sustainable approaches to ocean management and use of natural resources. ✓ Cohort of inter-disciplinary marine scientists emerging from the iAtlantic Fellowship programme.	D3.1, D6.4
9. Contribute to policymaking in research, innovation and technology.	✓ Use of integrated sets of tools and methodologies informing regional ocean management and encouraging inter-disciplinary, trans-continental and multi-stakeholder stewardship of the deep and open Atlantic Ocean. ✓ Area-Based Management Tools (ABMT) to facilitate marine spatial planning (MSP) for areas beyond national jurisdiction (ABNJ) to strengthen regional ocean governance and facilitate integrated and cross-sectoral approaches to the sustainable use of marine biodiversity in the S and N Atlantic. ✓ Improved focus on Areas of Particular Environmental Interest (APEIs) in the context of the developing regime for deep-sea mining. ✓ Responses to critical assessment of current ocean governance frameworks to identify opportunities for improving management. ✓ High-level Science-Policy Panel meetings and policy briefs highlighting options and challenges for Atlantic Ocean governance and recommendations for future action, including further capacity building. ✓ Better informed policy officials on needs to deliver coordinated and coherent ocean governance that are more inclusive of the S Atlantic.	D5.3, MS1.8, MS5.4, MS6.1, MS6.2

Table 9: Impact on achievement of UN SDG14 targets.

UN SDG 14 Target		Contribution of iAtlantic outputs to achieving target
14.2	*Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.*	iAtlantic's systematic conservation planning tools will prioritise both resource exploitation and conservation needs, deriving sustainable management scenarios in which significant adverse impacts are avoided and ecosystem resilience strengthened by reducing pressures and conserving areas critical to maintaining ecosystem connectivity.
14.5	*Conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information.*	The study of vulnerable marine areas and potential identification of new vulnerable areas will improve quality and quantity of scientific data to inform conservation policies and national and international legislation (e.g., through UN-FAO VME designation and the UN-CBD EBSA process).
14.7	*Increase the economic benefits to Small Island Developing States (SIDS) and least developed countries (LDCs) from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.*	iAtlantic's WP5 systematic conservation planning will help businesses and regional advisors operating in SIDS and LDCs to increase economic benefits and assess socioeconomic impacts of climate change by finding optimal solutions balancing exploitation with sustainable management. See LoS from industrial partners AquaBioTech, IOGP, BP, Petrobras and regional advisors Sargasso Sea and Benguela Current Commissions who have projects in, or stewardship for, SIDS and LDCs including off west Africa, the Bahamas and West Indies. iAtlantic also builds sustainable management capacity in SIDS of the Cabo Verdes and 10 African LDCs in the WASCAL consortium during WPs 3 and 6.
14.A	*Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular Small Island Developing States and least developed countries.*	iAtlantic will strongly support this target, generating new research capacity, strengthening human capacity through joint training activities, exploring the use of new subsea mapping and eDNA technologies, enhancing monitoring arrays and specifically analysing environmental stressors and enabling forecasting of future conditions and threats to marine biodiversity in African LDCs including Cabo Verde.
14.C	*Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources.*	Policy-directed activities of iAtlantic will support this target by providing detailed and robust scientific evidence and policy briefs to key organisations tasked with legislating for effective conservation both within and beyond national boundaries. Directly feeding into policy and science around activities such as deep-sea mining, pioneering approaches in iAtlantic aim to directly support sustainable use of Atlantic Ocean resources.

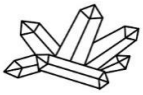
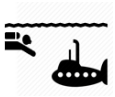
2.1.2 Other Substantial Impacts

A platform of knowledge and tools for further all-Atlantic research and innovation. Activities during and beyond the end of the iAtlantic project will impact future work to fill gaps in our knowledge and provide an integrated resource that will be used to advance efforts to understand, protect and exploit the Atlantic in the future and avoid irreversible decline.

The physical, chemical and biological observations collected and processed by the project will meet the needs of many end-users across science, policy and industry. By collecting, processing and storing its data in standardised formats, iAtlantic's results will support both national and pan-Atlantic initiatives. For example, the collated bathymetry and habitat maps will support ongoing work to map the Atlantic at broad (e.g. ASMIWG, Seabed 2030) and regional scales (e.g. Canada's COMREN initiative), as well as informing local spatial planning activities. Furthermore, the enhanced understanding of stressors and tipping points and improved oceanographic and ecosystem connectivity models generated by iAtlantic will feed into international review and assessment processes including via the UN World Ocean Assessment and Intergovernmental Panel on Climate Change (IPCC).

Contribution to the EU Blue Growth Strategy and the Blue Economy. The current output of the global ocean economy is €1.3 trillion[98], a figure that is expected to double by 2030[97]. iAtlantic will directly contribute the key components; knowledge, spatial planning tools and enhanced surveillance technologies and infrastructure required to realise further growth of ocean-based industries in the Atlantic and deliver on the potential of the Blue Economy. The potential impact of iAtlantic outputs for key sectors of the Blue Economy are shown in Table 10 below.

Table 10: Impact of iAtlantic activities and results for sectors of the Blue Economy.

Sector	iAtlantic Impact
Seabed Mining 	iAtlantic will produce whole ocean projections of climate change risk against a backdrop of ecosystem connectivity, status and resilience to sector-specific multi-stressors including toxicity and plumes of SMS mine tailings arising from seabed mining. These outputs closely align with the International Seabed Authority's (ISA; the sector's regulator) 2019–2023 Strategic Plan to develop regional environmental management plans: these currently lack baseline data from the S Atlantic and knowledge of multi-stressor impacts on benthic or pelagic organisms and ecosystems. iAtlantic's systematic conservation planning will also align and enable seamless data integration with ISA's new Deep-sea Data Portal to ensure iAtlantic scenarios inform decision making and Atlantic governance, which is very timely as the ISA seeks to conclude agreements regarding mineral extraction in ABNJs.
Aquaculture 	The project's all-Atlantic climate-based predictions of ocean change and regional ecosystem status assessments directly benefit planning activities in the predominantly coastal aquaculture sector, both in terms of changes to continental shelf circulation that flush and supply aquaculture sites but also because temperature, salinity and oxygen govern environmental suitability for cultured finfish and invertebrates. iAtlantic's systematic conservation planning can also explore the feasibility of aquaculture sector growth by scenario-testing the sector's expansion into deeper or open-ocean offshore regions without increasing multi-sector conflict and risk to ecosystems.
Blue Biotechnology 	The project's all-Atlantic research cruise programme will offer the Blue Biotechnology sector vastly enhanced access to freshly collected samples from remote and difficult/costly-to-access deep and open-ocean ecosystems. iAtlantic will establish benefit-sharing processes with the Blue Biotechnology sector through shared access to eDNA libraries and genetic data and demonstrate potential for the MAPS eDNA sampler to act as a cost-effective industrial application to map marine genetic resources from the seafloor through the water column.
Maritime & Coastal Tourism 	iAtlantic will provide projections and greater understanding about how climate change and human activities can impact ecosystem cultural services that are vital to the growth of the Marine and Coastal Tourism sector. Underwater mapping will help uncover the Atlantic's cultural heritage (e.g. shipwrecks), while iAtlantic's assessments of climate-driven changes to whales, swordfish and shark populations will interest whale-watching and game fishing operations. Multi-stressor experiments on cold-water coral reefs and hydrothermal vents will be highly relevant to the nascent deep-sea submersible tourism industry who depend on ecosystem aesthetical value.
Ocean Energy 	Ocean energy could meet 10% of the EU's electricity demand by 2050[99]. iAtlantic's climate-based projections of ocean circulation, transport and ecological connectivity, integrated with predictions of status and distribution of VMEs, will support planning for marine renewable infrastructure by helping to avoid adverse impacts on VMEs including the potential of spreading non-native species.
Oil and Gas 	iAtlantic will work closely with IOGP and member organisations to capitalise on the project's cost-effective technology (e.g. AUVs, gliders, machine learning, eDNA sampling) and upscaled maps (e.g. oceanography, seafloor and water column biodiversity, connectivity and resilience) to improve corporate environmental management plans that support sustainable development of deep and ultra-deep hydrocarbon reservoirs.
Fisheries 	Regional Fisheries Bodies (RFBs) have a mandate to apply the United Nations General Assembly precautionary approach for the interim prohibition of destructive fishing practices, including bottom trawling, that has adverse impacts on VMEs (UNGA Res. 59/25, Art. 66). iAtlantic's nested ocean, regional and local-scale maps of VME occurrences (ground-truthed and predictive) will provide regional fisheries bodies with new data on the distribution of Atlantic VMEs and their resilience to changing oceans and expanding human activities. In the European context, iAtlantic's research will support RFMOs' obligations under the Common Fisheries Policy EU regulation 2016/2336 to annually review scientific information on bottom fisheries impacts on deep-sea ecosystems in the NE Atlantic.

98 OECD (2016) The Ocean Economy In 2030

99 Ocean Energy Forum (2016) Ocean Energy Strategic Roadmap 2016, building ocean energy for Europe

Enhancing Ocean Literacy and the public's understanding of the importance of the ocean to humankind. iAtlantic will help citizens make informed and responsible decisions regarding the ocean and its resources and engaging in meaningful dialogue about the ocean. Most European citizens are not aware of the full extent of the medical, economic, social, political and environmental importance of the sea to Europe and indeed to the rest of the world. Many of us are not aware of how our day-to-day actions can have a cumulative effect on the health of the ocean – a necessary resource that must be protected for all life on the planet Earth to exist.

iAtlantic's outreach to students and citizens lacking a sense of "Ocean Literacy" through the presentation of its motivations, aims and results will have a broad societal impact by enhancing fundamental understanding of how this important resource functions and connects and how anthropogenic activities at both global and regional scales are resulting in changes in the ability of the Atlantic to provide these services. The comprehensive programme of activities aimed at enhancing ocean literacy and ocean advocacy will result in better informed citizens and stakeholders which will positively impact the future management of the Atlantic. As public engagement in ocean issues is an effective tool in driving forward policy and management frameworks, active communication with citizens around key iAtlantic topics such as the inter-connectedness of Atlantic ecosystems and how climate change and human activities can impact ecosystem resources is key and will engage new stakeholders in issues around Atlantic Ocean management and exploitation.

Job creation through sustainable exploitation of ocean resources. iAtlantic will significantly impact EU job creation through its major contribution to sustainable exploitation of ocean resources. Europe's maritime sector currently employs over 5 million people[97] and the OECD predict that by 2030 employment in many ocean industries will outperform the global economy as a whole[98]. However, realising this increase requires healthy marine ecosystems and sustainable use of marine resources. The predictive models, risk maps and management scenarios produced by the project will inform socioeconomic activities in the Blue Economy and enhance opportunities for long-term sustainable exploitation of Atlantic resources which in turn will create jobs around ecosystem products and services such as food, tourism, energy, minerals, and medications that are of societal benefit. In addition, the close cooperation between higher education and the private sector in the delivery of iAtlantic activities will promote the development of skills that can be applied in the blue economy.

International Collaboration and Cooperation. iAtlantic's underpinning concept of bridging ocean observing systems, exchanging data, researchers, and equipment from South to North and East to West to predict where and when effects of global change and multiple stressors will occur requires international collaboration and cooperation. Relationships established by iAtlantic are expected to continue beyond the end of the project and will create more opportunities for further research and projects that build on the project's legacy. The inclusion of academic, governmental, commercial and civil society organisations from the North, South, East and West Atlantic to share data infrastructure, methodologies and technologies and deliver high value and long-lasting regional and global insight into Atlantic ecosystem sensitivity to global change will strengthen the individual and collective abilities of the participants.

Long-term monitoring infrastructure for the whole Atlantic. iAtlantic will significantly enhance ocean observational arrays in the S Atlantic, creating a correctly-scaled alignment of coupled climate-ocean measurements across the triad of OSNAP, RAPID and SAMOC arrays. The new sensors added to OSNAP and SAMOC will capture western and eastern boundary current systems more comprehensively, but also any effects of inter-ocean exchanges on AMOC and ecosystem-relevant parameters such as T, S, currents and oxygen that govern the distribution of marine resources shared by Atlantic nations.

2.1.3 Barriers, Obstacles and Framework Conditions

Political and policy complexity of basin-wide cooperation. Whilst the need to take an integrated strategic approach to management of maritime/marine activities (economic exclusion zones, marine spatial planning) is widely acknowledged, the fragmented nature of ocean governance mechanisms and the complexity influencing policy in ABNJs could be a barrier to realising the full potential of iAtlantic. For example, at present there is no formal mechanism to review or modify existing EBSA descriptions, or indeed propose new EBSAs in those regions where regional EBSA workshops have been convened. At present, the way to formally engage with the EBSA process is via a CBD-led Regional EBSA Workshop, even for areas beyond national jurisdiction. iAtlantic aims to mitigate this potential barrier by working closely with key stakeholders in policy and governance domains (ISA, CBD, UN) and representing iAtlantic at key policy fora (UN BBNJ treaty negotiation meetings, annual Conferences of Parties (COPs) of UN conventions such as the CBD and at RFMO meetings. However, it is recognised that whilst efforts will be made to engage as fully as possible, the rate of progress in relevant marine policy discussions may not entirely align with the timeframe of iAtlantic.

2.2 Measures to Maximise Impact

In line with the BG-08 call topic and the EU Marine Knowledge 2020 Strategy[100], maximum impact and exploitation of iAtlantic results will be achieved through the open offering of project data and products to shape future research, policy and Blue Growth activities. All data and outputs generated by iAtlantic will be made available in open access repositories in the N and S Atlantic and will be findable through dedicated iAtlantic EMODnet and GEOSS portals. By making all research outputs open access, iAtlantic will establish a secure foundation for the uptake and use of the project results both during and beyond the end of the project.

2.2.1 Plan for Dissemination and Exploitation of Results

Plans to disseminate and exploit the outcomes of iAtlantic are in line with the EC's Guidelines for the Exploitation and Dissemination of Results in Horizon 2020. Within WP6, activities will be undertaken to identify and engage with the full range of stakeholders with a vested interest in using or exploiting iAtlantic results. Dissemination of research results and publication of data and products will be overseen by WP6 and WP7 respectively and supported by iAtlantic's Innovation and Exploitation Manager with respect to protection of intellectual property.

Processes, protocols and guidance to facilitate dissemination and exploitation will be specified in D6.1, which describes dissemination, communication and exploitation activities to be performed as well as identifies measures to assess effectiveness on an ongoing basis. The plans will be consistent with the Grant Agreement and Consortium Agreement, ensuring there is a clear pathway for knowledge transfer and exploitation of results.

Dissemination of knowledge, data and products to maximise uptake of results.

Within the framework of iAtlantic special attention will be paid to the dissemination of the project output and results in all regions of the Atlantic. Mechanisms to facilitate the dissemination of new knowledge, data and products from by the project include:

Open Access Data: iAtlantic will adopt state-of-the-art data management techniques that adhere to international standards and provide efficient and flexible workflows. International collaboration between repositories in the North, South, East and West of the Atlantic will ensure that both raw and metadata generated by the project are discoverable and interoperable between repositories. The data generated by iAtlantic will also be pushed directly into key data portals and observatories including the European Ocean Observing System (EOOS), EuroGOOS, EMODnet, GEOSS, and OBIS to ensure widespread visibility and contribute to filling gaps in the data held by these portals. *Target Audience*: Science, Policy, Industry

Open Access Scientific Publications: Wherever appropriate the results from iAtlantic will be published open access in high-impact peer reviewed journals that have international reach. The choice of journal will be dictated by the nature of the results produced but target publications will include Frontiers in Marine Science, Journal of Geophysical Research, Limnology and Oceanography, Marine Resource Economics, Marine Policy, Molecular Ecology, Nature, Proceedings of the National Academy of Sciences, PLoS One and Science. Due to the nature of iAtlantic's research publications will be collaboratively produced by partners in the N and S Atlantic and young researchers will be encouraged to publish as first authors, to help promote their career and establish them as future leaders in their field of research. *Target Audience:* Science, Industry

Articles in Non-specialised Press: To highlight opportunities to engage with iAtlantic, in particular the iAtlantic fellows programme and capacity building activities, articles describing the objectives and key results of the project will be published in non-specialized press. Particular attention will be paid to publications in local press and relevant online media in the areas where specific events will be held. During the project non-technical summaries will be produced by the Project Office distilling highlights from the Periodic Reports. At the end of the project, a summary publication ('iAtlantic Compendium') will be produced to showcase the project's main achievements, outcomes and recommendations. This will be written in an accessible and informative style so that it is useful for the widest possible range of audiences. *Target Audience*: Public, Science

Technical Presentations: Dissemination of technical results will be achieved by presentations at international scientific conferences, including the organisation of iAtlantic thematic sessions where appropriate. It is anticipated that the results and achievements of the project will be presented at a minimum of 4 conferences per year. Target conferences will include: meetings of ASLO Aquatic Sciences, Brazilian Congress of Oceanography, European and

100 European Commission (2010) Marine knowledge 2020, marine data and observation for smart and sustainable growth. COM 461

American Geosciences Union, Deep-sea Biology Symposium, Deep-sea Coral Symposium, ICES Annual Science Conference, Latin American Congress of Marine Sciences, Oceanology, Southern African Marine Science Symposium and World Conference on Marine Biodiversity. *Target Audience:* Science

Public Presentations: Engagement with the public and promotion of ocean literacy is a demonstrated and powerful tool to drive change and address the challenges facing our oceans. To engage with the, promote iAtlantic the partners will exploit opportunities to present the project at public fora and educational events. We will leverage institutional and national programmes such as the SAEON's schools outreach programme or educational events at local aquaria to disseminate the project objectives and highlight key results (see LoS from Aquarium Finisterrae). Plans for media engagement are given below (see 2.2.4). *Target Audience:* Public

Policy Briefs: Open-science Policy Briefs highlighting options and challenges for Atlantic Ocean governance, including recommendations for future action and recommendations on related research needs and capacity building will be developed. The Policy Briefs will address options and challenges for Atlantic Ocean governance and present recommendations on future research needs and capacity building to relevant ocean science-policy frameworks. *Target Audience:* Policy

Exploitation of Results

The consortium's primary exploitation path will be use of high quality, high impact research outputs and novel tools open to the ocean science and policymaking communities. Exploitation activities where novel methods and technologies arise will be assessed and evaluated for their onward developmental value to the partnership with regards to achieving enhanced research capabilities, opportunities for funding of ambitious future research and potential for exploitation by third parties in marine management and the blue economy. The data and products produced by iAtlantic are expected to have significant utility at a policy level in uncovering and forecasting the impact of activities across the Atlantic ecosystem, such as the likely consequences of activities in areas beyond national jurisdiction (ABNJs) on exclusive economic zones and in helping to realise optimal standard approaches to the production of maps and management tools that facilitate comparisons across regions and improve management of common resources across national boundaries. They will also be highly relevant to industries undertaking marine spatial planning, including deep-sea mining operations, fisheries and future offshore aquaculture.

Specific measures are planned for exploitation of results arising from the development and demonstration of innovative technologies with the potential for commercial exploitation beyond the end of the project. Exploitation planning will be a standing agenda item at all Consortium meetings and an Innovation and Exploitation Manager with expertise in exploitation and valorisation of research outputs will facilitate, monitor and support the development of appropriate exploitation plans based on the results of the project. They will focus on the innovation potentials described in section 1.4.2 and will also monitor all output of the project. Specifically, by demonstrating the novel seabed imaging, eDNA mapping, hyperspectral imaging and high-throughput machine learning solutions in relevant deep and open ocean ecosystems, iAtlantic aims to lead early commercial adopters into the market such as IOGP, BP, Woodside and Petrobras. These organisations have already expressed interest in these technologies (see LoS from IOGP), and iAtlantic will work to encourage further investment in fully commercialising these novel systems. To enhance exploitation opportunities, our associate partners representing potential end users of these systems will have full access to these technologies to assess the value of integration of such solutions into in their business operations and services. A summary of the iAtlantic outputs and their potential exploitation pathways is shown in Table 11 below:

Table 11: Opportunities for exploitation of iAtlantic outputs.

iAtlantic Output	Contributing Partner(s)	Exploitation Pathway	Application Areas	Users
Hindcast and forecast models of climate change.	GEOMAR SAMS	Model data made available open access via the iAtlantic portal.	Scientific research. Area based management. Marine spatial planning.	Government Agencies, Intergovernmental Agencies (e.g. IPCC), Aquaculture (e.g. Nofirma).
Integrated maps of Atlantic ecosystems including areas at risk of future change and the convergence of	UEDIN, UNIVALI, IEO, IMAR, IFREMER, UKRI-NOC, GEOMAR, USP, UKN, UCC, SAIBI, UFES, NMU, UGOT	Mapping products and associated data layers available open access through the iAtlantic web GIS	Scientific research Marine spatial planning Area based management	Government Agencies, Intergovernmental Agencies (e.g. CBD, UN BBNJ), Oil and Gas (e.g. IOGP), Aquaculture

iAtlantic Output	Contributing Partner(s)	Exploitation Pathway	Application Areas	Users
multiple stressors.	CNRS, AMI, MFRI, UNIHB, UCL, HWU, DFO, NOAA	tool.		(AquaBioTech), Mining (e.g. ISA).
Basin scale management scenarios.	IMAR, UEDIN, NMU	Visualisations of the scenarios will be available open access via the iAtlantic portal.	Scientific research Marine spatial planning Area based management.	Government Agencies, Intergovernmental Agencies (e.g. CBD, UN BBNJ), Oil and Gas (IOGP), Aquaculture (AquaBioTech), Mining (ISA).
Machine learning solutions.	GEOMAR	Commercial Service Offering.	Scientific research Marine spatial planning Environmental impact assessment.	Marine Survey (ETME), Oil and Gas (IOGP), Mining (ISA).
Custom-made drop-down camera systems.	IMAR	Commercial Licence (patent to be applied for).	Scientific research Marine spatial planning Environmental impact assessment.	Marine Survey (ETME), Oil and Gas (IOGP), Mining (ISA).
New environmental DNA (eDNA) sampler.	UKRI-NOC	Commercial Licence (patent to be applied for).	Scientific research Marine spatial planning Environmental impact assessment.	Marine Survey (ETME), Oil and Gas (IOGP), Aquaculture (AquaBioTech), Mining (ISA).

2.2.2 Strategy for Knowledge Management and Protection

Responsibility for knowledge management and protection will sit with the iAtlantic General Assembly with support from the Innovation and Exploitation Manager as knowledge management is closely linked with exploitation planning. As iAtlantic intends to make all results and products produced by the project open access a thorough procedure to ensure that no opportunities for the protection of results are missed prior to publication will be implemented. A prepublication policy and associated publication notification procedures will be established at the start of the project. Should any results that are suitable for protection and/or exploitation be identified they will be highlighted to the General Assembly by the relevant partner(s). The General Assembly will then assess the impact of the discovery and the implications of protection and/or exploitation upon the project.

If necessary, the Innovation and Exploitation and Exploitation Manager will facilitate discussions between partners who have contributed to the generation of exploitable results. Their involvement is necessary to ensure clarity about the relationship between the project, the Consortium Agreement and the results to be exploited. If the Innovation and Exploitation Manager believes that the innovation is of interest to other partners in the project, then they will put the partners in contact with each other. These groups will then negotiate an agreement for use of background or foreground in accordance with the Consortium Agreement and the Grant Agreement terms, for example the use of UKRC's eDNA sampler technology (patent under consideration), GEOMAR AI algorithms, Ecotone AS patent "Underwater Hyperspectral Imaging" (PT2286194 and WO2009141622) which includes a database of spectral signatures and advanced software. In all cases, project participants will retain access to data and results generated by the project for research purposes, as required by the Grant Agreement. Specific details, background IP and agreements will be defined in the iAtlantic Consortium Agreement.

2.2.3 Management of Research Data

iAtlantic will participate in the Horizon 2020 Open Research Data Pilot and will thereby comply with all requirements, including the development of an iAtlantic Data Management Plan (DMP). WP7 will engage all iAtlantic partners in the development of a DMP, including an open access data policy and data submission workflow. Common data transfer protocols and data formats will be agreed upon at the start of the project, ensuring common standards, interoperability, backup and storage, alongside measures for sharing data. This includes security and encryption, provenance, inter-communication and knowledge sharing.

All data and other products will be open access and archived in the PANGAEA (EU), EMODnet (EU), MIMS (South Africa) and other data repositories (Figure 11). Data outside the scope of the named repositories will be stored in appropriate thematic portals, with permanent links to the main iAtlantic portals to ensure discoverability and access. In addition to references to the original datasets, data products will be added to the EMODnet and GEOSS data portals and archived project related documents (presentations etc.) will be stored in Zenodo, ensuring sustainability and access to the main project outcomes by stakeholders across the N and S Atlantic.

All iAtlantic research outputs will be safeguarded and published in open access mode, following an agreed process for verification, variable use and reuse methods. iAtlantic data will be curated and archived according to common metadata standards. To enable future data re-usability, the allocation of Digital Object Identifiers (DOI) for all iAtlantic datasets will be a standard procedure within the project. All published data will comply to the iAtlantic data policy.

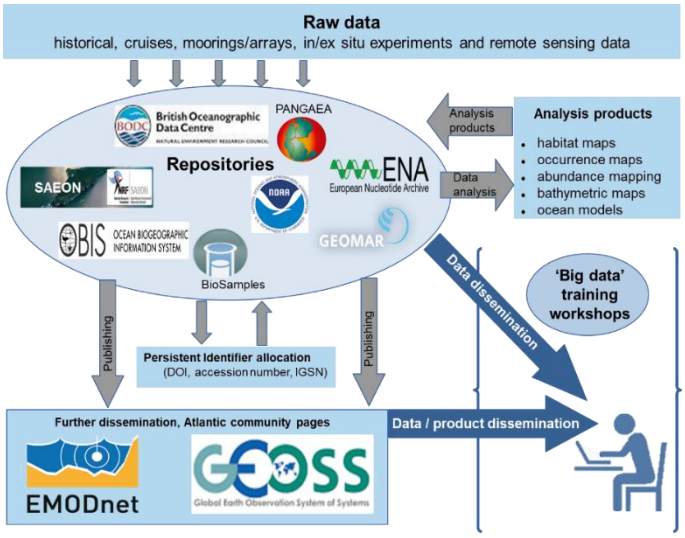


Figure 11: iAtlantic data workflow.

2.2.4 Communication Activities

To generate widespread interest in iAtlantic a project specific communications strategy will be implemented. The materials and key messages to be disseminated to the public, Blue Growth sectors and the research community will be agreed at key stages of the project, including project start up, launch of flagship activities such as the Demonstrator and Capacity-Building cruises and the publication of data, tools and products arising from the project. To ensure that the right messages are conveyed to the right stakeholders at the right time the project will use classic communication approaches in combination with strategic activities targeted at different sectors.

Classic approaches will include the open unidirectional dissemination and communication of results through presentation of journal articles via conferences or publications and mass dissemination using traditional media. Engagement with mainstream media (TV, radio, newspapers, online news outlets) will be key in communicating iAtlantic's ambitions and achievements to the broadest audience possible. iAtlantic will take advantage of its consortium's network of traditional media contacts including BBC, CNN, Discovery Channel, EuroNews and National Geographic amongst others. To maximise visibility of the project a clear project identity and mission, supported by a comprehensive web presence, project literature (brochures and leaflets in multiple languages) and key communication tools such as social media (Twitter, LinkedIn, YouTube), newsfeeds, podcasts, interactive visualisations and articles in popular online and published media will be established. The project website will be designed to be accessible to all audiences, ranging from the general public to policy makers, and will include a specific resource area for the media.

As dialogue with industry, policy and the public will be central to the delivery of the iAtlantic impact **strategic activities** will focus on realising meaningful engagement with the broad range of stakeholders with an interest in the Atlantic. As stakeholder fatigue is a very real issue, ensuring that stakeholders are engaged in the project at the right time and that opportunities for sharing of knowledge, data and results are fully exploited will be a central principle of iAtlantic. Although the final format of the strategic activities will necessarily be determined by the timing and availability of results generated by the project, specific activities will include:

Engagement with international policy fora: To communicate the work of iAtlantic the project will send delegates to relevant international meetings such as the UN BBNJ treaty negotiation meetings, the annual Conferences of Parties (COPs) of UN conventions such as CBD, meetings of the Regional Fisheries Management Organisations and bodies in the Atlantic, meetings of the International Seabed Authority relevant to the regulation of exploration and mining in the Atlantic and multi-sector conferences such as the UN Oceans conference and the Our Oceans meetings. The purpose of this engagement will be to ensure that outputs from those processes feedback into relevant iAtlantic work packages, to explore how iAtlantic results will be used by different end-users, and to identify where different sectoral groups may be able to contribute knowledge, data and expertise to the project.

Stakeholder engagement meetings: Stakeholder dialogue meetings will be organised for invited representatives, including policy-makers, industry bodies, regulators, IGOs/NGOs, fisheries organisations, the European Commission, government ministries and representatives from related research programmes. Results from iAtlantic will be presented, ideas exchanged, and relevant issues discussed. Three meetings will be organised to mark evolutionary stages in the project. The locations of these meetings will be determined based on optimum convenience for participants and will likely be linked to major meetings attended by our stakeholders to minimize travel and time commitments for participants. For example, our industry stakeholder meetings may be organised at major global maritime industry and technology events such as Oceanology.

Workshops: iAtlantic's programme of 15 capacity building workshops will be a significant opportunity to communicate the project activities beyond the established consortium and associated partners. The workshops will be open to local and international participants with the numbers boosted through the iAtlantic Fellowship Enhancement Grant scheme (see Section 1.3.4, WP6). Learning resources along with reports on the outcomes from each workshop will also be made available to the wider community through Zenodo and the iAtlantic website.

Webinar Series: iAtlantic will establish a webinar series, with events scheduled quarterly from Month 6 onwards. Webinars will be 45 mins long, plus 15 mins for questions and discussions. Speakers will be drawn from iAtlantic research and stakeholder communities; sessions will focus on topics of key relevance to the Atlantic community, including policy and ocean governance issues. The webinars will be open to the wider research and stakeholder community, with live feed to platforms such as Facebook Live and/or YouTube, and archive recordings will be available via Zenodo with links from the project website. Selected webinars in the series will be designed to have a more general appeal for non-specialist audiences.

Delivery of Ocean Literacy and Engagement Events: The iAtlantic science plan includes an extensive research cruise programme, which will provide substantial opportunities to convey the excitement of ocean research via expedition blogs that demonstrate the role of science in understanding the value of Atlantic ecosystems and their vulnerability to change. The project will capitalise on the opportunity to engage with the public in the South Atlantic during the project's cruises by arranging educational events and open ship days during the iAtlantic demonstrator cruise port calls.

Figure 12: iAtlantic communications activities.

Key Performance Indicators*:* As evaluation is a key component of the communication process iAtlantic will implement measures to evaluate the effectiveness of all communication activities to ensure that the broad reach required to deliver the expected impact of the project is achieved. Communication targets will be defined at the start of the project with Key Performance Indicators (KPIs) established to support the monitoring and evaluation process. Evaluation of project outputs and outcomes will be measured in terms of quality and quantity using tools such as web analytics, goal and event tracking and stakeholder feedback.

Table 12: Dissemination and communication key performance indicators.

Activity	Key Performance Indicators
Publicity	TV and press releases to announce iAtlantic activities and inform the public of research outcomes. At least 4 per year.
Website	Addressing both the public and wider stakeholders. At least 10,000 visits in 4 years.
Social Media	Twitter account regularly communicating iAtlantic activities. At least 1000 followers after 4 years.
Publications	Publication of scientific results in peer reviewed journals and popular online and published media. >20 scientific papers and 1 non-technical publication per year.
Policy Fora	iAtlantic represented at 3 international meetings per year.
Stakeholder Engagement	Delivery of 3 high level stakeholder meetings including representatives from all key sectors engaged in the Atlantic.
Workshops	Delivery of 14 capacity building workshops including participants from North and South Atlantic countries.
Webinars	Delivery of 10 policy, governance and ocean science webinars.
Ocean Literacy	>15 expedition blogs, 4 port call open ship educational events. 20 school ocean literacy talks.

3. IMPLEMENTATION

3.1 Workplan

The iAtlantic workplan, illustrated in Figure 13, comprises 5 technical work packages (WPs 1 to 5) which are supported by three cross cutting operational work packages focussed on capacity building and engagement (WP6), data management (WP7) and overall coordination and management of the project (WP8).

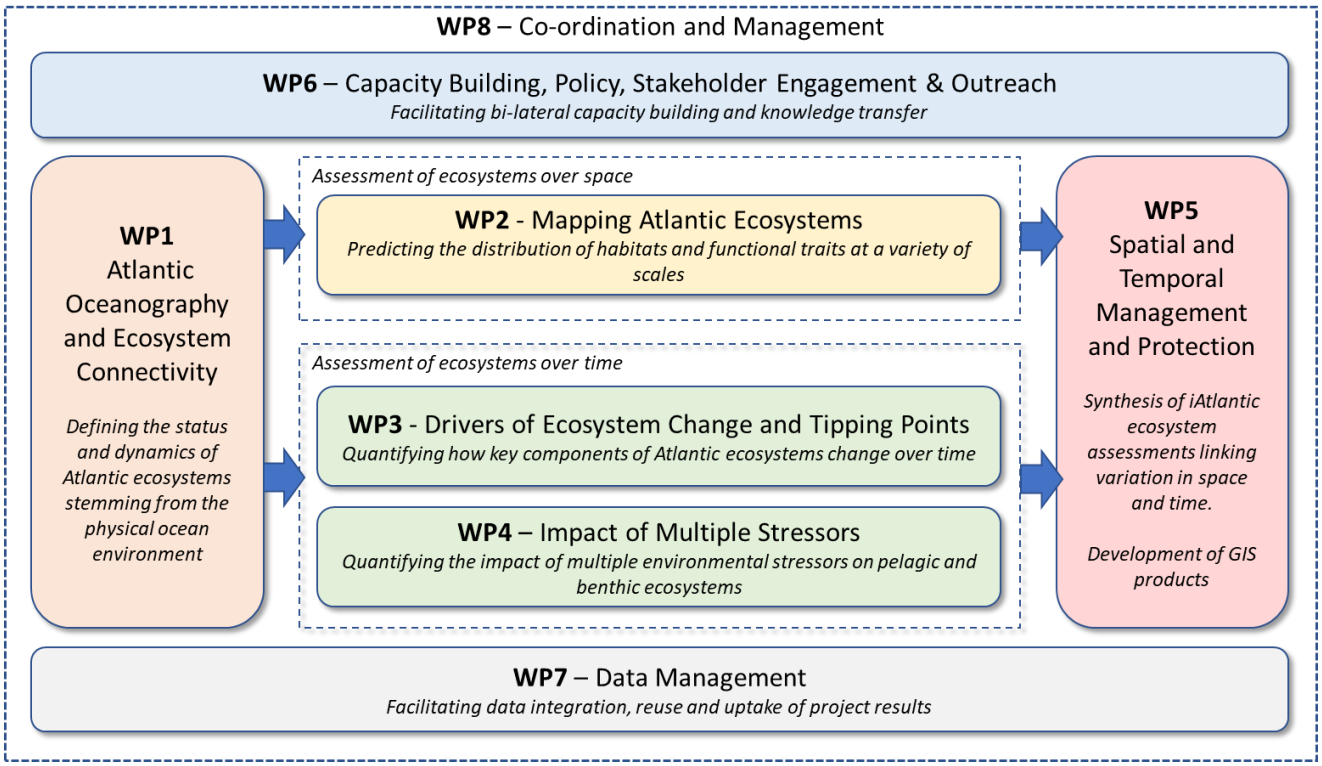
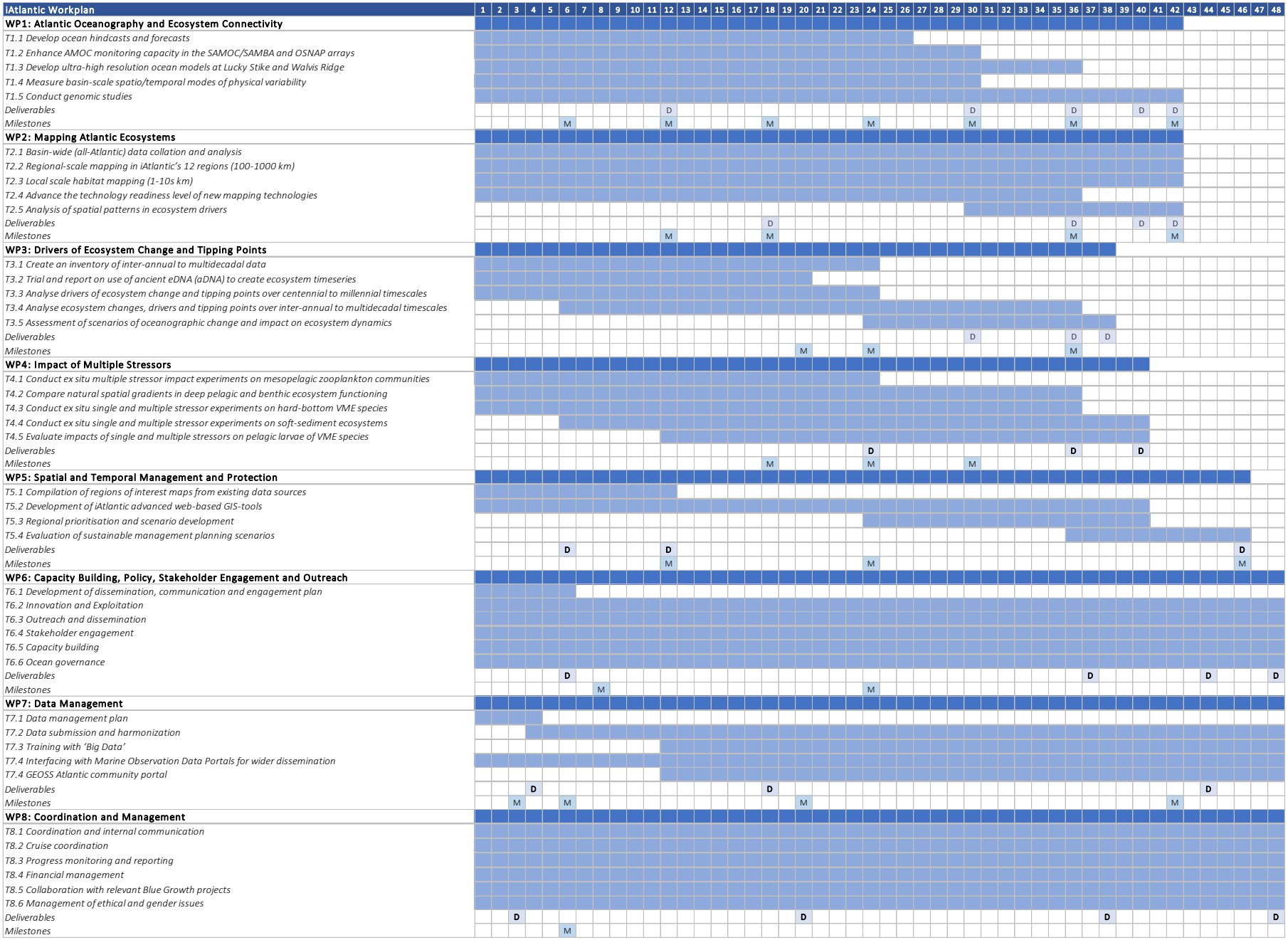


Figure 13: Overall structure of the iAtlantic workplan.

The technical WPs will focus on consolidation and synthesis of the rich and varied Atlantic data currently available and the collection of complementary data to fill significant gaps, particularly in the South Atlantic. Through coordinated processing and sharing of the data collected by each WP iAtlantic seeks to understand the implications of the physical circulation on ecosystem connectivity and function in the Atlantic basin (WP1), assess the present ecosystem status of Atlantic ecosystems (WP2), understand how different drivers of ecosystem change operate at the regional to ocean scale (WP3), validate the use of generic and system-specific tipping points to forecast ecosystem change (WP3) and quantify the impact of multiple environmental stressors on ecosystems in the Atlantic Ocean (WP4). The products and outputs from each of these activities will then be used to inform an **All Atlantic** analysis of areas in the Atlantic that achieve sustainable management and conservation objectives and develop spatial management scenarios that support the sustainable management and protection of Atlantic marine ecosystems over the short and long-term (WP5).

Table 13: List of iAtlantic work packages.

WP No.	*WP Title*	*Lead Participant*	*Lead Short Name*	*Person Months*	*Start Month*	*End Month*
1	Atlantic Oceanography and Ecosystem Connectivity	9	GEOMAR	207	M01	M42
2	Mapping Atlantic Ecosystems	8	UKRI-NOC	422	M01	M42
3	Drivers of Ecosystem Change and Tipping Points	1	UEDIN	184	M01	M38
4	Impact of Multiple Stressors	10	HWU	188	M01	M40
5	Spatial and Temporal Management and Protection	5	IMAR	72	M01	M46
6	Capacity Building, Policy, Stakeholder Engagement and Outreach	6	SC	121	M01	M48
7	Data Management	11	UNIHB	94	M01	M48
8	Coordination and Project Management	1	UEDIN	120	M01	M48
			Total	1408		



WP#	1	Start Date	M01	End Date	M42
Title	Atlantic Oceanography and Ecosystem Connectivity				

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Partner	UEDIN	UNIVALI	UWC	IEO	IMAR	SC	IFREMER	UKRI-NOC	GEOMAR	HWU	UNIHB	USP	UKN	SAMS	SHN	UCC	SAIBI	UFES	NMU	UGOT	UFSC	UCT	SBE	TMG	CNRS	SU	AU	AWI	UCL	MFRI	TEMPLE	GC	SAEON	OSU
PM	1	0	1	28	0	0	22	0	26	0	0	0	0	50	27	0	0	0	0	0	0	9	0	0	5	21	8	0	0	0	4	0	0	4

Objectives: The overall aim of WP1 is to align the ocean observing framework and make climate-based predictions to understand the temporal and spatial modes of variability in Atlantic Ocean circulation, and their drivers, to inform ecosystem assessments. The specific objectives are:

1. To align N-S capacities in monitoring the Atlantic Ocean circulation
2. Determine drivers and explain spatio/temporal patterns of physical change and variability in ecosystem-relevant parameters
3. To identify connectivity patterns at regional and basin-scales

Task 1.1 Develop ocean hindcasts and forecasts [M01 – M26] Global ocean general circulation models (VIKING and INALT) will be generated in hindcast mode (past ~50 years) to compare with observational data and in forecast mode (next 50 years), coupled to CMIP6-type global warming scenarios. Lagrangian estimates of connectivity between the Mid-Atlantic Ridge, Romanche Fracture Zone, and seamount chains will be performed. VIKING and INALT will be used to understand the joint interpretation of northern and enhanced southern AMOC arrays and the spatio-temporal modes of variability. It will provide 4D velocity and temperature/salinity data as boundary conditions for high-resolution model studies at key sites and input data for the Lagrangian studies to understand biological dispersal. Model data will also be provided for work in other WPs and the subject of a training event in month 6. ***Lead:*** GEOMAR will perform this task.

Task 1.2 Enhance AMOC monitoring capacity in the SAMOC/SAMBA and OSNAP arrays [M01 – M30] Model quantification of zonal flow in the crossing point between the westward Agulhas rings and the westward deep flow in the South Atlantic Basin will be performed to determine the need for a zonal component in the SAMOC/SAMBA array. The southern boundary of the SAMOC array will be extended by deploying a tall mooring at the continental shelf in the region of the Brazil Current (measuring T, S, oxygen, pressure, and currents) and enhancing the SAMOC-West and SAMOC-East arrays with oxygen sensors. At the northern boundary, oxygen sensors will be added to OSNAP moorings. ***Lead Partner:*** SHN, ***Role of Partners Involved:*** SHN will deploy the mooring and oxygen sensors at SAMOC West, UCT will deploy the oxygen sensors at SAMOC East, SAMS will deploy the oxygen sensors at OSNAP and IEO will analyse the zonal flow in model simulations (and using *in situ* observations in the central S Atlantic 10ºW-[27ºS-24ºS]). All partners will use this new capacity to measure oxygen concentrations and fluxes to understand the role of Agulhas leakage from the Indian Ocean and the Brazil Current in the oxygen budget of the subtropical South Atlantic, develop models of how Agulhas Current leakage influences AMOC strength, and quantify the variability of the North Atlantic Current in controlling changes to heat, freshwater and biogeochemical fluxes in the subpolar N Atlantic.

Task 1.3 Develop ultra-high-resolution ocean models at Lucky Strike and Walvis Ridge [M01 – M36] Ultra-high-resolution models will be developed in two regions to investigate energy dissipation, diapycnal mixing and transport of species near the seafloor and across the water column. The simulations will be conducted with CROCO-NH and include atmospheric forcing from re-analysed data, high-resolution 10m gridded topography, non-uniform geothermal heat flux and tidal forcing. Outputs from the simulations will be used to: (1) identify and quantify the full spectrum of physical drivers of ecosystem functioning in the two regions; (2) refine Lagrangian dispersal models in these two regions. ***Lead:*** IFREMER, ***Role of Partners Involved:*** IFREMER and AU will develop the high-resolution hydrodynamic CROCO-NH models and Lagrangian models at Lucky Strike and Walvis Ridge, respectively. IEO will analyse observations and model data comparison at Walvis Ridge, OSU and SHN will analyse CROCO-NH output in the South Atlantic. SAMS will support model data analysis.

Task 1.4 Measure basin-scale spatio/temporal modes of physical variability [M01 – M30] Standard model outputs on the frequency, duration, magnitude and rates of change, as well as the identification of extreme events such as marine heat waves (MHWs; anomalous and persistent warming events in the ocean) will be derived and used for iAtlantic's regional ecosystem assessments. ***Lead***: SAMS, Role of Partners Involved: SAMS will assemble all observationally-based physical data sets and merge with model data sets from T1.1. UCT will assemble SAMBA/SAMOC moored array data. SAMS will perform a first level of metric calculations using physical ocean variables for the 12 iAtlantic sites and for the whole Atlantic using both observationally-based and modelled data products and pass these to GEOMAR for T2.1. UWC and UEDIN will collaborate on assessment and further development of ecosystem relevant metrics (e.g. MHWs and velocity of change), and covariation with biological time series metrics, passing these analyses to T3.3 and T3.4.

Task 1.5 Conduct genomic analyses [M01 – M42] High throughput sequencing technology (RADseq) will be used to estimate contemporary gene flows across the Atlantic in selected VME indicator species with putative amphi-Atlantic distributions, e.g. *Lophelia pertusa*, *Bathymodiolus* spp. Using genomic DNA from existing and new samples collected across the Atlantic, double digest RAD libraries will be produced and sequenced by France's National Sequencing Center, Genoscope. Contemporary gene flow will be then compared with Lagrangian larval trajectories from Task 1.1 in hindcast and forecast modes to identify regions and seafloor features that currently or that will in future maintain connectivity in these taxa. ***Lead:*** SU, ***Role of Partners Involved:*** SU will develop RAD libraries and perform genomics on seep/vent mussels and conduct dispersal modelling of seep/vent species using Lagrangian model outputs. IFREMER will perform the same task but for vent gastropods and *Rimicaris* spp.

shrimps. **CNRS** will develop RAD libraries and perform genomics on cold-water corals and shrimps, **TEMPLE** will do the same for cold-water corals, seep clams and mussels linking with the DeepSearch project.

No.	Deliverable Title and Description	Due
D1.1	**Atlantic circulation variability in the past 50 years**: report describing Atlantic circulation variability from 1958 to present day.	M12
D1.2	**Ecosystem relevant variations and oceanographic trends from present day to 2070**: report describing Atlantic circulation variability and potential trends in the next 50 years and associated physical spatio/temporal variations, trends and state changes.	M30
D1.3	**Quantitative assessment of near-seafloor flow dynamics and physical drivers for material and larval transport**: report on the high-resolution hydrodynamic models forced by basin-scale simulations at strongly contrasting case study sites, Lucky Strike and Walvis Ridge.	M36
D1.4	**Oxygen measurements at the southern and northern boundaries of the AMOC:** report on the data obtained from new sensors in the Brazil Current, Agulhas Leakage and North Atlantic Current.	M40
D1.5	**Preferential pathways of dispersal and role of the AMOC in connectivity:** Identification of preferential pathways of dispersal and the role of AMOC/Atlantic Equatorial belt in seep/vent communities' connectivity.	M42

WP #	2	Start Date	M01	End Date	M42
Title	Mapping Atlantic Ecosystems				

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Partner	UEDIN	UNIVALI	UWC	IEO	IMAR	SC	IFREMER	UKRI-NOC	GEOMAR	HWU	UNIHB	USP	UKN	SAMS	SHN	UCC	SAIBI	UFES	NMU	UGOT	UFSC	UCT	SBE	TMG	CNRS	SU	AU	AWI	UCL	MFRI	TEMPLE	GC	SAEON	OSU
PM	11	40	0	11	28	0	54	63	35	0	0	30	36	0	0	44	3	12	3	30	0	0	0	0	16	0	0	3	0	4	0	0	0	0

Objectives: The overall aim of WP2 is to map, at a nested range of appropriate and feasible scales, the present ecosystem status of deep and open-ocean ecosystems in the Atlantic. The specific objectives are to:

1. Evaluate and expand current knowledge on ecosystem distribution and the physical environment across the Atlantic
2. Describe the 3D structure of key ecosystems at regional and local scale
3. Identify the main environmental drivers behind ecosystem spatial patterns
4. Identify and apply the optimal technological developments that enable the above activities

Task 2.1 Basin-wide (all-Atlantic) data collation and analysis [M01 – M42] Compile environmental and biological data for the whole Atlantic from existing databases and data held by project partners and their networks, for integration into WP5's iAtlantic GIS (MS2.3), to be further integrated with AORA initiatives. The basin-wide map will be updated throughout the project (MS2.9). Marine landscape classifications (D2.1) and habitat suitability models of VME indicator taxa and, where possible, functional traits (D2.2) will be based on this inventory. ***Lead:*** **GEOMAR, *Role of Partners Involved:*** **GEOMAR** will coordinate the collation of environmental and biological data and will upload datasets to iAtlantic GIS. **IMAR** will support the integration of data and lead on the basin-wide habitat suitability modelling. **AWI** will support the bathymetry data collation and **All WP Participants** will contribute to the Task through data provision (Table 5).

Task 2.2 Regional-scale mapping in iAtlantic's 12 regions (100-1000 km) [M01 – M42] Regional habitat maps will be created using the inventory (T2.1), and additional data from iAtlantic cruises will be added for a subset of regions (1–4, 9, 10 and 11), including data collected using the new technologies developed under T2.4. Confidence maps will be produced to illustrate uncertainties associated with habitat classifications (MS2.7), using the latest ICES guidelines (report due 2018). Regional species distribution models will be used to predict the occurrence of select VME indicator species and functional trait distributions (D2.5) and to provide insights into regional environmental controls on ecosystem status. Common hierarchical habitat classification schemes (e.g. EUNIS, CMEC), protocols, and species distribution methods (e.g. random forest, GAM, MaxEnt) will be applied to all regions to ensure a standardised approach and that maps are comparable across regions. Object-Based Image Analysis for multi-scale spatial information extraction for seabed segmentation will be tested in specific regions based on data availability and quality. A WP2 workshop at the project kick-off meeting will decide on the habitat classification scheme and the optimal standard methods for the project and will share knowledge on these methods between iAtlantic partners (MS2.1). ***Lead:*** **UKRI-NOC*, Role of Partners Involved:*** See regional contributions in Table 5.

Task 2.3 Local scale habitat mapping (1-10s km) [M01 – M42] Habitat mapping work at even finer resolution (down to cm scale) will be carried out in Regions 2 –4 and 9 including: AUV or ROV-based acoustic mapping data (e.g. bathymetry, sidescan sonar, synthetic aperture sonar), biological data from samples, video or photography, where possible making use of new technologies as developed in T2.4), and WP1 outputs of fine-scale CROCO-NH models for Regions 3 and 9. High-resolution 3D point cloud models will be created from the acoustic mapping data or through photogrammetry (e.g. SfM) techniques, which will form the basis for 3D habitat maps and virtual reality outreach materials (D2.3). Approaches agreed at the project kick-off meeting will define the statistics and species distribution modelling methods (as described for T2.2) to be applied, and environmental drivers of species and habitat distribution will be identified at the local scale. ***Lead: IFREMER, Role of Partners Involved:*** **IFREMER** will carry out the local scale analysis for the Lucky Strike (Region 3), and for the Lampaul Canyon (Region 2). **IMAR** will collaborate on the work at Lucky Strike. **UKRI-NOC** will focus on the Rockall Trough to Porcupine Abyssal Plain (Region 2) and assist **IEO** with work on Walvis Ridge (Region 9) during the *iMirabilis* demonstrator cruise. **UCC** will carry out further studies of

the Porcupine Bank Canyon (Region 2). DFO will provide local scale maps for the Gully Marine Protected Area (Region 4), while NSCC and MUN will provide additional data (Region 4). GEOMAR will assist with the analysis of substratum and biological data from video and photography, and the application of photogrammetry techniques. UEDIN will apply automated techniques to discriminate seabed mounds and/or pockmarks and apply this approach to datasets in the S Atlantic in collaboration with USP.

Task 2.4 Advance the technology readiness level of new mapping technologies (Tasks 2.4.1–2.4.4) [M01 – M36]

Task 2.4.1. Advance the eDNA sampler for AUV use. The MAPS eDNA sampler will be advanced from TRL6 to TRL8 and deployed during two research missions including the *iMirabilis* demonstrator cruise to the Walvis Ridge in the S Atlantic (Region 9), and during collaborative work planned in the Gully Canyon off Canada (Region 4). Samples will be sequenced, shared with the consortium (MS2.4), compared with and added to genetic libraries. ***Lead: UKRI-NOC, Role of Partners Involved:*** UKRI-NOC will progress the eDNA sampler from TRL6 to TRL8, involving: upgrade the motors to advance samples, adding a higher-capacity filter supply and storage device, designing a date-time-location indexing system for sample tracking, and including reservoirs to purge and decontaminate between sampling events. UKRI-NOC will sequence the MAPS samples and provide these data in collaboration to partners working in Regions 4 and 9. For comparison, CNRS will characterise benthic communities based on eDNA extracted from sediment. DFO will facilitate the use of the MAPS in the Gully Canyon (Region 4) and will share species barcode data of major taxonomic groups to support UKRI-NOC's data analyses and interpretations.

Task 2.4.2. Machine learning approaches for automated image analysis. Development of image datasets for Regions 2–4 and 8 – 10 (see T2.2 and T2.3), 'visual taxonomies', will be obtained by AUV, ROV and low-cost cameras tested during demonstrator expeditions and iAtlantic cruises followed by hierarchical supervised classification schemes for machine learning to automate the organisations of image datasets into image categories. To support this process, a new manual image annotation protocol will be developed and presented during a knowledge exchange workshop early in the project (MS2.2). Groups of single classifiers ('ensembles') will be assessed to incorporate geo-referencing data into the classification process to allow the single classifiers to adapt to local-scale characteristics of a habitat while enabling the ensemble to learn the regional to basin-scale data characteristics. To enable rapid deployment of these novel techniques during expeditions at sea, sea-going high-performance computer clusters will be developed. Guidelines on the use of machine learning for marine species detection and classification will be produced. ***Lead: GEOMAR, Role of Partners Involved:*** GEOMAR will work on all aspects of the task and carry out the low-cost camera tests in collaboration with IMAR. UKRI-NOC and IFREMER will contribute to the development of visual taxonomies, hierarchical supervised classification schemes and manually annotated image datasets for Regions 2–4 and 8–10. NSCC will also contribute with taxonomies and supervised classification and will actively participate in knowledge exchange.

Task 2.4.3. Trial of hyperspectral imaging. The hyperspectral camera will be tested in Lampaul Canyon (Region 2). An area of interest will be selected based on the data collected under T2.3. Hyperspectral images will be acquired, analysed and processed for the discrimination and mapping of seabed type, and the accuracy will be assessed using conventional ground truthing data acquired under T2.3. We will also test the ability of the system to provide useful metrics for the assessment of habitat conservation status. The results will be provided in a technical report describing the data, method and algorithms as well as the main results obtained. ***Lead:*** IFREMER***, Role of Partners Involved:*** The work will be fully carried out by IFREMER.

Task 2.4.4. Develop prototypes of low-cost stereo cameras. Prototype systems will be developed based on off-the-shelf systems and trialled throughout iAtlantic cruises where possible, including on the Demonstrator Cruise to Region 9, and will be made available to project partners. A detailed description of the system and the optimal protocol for its use will be developed. The use of machine learning to analyse the resulting data will be evaluated in Tasks 2.4.2. ***Lead***: IMAR, ***Role of Partners Involved***: IMAR and GEOMAR will collaborate on the development of the low-cost camera systems.

Task 2.5 Analysis of spatial patterns in ecosystem drivers [M30 – M42] A cross-scale, comparative analysis of the environmental factors that drive the main spatial patterns in Atlantic ecosystems will be applied to the results of Tasks 2.1, 2.2 and 2.3. Joint models will be explored to account for biological traits and fully understand species-environment relationships. ***Lead:*** UKRI-NOC***, Role of Partners Involved:*** All WP partners will contribute by providing data and analysis results derived through T2.1, T2.2 and T2.3. UKRI-NOC and DFO will carry out the species-environment modelling.

Del. No	Deliverable name	Due
D2.1	Basin-wide Atlantic marine landscape map: Map delineating the different marine environments in the Atlantic Ocean.	M18
D2.2	Models of VME taxa and functional traits distribution: Maps demonstrating the outcomes of Atlantic-wide VME taxa and functional traits distribution modelling.	M36
D2.3	3D habitat maps (point cloud models): 3D habitat maps for the local case study areas.	M36
D2.4	New imaging and analysis approaches for marine species detection and classification: Technical report on the development of new imaging and analysis, including details on data, methods and algorithms used for hyperspectral imaging, the description of new low-cost stereo-camera systems and their use, and guidelines on the use of machine learning applications.	M36
D2.5	VME taxa and functional trait predictions: Maps demonstrating the distribution of VME taxa and functional trait predictions for 7 of the iAtlantic regional study areas.	M40
D2.6	Environmental drivers of ecosystem spatial patterns in the Atlantic: Report evaluating the environmental drivers of ecosystem spatial patterns in the Atlantic at varying scales.	M42

WP #	3	Start Date	M01	End Date	M38
Title	Drivers of Ecosystem Change and Tipping Points				

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Partner	UEDIN	UNIVALI	UWC	IEO	IMAR	SC	IFREMER	UKRI-NOC	GEOMAR	HWU	UNIHB	USP	UKN	SAMS	SHN	UCC	SAIBI	UFES	NMU	UGOT	UFSC	UCT	SBE	TMG	CNRS	SU	AU	AWI	UCL	MFRI	TEMPLE	GC	SAEON	OSU
PM	53	41	2	7	0	0	30	1	9	0	15	7	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0	0	0

Objectives: The aim of WP3 is to understand drivers of ecosystem change at regional to ocean scales across different ecosystems, and to validate the use of generic and system-specific tipping points to forecast ecosystem change. The specific objectives are to:

1. Quantify the single and cumulative effects of oceanographic variability (and where relevant any anthropogenic pressures) on key ecosystem compartments
2. Test the nature of ecosystem changes for gradual shifts, generic and system-specific thresholds
3. Score each of the 12 regions according to whether their focal ecosystems are likely to change under future climate change forecasts

Task 3.1 Create an inventory of inter-annual to multidecadal data [M01 – M24] Create ecosystem timeseries over inter-annual to multidecadal timescales for each region using existing data. Compile available biological data bespoke to the ecosystem and region (a flexible approach), and match this to WP1's regional hindcasts and maps of extreme environmental events, as well as any local instrumental records (Task 1.4). Implement a common data template for all partners to optimise data assimilation. Harmonise common data and metadata standards to enable collaborations and an understanding of processes at full ocean scale. Use the H2020 EN ENVRI+ methodology[101] to mitigate issues related to data heterogeneity and diversity. ***Lead:*** **UEDIN, *Role of Partners Involved:*** Biological data compilation will be led by regional partners and in collaboration with their regional stakeholders and International Partners (see LoS): Region 1 (**MFRI, UEDIN, UIH**); Region 2 (**UKRI-NOC**); Region 3 (**IFREMER**); Region 4 (**DFO**); Region 5 (**BIOS, UEDIN**); Region 6 (**GEOMAR, UniCV, INDP**); Region 7 (**UNIVALI**); Region 9 (**UNIVALI**), Region 10 (**UNIVALI**), Region 11 (**UNIVALI**). **SAMS, GEOMAR, BIOS** and **UWC** will help match and analyse the relationships between biological timeseries with the relevant WP1 hindcasts and maps of extreme environmental events.

Task 3.2 Trial and report on use of ancient eDNA (aDNA) to create ecosystem timeseries [M01 – 20] Analyse eDNA and sediment fauna from six sediment cores from Regions 1,4 and 5 to reconstruct deep and open-ocean ecosystem timeseries. Genome scans for aDNA will search in the top 10-15 cm parts of sediment cores and compared to standard paleo-oceanographic and ecological methods to verify any downcore ecosystem changes and to test whether aDNA signals degrade downcore as well. Classical morphological analyses of sediment communities will be conducted and compared with the aDNA results to validate the accuracy and reproducibility of the method downcore and across regions. ***Lead:*** **UCL**, ***Role of Partners Involved:*** **UCL** will conduct the morphological analyses and palaeoceanographic reconstructions, with International Partner **UA** conducting the genomics, creating and analysing the genome libraries. **UCL** and **UA** will compare aDNA results morphological changes. **UCL** will prepare a report outlining the trial and results.

Task 3.3 Analyse and report on drivers of ecosystem change and tipping points over centennial to millennial timescales [M01 – M24] Centennial to millennial paleo-proxy ecosystem data spanning the last 1-10 kyr will be generated (longer and shorter resolution may also be possible). New palaeoceanographic data will be collected using proxies for ocean circulation (e.g. sediment grain size analysis; stable C and O analysis including ^{18}O and ^{13}C; foram-based geochemical proxies; coral-based neodymium isotopes) and for past ecosystem variability (e.g. flux/growth rates and species assemblage data from a range of fossil archives including planktonic and benthic forams, cold-water corals, diatoms and coccoliths, and organic matter type and flux including ancient eDNA). This newly generated data will be combined with existing data compiled from literature searches and paleo databases, e.g., PANGAEA. Regional comparisons of ecosystem drivers of change and tipping points will be evaluated to produce a fully-Atlantic perspective report. ***Lead:*** **UCL**, ***Role of Partners Involved:*** Samples will be analysed from: Regions 1,4 and 5 (UCL); Region 7 (**UNIVALI, USP**); Region 8 (**UNIHB**); Region 9 (**UNIHB, UNIVALI, USP; IEO** may collect new samples); Regions 10 and 11 (**UNIVALI, USP**); Region 12 (**UNIHB**); International Partner **DAL** will provide scientific guidance to **USP** on stable isotope methods for corals. **UCL** will prepare a summary report with **all Task Partners** assisting.

Task 3.4 Analyse ecosystem changes, drivers of these changes, and tipping points over inter-annual to multidecadal timescales [M06 – M36] Time-frequency domain timeseries analyses, marine extreme event analysis (e.g. MHWs), and evaluation of tipping points in inter-annual to multidecadal timeseries coupled to WP1 hindcasts or other relevant oceanographic data will be applied. An expert-led capacity-building workshop midway (M26) through the project in Cape Verde with the WASCAL consortium will elaborate a common strategy among partners to define common ecosystem and oceanographic descriptors and determine appropriate statistical analysis approaches. ***Lead:*** **IFREMER**, ***Role of Partners Involved:*** Analyses on inter-annual and multidecadal datasets will be conducted for Region 1 (**MFRI, UEDIN**); Region 2 (**UKRI-NOC**); Region 3 (**IFREMER**); Region 4 (**DFO**); Region 5 (**BIOS, UEDIN**); Region 6 (**GEOMAR, UniCV, INDP**); Region 7 (**UNIVALI**); Regions 9–11 (**UNIVALI**). **SAMS**, **GEOMAR**, **UWC** and **BIOS** will assist with interpretations of WP1 hindcasts and extreme events. **IFREMER**, **UEDIN** and **GEOMAR** will

101 Beranzoli et al., 2017. ENVRI+ D2.2. Methodology report for handling of data heterogeneity. Ref. Ares(2017)2234534 - 02/05/2017

organise the statistics workshop in Cape Verde with local facilitation from International Partners **UniCV** and **INDP**. World-leading statistical expertise will be provided by **UM**.

Task 3.5 Assessment of scenarios of oceanographic change and impact on ecosystem dynamics [M24 – M38] Place-based risk assessments will be conducted to map the likelihood of IPCC scenarios of climate change (WP1 forecasts) impact on ecosystem dynamics and push towards/beyond tipping points, considering results to date from WP4 Tasks 4.1, 4.3 and 4.5.
Lead: **UEDIN**, ***Role of Partners Involved:*** **SAMS, GEOMAR** and **UWC** will advise on forecasts with **UEDIN**. All data contributors from the 12 large marine regions will assist with assessments. **SAMS** will create vector file risk maps as outputs for WP5.

No	Deliverable name	Due
D3.1	**Methods to create and assess deep and open-ocean ecosystem timeseries**: report on the methods for performing regional assessments of ecosystem change and tipping points using time series data, including protocols for harmonisation of common data and metadata standards.	M30
D3.2	**Drivers of ecosystem change and tipping points**: report on the analyses of time-frequency domain timeseries and marine extreme events (e.g. MHWs), and evaluation of tipping points in inter-annual to multidecadal timeseries.	M36
D3.3	**Risk assessments of future changes to ecosystem dynamics and risk of tipping points**: report on the assessment of whether scenarios of oceanographic change will impact ecosystem dynamics and push towards/beyond tipping points.	M38

WP #	4	Start Date	M01	End Date	M40
Title	Impact of Multiple Stressors				

#	Partner	PM
1	UEDIN	30
2	UNIVALI	0
3	UWC	6
4	IEO	30
5	IMAR	52
6	SC	0
7	IFREMER	3
8	UKRI-NOC	0
9	GEOMAR	6
10	HWU	35
11	UNIHB	0
12	USP	7
13	UKN	0
14	SAMS	0
15	SHN	0
16	UCC	0
17	SAIBI	0
18	UFES	12
19	NMU	0
20	UGOT	0
21	UFSC	6
22	UCT	0
23	SBE	0
24	TMG	0
25	CNRS	0
26	SU	0
27	AU	0
28	AWI	0
29	UCL	0
30	MFRI	1
31	TEMPLE	0
32	GC	0
33	SAEON	0
34	OSU	0

Objectives: The overall aim of WP is to quantify the impact of environmental stressors on deep-sea pelagic and benthic ecosystems in the Atlantic Ocean. The specific objectives are:

1. Gain knowledge on the baseline functioning of deep-sea pelagic and benthic ecosystems;
2. Assess the effects of different environmental stressors on deep-sea pelagic and benthic ecosystem functioning and integrity;
3. Assess the effects of different environmental stressors on the larvae of VME organisms;
4. Identify tipping points for deep-sea ecosystems in the Atlantic Ocean.

Task 4.1 Conduct *ex situ* multiple stressor impact experiments on mesopelagic zooplankton communities [M01 – M24] *Ex situ* experimental study of the impacts of warming oceans, declining pH, and seabed mining on deep-sea pelagic fauna (e.g. copepods, gelatinous zooplankton) and microbial communities. Organisms will be collected during iAtlantic cruises to Region 9 but also from a Norwegian fjord (Lurefjorden) using custom zooplankton samplers from the JAGO manned submersible. Impacts on pelagic ecosystem functioning (O_2 consumption, CO_2 production and feeding) will be measured. ***Lead: UWC***, ***Role of Partners Involved:*** **UWC** (*via* the NANSEN programme) and **IEO** will provide ship time to collect bathypelagic water samples from Region 9, with **UWC** and **HWU** conducting the acidification and warming experiments onboard. **GEOMAR** and **HWU** will collect deep-sea jellyfish from Norway and undertake the warming and particle exposure experiments using these faunas.

Task 4.2 Compare natural spatial gradients in deep pelagic and benthic ecosystem functioning [M01 – M36] Collect baseline data on ecosystem functional processes of selected deep-sea pelagic and benthic systems and use these to assess: (1) different productivity / oxygen conditions structure ecosystems in both pelagic and benthic (bathyal and abyssal and bathyal benthic and pelagic ecosystems, (depth) settings 2) the importance of coastal plant material to deep-sea food webs and by inference, their sensitivity to changes in the flux of this organic material, and (3) the status of VMEs throughout the Atlantic. ***Lead:*** **HWU**, ***Role of Partners Involved:*** **UKRI-NOC**, **USP**, **SHN** and **IEO** will provide ship time for Regions 2,6,9,10 and 12 (with latter at SAMOC-West at 34.5°S); **HWU** will provide benthic landers for *in situ* measurements. **HWU** and **UFES** will perform C-uptake measurements on fauna from these experiments. **HWU** and **IMAR** will perform stable isotope analysis to elucidate pelagic food-web structure. **UWC** will carry out the study on importance of kelp detritus to slope and canyon fauna in Region 9. **IMAR, IEO, UEDIN, MFRI** and **USP** will study coral ecosystems in Regions 1,3,9 and 10. **IFREMER** will perform stable isotope analysis in Region 2. **HWU** will integrate the collected data.

Task 4.3 Conduct *ex situ* single and multiple stressor experiments on hard-bottom VME species [M01 – M36] Single and synergistic effects of predicted changes in ocean chemistry (Δ temp, pH, O_2) and increased particle exposure from mining or trawling activities on key deep-sea scleractinian corals, gorgonians or sponges will be assessed. Stressor experiments will be performed. The aquaria data will be used in combination with measurements of the proportion of live and dead coral framework generated from ROV field surveys (see Task 4.2). Data will be combined to estimate calcium carbonate budgets in cold-water coral reefs under present and future scenarios of climate change, and to identify tipping points that help ground-truth temporal ecosystem studies in WP3. ***Lead:*** **UEDIN**, ***Role of Partners Involved:*** **USP**, **IMAR, UEDIN** and **IEO** will provide ship time to Regions 2,3,6,9,10 and SAMOC-West at 34.5°S as well as off Norway and off Galicia, and will conduct the exposure experiments in collaboration with Aquarium Finisterrae in northern Spain (see LoS). **IMAR** and **UEDIN** will build calcium

carbonate budgets for coral ecosystems.

Task 4.4 Conduct *ex situ* single and multiple stressor experiments on soft-sediment ecosystems [M06 – M40] Experiment in eutrophic and oligotrophic ecosystems (Regions 6 and 10, respectively) to assess individual and cumulative impacts of increased temperature and organic matter quality on soft sediment ecosystems. ***Lead: UFES***, ***Role of Partners Involved:*** **UFES** and **IEO** will supply ship-time to sample deep-sea sediments off Cape Verde (Region 6; **IEO**) and in the Espirito Santos Basin (Region 10; **UFES**). Experiments on temperature and changes to POC composition and quality will be run by **HWU** and **UFES**.

Task 4.5 Evaluate impacts of single and multiple stressors on pelagic larvae of VME species [M12 – M40] Short and long-term *ex situ* exposure experiments will be used to measure effects of IPCC projected changes in temperature, pH and O_2, and realistic particle exposure resulting from deep-sea mining and fishing activities on pelagic larvae from VME organisms including cold-water corals, sponges, and hydrothermal vent mussels. ***Lead:*** **IMAR**, ***Role of Partners Involved:*** **IMAR**, **UGOT, IEO** and **IFREMER** will provide ship time to collect larvae in Regions 2 and 3, and off Norway, Sweden and Galicia; experiments will be conducted in **IMAR**, **UGOT** and **IEO** laboratories.

No	Deliverable name	Due
D4.1	**Stressor impacts on planktonic organisms:** Report on the effects of climate change and suspended particles on deep planktonic organisms.	M24
D4.2	**Baseline ecosystem function in selected deep pelagic and benthic environments**: Report on baseline ecosystem function in selected deep-sea pelagic and benthic environments characterised by different environmental conditions.	M36
D4.3	**Assessment of the effects of multiple stressors on the functioning of hard-bottom VME ecosystems**: Report on experimental studies assessing the effects of multiple stressors on the functioning of hard bottom benthic ecosystems.	M36
D4.4	**Assessment of the effects of multiple stressors on the pelagic larvae of VME species**: Report on experimental studies assessing the effects of multiple stressors on the larvae of selected deep-sea benthic species.	M40
D4.5	**Impact of increased temperature, and altered POC composition on soft-sediment ecosystems:** Report on the potential impact of increased temperature, and altered POC composition on benthic processes at bathyal depths.	M40

WP #	5	Start Date	M01	End Date	M46
Title	Spatial and Temporal Management and Protection				

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Partner	UEDIN	UNIVALI	UWC	IEO	IMAR	SC	IFREMER	UKRI-NOC	GEOMAR	HWU	UNIHB	USP	UKN	SAMS	SHN	UCC	SAIBI	UFES	NMU	UGOT	UFSC	UCT	SBE	TMG	CNRS	SU	AU	AWI	UCL	MFRI	TEMPLE	GC	SAEON	OSU
PM	12	1	0	9	25	0	0	0	1	1	1	0	0	3	0	0	0	0	12	0	0	0	7	1	0	0	0	2	0	2	0	0	0	0

Objectives: The overall aim of WP5 is to produce transparent ocean basin scale management scenarios for the whole Atlantic. The specific objectives are:

1. Compile spatial and temporal information to produce a series of outputs illustrating the current and future projected changes in status of Atlantic ecosystems throughout the Atlantic;
2. Apply site prioritisation techniques to identify zones where different management regimes can be applied;
3. Generate planning scenarios to inform marine spatial planning and sustainable development in the Atlantic.

Task 5.1 Compilation of regions of interest maps from existing data sources [M01 – M12] To inform the development of management scenarios (T5.3) and complement the data produced by WPs 1-4 existing geospatial information on areas of the Atlantic will be collected from public repositories and contributions from our industry partners. This geospatial information will include EBSAs and ABMTs, areas exploited by industry, areas of interest to industry and migration hotspots. Where debate exists as to which dataset is most appropriate, multiple options will be included. The data will be used to produce GIS layers for incorporation into the iAtlantic GIS tool (T5.2). ***Lead:*** **IMAR**, ***Role of Partners Involved***: **IMAR, MFRI, IEO, HWU, UNIVALI** and **NMU** will collate existing data from public repositories. **UEDIN, SC, SBE** and **GC** will establish links with industry partners to facilitate sharing of relevant geospatial data. **IMAR** and **UEDIN** (through a subcontract with the Marine Geospatial Ecology Lab at Duke University) will facilitate the development of the GIS layers.

Task 5.2 Development of iAtlantic advanced web-based GIS-tools [M01 – M40] Develop, maintain and populate iAtlanticGIS, an advanced web-based GIS-tool based on open source GEONODE platform catering for the needs of the iAtlantic partners. Available geospatial data from iAtlantic WPs 1–4 will be collated in iAtlanticGIS which will feed into Task 7.4 providing an interface towards relevant marine data portals for wider dissemination, and Task 5.3 as input for the identification of spatial areas relevant for the sustainable management and protection of the Atlantic marine ecosystem. ***Lead:*** **SBE**, ***Role of Partners Involved:*** **SBE** will develop and maintain iAtlantic GIS and facilitate the process to embed the tool into the EMODnet website's community pages for wider dissemination to EMODnet and other data portals in WP7. **SBE** will coordinate the selection and ingestion of relevant geospatial data to be fed into iAtlantic GIS with assistance from **IMAR** and **MFRI** and coordinate with WP7 Leader **UNIHB**. **GEOMAR, SAM, IEO** and **HWU** will contribute to the task by providing functionality requirements and testing as well as by providing data layers from WPs 1–4 in appropriate format for ingestion.

Task 5.3 Regional prioritisation and scenario development [M24 – M40] Define a set of management planning scenarios using

spatial and temporal data layers compiled in T5.2 and regions of Blue Economy interest compiled in T5.1 (e.g., climate change, fishing, deep-sea mining claim and areas of interest, and shipping). Spatial numerical optimisation tools (e.g., Marxan, Marxan with Zones, Zonation, PrioritizR) will be used to identify a set of focal scenarios based on these integrated datasets and identify distinct zones where different management regimes can be applied in the different regions. Sustainable management planning scenarios for the regional ecosystems representing a range of optimisation targets that integrate habitat data, asymmetric spatial connectivity, species distributions, human stressor data and future climate scenarios will then be developed. ***Lead:*** IMAR; ***Role of Partners Involved***: IMAR will coordinate the development of the representative approaches and numerical optimisation tools, UEDIN, NMU and MFRI will support the analysis and selection of regions.

Task 5.4 Evaluation of sustainable management planning scenarios [M36 – M46] Evaluation of each scenario will be performed during a focused session at the 3rd stakeholder workshops organised by WP6 and facilitated by UEDIN (via Duke subcontract). Outputs from this workshop will be refined to produce transparent European marine spatial planning and all-Atlantic Ocean management scenarios that will inform key processes such as the development of regional environmental management plans. ***Lead Partner:*** IMAR, ***Role of Partners Involved:*** IMAR and NMU will lead on the development of the planning scenarios. UEDIN (via Duke subcontract) will facilitate the stakeholder evaluation workshop.

Del. No	Deliverable name	Due
D5.1	iAtlantic GIS tool architecture: Report describing the architecture of the iAtlantic GIS tool, including protocols for ingestion of data layers.	M06
D5.2	Atlantic regions of interest: Compilation of maps illustrating regions of conservation and commercial interest in the Atlantic.	M12
D5.3	Ocean scale management scenarios for the Atlantic: report on the scenarios identified by iAtlantic and their capacity to inform the implementation of Area Based Management Tools (ABMT).	M46

WP #	6	Start Date	M01	End Date	M48
Title	Capacity Building, Engagement, Outreach and Exploitation				

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Partner	UEDIN	UNIVALI	UWC	IEO	IMAR	SC	IFREMER	UKRI-NOC	GEOMAR	HWU	UNIHB	USP	UKN	SAMS	SHN	UCC	SAIBI	UFES	NMU	UGOT	UFSC	UCT	SBE	TMG	CNRS	SU	AU	AWI	UCL	MFRI	TEMPLE	GC	SAEON	OSU
PM	18	2	1	9	1	26	1	2	4	1	1	2	1	3	1	2	0.5	1	12	1	1	1	1	12	1	1	0.5	0.5	1	1	1	11	1	1

Objectives: The overall aim of WP6 is to maximise the uptake and impact of iAtlantic research by widely sharing knowledge, outcomes and results with a broad range of audiences. The specific objectives are:

1. Achieve high levels of awareness of iAtlantic activities and results across a wide variety of audiences, from the public high-level policy fora;
2. Engage with and support stakeholders and decision-makers at regional, national and international levels, across sectors and geographic boundaries;
3. Build and enhance capacity in the relevant scientific, technological and policy-oriented skills and enable transfer of knowledge throughout the Atlantic;
4. Contribute to development of adaptive ocean governance frameworks and facilitate solution-oriented project outcomes to support progress towards the conservation and sustainable use of marine biological diversity;
5. Plan for monitor and manage the exploitation of results and technologies.

Task 6.1 Development of dissemination, communication and engagement plan [M01 – M06] Establish a communication and dissemination plan (D6.1), based on EC best practice. The plan will set out communication principles and define the objectives, target end users of iAtlantic communications as well as tools and channels, responsibilities and metrics for measuring the impact of communications activities. To ensure activities are directed at the right people at the right time a comprehensive stakeholder mapping exercise will be performed to identify key stakeholder groups and meetings (both regional and sectoral) that will take place during the course of the project and determine priorities for iAtlantic's engagement/attendance. ***Lead:*** SC, ***Role of Partners Involved:*** SC will coordinate the development of the communications plan with support from UEDIN. SC will lead on the stakeholder mapping exercise with input from All Partners with respect to identifying national, regional or international opportunities to promote iAtlantic and facilitating engagement with key stakeholders outwith the iAtlantic collaboration.

Task 6.2 Innovation and Exploitation [M01-M48] Review the outputs and results of the project to assess exploitation opportunities. Facilitate exploitation discussion at consortium meetings and workshops. Work to reach agreement on exploitation plans considering markets, intellectual property, barriers to entry, joint or collaborative ventures, routes to market and potential supply chains. Engage with industrial partners to develop exploitation plans informed by the 'voice of the customer'. ***Lead:*** UEDIN, ***Role of Partners:*** UEDIN will lead the exploitation planning and facilitate discussions of opportunities for exploitation. All Partners will contribute to the development of the exploitation plans.

Task 6.3 Outreach and dissemination [M01-M48] Establish a clear project identity, supported and promoted via a project website, social media, project literature and promotional tools and materials for use at events, school talks and conferences. Develop a comprehensive information resource accessible to a range of audiences in multiple languages (English, French,

German, Spanish, Portuguese). Online resources will include podcasts, short films, interviews, downloadable briefings, interactive visualisations, infographics and posters spanning a range of project-specific topics, as well as more general issues pertinent to Atlantic ecosystem research. The site will be regularly updated with news, cruise blogs and the bi-annual e-newsletter. Organise live broadcasts and expedition blogs from iAtlantic cruises for engagement with mainstream media channels, schools and general public, and use cruise port calls to engage with local communities. Disseminate project results to the wider scientific community via participation at international conferences, technical meetings and workshops, identify opportunities to convene dedicated iAtlantic conference sessions, and publish results in peer-reviewed scientific journals. Produce a 'research highlights' publication showcasing the project's main achievements, outcomes and recommendations in an accessible and informative style so that it is useful for the widest possible range of audiences (D6.7). ***Lead:*** UEDIN, ***Role of Partners Involved:*** UEDIN will be responsible for project branding, project website and social media accounts, project literature and promotional materials. SC will contribute content and materials to the online resources, provide graphic design and desktop publishing skills, create and distribute the project newsletter and end of project research highlights publication, organise and coordinate ship-based expedition outreach activities.

Task 6.4 Stakeholder engagement [M01-M48] Engage with relevant meetings of various stakeholder groups and international policy fora to promote iAtlantic's work, ensure feedback from those processes into relevant iAtlantic work packages, explore how iAtlantic results will be used by different end-users, and where the different sectoral groups may be able to contribute knowledge, data and expertise to the project effort. Convene a dedicated Blue Growth session at the annual project meetings as appropriate. Engage with the CSA AANCHOR project and attend, as appropriate, stakeholder platform workshops organised by this programme. Convene three high-level Stakeholder Dialogue meetings through the course of the project, at which results from iAtlantic will be presented, ideas exchanged, and relevant issues discussed. Initiate joining forces with the other projects funded under this call to deliver periodic Blue Growth Atlantic showcase events. ***Lead:*** SC, ***Role of Partners Involved:*** Stakeholder engagement activities will be coordinated and monitored by SC; UEDIN, TMG, GC, NMU and UNIVALI will be involved in leading or contributing to stakeholder dialogue and events. All Partners will exploit opportunities to engage in specific stakeholder meetings should they arise over the course of the project.

Task 6.5 Capacity building [M01-M48] Establish a comprehensive, multidisciplinary capacity building programme to maximise training opportunities across the spectrum of researchers in the project community and beyond. A series of technical workshops, training sessions, seminars and at-sea training opportunities will be organised by the WP leads, monitored and facilitated by WP6, and spanning five key umbrella themes: 1) Transfer of technologies, facilities and experimental techniques, 2) Researcher mobility, 3) Analytical techniques, dataset integration and interpretation, 4) Ocean policy and governance, 5) Transferable skills. In addition, two dedicated regional capacity building workshops will be organised, one in Cape Verdes (with focus on African participation and in partnership with the WASCAL consortium) and one in South America at COLACMAR in close collaboration with UNIVALI. A quarterly webinar series will expand the project's outreach beyond the immediate iAtlantic research community, and strong links will be made to other international capacity development initiatives. Key beneficiaries of the iAtlantic capacity building programme will be the community of iAtlantic Fellows, comprising the postgraduate and postdoctoral researchers recruited in the first 6-12 months of the project. Selected iAtlantic Fellows, supported by more senior researchers, will also present "Ocean Literacy" talks at local schools in the N and S Atlantic. Mentoring partnerships will be established between regions and across disciplines. Wherever possible, we will seek to accommodate the participation of regional organisations outside the immediate iAtlantic community. The iAtlantic cruise programme, and the demonstrator cruises, will provide a wealth of training opportunities, including use of transit time for seabird and marine mammal observing. ***Lead:*** SC. ***Role of Partners Involved:*** SC will coordinate and monitor the overall capacity building programme, convene the two regional capacity building workshops, organise and host the webinar series, coordinate the iAtlantic mentoring programme, support the organisation of technical training workshops and facilitate sea-going opportunities and researcher exchange activities. GC and TMG will have input to policy/governance-focused capacity building activities. GEOMAR will lead on delivery of the regional capacity building workshop in Cape Verdes; GC will help organise and deliver the regional capacity building workshop in South America. All partners will contribute to the overall capacity building programme either through hosting events or supporting the delivering of capacity building activities.

Task 6.6 Ocean governance [M01-M48] Critically assess the current ocean governance frameworks applicable to the management of human activities affecting Atlantic marine ecosystems under conditions of change to identify opportunities for improving management approaches. Develop policy briefs on 1) options and challenges for Atlantic Ocean governance, and 2) recommendations on related research needs and capacity building to relevant ocean science-policy frameworks. In collaboration with WPs 1-5, produce topical briefing documents to explain and raise awareness of key issues pertinent to or arising from iAtlantic research that have relevance for policy development. ***Lead:*** TMG. ***Role of Partners Involved:*** TMG will undertake the ocean governance framework assessment and produce the policy briefs, with input and support from GC. There will be strong links with Task 6.2 in engagement with policy fora.

Del. No	Deliverable name	Due
D6.1	iAtlantic dissemination, exploitation and communication plan: Plan for the dissemination, exploitation and communication of iAtlantic results including key messages, target stakeholders and performance indicators.	M06
D6.2	Atlantic Ocean governance frameworks affecting Atlantic marine ecosystems under conditions of change: Report on current ocean governance frameworks applicable to the management of human activities affecting Atlantic marine ecosystems under conditions of change.	M37
D6.3	Outcomes of regional capacity building, enhancing skills development and knowledge transfer between the North and South Atlantic: Report on the outcomes of the iAtlantic capacity building programme.	M44

D6.4	**Challenges and recommendations for Atlantic Ocean governance**: Policy briefs on the 1) options and challenges for Atlantic Ocean governance using WP5 scenario outcomes, and 2) recommendations on future research needs and capacity building to relevant ocean science-policy frameworks.	M48
D6.5	**Final exploitation plans for the result and outputs of the project:** Report on the assessment of iAtlantic outcomes and the exploitation potential.	M48
D6.6	**iAtlantic Compendium - achievements, outcomes and recommendations**: Publication in non-specialised press summarising the key achievements, outcomes and recommendations produced by iAtlantic.	M48

WP #	7	**Start Date**	M01	**End Date**	M48
Title	Data Management				

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Partner	UEDIN	UNIVALI	UWC	IEO	IMAR	SC	IFREMER	UKRI-NOC	GEOMAR	HWU	UNIHB	USP	UKN	SAMS	SHN	UCC	SAIBI	UFES	NMU	UGOT	UFSC	UCT	SBE	TMG	CNRS	SU	AU	AWI	UCL	MFRI	TEMPLE	GC	SAEON	OSU
PM	11	0	1	3	0	1	1	1	3	1	37	1	1	1	1	2	1	1	6	0	0	1	7	0	1	1	0.5	0	1	0.5	0	0	10	0

Objectives: WP7 aims to provide iAtlantic partners with a state-of-the-art data handling workflow in accordance with the H2020 Open Research Data Pilot. The specific objectives of WP7 are:

1. Plan and carry out iAtlantic data handling and archiving according to the FAIR principles (data will be Findable, Accessible, Interoperable and Re-usable);
2. Provide data handling and harvesting expertise in training opportunities;
3. Ensure wider and long-term data dissemination through EMODnet's data portals and resources for all Atlantic stakeholders, including those in the North West and South Atlantic, and through the European Atlas of the Seas;
4. Work on growing the international data community around Atlantic Ocean Observations through a thematic GEOSS Portal interface and EMODnet.

Task 7.1 Data management plan (DMP) [M01 – M4] The DMP will identify and specify what data will be open access and provide guidelines for its discovery, access, use, re-use and for its curation and preservation. Considering the large quantity of data flowing into the project from other sources, the task will require a substantial effort from UniHB, but will also require active cooperation from all iAtlantic partners to provide the needed information. The DMP will follow the general EU guideline: 'as open as possible, as closed as necessary', regarding research data. The DMP will also specify metadata standards and emphasize the necessity of allocating persistent identifiers for all generated data. ***Lead:*** **UNIHB**, ***Role of Partners Involved:*** **UNIHB** will lead on the development and implementation of the DMP. **All Partners** will provide the critical information necessary to establish the data management plan.

Task 7.2 Data submission and harmonisation [M04 – M48] Curation of (raw) data generated by the project, including providing guidance on dataset granularity and harmonization of data and metadata. Production and archiving of uniquely identifiable and re-usable datasets and making these data(sets) available to various open science resources and projects (EMODnet, PANGAEA, OpenAIRE, Scholix, THOR, FREYA, GEOSS). Coordination with EMODnet on strategies for optimal data transfer from PANGAEA to EMODnet, data accessibility and harmonization, to support data visualisation and modelling (WP5). Building on current and previous activities by PANGAEA in the EU projects THOR and FREYA, which focus on persistent identifiers, will help ensure that iAtlantic data are archived according to state-of-the-art standards. ***Lead:*** **UNIHB**, ***Role of Partners Involved:*** **UNIHB** will support partners in preparing their data for submission to PANGAEA, **All Partners** will provide data and metadata for submission. **UNIHB** will work to accommodate specific needs in respect of subsequent data analyses (aggregating files, establishing workflows etc.). **UNIHB** and **SCB** will establish cooperation between EMODnet and PANGAEA to enable data flow from PANGAEA to EMODnet as input for EMODnet analyses and visualisation tools. **UNIHB** will facilitate data archiving in the PANGAEA long-term data archive.

Task 7.3 Training with 'Big Data' [M12 – M48] The vast amounts of Atlantic data from this large geographic area will be analysed and interpreted in innovative ways, to support both societal needs and the Blue Economy. Harvesting, handling, analysing and modelling 'big data' are major themes in the rapidly evolving discipline of Data Science. iAtlantic will use its data and model outputs to run a 'Big Data Workshop' that will gain additional support from and cooperate with the proposed new Helmholtz MarDATA Graduate School for Data Scientists (led by GEOMAR). iAtlantic will cooperate with this programme to support training workshops for iAtlantic Fellows within the graduate school using iAtlantic data and models and the expertise of the individual partners. ***Lead:*** **GEOMAR**, *Role of Partners Involved:* **UNIHB** and **SBE** will support all iAtlantic activities relating to the data training workshops. This includes preparing the data to be used and providing access to tools and models as well as support at the workshops and follow up activities. Lecturers from **AWI**, **GEOMAR** or **UNIHB** will lead the workshops as part of the graduate school training program.

Task 7.4 Interfacing with Marine Observation Data Portals for wider dissemination [M01 – M48] Analyse and improve existing interfaces, establishing new ones where necessary, between the iAtlantic consortium and the marine observation and data communities. Ensure that data and products (e.g. geospatial data layers, maps) generated by iAtlantic are made available via key marine observation and data sharing facilitates, in particular via EMODnet. Specifically, SBE will (i) review the harvesting protocols in place to ensure that data stored in PANGAEA are made available via EMODnet data portals; and (ii) facilitate the selection of relevant layers/maps available in the iAtlantic web-GIS to make them available via relevant ocean data portals and

online map viewers (e.g. EMODnet, MARCO, European Atlas of the Seas) for wider dissemination. Channelling these data resources via EMODnet to the global Atlantic community will directly contribute to DG MARE's EMODnet for global strategy. Once ingested by EMODnet and integrated into its data products catalogue for safekeeping, viewing and dissemination, they can be displayed/redistributed via any other data portal or map viewer world-wide via web-services. ***Lead:*** SBE, ***Role of Partners Involved:*** SBE will facilitate the interaction with EMODnet thematic data portals (and their global partners) for safekeeping and wider dissemination to users and other portals and map viewers, such as the recently upgraded European Atlas of the Seas – both of which are coordinated by SBE as part of its role administering the EMODnet Secretariat. UEDIN will manage overall exploitation and innovation planning. All WP Participants will contribute to the Task through provision of appropriate metadata required for uploading/feeding data and products into EMODnet and its product's data catalogue.

Task 7.5 GEOSS Atlantic Community Portal [M12 – M48] Draw together the international Atlantic observation community by strengthening and growing the network of actors in Atlantic Ocean observations. A functional interface will be built through a GEOSS portal community site. This newer feature of the GEOSS Portal allows users and data providers to build customizable sites around communities of interest. Data repositories in iAtlantic will register relevant data through the portal and actively seek out additional contributors from other Atlantic Flagship projects (BG08 call), other Atlantic research initiatives, research infrastructures and industry (see LoS from MBON). PANGAEA will populate the site with relevant actors and data providers including a catalogue of resources in GEOSS. The community pages will build on existing initiatives such as EMODnet. Particular attention will be paid to ensure complementarity and cross-reference between GEOSS community portal and the EMODnet for Atlantic user pages of its central portal. The focus will also include providing a forum for a community of practice and focus on the need to grow Essential Ocean Variables for the pelagic and deep-sea environments. ESA supports these efforts (see LoS) and will help with aspects of repository and data registration (e.g. by SAEON) to make the site operational. ***Lead:*** UNIHB, ***Role of Partners Involved:*** UNIHB will provide information relevant for the development of the mirror site and actively seek out the relevant groups beyond the iAtlantic consortium and partners to populate the mirror site and guide developments. SBE will work with UNIHB to ensure complementary information on Atlantic data resources is also available on the EMODnet central portal and to establish cross-references between the GEOSS geoportal community pages and EMODnet data portals.

No	Deliverable name	Due
D7.1	iAtlantic Data Management Plan: DMP including an open access data policy and data submission process. Common data collection protocols and database structures will be agreed at the start of the project ensuring common standards, interoperability, backup and storage alongside measures for sharing data including security and encryption, provenance, inter-communication and knowledge sharing.	M04
D7.2	GEOSS Atlantic Ocean Observation Community mirror site: Operational thematic GEOSS site that is populated, linked with other relevant sites and portals and can be accessed and used through the GEOSS portal by users and data providers.	M18
D7.3	Catalogue of iAtlantic Resources: A searchable metadata catalogue of all iAtlantic data families will be embedded in the EMODnet and GEOSS sites to provide a simple overview of the data generated in the project.	M44

WP #	8	Start Date	M01	End Date	M48
Title	Coordination and Management				

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Partner	UEDIN	UNIVALI	UWC	IEO	IMAR	SC	IFREMER	UKRI-NOC	GEOMAR	HWU	UNIHB	USP	UKN	SAMS	SHN	UCC	SAIBI	UFES	SANBI	UGOT	UFSC	UCT	SBE	TMG	CNRS	SU	AU	AWI	UCL	MFRI	TEMPLE	GC	SAEON	OSU
PM	60	5	1	3.5	3	1	1	22	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Objectives: The overall aim of WP8 is to ensure efficient delivery of the administrative, legal and financial aspects of the project. The specific objectives are:

1. Optimise the management and communications environment in which iAtlantic is performed;
2. Monitor performance and support the other WPs to deliver on their objectives, in compliance with the Grant Agreement;
3. Ensure effective and timely communication and resolution of any issues that arise during delivery of the project;
4. Facilitate communication and engagement with relevant Blue Growth initiatives;
5. Ensure iAtlantic meets and reports upon its regulatory and ethical requirements.

Task 8.1 Coordination and internal communication [M01 – M48] Coordination of the project, acting as the point of contact between the EC and the consortium, distribution of the financial contribution, review and approval of all reports and deliverables, including financial claims. Establishment of the iAtlantic consortium bodies. Planning, organisation and administration of consortium meetings including logistical plans, minutes and follow-up on actions from project meetings (as defined in section 3.2). Implementation of project management processes and procedures including progress monitoring systems and procedures, risk management procedures and innovation management procedures. ***Lead:*** UEDIN, ***Role of Partners Involved:*** UEDIN will undertake the coordination of the project, oversee delivery of the WP tasks, deliverables and milestones, act as chair of the general assembly and interface with the EC on behalf of the consortium. All Partners will actively contribute to the management boards and adhere to the management procedures established for the project.

Task 8.2 Cruise coordination [M01 – M48] Coordination of the iAtlantic cruise programme including the 3 Flagship

Demonstrator Capacity-Building cruises. Monitoring of diplomatic approvals for work performed in national waters. Liaising with cruise leads to establish opportunities for iAtlantic activities on respective cruises and WP6 to develop opportunities for capacity building during cruises. Coordination of the iAtlantic *iMirabilis* and *iCorsage* demonstrator cruises. ***Lead:*** IEO***, Role of Partners Involved:*** IEO will coordinate the iAtlantic cruise programme with support from the UEDIN Project Office; UKRI-NOC, MFRI, GEOMAR, SHN, AWI, UCC, IMAR, IFREMER, IEO, TEMPLE, DFO, SAMS, USP, UEDIN, UCT and UWC will contribute ship time to the cruise programme.

Task 8.3 Progress monitoring, quality control and reporting [M01 – M48] Track and report, on a quarterly basis, the progress towards the iAtlantic WP tasks, deliverables and milestones and highlighting any delays for the consideration of remedial action by the General Assembly. Management of the consolidation of technical and financial partner reports in a timely and professional manner as required meeting the needs of the Commission. Compilation of periodic summaries of environmental and ethical issues relating to iAtlantic's workplan. These will include summary reports of any permits required by iAtlantic partners e.g. to work in protected areas or with species protected by CITES legislation. Advising the EC Project Officer of any delays likely to affect the overall progress of the project. ***Lead:*** UEDIN, ***Role of Partners*** Involved: UEDIN will administer the collation, review and approval of deliverables, contractual and environmental/ethical reports; UEDIN will approve and submit reports and deliverables in line with the Grant Agreement; All Partners will contribute content for reports and deliverables in line with the schedule set out by the Project Office.

Task 8.4 Financial management [M01 – M48] Establishment of operating procedures for financial management to ensure that funds are correctly distributed and accounted for and that cost statements/audit forms are received as required by the Grant Agreement. Facilitating decisions regarding any re-allocation of budget between beneficiaries. Ensuring budget related actions are performed correctly and within the rules and regulations set out in the Grant Agreement and Consortium Agreement. ***Lead:*** UEDIN, ***Role of Partners Involved:*** UEDIN will lead discussions on the overall distribution of the project budget, approve cost claims and coordinate payments to the partners, UEDIN will track the project expenditure against plan and support partners with financial queries, All Partners will submit cost claims in line with the reporting schedule agreed for each reporting period.

Task 8.5 Collaboration with relevant Blue Growth projects [M01 – M48] Coordination of engagement with other BG-08 projects and relevant Atlantic Ocean research projects through participation in meetings, delivery of shared stakeholder engagement events. Ensuring that synergies with other projects funded under the H2020 BG-08 topic and relevant projects and initiatives are fully explored and exploited. ***Lead:*** UEDIN, ***Role of Partners Involved:*** UEDIN will coordinate engagement with relevant projects and initiatives such as other BG-08 projects and projects funded by the Belmont forum, while ensuring appropriate steps, e.g. NDAs are concluded prior to the start of the collaboration. All Partners will actively contribute to Atlantic Blue Growth activities and explore opportunities to engage with other projects and initiatives.

Task 8.6 Management of ethics and gender issues [M01 – M48] Seeking ethics approval from an approved local ethics committee in each participating country prior to the commencement of research. Review and collation of local ethical approval documentation to ensure that the protocol adheres to local ethical considerations and to relevant EU legislation and H2020 regulations. Monitoring relevant gender issues including gender in research and gender balance in leadership and decision making. ***Lead:*** UEDIN, ***Role of Partners Involved:*** UEDIN will coordinate the collection and monitoring of ethical approvals and gender issues. All Partners will ensure appropriate ethical approvals are in place before the start of any research and support the coordinator in the management of gender issues.

Del.	Deliverable Title and Description	Due
D8.1	iAtlantic Project Management Handbook: Setting out the management processes and procedures that will be implemented to ensure the timely delivery of the project activities, including schedules for meetings and reporting, risk and innovation management procedures.	M03
D8.2	1st iAtlantic Periodic Report: Report on the technical progress and achievements delivered by the project in the first period of the project.	M20
D8.3	2nd iAtlantic Periodic Report: Report on the technical progress and achievements delivered by the project in the second period of the project.	M38
D8.4	Final iAtlantic Periodic Report: Final report on the outcomes of the project including innovations delivered by the project and uptake of results.	M50

Table 14: List of deliverables.

	Del No.	Deliverable Name	WP	Lead	Type	Diss. Level	Due
1	D8.1	iAtlantic Project Management Handbook	8	UEDIN	R	CO	M03
2	D7.1	Data Management Plan	7	UNIHB	R	CO	M04
3	D5.1	iAtlantic dynamic mapping tool architecture	5	SBE	R	CO	M06
4	D6.1	iAtlantic dissemination, exploitation and communication plan	6	SC	O	PU	M06
5	D1.1	Atlantic circulation variability in the past 50 years	1	GEOMAR	R	PU	M12
6	D5.2	Atlantic regions of interest	5	IMAR	R	CO	M12
7	D2.1	Basin-wide Atlantic marine landscape map	2	GEOMAR	R	PU	M18
8	D7.2	GEOSS Atlantic Ocean Observation Community mirror site	7	UNIHB	R	PU	M18
9	D8.2	1st iAtlantic Periodic Report	8	UEDIN	R	CO	M20
10	D4.1	Stressor impacts on deep-sea planktonic organisms	4	UWC	R	PU	M24
11	D1.2	Ecosystem relevant variations and oceanographic trends from present day to 2070	1	SAMS	R	PU	M30

	Del No.	Deliverable Name	WP	Lead	Type	Diss. Level	Due
12	D3.1	Methods to create and assess deep and open-ocean ecosystem timeseries	3	IFREMER	R	PU	M30
13	D1.3	Quantitative assessment of near-seafloor flow dynamics and physical drivers for material and larval transport	1	IFREMER	R	PU	M36
14	D2.2	Models of VME taxa and functional traits distribution	2	IMAR	R	PU	M36
15	D2.3	3D habitat maps (point cloud models)	2	IFREMER	R	PU	M36
16	D2.4	New imaging and analysis approaches for marine species detection and classification	2	GEOMAR	R	PU	M36
17	D3.2	Analysis of drivers of ecosystem change and tipping points	3	IFREMER	R	PU	M36
18	D4.2	Baseline ecosystem function in deep-sea pelagic and benthic environments	4	HWU	R	PU	M36
19	D4.3	Assessment of the effects of multiple stressors on the functioning of hard bottom benthic ecosystems	4	UEDIN	R	PU	M36
20	D6.2	Atlantic Ocean governance frameworks affecting Atlantic marine ecosystems under conditions of change	6	TMG	R	PU	M37
21	D3.3	Risk assessments of future changes to ecosystem dynamics and risk of tipping points	3	UEDIN	R	PU	M38
22	D8.3	2nd iAtlantic Periodic Report	8	UEDIN	R	CO	M38
23	D1.4	Oxygen measurements at the southern and northern Boundaries of the AMOC	1	SNH	R	PU	M40
24	D2.5	VME taxa and functional trait predictions for key study regions	2	UKRI-NOC	R	PU	M40
25	D4.4	Assessment of the effects of multiple stressors on the larvae of deep-sea benthic species	4	IMAR	R	PU	M40
26	D4.5	Impact of increased temperature, and altered POC composition on benthic processes	4	UFES	R	PU	M40
27	D1.5	Preferential pathways of dispersal and role of the AMOC in connectivity	1	SU	R	PU	M42
28	D2.6	Environmental drivers of ecosystem spatial patterns in the Atlantic	2	UKRI-NOC	O	PU	M42
29	D5.3	Ocean scale management scenarios for the Atlantic	5	IMAR	R	PU	M46
30	D6.3	Outcomes of regional capacity building: enhancing skills development and knowledge transfer between the North and South Atlantic	6	SC	O	PU	M44
31	D7.3	Catalogue of iAtlantic resources	7	UNIHB	R	PU	M44
32	D6.4	Policy briefs: Challenges for Atlantic Ocean governance, and recommendations on future research needs and capacity building	6	TMG	O	PU	M48
33	D6.5	iAtlantic Compendium: Achievements, Outcomes and Recommendations	6	SC	R	PU	M48
34	D6.6	Final exploitation plans for the result and outputs of the project	6	UEDIN	R	CO	M48
35	D8.4	Final iAtlantic Periodic Report	8	UEDIN	R	CO	M50

3.4 Management Structure and Procedures

The iAtlantic management structure has been designed to deliver strategic control and effective coordination of the different project activities and support the implementation of appropriate standards at every level of the project. The aim is to create an efficient and effective environment for the research objectives to be achieved, fostering an optimal environment which balances scientific rigour with the overall project management.

2.1.1 Management Roles and Responsibilities

The iAtlantic consortium brings together experts from the required scientific and technical fields and is led by an experienced coordinator with the necessary infrastructure and expertise to execute the project, this will ensure that both scientific and management activities are resourced with appropriate means. The following management roles have been identified as necessary for the successful execution of this ambitious project:

Project Coordinator: The Project Coordinator (Professor Murray Roberts, UEDIN) will represent the consortium through the General Assembly. He will be responsible for delegation of the WPs and the effective overall execution of the work plan. The Project Coordinator will be directly responsible for communication with the European Commission including the provision of all technical, financial and commercial reports. UEDIN will work closely with the finance departments of all partners to ensure that the administrative, reporting and financial aspects of the project are managed in an effective and timely manner.

Regional Coordinators: To facilitate engagement with partners and key stakeholders across the Atlantic basin and support coherent execution of the project activities regional coordinators representing the North, South, East and West of the Atlantic have been identified:

- North East Atlantic: MFRI (Stefán Ragnarsson)
- South East Atlantic: UWC (Albertus Smit)
- North West Atlantic: DFO (Ellen Kenchington)
- South West Atlantic: UNIVALI (Jose Angel Alvarez Perez)

The regional coordinators will have responsibility for overseeing the activities of the project partners in the different Atlantic regions and will work closely with the iAtlantic Project Office to support the partners in their region, ensure compliance with the management procedures established for iAtlantic and facilitate engagement and collaboration opportunities with key stakeholders and ongoing or emerging initiatives in their region.

WP Leaders: The WP Leaders will be responsible for the on-schedule delivery of WP tasks, deliverables and milestones and will have regular informal contact by email and telephone with the participants of their WP. They will report on problems and solutions arising during the progress of the WP to the Project Office. The WP Leaders will be encouraged to share administrative responsibility and to support the researchers of other WPs to participate actively in the organisation of the research, information sharing, international exchange and efforts to promote and encourage young researchers within the consortium.

Project Office*:* To optimise the balance between the needs of the scientific and technical aspects of iAtlantic, as distinct from the operational functions of project management, associated with financial management, performance monitoring, reporting and partner liaison, the partners agree that UEDIN, will establish a project office for the duration of the project and appoint a full time Project Manager to iAtlantic. The Project Manager will deliver specific management activities and provide support to the consortium (as detailed in WP8) to enable effective use of the research effort.

Innovation and Exploitation Manager: Will support the consortium in monitoring project outputs and ensure that partners regularly explore potential opportunities to exploit results arising from iAtlantic; including scientific outputs, new methodologies, data, protocols and experimental approaches as well as *de-novo* knowledge and new strategies. They will participate in all meetings of the Steering Committee and ensure that opportunities for innovation and exploitation are considered in all forward project plans. Their work will be informed by the recommendations on best practices for knowledge transfer to maximise value creation from European research investment in Blue Growth projects that have arisen from the recent Columbus project (http://www.columbusproject.eu/).

2.1.2 Organisational Structure and Decision Making

The iAtlantic partners agree that in the interests of performance efficiency and effective conflict or dispute resolution, a formal mechanism and organisational structure provides safeguards and arbitration for all parties. The organisational and decision-making structure of iAtlantic includes the following bodies.

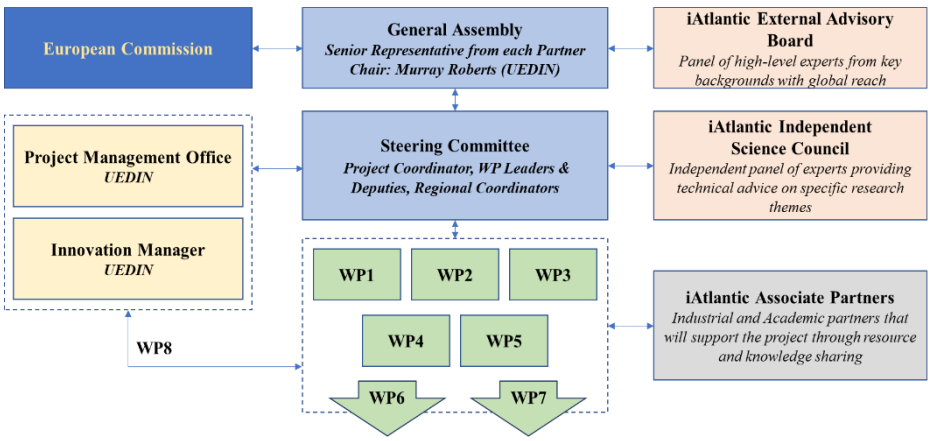


Figure 14: iAtlantic organisational structure.

General Assembly: This is the entity responsible for all project related issues. More specifically it will, based on advice from the Steering Committee (SC) and Project Office, authorise decisions on the scientific direction of the project and any agreed re-allocation of budget, if necessary (e.g. new major scientific orientations to pursue; lack of progress of one or other WPs or participants). The General Assembly itself will comprise a senior scientific representative (or nominated proxy) for each partner, other members will be appointed as appropriate. The General Assembly will have responsibility for ensuring that correct procedures are adopted and followed, and that all deadlines, milestones, deliverables, and reports, are achieved. The General Assembly will review the technical and scientific progress and

performance made by the project annually and agree in detail the forward actions for the next period, and where necessary, any corrective measures necessary to address delays. Its meetings will review overall progress against the project plan and include presentations from each of the partners who are actively working on interrelated research activity during that period. The General Assembly will meet in person at the annual iAtlantic consortium meeting to discuss privately any sensitive issues. Alternatively, conference calls will be arranged if urgent matters arise in between face to face meetings so that any problems are promptly and effectively solved. The iAtlantic Project Manager will participate as secretary in all General Assembly meetings.

Steering Committee (SC): The SC will have responsibility for scientific planning and progress monitoring and will be composed of each of the WP Leaders and Regional Coordinators. The SC will, with the support of the Project Office, implement a progress monitoring procedure and system, which will have clear timelines for deliverables and progress reporting. The SC will meet formally more frequently than the General Assembly, using web/tele-conferencing at least every 3 months to review progress and agree priorities for the following 6 months. The scientific plans will follow the pattern of annual updates for presentation to, and agreement of the General Assembly. At the end of each year the SC will review their plans for the next 18-month period so that a forward scientific plan becomes central to the overall project management. The SC will also suggest new directions and milestones and monitor progress made in relevant areas of research within the EC and outside Europe.

iAtlantic external Advisory Board: The Advisory Board will be responsible for providing expert independent high-level advice on the overall project's progress to inform decisions on project direction and opportunities for innovation and exploitation in the Blue Economy and Blue Growth. The Board will gather annually at the iAtlantic General Assembly meetings to review the overall progress of the project. The Board will produce an annual report of their overall assessment of iAtlantic including recommendations for additional activities that should be included to maximise opportunities for exploitation of results. The members have been selected both due to their broad expertise in key areas of the Blue Economy, marine science or policy development and the international reach of their positions. They have no other engagement or conflicts of interest with the project. The group will be chaired by Dr Phil Williamson an expert in marine ecology, biogeochemistry and global change. Please see Section 6 for letters from all Board members. The members of the iAtlantic external Advisory Board are:

- Professor Lisa Levin, Scripps Institution of Oceanography, an expert on the intersection of climate change and human activities on continental margin ecosystems
- Wendy Brown, Environmental Director of the International Association of Oil and Gas Producers
- Dr Gordon Paterson, Scientific Associate Natural History Museum, expert in deep-sea biology and the regulations of deep-sea mining
- Dr Alan Leonardi, Director NOAA's Office of Ocean Exploration and Research
- Thorsten Thiele, Economist and Founder of the Global Ocean Trust
- Kristina Gjerde, High Seas Advisor to IUCN

iAtlantic independent Science Council: As the scientific scope and geographic scale of iAtlantic are so broad we will use a multidisciplinary and multinational Science Council giving independent technical advice and guidance to WP leaders. To ensure that the high-level Advisory Board also benefits from the breadth and depth of the Science Council it will be coordinated by a member of the Advisory Board (Dr Gordon Paterson). Membership of the Science Council will be open throughout the project to ensure the expertise represented meet the emerging needs of the project. Our initial Science Council membership will be drawn from our external academic collaborators, see LoS from University of Adelaide (AU), University of Barcelona (ES), University of Cape Verde (CV), University of Victoria (NZ), Dalhousie University (CA), University of Iceland (IS), Ocean Frontier Institute (CA), Marine Institute-Memorial University (CA), University of Montreal (CA) and Nova Scotia Community College (CA).

2.1.3 Management Procedures

The guiding principles of the management and implementation of iAtlantic will be early establishment of procedures and protocols, and prompt resolution of issues. The following procedures will be implemented to facilitate the successful execution of the project:

Progress Monitoring and Evaluation of Results: To ensure on-schedule delivery of the research plan a progress monitoring procedure will be implemented at the start of the project. The principle scientific partner of each institution will produce a brief quarterly report detailing general progress and any problems or challenges arising with respect to the work plan. These reports will be sent to the Project Coordinator in the month following the end

of the quarter. The partner reports will be consolidated and distributed to the members by the Coordinator and made available for download via the private members' area of the project website. Activity reports will contain (1) a management overview; (2) a description of the progress towards the scientific and technological objectives, status of project deliverables (Table 14) and achievement of key milestones (Table 15); (3) identification of challenges and suggested corrective action to be taken; (4) progress towards publications and data depositions.

Table 15: List of milestones.

#	Milestone	WP(s)	Due	Means of Verification
MS7.1	Critical information necessary to establish the data management plan received by UNIHB	WP7	M03	First draft of Data Management Plan submitted to the General Assembly
MS1.1	Hindcast experiments (1958-now) with INALT20 and VIKING20x complete	WP1	M06	Models available to WP1, WP2 and WP3 and internal training on use of the models complete
MS1.2	New mooring designs for the SAMOC-West Brazil Current Array; SAMOC-East; OSNAP Rockall Trough Array finalised	WP1	M06	Designs approved by the iAtlantic Steering Committee
MS7.2	Strategies for optimal data transfer between PANGEA and EMODnet agreed	WP7	M06	Data transfer protocols submitted to the General Assembly
MS8.1	iAtlantic demonstrator capacity building cruise plans finalised	WP8	M06	Cruise plans approved by the Steering Committee
MS6.1	Initial set of ecosystem requirements defined in collaboration with key stakeholders	WP5, WP6	M08	Requirements integrated into WP5 planning scenarios
MS1.3	Collation and standardization of all observational and model hindcast and forecast fields for analysis complete	WP1	M12	Database and GIS layers of physical parameters submitted to WP5 and WP7 for subsequent analyses
MS2.1	State of (bathymetric) mapping in the Atlantic	WP2	M12	Maps produced, layer available in online GIS (WP5)
MS5.1	First data layers for integration into the iAtlantic online GIS received	WP5	M12	Data available for visualisation through the iAtlantic GIS portal
MS1.4	Genetic datasets on target species with the NGS technology compiled	WP1	M18	Datasets submitted to WP7
MS2.2	eDNA demonstrator samples collected and lab analysis complete	WP3	M18	Sequencing data provided to iAtlantic partners
MS2.3	Prototypes of low-cost stereo-camera systems produced	WP4	M18	Prototypes delivered by partners in France, South Africa and Brazil and functional in the lab
MS4.1	JAGO dives are undertaken to collect planktonic fauna. Experiments to test effects of multiple stressor are undertaken for WP4.4.	WP4	M18	Experimental data submitted to WP7
MS3.1	All geochemical and eDNA analyses completed	WP3	M20	Data submitted to WP7 and summary report of samples analysed submitted to the Steering Committee
MS7.3	Two layers from iAtlantic taken up and made available via EMODnet and/or the European Atlas of the Seas	WP7	M20	Layers published on EMODnet and/or European Atlas of the Seas
MS6.2	Revised set of ecosystem requirements defined, in light of iAtlantic preliminary results and feedback from key stakeholders	WP5, WP6	M24	Requirements integrated into WP5 planning scenarios
MS1.5	Forecast experiments (2015-2065) with INALT10X and VIKING10x	WP1	M24	Models available to WP3 for further analysis
MS3.2	Centennial to millennial scale analyses complete	WP4	M24	Data submitted to WP7 and report on palaeoceanographic drivers and tipping points submitted to the Steering Committee
MS3.3	Ecosystem timeseries compiled and coupled to VIKING20X hindcasts	WP5	M24	Summary report of timeseries and corresponding hindcasts shared with WPs 1 and 3
MS4.2	Deep-sea environments in the oligotrophic and eutrophic sites are surveyed and lander experiments are completed for T4.1.	WP4	M24	Cruise report submitted to the iAtlantic Steering Committee
MS4.3	Ex situ experimental studies for T4.2 are completed.	WP4	M24	Experimental data submitted to WP7
MS5.2	Multiple stressor maps compiled and integrated into the online GIS	WP5	M24	Data available for visualisation through the iAtlantic GIS portal
MS1.6	Collection of observations from new oxygen sensors complete	WP1	M30	Data submitted to WP7 and cruise report submitted to the iAtlantic Steering Committee
MS4.4	Soft-sediment incubations are carried out and completed for T4.3.	WP4	M30	Experimental data submitted to WP7
MS4.5	Ex situ larval experiments for T4.5 are completed.	WP4	M30	Experimental data submitted to WP7
MS1.7	Integrated maps/networks of predicted and realized present day dispersal produced.	WP1	M36	Maps produced, layer available in online GIS (WP5)

#	Milestone	WP(s)	Due	Means of Verification
MS2.4	Regional habitat maps for the 12 iAtlantic study regions complete	WP5	M36	Regional habitat maps delivered to iAtlantic GIS (WP5)
MS3.4	Risk assessment maps for iAtlantic study areas created	WP6	M36	Risk maps submitted to WP5
MS1.8	Forecasts of climate change to develop scenarios of migration and demographic changes in local populations	WP1	M42	Data submitted to WP5 for integration into management scenarios
MS7.4	Assessment of existing links between EMODnet data portals and PANGAEA complete.	WP7	M42	Report including recommendations for improving the interface for automatic harvesting and wider dissemination submitted to the SC
MS2.5	Updated maps on the state of (bathymetric) mapping in the Atlantic produced	WP6	M42	Layer available in the online GIS (WP5)
MS5.3	All data layers for the iAtlantic online GIS received	WP5	M42	Data available for visualisation through the iAtlantic GIS portal

Consortium Communication: Effective communication will be essential to deliver the iAtlantic project objectives. An interactive website and a confidential file sharing site will be established to facilitate regular online communication between partners. Web-conferencing will be extensively used for communication on both management and scientific matters. Formal network meetings involving all project partners will be held every 6 months. The network meetings will be conducted to pre-agreed agendas and include presentations on WP progress, emerging results and future plans. A separate session for the General Assembly will be allocated at each meeting to address any legal, ethical, contractual, financial, and administrative matters arsing.

Reporting and Reviews: *Periodic and Financial Reports:* At the end of each reporting period the consortium will prepare and submit to the Commission technical and financial reports, including requests for payment. All beneficiaries will contribute to the completion of the technical reports and the finance teams at each institution will ensure timely completion of the finance claims for the period. The Coordinator's financial office (UEDIN) will collate summaries of the cost statements and justifications prepared by each participating institution. *Final Report*: On completion of the project, a final report will be prepared where results will be assessed against agreed objectives. The report will focus on the economic and social implications of the data obtained. It will also describe the dissemination of the results and the factors associated with their potential economic exploitation.

Financial Management: Any changes to allocated budgets necessary for the effective and efficient performance of the project will be agreed by the General Assembly, details will be defined in the Consortium Agreement. Annually, or in line with the planned and agreed Commission reviews, the Project Office will request from each partner detailed technical and financial reports. Upon receipt, all reports will be consolidated and sent to the European Commission for validation. After validation, the EC will transfer to UEDIN the next budget tranche for distribution to the partners according to the accepted claims. Each partner will keep strict accounting of expenditures for each period. Financial audits will be carried out and certificates provided in line with the requirements of the Grant Agreement.

Innovation Management: Innovation management is a process that allows participants to cooperate with a common understanding of market and technical challenges, goals and processes. It aims to implement new creative ideas and introduce new services, processes or products and is therefore pivotal to iAtlantic. The consortium recognises that collaboration is an important source of innovation and as such the project structure is designed to ensure that all partners are actively engaged in innovation management and that the knowledge gained through participation in iAtlantic has an impact far beyond the project duration. Each quarter the partners will report on progress, highlighting opportunities for innovation to the iAtlantic Innovation and Exploitation Manager who will evaluate opportunities for use of results. The results of this activity will be developed into project exploitation plans following the iAtlantic intellectual property management procedures (see section 2.2) to ensure adequate protection and exploitation of the results.

Conflicts-Unexpected Events: In the case of notable divergence from the objectives of one WP, a detailed plan of action will be established between the Coordinator, the WP leader, and the contributors of the WP concerned. If important technical or financial re-orientations are required, decisions will be made during the General Assembly meeting by consensus whenever possible, or if where necessary, and as a final resort, by a simple majority vote. All participants will be notified in advance of any proposed modifications to the work plan or budget allocations that are to be decided upon. Further conflict resolution measures including arbitration will be defined and agreed in the Consortium Agreement.

2.1.4 Critical Risks for Implementation

The analysis of the activities to be carried out in iAtlantic has identified some risks potentially jeopardising the achievement of the project goals. However, the approach taken by the project, as set out in the project work-plan, means that the overall risk of failure to deliver substantial outputs and outcomes is acceptable and manageable. Table 16 below summarises the most critical risks identified during the development of this proposal. This list will be re-assessed and updated at the kick off meeting and then annually based on analysis of project results during the project. Risks will be monitored throughout the project and a risk log kept up to date by UEDIN.

Table 16: Critical risks for implementation.

P= Probability, S= Severity, High= 5, Low=1, RS=Risk Score >10 is unacceptable

Description of Risk	P	S	RS	WP(s)	Proposed Mitigation
Management Risks					
Delays in the delivery of critical tasks due to the complexity and scale of the project	2	4	8	All	The experience of many iAtlantic partners, particularly WP leads, in large international projects and the role of steering committee and regional coordinators, minimise the risk of coordination problems between partners sharing tasks that feed in different WPs. In the event of difficulties re-planning and, if necessary, re-allocation of tasks will be undertaken to avoid cascading delays.
Poor communications between partners due to geographical locations and the scale of the partnership	3	3	6	All	Regular programme of Steering Committee and appointment of Regional Coordinators together with minutes of meetings followed-up by the Project Office. Our response in the event of this risk will be to emphasise the role of WP leads and where necessary look to re-appoint.
Loss of a partner or loss of key staff	2	3	6		The scale and strength of the consortium partially mitigates this risk, in the event of critical expertise being lost to the project the recruitment of an additional partner will be undertaken to ensure minimum risk to the project's objectives.
Departure of the UK from EU membership "Brexit" without an agreement ensuring ongoing participation in the Framework Programme could disrupt the project, making funding of 6 beneficiaries ineligible and possibly UEDIN coordination an issue. Official advice to UK organisations is to continue to apply for EU funding while the UK remains a Member State. The draft Article 50 Withdrawal Agreement includes participation in programmes (Articles 130 and 131) was published by the EC on 28/02/2018.	1	5	5	All	The UK Govt paper on future science and innovation supports ongoing participation in the FP. Nevertheless, should this risk arise, the UK Govt has committed to directly financing UK participants in funded projects meaning ongoing performance of planned work in the project would be as a 3rd country without EU funding. If UK coordination was no longer possible the coordinator responsibilities would move to GEOMAR under the capable leadership of Colin Devey, with Covadonga Orejas (IEO) acting as Deputy. Should this risk arise prior to signature of the Grant Agreement, the activities of the UK partners will be integrated into the EU and southern Atlantic partners roles.
Financial mismanagement, loss of contributions in kind currency fluctuations.	2	2	4	All	A session dedicated to the H2020 financial rules will be held at the KO meeting and frequent updates on use of funding implemented. Experienced support on financial issues will be provided by the Project Manager supported by the University of Edinburgh's European grants office.
Planned cruises are not realised due to factors external to the project (political, financial)	2	2	2		Of the total cruises included in the iAtlantic cruise program 50% have been already approved, and the remainder have been submitted. Should any of the planned cruises not be approved iAtlantic partners will look to move activities to other cruises in the partner networks and/or apply for additional ship time to conduct the planned legs.
Scientific and Technical Risks					
Difficulties in shipping of equipment and samples between European and non-European countries	2	1	2	2,3,4	Shipments will be planned to allow information on the rules, regulations and formalities for each receptor country will be take into consideration.

Description of Risk	P	S	RS	WP(s)	Proposed Mitigation
Loss of seagoing equipment (e.g. landers and box-coring equipment)	3	3	6	4	All equipment will be insured thereby guaranteeing equipment can be replaced. This will increase the possibility of carrying out experiments later. Where feasible spare equipment (e.g. box-corers) will be brought to sea on cruises to replace any lost gear, which will maximise chances for sample retrieval. Seagoing gear will be serviced prior to expeditions to limit failures at depth.
Delays in provision of ocean model data for analyses, model-data comparisons and Lagrangian experiments	2	2	4	1	The ocean model data exist in preliminary forms and for earlier time periods (until 2009). In case of delays, these will be used for the implementation of methodologies and preliminary results. Results can be updated once model data are available.
DNA samples are of poor quality for some species so RAD libraries cannot be produced	2	2	4	1	Develop or use of previously-developed microsatellites (for some species) that can be easily amplified from fragmented DNA
Machine learning systems developed in WP2 may not be easily transferable to different cameras / platforms	2	2	4	2	The heterogeneity of available optical image data will be assessed by unsupervised machine learning methods to quantify the prediction capabilities of the trained systems and enable assessing the risk when relying on the novel, black-box machine learning systems.
Regional scale mapping is very complex and will be a challenge to manage. Some planned data collection activities may not be successful or may encounter logistical problems.	3	1	3	2	Basic habitat maps will be produced with datasets of less quality or less information with confidence maps. If data provision in one region runs into problems, the insights to the drivers behind habitat and species pattern at regional level will still be met.
Technical issues with the new camera technologies proposed in WP2	2	1	2	2	The hyperspectral camera is already available but untested for local-scale habitat mapping. If it does not fully perform according to expectations, this will be important information. Equally, experiences with the development and deployment of a new low-cost stereo-camera will be valuable information for the future planning of benthic surveys and camera use.
Delays with the adaptation of the MAPS eDNA sampler for use in AUVs.	2	3	6	2	Two cruises are earmarked for the deployment of the eDNA sampler, providing contingency if the original time-frame slips. In addition, later cruises can be modified for replacement deployments.
Machine Learning not applicable to specific image dataset to be considered in the project.	4	1	4	2	Optimise and streamline image data acquisition among partners to provide images suitable for ML. Switch to less-detailed supervised classification in the hierarchical classification scheme.
Annotation protocols too diverse to be homogenised as an input method for the machine learning training annotations.	3	1	3	2	Re-annotation of selected parts of required datasets.
Failure to maintain deep-sea organisms for laboratory experimentation.	1	1	1	4	UEDIN, IMAR-UAz, IEO and UGOT have successfully maintained several stony and soft coral species and vent mussels in the laboratory. If a partner cannot maintain the proposed organism for experimentation, the same experiments can be conducted by another partner.
Larvae for multiple stressor experiments do not survive or spawning does not take place	2	1	1	4	Several species have been targeted for this experiment. We expect to have larvae from several species but if unsuccessful we will use the cold-water coral *Lophelia pertusa* for which larval rearing and survival in aquaria has been successfully performed by UGOT over several years.
Aquarium infrastructure or systems experience technical problems	2	2	2	4	Several institutes have aquaria specimens can be transported to another aquarium. We have experience in transporting specimens including CITES and importation requirements.
Lower than anticipated engagement of industrial sector	2	1	1	All	Specific plans have been developed to work with the industry partners hence we are confident they will be actively engaged. WP6 will proactively engage with industry partners through planned stakeholder workshops. Industry partners are interested in the capacity building activities, further enhancing the engagement of industry.

3.5 Consortium as a Whole

The iAtlantic consortium of 34 partners consists of 8 EU universities, 8 universities from Brazil and South Africa around the South Atlantic, 3 small and medium sized enterprises (SMEs), 1 South African government agency and 8 EU and 4 South Atlantic focussed marine research centres in South Africa and Argentina. Partners are drawn from Brazil, Canada Denmark, France, Germany, Ireland, Netherlands, Norway, Portugal (incl. Azores), Spain, the UK and the USA and have been carefully selected to give iAtlantic the whole-Atlantic reach and vision it needs to deliver its objectives. This consortium has both the right mix of expertise across the scientific/policy realms and the offshore capabilities to deliver iAtlantic's fully integrated 4-year programme of work. Full details of the consortium are given in Section 4 with roles of partners in recent and on-going large-scale projects in Section 1.3.3.

iAtlantic has also created a network of 40 Associate Partners from providing additional depth and breadth across sectors from research to industry and policy making in countries bordering the whole Atlantic. iAtlantic's industry Associate Partners include the offshore energy sector, the most economically significant sector operating in the deep and open Atlantic. Our partnership with major oil and gas multinationals is both through the industry body, the International Association of Oil and Gas Producers (IOGP), and through several individual operators having specific plans to work with iAtlantic including Petrobras, BP and Woodside Energy. In addition, we have partnered with a motivated group of Blue Growth SMEs including: OneMind, data science; MAREXI, marine technologies; AquaBioTech, offshore aquaculture and PROOCEANO, deep sea oceanography. iAtlantic's regulatory and policy Associate Partners include government agencies such as the Canadian Department of Fisheries and Oceans, US National Oceanographic and Atmospheric Administration (NOAA) and non-governmental organisations including IUCN and the Deep-sea Conservation Coalition. This inclusive Associate Partnership gives iAtlantic a unique network of specialist organisations across Blue Growth, policy, regulatory and conservation management sectors. Each organisation has clearly defined roles in project delivery and in stakeholder consultation or Advisory Board membership (see 3.2.11). In addition to its industry and policy specialists iAtlantic has engaged a select group of North American academic institutions in Canada (Dalhousie and Memorial Universities) and the USA (Duke University) who bring additional specialist expertise and direct connections to relevant large-scale marine research projects, see 3.2.11.

3.5.1 Industrial Involvement in Exploitation

iAtlantic's objectives and implementation have been designed with our industry partners who will be involved in all stages of the project from data gathering at sea through to contributions to stakeholder workshops (WP6) and development of spatial and temporal management and protection systems (WP5). Our letters of support highlight the close relationships between the iAtlantic consortium and our industry partners. Involvement crosses scales and sectors from small to very large enterprises. For example, the Spanish SME OneMind Data Science has partnered with iAtlantic to identify new trends and improvements in sampling design and new technologies of data analysis. The major maritime survey company Kongsberg has highlighted its willingness to provide access to their products and translate iAtlantic findings to their open forum for multibeam echosounder users – an important channel for us to reach further marine survey and mapping stakeholders. Working through IOGP, iAtlantic has reached the global offshore oil and gas sector who have specified several key areas through which they wish to collaborate: sharing access to industry data, collaborative work offshore, sharing technology developments (e.g. eDNA, autonomous approaches, 'big data' analytics) and working with iAtlantic's capacity building programme including the agreement in principle to fund and/or provide in kind support to the iAtlantic Fellowship Enhancement scheme. Further details of our collaboration with individual IOGP members can be found in the LoS from BP and Woodside.

In addition to the specific plans summarised above, SME partners will benefit from early access to data and new marine technologies and the opportunity to influence policy briefs as well as establish new collaborations with both the academic and industrial partners around the Blue Growth agenda. The iAtlantic project provides the means not only for SMEs to engage in regulatory and policy development but also to access iAtlantic's deep-sea sample collections to potentially screen for example bioactive compounds and provide specialist taxonomic input for key groups (e.g. sponges, corals).

3.5.2 All Atlantic and International Influence of the iAtlantic Consortium

iAtlantic will only achieve its expected impacts by directing its results to the organisations at national, European and international levels with responsibility for policy development and implementation. The iAtlantic consortium is exceptionally well positioned for this purpose. For example, the coordinator at P1 UEDIN contributed to the 2013 IPCC 5th assessment report, led the 2014 CBD synthesis report on ocean acidification and drafted the CBD's

Voluntary Specific Workplan on Biodiversity in Cold-water Areas within the Jurisdictional Scope of the Convention; P2 UNIVALI actively contributes to international environmental management fora including FAO, ICCAT, CBD, SEAFO and ISA; P4 IEO is the official advisor organism for the Spanish Ministry of Food, Agriculture and Environment and represents Spain in the Atlantic RFMOs (NAFO, NEAFC) and EU delegations representing the EC as independent experts to the STECF and meetings of the Regional Advisory Councils, CBD, IUCN and is the national organisation responsible for the MSFD in Spain; P6 Seascape provides Global Ocean Biodiversity Initiative (GOBI) Secretariat; P15 SHN is a government agency under the Argentinian Ministry of Defence and works closely with the hydrographic services of neighbouring countries in the region; P23 Seascape Belgium provides EMODnet Secretariat; P32 GC has extensive experience on developing deep-sea policy, regulations and recommendations at the level of the UN General Assembly, UN FAO, NEAFC, NAFO (and other RFMOs) and International Seabed Authority; P33 SAEON is involved in the development of Global Change Research Data Infrastructure and Coordinates the African Ocean Biodiversity Information System (AfrOBIS). International partner DFO in Canada is member of NAFO WGESA, WGEAFFM and Scientific Council, the ICES WGECO, WGAGFM, and provides expert advice to FAO and CBD. Please see Section 4 for more details across the iAtlantic consortium.

3.5.3 Other Countries

In addition to the beneficiaries from the S Atlantic, to fully deliver on the International aspects of the project iAtlantic's consortium of partners includes two beneficiaries from the USA (TEMPLE and OSU) who are participating expertise and data to WP1 without EC funding. In addition, 11 international partners have committed to supporting the delivery of the project. The Canadian Department of Fisheries and Oceans (DFO), NOAA's Office of Ocean Exploration, Memorial University Nova Scotia, Nova Scotia Community College (NSCC), Dalhousie University (DAL), and the Université de Montréal (UM) will support the delivery of tasks in WP1, WP2, WP3 and WP8 under the respective administrative agreements for the US and Canada (see section 4.2 for details). Whilst the Bermuda Institute of Ocean Sciences (BIOS), the Universidade de Cabo Verde (UniCV), Instituto Nacional de Desenvolvimento das Pescas (INCP), the University of Adelaide (UA) and the Centro de Investigación Científica y de Educación Superior de Ensenada will support the delivery of WP3 through the provision and analysis of timeseries data and the delivery of the expert workshop.

3.6 Resources to be Committed

The resources requested by iAtlantic reflect the enormous challenge of performing basin scale research and the enhanced collaboration that is required to deliver the iAtlantic project. 67% of the total requested resource will be used to fund activities that integrate North and South Atlantic approaches to assess ecosystem status (WP2), forecast ecosystem change (WP1), identify regions in the deep-sea and open-ocean under greatest threat (WP3 and WP4) and produce tools and products to support management and governance activities in the Atlantic (WP5). The remaining 33% will be used to facilitate stakeholder engagement, capacity building and dissemination activities (WP6), implement sustainable measures for the management and exploitation of project data (WP7) and the staff costs for overall management and execution (5%) plus costs of the demonstrator cruise programme including AUV and ROV costs (12%) (WP8). In addition to the resources requested the iAtlantic beneficiaries and partners will provide access to infrastructure and equipment including research vessels, data, aquaria and samples at no additional cost to the project (see 3.6.4 below). The requested contribution to iAtlantic therefore only represents part of the resource that will be used to deliver this ambitious project.

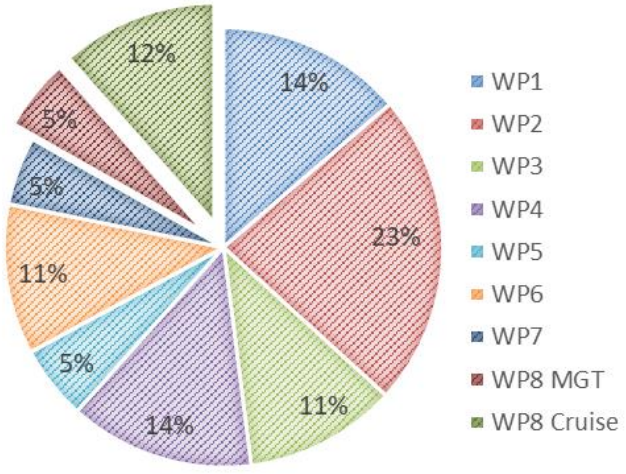


Figure 14: Breakdown of iAtlantic resources by activity.

3.6.1 Effort and Personnel Costs

Personnel costs account for 66% of the total project direct costs. This resource will be used to fund 1408-person months, or 117-person years, of effort (Table 17) equating to an average of 29 FTE personnel working on the project each year. The personnel funded by the project represents the truly interdisciplinary team necessary to

realise the objectives of iAtlantic and will include biologists, ecologists, geologists, data managers, political scientists, environmental consultants and technicians. In testament to the commitment of the partners involved in iAtlantic a number of partners have committed effort to the project at no cost to the grant meaning that the time invested in delivery of the project far exceeds the requested personnel budget.

Table 17: Summary of staff effort.

Partner	Short Name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	Total PM
1	UEDIN	1	11	53	30	12	18	11	60	196
2	UNIVALI	0	41	41	0	0	2	0	5	89
3	UWC	0	0	0	9	0	1	1	1	12
4	IEO	28	11	7	30	9	9	3	4	100
5	IMAR	0	28	0	52	25	1	0	3	108
6	SC	0	0	0	0	0	26	1	1	28
7	IFREMER	22	54	30	3	0	1	1	1	112
8	UKRI-NOC	0	63	1	0	0	1	1	22	88
9	GEOMAR	26	35	9	6	1	4	3	3	87
10	HWU	0	0	0	36	0	1	1	1	39
11	UNIHB	0	0	15	0	0	1	37	1	54
12	USP	0	30	7	7	0	2	1	1	48
13	UKN	0	36	0	0	0	1	1	1	39
14	SAMS	50	0	6	0	3	3	1	1	64
15	SHN	27	0	0	0	0	1	1	1	30
16	UCC	0	44	0	0	0	2	1	1	48
17	SAIAB	0	3	0	0	0	1	1	1	5
18	UFES	0	12	0	12	0	1	1	1	27
19	NMU	0	3	0	0	12	12	6	1	34
20	UFSC	0	30	0	0	0	1	0	1	32
21	UGOT	0	0	0	6	0	1	0	0	7
22	UCT	9	0	0	0	0	1	1	1	12
23	SBE	0	0	0	0	7	0	7	1	15
24	TMG	0	0	0	0	3	12	0	1	16
25	CNRS	5	16	0	0	0	1	1	1	24
26	SU	21	0	0	0	0	1	1	1	24
27	AU	8	0	0	0	0	1	1	1	10
28	AWI	0	3	0	0	0	1	0	1	4
29	UCL	0	0	10	0	0	1	1	1	13
30	MFRI	0	4	5	1	2	1	1	1	13
31	TEMPLE	5	0	0	0	0	0	0	1	6
32	GC	0	0	0	0	0	11	0	0	11
33	SAEON	0	0	0	0	0	0	11	1	12
34	OSU	5	0	0	0	0	0	0	1	6
Total Person Months		206	422	184	188	72	201	94	120	1408

3.6.2 Other Direct Cost Items

Travel, consumables, equipment and 'other costs', account for the remaining 34% of the direct costs budget. Given the pan-Atlantic reach of the project a substantial travel budget (10% of direct costs) has been allocated to ensure the active participation of all partners in the annual project consortium meetings and the capacity building events, held in locations throughout the Atlantic. This budget will also be used to support dissemination and engagement activities and participation in the extensive cruise programme that underpins the iAtlantic research activities.

Other costs are the second largest budget item accounting for 13% of direct costs. The budget includes funds to: access an ROV, the Autosub600 AUV, the JAGO submersible and landers (€517,272), contribute to ship time, particularly for the Brazilian Cruises (€100,000), deliver the capacity building workshop programme (€200,000), pay for open access publications (€30,000), support researcher exchange (€20,000) and cover shipping costs (€20,000). The coordinator also holds a significant fund to facilitate the engagement of the advisory board, associate partners and science council (€200,000) in engagement activities and events.

Consumables and Equipment costs account for 7% and 4% of the direct cost budget respectively. The consumables include laboratory consumables for construction and enhancement of the arrays (€33,200) and nucleic acid extraction and NGS sequencing in WP1 (€60,000), engineering parts and components for the imaging and eDNA

technologies, in situ visual markers, data storage devices, software licences, fixatives and preservatives and biological cruise consumables in WP2 (€204,328) sediment cores and sample analysis (geochemistry, isotope analysis and eDNA), in WP3 (€71,568), aquaria experiments and sample analysis in WP4 (€136,560), software licences in WP5 (€3,000) and the production of capacity building and dissemination materials in WP6 (€33,654) and demonstrator cruise consumables (€9,787)

This equipment resource will be used to: construct the tall mooring for the SAMBA array (€73,300, WP1), purchase oxygen sensors for SAMBA moorings (€67,500, WP1), enhance the 57N OSNAP array (€22,500, WP1), provide high performance computing resource for image analysis and machine learning (€14,700, WP2), purchase low cost cameras to evaluate the technology concept (€18,107, WP2) connect a thermistance chain to the EMSO observatory (€30,000, WP3), purchase a box corer (€49,000, WP4), purchase of small experimental equipment (€31,970, WP4) and computing resource for data management (€44,910, WP2, WP3, WP4, WP7). All capital equipment purchased with grant funds will be deprecated in line with the purchasing beneficiary's normal depreciation policy.

Justification for the Other Direct Costs for partners requesting >15% of their contribution to support travel, equipment and consumables and other costs is provided in Table 18 below:

Table 18: iAtlantic other direct cost items.

P1/UEDIN	Cost (€)	Justification
Travel	€94,313.00	4 Consortium meetings (8 people) 14 Capacity Building Events (2 people), Cruise Travel and Coordination travel.
Other Goods and Services	€386,250.00	Lab materials, Computers, Hard discs, Software licences (€31,250), Geochemistry analytics (€15,000), Hosting costs for workshop in Cape Verde (€20,000), Dissemination materials (video, printing) and website development (€40,000), Meeting Costs for General Assemblies (€75,000), Advisory Board, Science Council and Associate Partner Engagement Budget (€200,000), audit (€5,000)
Total	€480,563.00	

P2/UNIVALI	Cost (€)	Justification
Travel	€19,320.00	4 Consortium meetings (2 people), 2 Capacity Building Events (2 people), 2 Conferences (1 person)
Other Goods and Services	€60,000.00	25 days-at-sea with the RV Alfa Crucis, 40% of the amount required to complete 2 surveys in areas 10 and 11
Total	€79,320.00	

P3/UWC	Cost (€)	Justification
Travel	€26,300.00	4 Consortium meetings (2 people), 3 Capacity Building Events (1 person), 1 Conference (3 people)
Equipment	€9,060.00	Chillers and Pumps (€5,500), Computing Resource (€3,560)
Other Goods and Services	€11,800.00	Isotope analysis (€10,300), Fixatives and preservatives (€1,500)
Total	€47,160.00	

P4/IEO	Cost (€)	Justification
Travel	€62,900.00	4 Consortium meetings (4 people), 5 Capacity Building Events (2 people), 4 Conferences (2 people)
Other Goods and Services	€288,500.00	Aquaria tools (€10,000), 17 External discs (€2,100), Laboratory materials (€5,000), Open access publications (€5,000), Shipping Costs (€11,400), ROV Luso 3rd party contribution (€250,000), audit (€5,000)
Total	€96,400.00	

P5/IMAR	Cost (€)	Justification
Travel	€86,500.00	4 Consortium meetings (4 people), 5 Capacity Building Events (2 people), 4 Conferences (2 people)
Other Goods and Services	€178,800.00	Software, storage, sampling (€27,500), parts for the low-cost imagery system (€8,750), lab consumables, electrodes, aquaria parts (€30,800), computer parts (€1,750), ship time (€10,000), Habitat suitability modelling workshop (€20,000), lab analyses: gene sequencing, scanning and transmission electron microscopy (€75,000) Open access fees (€5,000).
Total	€265,300.00	

P6/SC	Cost (€)	Justification
Travel	€24,000.00	4 Consortium meetings (1 person), 5 Capacity Building Events (1 person), 2 Conferences (1 person), 8 stakeholder and policy engagement meetings (1 person)
Other Goods and Services	€66,550.00	Newsletter, brochure printing, other promotional printing costs; webinar host fees; video editing fees; media kit for cruise coverage (€15,200), Meeting hosting costs (venue hire, catering, etc): 3 x Stakeholder dialogue meetings, 4 x Capacity building workshops, Regional CB workshops in Brazil and South Africa, Outreach events (€51,530)
Total	€90,550.64	

P7/IFREMER	Cost (€)	Justification
Travel	€51,000.00	4 Consortium meetings (3 people), 1 Capacity Building Events (2 people), 3 Conferences (4 people), 2 student exchanges
Equipment	€34,200.00	Thermistance chain connected to the EMSO observatory (€30,000), Computing resource for processing of hyperspectral imagery, high-resolution mapping and 3D annotation (€4,200)
Other Goods and Services	€56,600.00	Storage units and archiving of numerical models (€10,000), Consumables for lab analyses: reagents, lab material (€16,600), Hard drives, in situ visual markers, optical material, computer licence (€11,000), Consumables for DNA extraction and amplification (€4,000), Acquisition of baseline knowledge on trophic relationships (€5,000), DNA sequencing (€5,000), Hosting Brazilian student (€5,000)
Total	€141,800.00	

P8/UKRI-NOC	Cost (€)	Justification
Travel	€47,280.00	4 Consortium meetings (4 people), 1 Capacity Building Events (2 people), 3 Conferences (1 person), 2 Cruise participations
Other Goods and Services	€142,348	High-performance PC, eDNA sampler consumables (engineering parts, molecular reagents, extraction kits, enzymes, probes, primers, MasterMixes) (€87,000), 25TB portable data storage, ethanol and biological consumables for cruises, ENG1 and sea survival certificates, network storage (€37,588), Computing consumables, open access publications (€4,560), Open access publications (€8,200), Audit (€5,000)
Total	€412,824.00	

P9/GEOMAR	Cost (€)	Justification
Travel	€49,000	4 Consortium meetings (6 people), 1 Capacity Building Event (2 people), 3 Conferences (1 person), 2 researcher exchanges, Capacity building event experts travel
Equipment	€5,000.00	Project specific Computer for "Machine Learning" task
Other Goods and Services	€81,540.00	Fees for 2 OA publications (€2,500), JAGO Charter for 12 Days (€61,540), Cape Verde Cape Verde event costs (€12,500), audit (€5,000)
Total	€135,540.00	

P10/HWU	Cost (€)	Justification
Travel	€57,400.00	4 Consortium meetings (2 people), 2 Capacity Building Event (2 people), 3 Conferences (2 people), 4 Cruises (2 people)
Equipment	€49,000.00	Box corer (€49,000)
Other Goods and Services	€175,860.00	Laboratory consumables (€20,410), sample analyses (€40,840), Lander for the Nansen cruise (€20,000), shipping insurance and ship time lander rental (€88,400), open access publications (€6,200)
Total	€282,260.00	

P12/USP	Cost (€)	Justification
Travel	€25,000.00	4 Consortium meetings (1 person), 2 Capacity Building Event (1 person), 4 National meetings (2 people)
Other Goods and Services	€99,000.00	Sample analyses (€49,000), Ship time (€50,000)
Total	€124,000.00	

P13/UKN	Cost (€)	Justification
Travel	€17,000.00	4 Consortium meetings (2 people), 2 Capacity Building Events (2 people), 2 Conference (2 people)
Total	€17,000.00	

P14/SAMS	Cost (€)	Justification
Travel	€28,000.00	4 Consortium meetings (3 people), 1 Capacity Building Event (2 people), 2 Conference (2 people)
Equipment	€22,500.00	1 x Oxygen Sensor to be installed on the OSNAP 57N array (€22,500)
Other Goods and Services	€24,000.00	Mooring hardware (€ 6,000), batteries for 4 x 4 deployments (€16,000)
Total	€74,500.00	

P15/SHN	Cost (€)	Justification
Travel	€12,000.00	4 Consortium meetings (1 person), 1 Capacity Building Event (1 person), 1 Conference (1 person)
Equipment	€73,300.00	ADCP float; 2 Acoustic Releases; 1 MicroCAT SBE 37 CTD/ODO; 2 Nortek Aquadopp Current Meters (€73,300)
Other Goods and Services	€20,600.00	Mooring Hardware; Batteries (MicroCATs, ADCP, Current Meters) (€11,600), Shipping costs (€6,000), Open access publications (€3,000)
Total	€105,900.00	

P17/SAIAB	Cost (€)	Justification
Travel	€15,000.00	4 Consortium meetings (1 person), 2 Capacity Building Event (2 people), 2 Conferences (2 people)
Equipment	€2,000.00	High power computing for processing (€2,000)
Total	€17,000.00	

P18/UFES	Cost (€)	Justification
Travel	€12,000.00	4 Consortium meetings (1 person), 1 Capacity Building Event (1 person), 1 Conference (1 person)
Other Goods and Services	€16,800.00	Lab supplies (pots, reagents, sampling materials) (€5,000), Ship time in Brazil or other sampling expenses (€11,800)
Total	€28,800.00	

P19/NMU	Cost (€)	Justification
Travel	€50,209.12	4 Consortium meetings (1 person), 2 Capacity Building Event (3 people), 2 MSP Cruise participations (3 people)
Equipment	€18,107.47	Low cost cameras (€18,107)
Other Goods and Services	€5,453.79	Capacity building materials (€5454)
Total	€73,752.38	

P21/UFSC	Cost (€)	Justification
Travel	€8,500.00	3 Consortium meetings (1 person), 1 Capacity Building Event (2 people), 5 Cruise participations (1 person)
Equipment	€2,000.00	Computing resources (€2,000)
Other Goods and Services	€27,784.00	Consumables for preserving specimens (ethanol, formalin) (€1,784), Cruise costs (€18,000), Taxonomy workshop hosting (€8,000)
Total	€38,284.00	

P22/UCT	Cost (€)	Justification
Travel	€12,500.00	4 Consortium meetings (1 person), 3 Capacity Building Events (1 person), 2 Conferences (1 person)
Equipment	€67,500.00	3 x Oxygen sensors to be installed on SAMBA tall moorings
Other Goods and Services	€5,500.00	Chemicals for ship-based consumables - i.e. salinity, nutrient, chl-a and oxygen validation - ship based calibration (€3,000), Filter paper, filtration system for all plankton analysis - ship based cost (€2,500)
Total	€92,500.00	

P24/TMG	Cost (€)	Justification
Travel	€25,000.00	4 Consortium meetings (1 person), 4 Capacity Building Events (1 person), 4 Conferences (1 person), 3 Stakeholder and policy meetings (1 person)
Equipment	€2,500.00	Computing resource (€2,5000)
Total	€27,127.00	

P25/CNRS	Cost (€)	Justification
Travel	€6,000.00	4 Consortium meetings (1 person), 1 Capacity Building Event (1 person), 1 Conference (1 person),
Other Goods and Services	€10,700.00	Nucleic Acid Extraction kits (€4,000), NGS Libraries and sequencing (€6,700)
Total	€16,700.00	

P26/SU	Cost (€)	Justification
Travel	€8,000.00	4 Consortium meetings (1 person)
Other Goods and Services	€32,000.00	Laboratory materials (€17,000), sequencing (€14,000)
Total	€40,000.00	

P28/AWI	Cost (€)	Justification
Travel	€30,000.00	4 Consortium meetings (1 person), 4 Capacity Building Event (2 people), 1 Conference (1 person), 4 Cruise travels (2 people)
Total	€30,000.00	

P29/UCL	Cost (€)	Justification
Travel	€11,250.00	4 Consortium meetings (1 person), 1 Capacity Building Event (2 people), 2 Conferences (1 person)
Other Goods and Services	€30,268.75	Grain size, trace metal, stable isotope and eDNA analyses of sediment cores (€30,269)
Total	€41,518.75	

P32/GC	Cost (€)	Justification
Travel	€14,100.00	4 Consortium meetings (1 person), 3 Capacity Building Event (1 person), 4 Conferences (1 person), 3 Stakeholder and policy meetings (1 person)
Total	€14,100.00	

P33/SAEON	Cost (€)	Justification
Travel	€12,000.00	4 Consortium meetings (1 person), 4 data integration meetings (2 people)
Total	€12,000.00	

3.6.3 Subcontracting

iAtlantic will subcontract specialist analysis and data collection including: sequencing of eDNA sampler collections (WP2, UKRI-NOC), collation of observation data from the Sargasso Sea (WP3, UEDIN) and analyses of stable isotope samples (WP4, UWC). In addition, UEDIN will subcontract the preparation of GIS layers visualisations and facilitation of workshops to evaluate iAtlantic management scenarios (WP6) to the Marine Geospatial Ecology Lab, Duke University (MGEL). As one of two organisations that facilitated and supplied technical support for all 13 CBD regional expert workshops to describe EBSAs, MGEL has unparalleled expertise in this area.

3.6.4 Unfunded Resource

iAtlantic's cruise programme is conservatively estimated to be worth ca. €27M. This total has been derived by summing the costs of each cruise using ship time costs supplied by our partners. For example, the *iMirabilis* expedition led by IEO on board the RV *Sarmiento de Gamboa* costs €15k per day over the 126 days required for the ship to transit to, operated in and return from the S Atlantic. This represents an in-kind contribution of €1.89M with iAtlantic funding the costs of the ROV *Luso* (€250k), the AUV *Autosub6000* (€240k) giving a total cost of at least €2.38M. Our costings do not include costs for the scientific crew's staff time, their equipment, consumables, travel or any other costs. Thus, our total of ca. €27M represents the value added to iAtlantic from its cruise programme.

4. fMEMBERS OF THE CONSORTIUM

4.1 Participants

Participant No.	1
Short Name	UEDIN
Country	United Kingdom
Organization Type	HEI
Website	www.ed.ac.uk

Partner Profile

The University of Edinburgh's (UEDIN) College of Science and Engineering is in the front rank of the UK University science and engineering groupings for research quality and research income. In the most recent (2014) UK Research Excellence Framework (REF) the College continues to be a top performer and was classified as world-leading in terms of originality, significance and rigour. The results reveal that overall 84% of the University's research activity is in the highest categories. Edinburgh is also one of a select group of British universities to achieve outstanding results when demonstrating the impact of its research on wider society. More than half of its research in this category has been classed as 'world leading'. One of the University's fundamental missions is the advancement and dissemination of knowledge. The College is also highly active in European research collaborations, participating in 490 projects since Framework 6 (125 projects in Framework 6, 235 projects in Framework 7, and to date 130 in Horizon 2020, including 33 ERC awards and 31 Marie Skłodowska-Curie actions awards).

The School of GeoSciences will host the iAtlantic Project Office. The school investigates what shapes our world and the environments in which we live to understand the interactions between Earth's geology, atmosphere, oceans, biosphere and human responses and roles. Our interdisciplinary research and teaching are built on strong core disciplines including ecology, geography, geology, geophysics, meteorology, marine and environmental sciences. The overarching aim of the Global Change Research Institute within the School is to improve the scientific understanding of past, present and future changes in the Earth system through measurements, theory and computational modelling. The School of GeoSciences hosts the on-going H2020 Blue Growth ATLAS project (www.eu-atlas.org).

Role in the Project

UEDIN will establish the iAtlantic Project Office leading overall project coordination (**Roberts**), appointing the Project Manager (**Eighteen**), leading financial management, collaboration with other projects, management of ethical and gender issues and facilitating cruise coordination (led by IEO). UEDIN also leads WP3 (**Henry**), takes a significant role in WP4 by leading Task 4.3 through experiments on cold-water corals (**Hennige**) and WP6 by leading iAtlantic's Exploitation & Innovation planning (Tasks 6.2 and 7.4). UEDIN will establish the project website and promotional materials (Task 6.3) and take a number of other roles in WP1 (Task 1.4), WP2 (Task 2.3, **De Clippele**), WP5 (Tasks 5.1, 5.3 and, via a subcontract with the Marine Geospatial Ecology Lab at Duke University, will ensure delivery of Task 5.4) and WP6 (Task 6.1, 6.4).

UEDIN is very experienced in ensuring protection of intellectual property and support in the translation to market. The University's Technology Transfer Office, Edinburgh Innovations (EI), plays an active professional role in protection, commercialisation and spin-out activities around intellectual property arising from research at UEDIN (https://edinburgh-innovations.ed.ac.uk/). EI works with external patent agents with specialist experience of drafting and prosecuting patent applications for software applications and has in-house licensing and legal teams with experience of negotiating licensing and collaboration. The format of protection will be informed by the completion of due diligence activities, market research and company engagement activities.

Key Personnel

Murray Roberts (male) is a Professor of Marine Biology and lead of UEDIN's Changing Oceans research group. He is a world leader on the biology and ecology of cold-water corals (CWC), especially in relation to effects of global climate change. Current research goals are working to advance understanding of the biology and ecology of structurally complex seabed communities and provide the information needed for their long-term management and conservation. He coordinates the €9.2M European Union 'ATLAS' project (2016-20) in response to the Horizon 2020 Blue Growth call improving the preservation and sustainable exploitation of Atlantic marine ecosystems. Other roles include being a Contributing Author on the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report Chapter 6 'Ocean Systems' (Working Group II); being on the Convention on Biological Diversity's (CBD's) Expert Group on ocean acidification; member of the Expert Panel for the United Nations Regular Process for Global Reporting. He has worked with a number of UN bodies including UNEP and the CBD Secretariat, leading the recent background document preparation for the new Voluntary Specific Workplan on Biodiversity in Cold-water Areas within the Jurisdictional Scope of the Convention on Biological Diversity (see in LoS from CBD). Roberts is the lead author of the only textbook on his subject specialism (Cold-water Corals, Cambridge University Press) and the most cited paper in the field (Roberts et al. 2006). He has led or participated in 23 offshore research cruises and has published 69 peer-reviewed papers. He will co-ordinate the iAtlantic project with most time dedicated to WP8. He will make additional scientific

contributions to WP1, 2, 3, 4 and 5 and assist Capacity Building and Innovation & Exploitation management in WPs 6 and 7. He will dedicate 50% of his time to these roles.

Lea-Anne Henry (female) is a marine ecologist and Chancellors Fellow at UEDIN. The goal of her research is to understand and predict how climate change and human activities impact marine ecosystems, habitats and species of conservation interest, and she will lead WP3 Ecosystem Drivers of Change and Tipping Points for iAtlantic. She won an Incoming International Marie Curie Fellowship in FP6, contributing research to FP6 and FP7 projects HERMES and HERMIONE. Henry was PI on the industry funded ANChor project investigating how numerical modelling can inform policy-makers on the impacts marine infrastructure have on cold-water coral ecosystems, and her industry contacts will help iAtlantic explore methods for further industry data-sharing in WP5. Henry is a Member of the ICES Working Group on Deep Water Ecology and has participated in 18 offshore cruises in the North Atlantic including Canada, Bermuda, the UK, Spain, Azores, and the High Seas. She has published 39 peer-reviewed papers. She will be primarily involved in WP3 but will contribute to making oceanographic outputs in WP1 relevant to WP3, and will act as industry liaison for WP5.

Sebastian Hennige (male) is a NERC Independent Research Fellow and proleptic Lecturer, with a focus on how environmental change will impact marine organisms, and in particular corals. His research combines organism physiology, ecology, biomineralisation and policy through laboratory and fieldwork, with an overarching aim of better understanding the tipping points of ecosystems and how we interact with this. In the field, he has been involved in the collection of benthic organisms using ROVs, video grabs and submersibles, and has conducted experiments on board research cruises in addition to laboratory work. He has led key reports for the CBD on the impacts of ocean acidification to marine biodiversity, and led recent research on the impact of ocean acidification on cold-water coral biomineralisation and reef formation. He is currently leading a NERC project on investigating impacts of climate change on tropical and cold-water corals and will be involved in WP4.

Laurence De Clippele (female) is a postdoctoral researcher at UEDIN with expertise in benthic ecology, seabed habitat mapping and the use of automated GIS mapping tools to discriminate seafloor bathymetry. She has additional expertise in science communication and outreach and has led highly successful collaborations with artists-in-residence to bring marine science and conservation issues to a wider public. De Clippele will apply automated mapping approaches in WP2, and contribute to outreach and engagement activities in WP6.

Julia Eighteen (female) is an experienced project manager at UEDIN. She is a PRINCE2 practitioner and fluent in Spanish. She has managed a diverse array of projects over the last decade including in projects in marine science, engineering and human health and holds a diploma in public service interpreting (Spanish/English Law). Eighteen brings a unique skillset to iAtlantic's Project Office, with substantial additional benefits to the project accruing from her strong interpersonal and linguistic skills.

Experience - Relevant Publications

1. De Clippele LH, Gafeira J, Robert K, Hennige S, Lavaleye M, Duineveld GCA, Huvenne VAI, Roberts JM (2017) Using novel acoustic and visual mapping tools to predict the small-scale spatial distribution of live biogenic reef framework in cold-water coral habitats. Coral Reefs 36: 255-268
2. Hennige SJ, Wicks LC, Kamenos NA, Perna G, Findlay HS, Roberts JM (2015) Hidden impacts of ocean acidification to live and dead coral framework. Proceedings of the Royal Society B. 282: 20150990
3. Secretariat of the Convention on Biological Diversity (2014) An Updated Synthesis of the Impacts of Ocean Acidification on Marine Biodiversity. (Eds: S Hennige, JM Roberts & P Williamson). Montreal, Technical Series No. 75, 99 pages
4. Henry L-A, Frank N, Hebbeln D, Wienberg C, Robinson L, van de Flierdt T, Dahl M, Douarin M, Morrison CL, López Correa M, Rogers AD, Ruckelshausen M, Roberts JM (2014) Global ocean conveyor lowers extinction risk in the deep sea. Deep-Sea Research I 88: 8-16
5. Roberts JM, Wheeler AJ, Freiwald A (2006) Reefs of the deep: the biology and geology of cold-water coral ecosystems. Science 312: 543-547

Experience - Relevant Previous Actions or Activities

1. European Commission €9.2M ATLAS project (A trans-Atlantic assessment and deep-water ecosystem-based spatial management plan for Europe) in response to the Horizon 2020 Blue Growth call improving the preservation and sustainable exploitation of Atlantic marine ecosystems. Roberts is project co-ordinator.
2. UK Ocean Acidification programme (UKOA, 2010-15), £12M, 5year UKOA programme jointly funded by the Department for Environment, Food and Rural Affairs (Defra), the Natural Environment Research Council (NERC) and the Department of Energy and Climate Change (DECC). Roberts led work on calcifying biogenic habitats and all deep- sea benthic cruises for UKOA. Hennige appointed as PDRA.
3. Natural Environment Research Council (NERC, 2013-2018), a £513k project on assessing the impacts of climate change on tropical and cold-water coral. Led by Hennige.
4. Hotspot Ecosystem Research and the Impact of Man's Impact on European Seas (HERMIONE, 2009-12), a €8M consortium of 41 partners from 13 countries across Europe. Roberts & Henry worked on impacts of ocean acidification on cold-water corals and the spatio-temporal controls on communities associated with these habitats.

5. Trans-Atlantic Coral Ecosystem Study (TRACES, 2007-09), a €241k Marie Curie Outgoing International Fellowship awarded to Roberts to develop the concept behind a unified trans-Atlantic basin-scale assessment of cold-water coral ecosystems.

Infrastructure and Facilities

Existing marine science infrastructure at UEDIN includes dedicated experimental marine aquaria, constant temperature rooms, laboratories, Geographic Information Systems and computing facilities augmented with fieldwork capabilities. The UEDIN laboratories provide extensive benthic biology facilities with large fume-cupboards providing dedicated formalin/alcohol and sample storage facilities. Benthic biological samples can be assessed and identified with high quality Zeiss Stemi stereomicroscope and digital camera with analysis packages/platforms available including Canoco, SPSS, PRIMER and MatLab. Experimental aquaria work is facilitated through apparatus to manipulate and measure carbonate chemistry, dedicated aquaria for coral and sponge research in climate-controlled rooms, monitoring systems to ensure conditions are stable and physiological monitoring equipment (e.g. respiration chambers equipped with optode O_2 sensors). Additional facilities in the School of GeoSciences include analytical inorganic (ICP) and organic geochemistry, ion microprobe, optical microscopy, scanning electron microscopy, stable isotope mass spectrometry, thin section laboratory, X-ray diffraction and fluorescence laboratories and a mechanical workshop.

Participant No.	2
Short Name	UNIVALI
Country	Brazil
Organization Type	HEI
Website	www.univali.br

Partner Profile

UNIVALI is a 52-year-old university located in Santa Catarina State, southern Brazil, with over 24,000 students. UNIVALI is committed to the local community, the formation of human resources in different areas and the production and dissemination of knowledge that contributes to the solution of both regional and global problems. Its six campuses are spread along the coastline of Santa Catarina, an area profoundly influenced by marine environments and economically linked to maritime activities, including navigation, fishery, aquaculture and tourism. An important segment of UNIVALI's research activities is concentrated in the School of Marine Science and Technology, where a team of marine scientists have historically addressed questions associated to natural processes, human interactions and sustainable use of the South Atlantic Ocean (coastal and oceanic). UNIVALI has participated in national and international environmental management fora, the latter including FAO, ICCAT, CBD, SEAFO and ISA. Capacity-building for marine-related activities has also been a major goal of UNIVALI, and is a core principal in the well-established (26- years) 'Oceanography' undergraduate program, and within the postgraduate programme in 'Environmental Sciences and Technology'.

Role in the Project

UNIVALI will participate in research activities as well as supporting coordination & management actions as regional coordinator for SW Atlantic. In WP2 UNIVALI will map and assess the state of deep-sea ecosystems associated with study areas 10, 11 and 7. UNIVALI has a strong track record of participating in studies exploring and assessing benthopelagic fauna (fish and cephalopods) in the South Atlantic's deep ocean areas including the Rio Grande Rise, Walvis Ridge, São Paulo Ridge and the Mid-Atlantic Ridge. IN WP3, UNIVALI will provide and analyse a time series database of fisheries operating in the continental slope and open ocean off South-eastern and Southern Brazil (e.g. catch, effort, spatial distribution and bycatch). UNIVALI has previously coordinated a long-standing fishery monitoring system (2000-2017) and currently manages a georeferenced database suited for time series analysis. In WP6, UNIVALI will support the implementation of the capacity building program in Brazil. In association with WP2, UNIVALI participants will greatly benefit from activities that promote transfer of technologies and enhance expertise in key research techniques associated with deep sea ecology, including video/photo annotation and analysis, taxonomy and others. In WP8 UNIVALI will support the coordination and management actions from Brazil. UNIVALI has helped to coordinate the engagement of Brazilian organisations and scientists during iAtlantic's planning phase, and will facilitate coordination and management during the implementation of the project's WPs in Brazil.

Key Personnel

Prof Jose Angel Alvarez Perez (male) has a degree in Oceanography, Masters in Biological Oceanography (Federal University of Rio Grande, Brazil) and a PhD in Biology (Dalhousie University, Canada). In his early career Angel focused on population biology, and for 10 years led a national deep-sea fisheries research and management program. In 2006 he expanded his research interests to include diversity patterns and ecology of deep-sea environments of the South Atlantic. As chair of a Census of Marine Life spin-off project, 'South Atlantic MAR-ECO', he conducted deep-sea biodiversity studies along the southern Mid-Atlantic ridge and Walvis Ridge, and later was a member of the Brazil-Japan scientific consortium that explored the Rio Grande Rise and other deep topographic features with the manned submersible Shinkai 6500. Between 2013 and 2018, Angel collaborated with the Geological Service of Brazil (CPRM) to develop environmental baseline studies in a Cobalt-rich ferromanganese crust exploration area in the Rio Grande Rise. Angel has produced publications on deep pelagic and benthopelagic megafauna communities (particularly cephalopods and fish) and on fishery impacts on deep-sea areas of the South Atlantic.

Prof Paulo Ricardo Pezzuto (male) has a degree in Oceanography, Masters in Biological Oceanography (Federal University of Rio Grande, Brazil) and Doctorate in Zoology (Federal University of Paraná, Brazil). Paulo has dedicated his career to the study of benthic ecosystems, population biology and sustainable fisheries of deep-sea benthic resources. He has led the fisheries monitoring program at UNIVALI for over 10 years.

Prof Rodrigo Sant'Ana (male) has a degree in Oceanography and a Masters in Environmental Science and Technology (UNIVALI). He is specialized in data science, statistical methods and population modelling, and has led several deep-sea stock assessments and spatial modelling of open-ocean long-line fisheries bycatch in the South Atlantic. He currently manages UNIVALI's Fisheries Database system (ProPesqWEB).

Experience - Relevant Publications

1. **Perez JAA**, Kitazato H, Sumida PYG, **Sant'Ana R,** Mastella AM (2018) Benthopelagic megafauna assemblages of the Rio Grande Rise (SW Atlantic). Deep-Sea Research Part I 134: 1-11
2. Hajdu E, Castello-Branco C, Lopes DAA, Sumida PYG, **Perez JAA** (2017) Deep-sea dives reveal an unexpected hexactinellid sponge garden on the Rio Grande Rise (SW Atlantic). A mimicking habitat? Deep-Sea Research Part II 146: 93-100
3. Sumida PYG, Alfaro-Lucas JM, Shimabukuro M, Kitazato H, **Perez JAA**, Soares-Gomes A, Toyofuku T, Lima A, Ara K, Fujiwara Y (2016) Deep-sea whale fall fauna from the Atlantic resembles that of the Pacific Ocean. Scientific Reports 6: 22139

4. Perez JAA, Alves E, Clark M, Bergstad OA, Gebruk AV, Cardoso IA, Rogacheva A (2012) Patterns of Life on the southern Mid-Atlantic Ridge. Compiling what is known and Addressing Future Research. Oceanography 25: 14-29
5. Perez JAA, Pezzuto PR, Wahrlich R, Soares ALS (2009) Deep-water fisheries in Brazil: History, status and perspectives. Latin American Journal of Aquatic Research 37 (3): 513-541

Experience - Relevant Previous Actions or Activities

1. Strategic Environmental Management Plan in the Atlantic (SEMPIA) – Development of a proposal for scientifically-based design criteria and placements of Areas of Particular Ecological Interest (APEIs) on the North Atlantic MAR in the context of deep-sea mining.
2. Brazil-Japan Joint Research Initiative in the South Atlantic – Research cruise "Iatá-piuna" (Implementation Agreement – JAMSTEC/ IOUSP / CPRM) on board the R/V Yokosuka (JAMSTEC) and HOV Shinkai 6500 (2013 – 2015). Deep-sea dives to explore benthic environments and characterize megafauna communities associated with the Rio Grande Rise, São Paulo Ridge and São Paulo Plateau (2013). Collaborative studies on the ecology and geology of these deep-sea features of the SW Atlantic.
3. South Atlantic MAR-ECO. Patterns and Processes of the Ecosystems of the Southern Mid-Atlantic - a Census of Marine Life field project. Initiative that involved the review of state-of-the-art knowledge on deep-sea biodiversity of South Atlantic Mid-ocean ridge (MAR) and associated ridges (2006 – 2010). Research cruise on board the R/V Akademik Ioffe (Shirshov Institute – Academy of Sciences – Russia) sampling deep pelagic and benthic megafauna of the southern MAR and Walvis Ridge (2009).
4. Deep-sea fisheries off southern Brazil. Initiative supported by the deep-sea fishing management committee – Ministry of Fisheries and Aquaculture (Brazil) that included assessment of main fish (e.g. monkfish) and shellfish (e.g. deep-sea crabs and shrimps) stocks commercially exploited at slope and continental margin off southern Brazil. The project included the development of an Observers Program and evaluation of bycatch and ecosystem impacts of the main fisheries (trawling, pots, gillnets).

Infrastructure and Facilities

UNIVALI has all the necessary infrastructures, laboratories and arrangements to undertake the tasks envisaged in WP2, WP3, WP4 and WP8. The following are specific facilities that will be directly linked with activities of UNIVALI within the project.
The UNIVALI Video/Image analysis Lab contains three work-stations with 28" LED monitors (4K ultra HD), video board GeForce® GTX 1060 (3 GB DDR5 memory), a backup server (32 GB RAM DDR3 and DDR3L 1333/1600 MHz) capable of storing 12 TB, and image analysis/ image annotation software. The Fisheries Database system (ProPesqWEB) gathers industrial fishing records (i.e. landings, effort, fishing areas, vessels, technology, bycatch) of industrial (offshore) fishing fleets that operate from the harbours in Santa Catarina State, southern Brazil. These fleets have sustained nearly a quarter of Brazil's annual landings, and ProPesqWEB has been the main system providing the state's official landing statistics. The Fishery Monitoring System at UNIVALI includes physical structures (i.e. vehicles, work-stations, facilities) and specialised staff (i.e. landing monitors, database managers) responsible for regular collection of data from industrial and artisanal fisheries in Santa Catarina State. Since 2016, this system and ProPesqWEB have been funded by PETROBRAS as part of the deep-sea oil extraction licensing process.

Participant No.	3
Short Name	UWC
Country	South Africa
Organization Type	HEI
Website	www.uwc.ac.za

Partner Profile

UWC is a national university, and is committed to excellence in teaching, learning and research, to nurturing the cultural diversity of South Africa, and to responding in critical and creative ways to the needs of a society in transition. Drawing on its proud experience in the liberation struggle, the university is aware of the academic role in helping to build an equitable and dynamic society. In particular UWC aims to advance and protect the independence of the academic enterprise; design curricular and research programmes appropriate to its southern African context; further global perspectives among its staff and students, thereby strengthening intellectual life and contributing to South Africa's reintegration in the world community; assist educationally disadvantaged students in gaining access to higher education and succeeding in their studies; nurture. UWC also aims to nurture and use the abilities of the entire university community; develop effective structures and conventions of governance, which are democratic, transparent and accountable; seek racial and gender equality and contribute to helping the historically marginalised participate fully in the life of the nation; and to encourage and provide opportunities for lifelong learning through programmes and courses. This includes helping to conserve and explore the environmental and cultural resources of the southern African region, encouraging a wide awareness of these resources in the community; through co-operation with other stakeholders to develop an excellent, and therefore transformed, higher education system.

Role in the Project

UWC will participate in three Work Packages. In WP1, the major contribution will be in terms of statistically analysing daily time series of numerical ocean models (VIKING and INALT) for the presence of marine thermal events (Marine Heat Waves; MHWs), something that has not previously been attempted in the deep-ocean realm. Secondly, UWC will link the outcomes of WP1 with WP3, with the intention of mapping the sensitivity of the deep ocean biota to extreme thermal stressors. Lastly, UWC will as part of WP4 undertake studies of meso-pelagic zooplankton on the Walvis Ridge to assess their physiological processes as a function of the (potentially changing) physical properties of their environment, and to conduct a baseline survey of the prevalence and trophic impacts of allochthonous kelp on the deep-ocean floor south-west of the Benguela upwelling system. UWC (through Albertus Smit) will assist iAtlantic coordination (WP8) as lead contact for S Africa and regional coordinator for the SE Atlantic.

Key Personnel

Prof Mark J Gibbons (male) has a BSc (Hons) degree in Marine Biology (1980-1983) from the University of Liverpool and a PhD in Zoology (1984-1988) from the University of Cape Town. Whilst his research was initiated in the environment of the rocky intertidal, he has worked most extensively in the pelagos, focussing on diverse aspects of zooplankton ecology and behaviour and their links to key fish species. For the last decade or so, his research has been centred around the changing dynamics of the northern Benguela ecosystem, particularly with regard to jellyfish and gobies. Although he is principally an ecologist, his wide interests have led him to collaborate with world leaders in the taxonomy of diverse invertebrate taxa. Mark has worked for over 20 years at the University of the Western Cape in South Africa, where he trains considerable numbers of students from disadvantaged backgrounds. During this time, he has developed and led over five research projects, and has contributed towards the preparation and execution of several others internationally. He has an H-index of 33.

Associate Prof Albertus J. Smit (male) holds a PhD in marine botany from the University of Cape Town (1994-1997). He has worked extensively on several aspects of stable isotopic reconstructions of ecological connectivities in marine systems, and in recent years has developed, in collaboration with international collaborators, an algorithm implemented in the R statistical software language that is widely used for the detection and quantification of marine extreme thermal events. His current research at the UWC focusses on studies of climate change related impacts (waviness and thermal events) on the ecological well-being of kelp ecosystems in the Benguela upwelling system. It is this work that in iAtlantic will be extended to the deep ocean in a suite of work placed into WP1 (thermal events detected in the numerical ocean models VIKING and INALT), sensitivity mapping to thermal stressors in WP3, and kelp exports to the deep ocean off the Benguela system. He has an H-index of 19 and is a Lead Author on the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate.

Experience - Relevant Publications

1. Schlegel RW, Oliver ECJ, Perkins-Kirkpatrick S, Kruger A, **Smit AJ** (2017) Predominant atmospheric and oceanic patterns during coastal marine heatwaves. Frontiers in Marine Science 4: 323
2. Salvanes AGV, Bartholomae C, Yemane D, **Gibbons MJ**, Kainge P, Krakstad J-O, Rouault M, Staby A, Sundby S (2015) Spatial dynamics of the bearded goby and its key fish predators off Namibia varies with climate and oxygen availability. Fisheries Oceanography 24 (1): 88-101
3. Ortega-Cisneros K, de Lecea AM, **Smit AJ**, Schoeman DS (2017) Resource utilization and trophic niche width in sandy beach macrobenthos from an oligotrophic coast. Estuarine Coastal Shelf Science 184: 115-125

4. Utne-Palm AC, Salvanes AGV, Currie B, Kaartvedt S, Nilsson GE, Braithwaite VA, Stecyk JAW, Hundt M, van der Bank M, Flynn B, Sandvik GK, Klevjer TA, Sweetman AK, Brüchert V, Pittman K, Peard KR, Lunde IG, Strandabø RAU, **Gibbons MJ** (2010) Trophic structure and community stability in an overfished ecosystem. Science 329: 333-336
5. García-Reyes M, Sydeman WJ, Schoeman DS, Rykaczewski RR, Black BA, **Smit AJ**, Bograd SJ (2015). Under pressure: Climate change, upwelling and eastern boundary upwelling ecosystems. Frontiers in Marine Science 2: 109

Experience - Relevant Previous Actions or Activities

1. Thermal characteristics of the South African nearshore: implications for biodiversity [CPRR14072378735] A programme funded by the South African National Research Foundation (NRF; 2015 to 2017) that assessed the climate change-related impact on the nearshore, with a special focus on the impact of extreme thermal events (marine heat waves).
2. Upwelling dynamics in kelp beds: implications for trophic function [CSRP170430229220] A research programme funded by the NRF (2018 to 2020) to assess the effects of i) increased storminess, and ii) increased thermal stress as drivers of two alternative systems of trophic C and N flow pathways, viz., direct grazing via increased kelp litterfall, and enhanced flows through zooplanktonic pathways as a result of enhanced POM production.
3. Kelps and climate change [CPRR13090232176] NRF-funded research that seeks to understand the ecological and physiological consequences of climatic change on the kelps, *Ecklonia maxima* and *Laminaria pallida*, in the Western Cape Region of South Africa.

Infrastructure and Facilities

UWC has fully-equipped laboratories suitable for all the major experimental methodologies that we propose to undertake, including isotopic sample preparation and zooplankton incubation experiments.

Participant No.	4
Short Name	Instituto Español de Oceanografía (IEO)
Country	Spain
Organization Type	RTD
Website	www.ieo.es

Partner Profile

The Instituto Español de Oceanografía (IEO, www.ieo.es) is a public research organisation founded in 1914 and dedicated to multidisciplinary marine research. The IEO is the advisory body of the Spanish government in marine affairs, thanks to its wide expertise in the fields of physical, chemical oceanography, marine ecology, marine pollution and aquaculture. The IEO is responsible for providing the scientific basis for the management of marine living resources exploited by the Spanish fishing fleets. It is also responsible for part of the implementation of the Marine Strategy Framework Directive (MSFD) in Spanish waters. The IEO's headquarters are located in Madrid, but there are eight coastal oceanographic research centres along the Spanish coastline. The IEO has long experience in a wide range of ocean surveys and international experiments. As part of its core research programme it is actively involved in the development of ocean observing systems. The IEO has also long experience collaborating with the industry, mostly fisheries.

Role in the project

The IEO contributes to iAtlantic with three main areas of expertise: physical oceanography, habitat mapping and benthic ecology and ecophysiology. IEO will be mostly involved in WP1, 2, 4 and 5. C Orejas will act as the iAtlantic cruise coordinator and contribute to WP4 conducting experimental work in aquaria. She will also contribute to WP5, as results obtained from WP4 will help to develop management and protection plans. C Orejas will also participate in WP6 through the oceanographic cruise she will apply for that will include a high demonstration component. P Vélez-Belchí will contribute to WP1, determining the oceanographic conditions at some of the key iAtlantic case sites and in the analyses of zonal flows in the South Atlantic MOC. J Rivera's main tasks will be mapping and GIS data gathering. He will contribute to WP2, surveying seafloor and gathering bathymetric and geophysical data for the description of the geological setting in different iAtlantic sites (in particular Walvis Ridge). All IEO researchers included in the iAtlantic proposal have extensive experience in their respective research fields. Furthermore, the IEO team are very experienced in organising and participating in oceanographic cruises. In iAtlantic the IEO plans to submit two transatlantic research cruises, led by IEO researchers.

Key personnel

Dr Covadonga Orejas (female) has been a member of IEO staff since 2009. She works on the biology and ecology of benthic organisms (mostly cold-water corals), including bentho-pelagic coupling. Cova has worked in the Antarctic, Arctic, North Sea, Caribbean, Mediterranean and North East and South East Atlantic. She conducted her research for 9 years in Germany, based at the Alfred Wegener Institute for Polar and Marine Research, and at the Centre for Marine and Tropical Ecology. In 2005 Cova returned to Spain and worked at the Marine Science Institute (ICM-CSIC); during that time she was involved in the EU projects HERMES (FP6) and HERMIONE (FP7). Since 2015 Cova has also been part of the ATLAS project (H2020), as PI for IEO. Cova has worked with several sampling methodologies (mainly non-invasive as ROVs and submersibles). She performed studies on deep benthic communities *in situ* (e.g. cold-water coral mapping and distribution) and in aquaria (e.g. coral growth, ecophysiology). Cova has participated in more than 41 projects (5 as PI), and 25 oceanographic cruises (14 as PI, including the MEDWAVES cruise within the ATLAS project). She has more than 50 SCI scientific publications. She was academic editor of PLoS ONE for two years and is currently an editor for Frontiers in Marine Science. She acts as reviewer of more than 15 journals and funding agencies. In iAtlantic she will be involved mostly in WP2, 3, 4 and 5. She will coordinate the iAtlantic cruise activity and lead the *iMirabilis* cruise.

Dr Pedro Vélez-Belchí (male) holds a PhD from the university of the Balearic Islands, and since 2007 has been a physical oceanographer at the Spanish Oceanographic Institute, Canary Islands. His research activity ranges from the interaction between the western boundary currents and mesoscale activity to the decadal variability in the eastern Atlantic or the impact of environmental factors on the spawning grounds of large pelagic. He started and is currently the coordinator of the IEO ocean observing system in the Canary Islands, established in 2007 in order to monitor the long-term changes, and understand the causes of the eastern margin of the North Atlantic subtropical gyre. He has authored more than thirty scientific articles, having participated and/or coordinated several national and international research projects and a large number of oceanographic cruises. Currently he is a member of the ARGO programme steering team and National Coordinator of the Spanish contribution to the Argo program. He has been a guest researcher at the Woods Hole Oceanographic Institute (USA), and for two years (2010- 2012) was a Marie Curie researcher at the Scripps Institution of Oceanography (USA).

Dr Jesús Rivera Martínez (male) has been employed in the IEO since 2001, holding a permanent position since 2007. He graduated in Marine Science and his PhD is on Submarine Geomorphology. He works on marine geology and habitat mapping, usually within the framework of multidisciplinary projects conducted in the Mediterranean Sea and North and South Atlantic Ocean. He has participated in 57 scientific cruises (12 of them as chief scientist) surveying the seafloor in shallow and deep-sea areas for marine policy assessment (i.e. EEZ submission, MPA designation, fisheries management, submarine geo-hazards and marine pollution mitigation). He has co-authored more than 20 SCI publications and several maps, book chapters and articles for education and scientific dissemination. He has previously worked in two iAtlantic regions; Walvis Ridge and Patagonia mapping seabed for environmental and fisheries management purposes. He will lead the *iCorsage* cruise.

Experience - Relevant Publications

1. **Orejas C**, Gori A, Rad-Menéndez C, Last KS, Davies AJ, Beveridge CM, Sadd D, Kiriakoulakis K, Witte U, Roberts JM (2016) The effect of flow speed and food size on the capture efficiency and feeding behaviour of the cold-water coral *Lophelia pertusa*. Journal of Experimental Marine Biology and Ecology 481: 34-40
2. Vad J, **Orejas C**, Moreno-Navas J, Findlay HS, Roberts JM (2017) Assessing the living and dead proportions of cold-water coral colonies: implications for deep-water Marine Protected Area monitoring in a changing ocean. PeerJ 5: e3705
3. **Vélez-Belchí**, P, Hernández-Guerra A, Pérez-Hernandez MD (2017) On the Seasonal variability of the Canary Current and the AMOC. Journal of Geophysical Research: Oceans 122 (6): 4518-4538
4. **Vélez-Belchí,** P, Hernández-Guerra A, Fraile-Nuez E, Benítez-Barrios V (2010) Changes in Temperature and Salinity Tendencies of the Upper Subtropical North Atlantic Ocean at 24.5°N. Journal of Physical Oceanography 40: 2546-2555
5. **Rivera J,** Canals M, Lastras G, Hermida N, Amblas D, Arrese B, Acosta J (2016) Morphometry of Concepcion Bank: evidence of geological and biological processes on a large volcanic seamount of the Canary Islands Seamount Province. PLoS one, 11 (5): e0156337

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. 'A Trans-AtLantic Assessment and deep-water ecosystem-based Spatial management plan for Europe', ATLAS. (European Union H2020) Project coordinator: M Roberts, University of Edinburgh. (Ongoing project). IEO conduct work on oceanography, habitat mapping, biodiversity studies as well as ecophysiology.
2. 'Hotspot Ecosystem Research and Man's Impact on European Seas' (HERMIONE). European Commission's Framework 7th Programme, GA 226354. ICM, CSIC (Spain) (2009-2012). We contribute, among others investigating the effects of ocean acidification in the physiology of CWCs. This knowledge contributes to the know-how on effects of climate change on deep-sea benthic ecosystem engineer species.
3. 'Seasonal Variability of the AMOC: The Canary Current'. (Spanish funding agency CTM 2013-48695-C2-2-R). Principal investigator: P Vélez-Belchí, A Hernández-Guerra. Institution: IEO. Funding agency: Plan Estatal I+D+i, CTM2013-48695-C2-2-R. The IEO task in this project was focused in understanding the role of Rossby waves in the AMOC.
4. 'Euro-Argo Improvements for the Euroepean Marine Service' (European Union FP7-SPACE.2012-1-312642). Principal investigator: P Y Le Traon (Laboratoire de Physique des Océans), P Vélez-Belchí (Principal investigator Partner IEO). In this project, the IEO conducted a pilot experiment to determine the mission configuration of deep extension of the Argo program.
5. Joint submission made by France, Ireland, Spain and the United Kingdom of Great Britain and Northern Ireland in respect of the area of the Celtic Sea and the Bay of Biscay on 19 May 2006. Submission #6. CLCS\52. Submission through the Secretary-General of the United Nations, to the Commission on the Limits of the Continental Shelf. J Rivera participated in the Geomorphology and Foot of Slope Working Group.

Infrastructures and facilities

The IEO has a fleet of 8 Research Vessels (RV), from 14 m to 65 m length. All of them are equipped with the latest generation navigation and positioning technologies, and the sampling equipment to monitor oceanic parameters. Furthermore, the IEO researchers have access to RV of the Spanish fleet, including the Sarmiento de Gamboa (SdG), a vessel fully equipped for offshore research with a large number of sampling devices and instruments. The SdG was already successfully used for the MEDWAVES cruise within the ATLAS project (H2020). The IEO plan to conduct two transatlantic research cruises within iAtlantic (*iMirabilis* and *iCorsage*). Regarding oceanographic observatories, the IEO maintains an observing system in the eastern Atlantic and the Mediterranean Sean that includes more than 150 stations and buoys carried out on a monthly or twice yearly basis. The IEO Ocean observing system goes back to the 1990s in most stations.

Participant No.	5
Short Name	IMAR-UAz
Country	Portugal
Organization Type	RTD
Website	www.horta.uac.pt/intradop

Partner Profile

IMAR-UAz is involved in the study of open-ocean and deep-sea ecosystems, with a special focus on the Atlantic but with extensions to other ocean basins. IMAR-UAz has a strong background on ecology, fisheries, and ecosystem-based management of open-ocean and deep-water marine ecosystems including seamount, cold water coral ecosystems, and hydrothermal vents. There is also an emphasis on the study of anthropogenic impacts in the deep sea. In the last two decades IMAR-UAz has beenwas involved in large international research consortia, participating as partner in 8 EU FP7 and 3 H2020 projects, as well as partnering in many others with a global focus (e.g. Census of Marine Life programs and the Ocean Tracking Network).IMAR-UAz also performs research activities with governmental and private research organizations, including services for industry and public administration. IMAR-UAz has long been involved with governmental and nongovernmental partners at international, European and national levels, in the implementation of Marine Protected Areas, fisheries monitoring programs and research for biodiversity conservation.

Role in the project

Due to its extensive experience on deep-sea studies, IMAR-UAz will contribute to iAtlantic objectives in several areas of expertise and WPs. In WP2, IMAR will contribute to regional habitat characterization and mapping using bathymetry and imagery and will lead the development of species distribution models under present and future climate scenarios. IMAR has strong expertise in both habitat mapping and species distribution models. IMAR is deputy leader of WP4 (Marina Carreiro-Silva). In this WP, IMAR will be mainly involved in experimentation with vent fauna and cold-water corals in aquaria. IMAR team members have good experience on physiological and ecotoxicological studies of deep-sea fauna under conditions of metal contamination associated with deep-sea mining activities and climate change scenarios. IMAR leads WP5 (Telmo Morato) and will use data generated by other WPs to develop numerical optimisation tools to identify areas in the whole Atlantic that achieve certain sustainable management and conservation objectives over the short and long-term (climate-based predictions). IMAR has relevant expertise in mapping human activities and its impacts in the deep sea and the application of the Ecosystem Evaluation Framework (EEF) to identify key locations in the Atlantic that may constitute an Ecologically or Biologically Sensitive Marine Area (EBSA). In WP6, IMAR will contribute to knowledge transfer through participation in workshops and courses on deep-sea ecology and capacity building on infrastructures for experimentation with deep-sea fauna. IMAR has long experience in sharing knowledge with the scientific community and other marine stakeholders by sharing data and expertise, organizing and promoting international expert workshops and conferences, and, within society, cooperating and promoting events with schools, literacy NGOs and networks and the media.

Key personnel

Dr Telmo Morato (male) has been involved in several national and international research projects focusing on seamounts, open-ocean and deep-sea ecology, fisheries management, and conservation. Telmo's scientific output comprises ~ 50 peer-reviewed publications, including a book on Seamounts Ecology, Fisheries and Conservation and articles in multidisciplinary international Journals that made 'Research Highlights' in Science and Nature journals. He has also recently co-authored a comment in Nature about the need for protecting and restoring the deep-sea.

Dr Marina Carreiro-Silva (female) is a marine biologist specialized on the ecology of tropical and cold-water coral ecosystems. Her current research activities focus on the study of the impacts of climate change on cold-water coral physiology and of reef framework destruction by bioerosion processes. Other research activities include studies on specific aspects of the biology and ecology of key cold-water corals species in the Azores, such as growth, reproduction and taxonomy. Marina has participated in several national and international research projects on cold-water coral ecosystems as a PI or team member and has over 25 ISI publications in her field of expertise. Marina currently coordinates a small group of students (BSc, MSc, PhD), working on cold-water coral physiology, biology and ecology.

Dr Ana Colaço (female) holds a PhD in Ecology and Biosystematics, by the Faculty of Science, University of Lisbon. Ana is a research fellow at the Centre of IMAR of the University of the Azores and is involved in several R&D projects related to the deep-sea environment. Ana specializes on hydrothermal vent ecosystems, the trophic ecology of deep-sea systems, benthic ecology, biodiversity, and ecosystem functioning. Ana was part of the Biology Group of Interridge, and is now a member of the Observatories group from Interiddge and from the ICES WGDEC. Ana has substantial experience in international cooperation both at the European level (MAST III; FP5; FP6; FP7; H2020) and bilateral cooperation projects, and participated in several projects dedicated to observatories and tools for extreme environments (EXOCET/D; ESONET; FIXO3), and impact on the Deep-sea (DEEPFUN, MIDAS). Ana is institution PI of several deep-sea projects (DeepFun- FCT, Portugal; Ecomining-JPIOceans; MIDAS-FP7; FixO3-FP7; Sponges-H2020) and has established strong links with several institutions across Europe and overseas. Ana has more than 50 peer-reviewed journal publications.

Dr. Inês Martins (female) is a marine biologist with a strong background on the biology and ecotoxicology in deep-sea hydrothermal ecosystems. Her current research activities focus on the study of the physiological adaptation of deep-sea

organisms to hostile environments. Other research activities include studies on cellular oxidative stress in deep-sea invertebrates, metal toxicity physiological impacts in deep-sea species and metal speciation implications in deep-sea invertebrates under mining impact scenario. Inês participated in several national and international research projects on deep-sea ecosystems and has over 22 ISI publications in her field of expertise.

Experience - Relevant Publications

1. Barbier EB, Moreno-Mateos D, Rogers AD, Aronson J, Pendleton L, Danovaro R, Henry L-A, **Morato T**, Ardron J, Van Dover CL (2014) Protect the deep sea. Nature 505: 475-477
2. **Morato T**, Hoyle SD, Allain V, Nicol SJ (2010) Seamounts are hotspots of pelagic biodiversity in the open ocean. *PNAS* 107(21): 9707-9711. Featured in Science 328:1077
3. Taranto GH, Kvile KØ, Pitcher TJ, **Morato T** (2012) An ecosystem evaluation framework for global seamount conservation and management. PLoS ONE 7(8): e42950
4. **Carreiro-Silva M**, Cerqueira T, Godinho A, Caetano M, Santos RS, Bettencourt R (2014) Molecular mechanisms underlying the physiological response of the cold-water coral *Desmophyllum dianthus* to ocean acidification. Coral Reefs 33: 465-476
5. **Martins I**, Godinho A, Goulart J, **Carreiro-Silva MSMS** (2018) Assessment of Cu sub-lethal toxicity (LC 50) in the cold-water gorgonian *Dentomuricea meteor* under a deep-sea mining activity scenario. Environmental Pollution 240: 903-907

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. EU H2020 ATLAS (2016-2020) a Trans-Atlantic assessment and deep-water ecosystem-based spatial management plan for Europe. TM leads WP3 on Biodiversity and Biogeography. In this WP, IMAR is responsible for the construction of a dataset on deep-sea biodiversity, the development of species distribution models for current and future ocean conditions, the application of indicators of Good Environmental Status, and eDNA sampling. IMAR-UAz is also involved in classical and genetic analyses of deep-sea biodiversity, laboratory experiments on the impact of ocean dynamics on the physiology cold-water corals.
2. EU H2020 MERCES (2016-2020) Marine Ecosystems Restoration in European Changing Seas. TM leads the WP on Deep-Sea Restoration. IMAR is responsible for the conceptual work on applying the principles of ecological restoration for deep-sea ecosystems and on pilot studies testing the feasibility of coral transplantation techniques for the recovery of cold-water corals impacted by anthropogenic activities (fishing, mining).
3. EU FP7 MIDAS (2013-2017) Managing Impact of Deep-sea Resources Exploitation. AC leads the WP on the impact of mining on species connectivity. In addition, IMAR was responsible for mapping the dispersal of sediment plumes, quantitative estimates of the impact of sediment plumes on the physiology of selected VME species and commercial important fish, experimental studies of the impact of sediment plumes on the physiology of hydrothermal vent fauna and cold-water corals.
4. EU FP7 HERMIONE (2009-2012) Hotspot Ecosystem Research and Man´s Impact on European Seas. Large-scale maps of human activities in the deep-sea, development of the Ecosystem Evaluation Framework, a global dataset on seamount ecosystems ecology. Laboratory experiments on the impact of climate change on the physiological condition of cold-water corals.
5. EU FP7 CORALFISH (2008-2012) Assessment of the interaction between coral, fish and fisheries, in order to develop monitoring and predictive modelling tools for ecosystem-based management in the deep waters of Europe and beyond. IMAR was responsible for mapping the distribution of CWC, fish species and human activities. Quantitative data on the impact of deep-sea bottom longline on benthic ecosystems, improved knowledge on the biodiversity of the deep-sea benthic communities in the Azores.

Infrastructures and facilities

IMAR has the RV *Arquipélago*", with capacity for fisheries survey cruises, acoustic surveys and fish tagging and RV *Águas-Vivas*", with capacity for fish telemetry work. IMAr additionally has several rigid-hulled inflatable boats, a 300m depth ROV, a deep-sea lander, the experimental laboratory DeepSeaLab equipped to work under pressurized conditions, the aquaculture facilities (AquaLab), and the Acoustic Telemetry Observatory in the MidAtlantic (ATOM). Additionally, several relevant datasets will be made available to the project such as the Azores vulnerable marine ecosystem database, the existing video library on deep-sea habitats, the seamount ecosystem evaluation framework database, and fisheries observer program datasets relevant to the project.

Participant No.	6
Short Name	Seascape Consultants Ltd
Country	United Kingdom
Organization Type	SME
Website	www.seascapeconsultants.co.uk

Partner Profile

Seascape Consultants Ltd was established in 2010 to provide solutions and high-level advice to the marine sector, with expertise in the fields of marine biodiversity, ecosystems and habitat mapping, seafloor processes, marine data, ocean governance, sustainable management and legislative advice. Seascape Consultants specialise in marine research programme coordination and management, and communication of science results to stakeholder groups, providing unique high-level services to UN and intergovernmental organisations. Current leadership roles include coordinating the international Global Ocean Biodiversity Initiative (GOBI; www.gobi.org; 2013-2021) and the DG MARE-funded initiative to develop a regional management plan for the Atlantic (ref EASME/EMFF/2017/ 019). Seascape also successfully coordinated the FP7 MIDAS project (www.eu-midas.net; 2013-2016), provided the Secretariat for the European Marine Observation and Data Network (EMODnet) from 2013-2017, and is a partner in a range of on-going EU-funded projects focused on the marine environment (ATLANTOS, ATLAS, COLUMBUS, INMARE, STEMM-CCS, BLUE NODULES, MSP Platform). Seascape also undertakes commissioned research and capacity building activities, working closely with intergovernmental organisations (CBD, ISA, UNESCO, UNEP) and civil society (IUCN, WWF, Pew Charitable Trusts) as well as with industry to advance the sustainable management of ocean space and resources and the conservation of marine biological diversity. Previously, Seascape was commissioned to undertake a 15-year formal performance review of the International Seabed Authority. Seascape Consultants operates offices and teams in both the UK and Belgium.

Role in the project

In iAtlantic, Seascape Consultants Ltd will lead WP6 (Knowledge Sharing), encompassing activities in outreach, stakeholder engagement, capacity building and policy interfaces. These activities require a high degree of coordination and engagement with project partners and the external stakeholder community and will draw upon Seascape's considerable experience in science communication, stakeholder liaison, capacity building and policy engagement. Specifically, Seascape will develop many of the outreach tools and communication activities described in Task 6.1, bringing multimedia communication expertise, desktop publishing skills and effective, imaginative design. Seascape will also lead Task 6.2 (Stakeholder Engagement), taking full advantage of Seascape's extensive network of contacts and collaborators across a broad range of relevant sectors - including industry, policy, academia and civil society - and geographic regions; and Task 6.3 (Capacity Building), by providing coordination, facilitation, and support to the iAtlantic community to ensure opportunities for learning, training and development are available across the project and beyond. Seascape will also contribute to Task 6.4 through provision of expertise in ocean governance, policy development, marine spatial planning, and area-based ocean management.

Key personnel

Dr Vikki Gunn (female) is a Director of Seascape Consultants Ltd and will lead WP6. Dr Gunn has extensive experience in scientific programme coordination, communication and outreach, having successfully managed four successive interdisciplinary EC research projects (EUROSTRATFORM: 2002-2005; HERMES: 2005-2009; HERMIONE: 2009-2012; MIDAS: 2013-2016). She is currently the lead for WP7 Knowledge Sharing in the H2020 project STEMM-CCS (www.stemm-ccs.eu), and heads the Secretariat team for the Global Ocean Biodiversity Initiative (GOBI, www.gobi.org). Dr Gunn has produced a wide range of communications materials in recent years, ranging from brochures, project newsletters, conference volumes and research summaries, to exhibition stands, podcasts, animations and short films - most recently for the Convention on Biological Diversity to promote their work on EBSAs, but also for the EC's European Marine Observation Data network. In her previous role at the National Oceanography Centre, Gunn initiated and ran the Classroom@Sea programme - one of the first outreach schemes to involve public participation in scientific research cruises - and conceived and co-authored "Message in a Bottle", a children's book written to highlight the issue of marine litter, which was published in 7 languages with more than 30,000 copies distributed worldwide. Dr Gunn has organised stakeholder and policy dialogue events at national and international level (including at the UN), convened a number of training events and conferences for a variety of audiences, and has worked with mainstream media (BBC TV and radio, EuroNews) to promote marine scientific research.

Prof David Johnson (male) is a Director of Seascape Consultants Ltd and Emeritus Professor of Coastal Management at Solent University (UK). He was previously Executive Secretary to the OSPAR Commission (2006-2012) and his career has included work in practical conservation, environmental consultancy, and higher education as well as intergovernmental marine environmental protection. He is a Chartered Geographer and Chartered Scientist, currently serving on the Steering Group of the Global Ocean Forum and the IUCN High Seas Task Force, as well as a member of the GESAMP pool of experts and a Visiting Professor at the World Maritime University in Malmo Sweden. During his time with OSPAR, David helped re-focus the work of the Commission through production of the Quality Status Report 2010, taking into account the EU Marine Strategy Framework Directive, climate change impacts and the challenge of Marine Protected Areas in Areas Beyond National Jurisdiction. David is Coordinator of the Global Ocean Biodiversity Initiative, a consultant to the UNESCO World Heritage marine team and Chairman of ACOPS, a UK NGO. David is the lead for Policy Interfaces (WP7) in the H2020 ATLAS project. He

has coordinated contract work for ISA (Article 154 Performance Review), UNEP-MAP, European Marine Board, UNEP-WCMC and WWF International.

Prof Philip Weaver (male) is a Director of Seascape Consultants Ltd with over 30 years' experience as a marine scientist and more than 60 peer-reviewed publications. He was Director of the UK's Natural Environment Research Council's strategic research laboratory at the National Oceanography Centre, Southampton until 2010 and remains a Senior Visiting Fellow. Prof. Weaver has coordinated 4 successive EC-funded marine science research projects that have collected vast amounts of biological, geological and environmental data and have contributed greatly to the knowledge of the oceans (EUROSTRATFORM: 2002-2005; HERMES: 2005-2009; HERMIONE: 2009-2012; MIDAS: 2013-2016). He has presented results of these projects to the United Nations General Assembly and to the European parliament and has published results and outcomes from the projects in a range of media. Prof Weaver is highly engaged in developing responsible environmental guidance for the emerging deep-sea mining industry and is currently leading the DG MARE-funded initiative to develop a regional environmental management plan for the Atlantic. He is also the lead for WP5 Environmental Impact Management in the ongoing H2020 Blue Nodules project.

Dr Rachel Boschen-Rose (female) is a marine biologist with interests in seabed communities, habitat distribution and species connectivity, with experience in deep-sea mining and ocean governance. Rachel joined Seascape Consultants Ltd in February 2018 as part of the team working on regional environmental management planning in the Atlantic. Rachel's previous research includes the ecological impacts of Seafloor Massive Sulphide mining on New Zealand seamounts, brittle star ecology near sub-Antarctic hydrothermal vents, and community function of hydrothermal vent fauna in the Canadian North-Pacific. As part of her research, Rachel has worked with scientists, policy makers, government officials, and industry, from New Zealand, Pacific Island Nations, Europe and Canada.

Experience - Relevant Publications

1. Johnson DJ, Ferreira MA, Kenchington E (2018) Climate change is likely to severely limit the effectiveness of deep-sea ABMTs in the North Atlantic. Marine Policy 87: 111-122
2. Dunn DC, Van Dover CL, Etter RJ, Smith CR, Levin LA, Morato T, Colaço A, Dale AC, Gebruk AV, Gjerde KM, Halpin PN, Howell KL, **Johnson D**, Perez JAA, Ribeiro MC, Stuckas H, **Weaver P** and the SEMPIA Workshop Participants (In Press) A strategy for the conservation of biodiversity on mid-ocean ridges from deep-sea mining. Science Advances.
3. Van Dover CL, Ardron JA, Escobar E, Gianni M, Gjerde KM, Jaeckel A, Jones DOB, Levin LA, Niner HJ, Pendleton L, Smith CR, Thiele T, Turner PJPJ, Watling L, **Weaver PPE** (2017) Biodiversity loss from deep-sea mining. Nature Geoscience 10 (7): 464
4. **Examples of project publicity materials:** The Global Ocean Biodiversity Initiative brochure; GOBI newsletters; STEMM-CCS project brochure; EBSAs: Special Places in the Ocean (brochure developed for Blue Solutions)
5. **Online Films:** Ecologically or Biologically Significant Areas: Science in Pursuit of Special Places in the Ocean (written and produced by V. Gunn for UN CBD); Introduction to the European Marine Observation and Data network (written and produced by V. Gunn)

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Global Ocean Biodiversity Initiative (GOBI; www.gobi.org) - an international partnership of organisations committed to advancing the scientific basis for conserving biological diversity in the marine environment. In particular, GOBI contributes expertise, knowledge and data to support the Convention on Biological Diversity's efforts to identify ecologically and biologically significant marine areas (EBSAs) by assisting a range of intergovernmental, regional and national organisations to use and develop data, tools and methodologies. GOBI also undertakes research to generate new science that will enhance the value of EBSAs and their utility for promoting environmental protection and management for specific areas of the world's oceans. GOBI is coordinated and managed by Seascape Consultants through funding from the German Federal Government.
2. Areas of Particular Environmental Interest in the Atlantic (EASME/EMFF/2017/1.3.1.1/SI2.775068; 2018-2021) - A DG MARE-funded initiative to develop a regional management plan for the Atlantic, with particular focus on the sustainable management of deep-sea mining activities. Coordinated and managed by Seascape Consultants with an international team of collaborating partners and involving extensive international stakeholder liaison.
3. A Trans-AtLantic Assessment and deep-water ecosystem-based Spatial management plan for Europe (ATLAS; www.eu-atlas.org) - H2020-funded project aiming to improve understanding of complex deep-sea ecosystems and their associated species, in order to help predict future changes to these ecosystems and species together with their vulnerabilities in the face of climate change. Seascape leads WP7 Policy Interfaces.
4. Managing Impacts of Deep Sea Resource Exploitation (MIDAS; 2013-2016): FP7 project coordinated by Seascape, which investigated the environmental impacts of extracting mineral and energy resources from the deep sea. This included the exploitation of materials such as polymetallic sulphides, manganese nodules, cobalt-rich ferromanganese crusts, methane hydrates and the potential mining of rare earth elements.

Infrastructures and facilities

Seascape has all the necessary infrastructures and arrangements to undertake the tasks envisaged in the project and fulfil its specific role.

Participant No.	7
Short Name	IFREMER
Country	France
Organization Type	RTD
Website	www.ifremer.fr

Partner Profile

IFREMER, France's national integrated marine science research institute, contributes to the national and European strategy for research and innovation by producing basic knowledge, applied research results in response to questions raised by society, and research and technology that contribute to the economic development of the marine sector. Through a systemic approach and in the context of global change, IFREMER participates in observing and monitoring the marine environment at all levels and in studying ecosystems, the processes that govern them as well as the services that they provide. To this end, IFREMER designs and builds marine research and monitoring infrastructures, develops tools for observation and scientific investigation and manages databases. In addition, research at IFREMER supports the deployment of maritime policies, including the implementation of the Water Framework Directive (WFD), the Marine Strategy Framework Directive (MSFD), public health and animal health policies, Common Fisheries Policy (CFP), aquaculture and national strategies for biodiversity. IFREMER also assists the national government in the assessment of marine resources and the conditions of their exploitation. Created on 5 June 1984, IFREMER is a state-owned public industrial and commercial institute (EPIC), placed under the joint supervision of the Ministry of Higher Education and Research and the Ministry of the Environment. The institute had 1,480 employees in 2017.

Role in the project

In WP1 IFREMER will bring expertise in physical oceanography, specifically in ocean dynamics, mesoscale processes and numerical modelling. IFREMER will build small-scale hydrodynamic models for key Atlantic sites. In WP1, IFREMER will also bring expertise in genetic connectivity analyses along the Mid-Atlantic ridge (MAR) (Task 1.3). In WP2 IFREMER will contribute to the regional and local mapping of habitat and fauna using bathymetry, imagery – including 3D reconstruction - and a hyperspectral camera. IFREMER has a strong expertise in habitat mapping and monitoring from both optical and acoustical imagery and can contribute knowledge and experience in data acquisition and processing. IFREMER is the deputy leader in WP3 (Marjolaine Matabos) and will be largely involved in the acquisition and analyses of ecological time-series particularly through their implication in the EMSO ERIC. The institute will contribute data but also expertise in temporal analyses of multidisciplinary data. In WP4, IFREMER will collaborate with IMAR-UAz in Portugal for the implementation of experimental settings to assess the role of temperature on vent benthic species. IFREMER will provide expertise in trophic ecology in WP4 and contribute to baseline studies on the functioning of key ecosystems.

Key personnel

A total of 12 staff from IFREMER are involved in the project.

Dr Marjolaine Matabos (female) is a researcher in benthic ecology with a strong focus on temporal dynamics of deep-sea ecosystems using observatories. Marjolaine has published papers on biodiversity associated with hydrothermal vents, population genetics of vent species, and benthic communities' dynamics in several deep-sea environment. Marjolaine is Deputy leader of WP3.

Dr Touria Bajjouk (female) joined Ifremer to head regional coastal monitoring networks. During her career, she has developed expertise in the field of GIS, remote sensing, processing of spatial and spectral high-resolution imagery (SPOT, airborne hyperspectral imaging, Lidar) and benthic coastal habitat mapping.

Dr Jonathan Gula (male) is a physical oceanographer with expertise in ocean dynamics, hydrodynamic submesoscale processes and numerical modelling.

Sandra Fuchs (female) is an engineer in molecular biology with experience in molecular techniques and population genetic analyses.

Tristan Le Toullec (male) is a CNRS engineer. He is assisting LOPS researchers in their software developments.

Dr Lénaïck Menot (male) is a benthic ecologist studying biodiversity in various non-chemosynthetic deep-sea ecosystems, including abyssal plain, nodule fields and coral gardens. His research involves sampling, and habitat and faunal mapping using optical imagery.

Dr Loïc Michel (male) is a marine ecologist focusing on the links between trophic processes, ecosystem functioning and biodiversity. He has extensive experience in the use of trophic markers (notably stable isotope ratios) to study food web structure and dynamics.

Dr Jeroen Molemaker (male) is a senior researcher from UCLA, part-time at LOPS. He is an expert in ocean modelling, small-scale processes. He is also participating in the development of new measurement techniques.

Dr Karine Olu (female) is a benthic ecologist with experience in cold seeps, and coral gardens. Her research focuses on faunal communities' structure and environmental control based on imagery analysis and habitat mapping, and sampling.

Dr Florence Pradillon (female) is a benthic ecologist with expertise in vent species life-history traits and larval biology.

Prof Guillaume Roullet (male) Laboratory of physical and spatial oceanography) is a professor and physical oceanographer. He studies ocean dynamics, mesoscale processes and has a strong expertise in numerical modelling.

Dr Pierre-Marie Sarradin (male) is the head of the 'Deep-sea environments studies' Research Unit at Ifremer. He is a chemist specialising in chemical characterization of vent habitats. He is the regional team leader of the EMSO-Azores observatory.

Dr Jozée Sarrazin (female) is the head of the Deep-sea lab. Her research focuses on the ecology of deep-sea hydrothermal vents from biodiversity to ecosystem functioning.

Julie Tourolle (female) is a mapping engineer with experience in GIS and habitat mapping.

Experience - Relevant Publications

1. van den Beld IMJ, Bourillet J-F, Arnaud-Haond S, Chambure L de, Davies JS, Guillaumont B, **Olu K**, **Menot L** (2017) Cold-Water Coral Habitats in Submarine Canyons of the Bay of Biscay. Frontiers in Marine Science 4: 118
2. Lelièvre Y, Legendre P, **Matabos M**, Mihaly S, Lee RW, Sarradin P, Arango CP, Sarrazin J (2017) Astronomical and atmospheric impacts on deep-sea hydrothermal vent invertebrates. Proceedings of the Royal Society of London, part B, Biological Science284: 20162123
3. Sen A, Dennielou B, **Tourolle J**, Arnaubec A, Rabouille C, **Olu K** (2017) Fauna and habitat types driven by turbidity currents in the lobe complex of the Congo deep-sea fan. Deep-Sea ResearchPart II Topical Studies in Oceanography 142:167-179
4. Marcon,Y, Sahling H, Allais A-G Bohrmann G, **Olu K** (2014) Distribution and temporal variation of mega-fauna at the Regab pockmark (Northern Congo Fan), based on a comparison of videomosaics and geographic information systems analyses. Marine Ecology 35: 77-95
5. Vic C, **Gula J**, **Roullet G**, **Pradillon F** (2018) Dispersion of deep-sea hydrothermal vent effluents and larvae by submesoscale and tidal currents. Deep-Sea Research Part I: Oceanographic Research Papers

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. EU H2020 ATLAS (2016-2020) a Trans-Atlantic assessment and deep-water ecosystem-based spatial management plan for Europe. 1) genetic connectivity and eDNA-based biodiversity assessments; 2) predictive habitat mapping of cold-water coral habitats, 3) Quantification of abrasion by fishing activities and spatial overlap with the distribution of vulnerable marine ecosystems, 4) Evaluation of indicators for the assessment of Good Environmental Status of cold-water coral habitats.
2. EU H2020 MERCES (2016-2020) Marine Ecosystems Restoration in European Changing Seas. IFREMER is involved with experimental work on the Lucky Strike vent field, to assess the capacity for natural regeneration of vent ecosystems (biodiversity, trophic ecology, life-history-traits).
3. ANR Congolobe (2011-2016) Organic carbon transfer and ecosystem functioning in the terminal lobes of the Congo deep-sea fan. IFREMER was involved in Habitat/Megafauna mapping, ecosystem functioning, sediment chemistry
4. EU FP7 MIDAS (2013-2017) Managing Impact of Deep-sea Resources Exploitation. The objective of the project was to identify the scale of possible impacts, and their duration, on deep-sea ecosystems associated with different types of mineral exploitation (i.e. nodules and massive sulphide mounds). IFREMER was involved with *in situ* experimentation and habitat mapping.
5. EU Life project MARHA Marine Habitats (2018-2018). 1) Habitat mapping of deep corals and coastal areas using bathymetry and imagery. 2) Acquisition of ecological time-series using a deep-sea observatory. 3) Methodological development using a new hyperspectral camera.

Infrastructures and facilities

Infrastructure and facilities at IFREMER include ocean observation infrastructure to collect data (observatory platforms, satellites, scientific underwater vehicles, etc.) and research infrastructure and testing facilities (test tanks, metrology, assembly workshops, computing platforms). IFREMER operates the French oceanographic fleet for the benefit of the scientific community, which is composed of four ocean vessels (*Pourquoi pas?, L'Atalante, Thalassa, Marion Dufresne II*), two vessels deployed in the French overseas territories (*Alis, Antea*), three coastal vessels (*L'Europe, Thalia, Haliotis*), five underwater vehicles (*Nautile, Victor 6000, HROV Ariane, Idefx, Asterx*) and large instrumented platforms (e.g. marine seismic equipment). IFREMER also has the digital infrastructures to compile, consult and exchange large amounts of information easily, and software for post-processing of images and data acquired with the submersibles (i.e. Adélie, Matisse).

Participant No.	8
Short Name	UK Research and Innovation – NOC
Country	United Kingdom
Organization Type	RTD
Website	www.ukri.org; www.noc.ac.uk

UK Research and Innovation
National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

Partner Profile

The National Oceanography Centre (NOC) is the UK's centre of excellence for ocean research and environmental technology development. It is one of the centres belonging to UK Research and Innovation (UKRI), the overarching Governmental organisation that funds research in the country. NOC has the remit to provide the country's capability and leadership for big ocean science; this includes provision of major facilities (such as the Royal Research Ships and the deep submergence autonomous and robotic vehicles), and programmes of sustained observing, survey, mapping, data management, long-term ocean research and technological development. NOC undertakes multi-disciplinary studies of marine processes and global scale environmental change, mapping seafloor and sub-seafloor environments for the understanding and management of natural resources and geo-hazards. Furthermore, the scientific teams study the biogeochemical cycles that affect climate and ecosystems, and investigate the distribution of and drivers behind biological patterns in the oceans (abundance, biomass, diversity etc). The Centre has a strong track record of working with the EC to deliver international collaborative projects.

Role in the project

NOC will participate in iAtlantic on several fronts. Based on the expertise of the NOC team in habitat mapping, benthic ecology and technology development, the bulk of the Centre's participation will be in WP2. NOC will lead the WP, and will heavily contribute to it through the coordination of Tasks 2.2 and 2.5, the delivery of data, and the development of scientific research for Tasks 2.2, 2.3 and 2.5. In addition, NOC will provide the project, as part of Task 2.4, with some of its main technological developments: (1) the MAPS underway eDNA sampler which will be deployed from the Autosub Autonomous Underwater Vehicle (AUV) during one or more of the demonstrator cruises; and (2) a significant contribution to the development of machine learning solutions for the analysis of very large marine imaging datasets.
In addition to its contributions to WP2, NOC will also assist with Task 3.1 (time-series data compilation, particularly providing the Porcupine Abyssal Plain dataset, collected by NOC scientists over >25years), and will actively participate in the project outreach and dissemination activities, as coordinated by WP6.

Key personnel

Dr Veerle Huvenne (female) is an expert in marine habitat mapping, specialising in complex deep-sea environments such as cold-water coral reefs, submarine canyons, seamounts and hydrothermal vents. Originally trained as a 'Bioscience Engineer', with an MSc in Oceanography and PhD in Marine Geology, she now leads the Seafloor & Habitat Mapping team at NOC. Dr Huvenne has (co-)authored 91 peer-reviewed publications and has an ISI h-index of 26. She has a strong reputation in the use of Remotely Operated Vehicles (ROVs) and Autonomous Underwater Vehicles (AUVs) to generate a complete, multi-scale and fully 3-dimensional understanding of deep-sea systems. As part of her €1.4M ERC project CODEMAP, she developed new capacities for ROVs and AUVs, which allow detailed mapping of vertical and overhanging substrates, unreachable by traditional techniques. Dr Huvenne also works on the development of automated seafloor classification techniques at a range of scales, and on the assessment of the effectiveness of Marine Protected Areas.

Dr Daniel Jones (male) specialises in deep-water benthic ecology, focusing on assessing spatial and temporal community patterns in seafloor ecosystems and their responses to both natural drivers and anthropogenic disturbances. Dr Jones has a BSc in Marine Biology, MSc in Marine Resource Management and a PhD in Marine Ecology. He has worked in both science and offshore industry and now leads the DeepSeas group at NOC, who have developed and maintained a long-term time-series study of the abyssal benthic ecosystems of the Porcupine Abyssal Plain since 1989. Dr Jones has (co-)authored over 90 peer-reviewed publications (H-Index = 19). To understand deep-sea community dynamics, Dr Jones typically uses ROV, AUV, lander and towed-camera images to quantify the density and diversity of megafaunal assemblages. As a quantitative ecologist, he has expertise in processing and analysing large ecological datasets and working on processes at global and regional scales as well as very high-resolution studies of finer-scale patterns. He has worked with the oil and gas industry to assess ecological patterns in their areas of interest as well as their disturbances (SERPENT Project) and was recently a work-package leader on the 12MEUR FP7 project MIDAS, focussed on deep-sea mining. His work in the Atlantic has covered the continental margins, Mid-Atlantic Ridge and abyssal plains, and he has also expertise in deep-water Pacific and Polar ecology.

Prof Matt Mowlem (male) is the head of OTEG (Ocean Technology & Engineering) at NOC and has 18 years of experience in analytical system, sampler and sensor R&D program management (6 patents, >50 publications). Prof Mowlem has since 2004 built from scratch the world's leading group in the field of autonomous ruggedised aquatic micro-sensors. This new generation of autonomous sensors addresses, with world leading accuracy and precision and at low cost, a wide range of environmental parameters (e.g. nutrients, trace metals, pH and the carbonate system) on a variety of platforms. EU funding has enabled further biogeochemical sensor development (SenseNET, SenseOCEAN), and the development of Lab-on-a-Chip (LOC) nucleic acid analysers (Labonfoil). Prof Mowlem is the head of WP6 (cross-cutting issues and emerging networks) on AtlantOS, involved in the development of sensors for ocean scale observation systems.

Dr Julie Robidart (female) is a molecular ecologist focused on sensors for marine organisms and environmental DNA (or eDNA) technologies. Dr Robidart led an international team of scientists in the development of molecular probes for marine eukaryotes and organised deployments of 5 types of drifting sensors interrogating the nitrogen cycle in the N. Pacific as Chief Scientist of BioLINCS, a 15 day cruise that has produced 11 publications thus far. Dr Robidart led the development of 2 types of eDNA samplers while at NOC, with 2 *in situ* deployments in the first year of production. These time-series samples are the first of their type, and eDNA markers from this high-resolution time-series will be calibrated with taxonomic identification of plankton in the Western Channel Observatory.

Dr James Strong (male) is a marine ecologist whose primary interests are marine habitat and species mapping and modelling. His most recent work has been on the identification and reduction of sources of uncertainty within habitat mapping methods, species distribution modelling, and integrating landscape ecology with habitat mapping. Dr Strong's research interests also include landscape ecology, marine habitat restoration, algal aquaculture, predicting the impact of climate change on marine habitats and environmental monitoring. He is the chair of the ICES Working Group on Habitat Mapping.

Dr W Brett Hosking (male) is an electronic engineer who specialises in computer vision and machine learning. He has a Masters degree in digital communications and a PhD in video coding and compression. His work mainly focuses on the development of tools to automate the annotation of underwater images captured from Autonomous Underwater Vehicles (AUVs) for faster acquisition of ecological information. His interests also include the application of signal processing and deep learning for developing a greater level of scene understanding comparable to humans.

Experience - Relevant Publications

1. **Huvenne VAI**, Bett BJ, Masson DG, Le Bas TP, Wheeler AJ (2016) Effectiveness of a deep-sea cold-water coral Marine Protected Area, following eight years of fisheries closure. Biological conservation 200: 60-69
2. Hogg O, **Huvenne VAI**, Griffiths H, Linse K (2018) On the ecological relevance of landscape mapping and its application in the spatial planning of very large marine protected areas. Science of the Total Environment 626: 384-398
3. Morris KJ, Bett BJ, Durden JM, Benoist NMA, **Huvenne VAI**, **Jones DOB**, Robert K, Ichino MC, Wolff GA, Ruhl HA (2016) Landscape-scale spatial heterogeneity in phytodetrital cover and megafauna biomass in the abyss links to modest topographic variation. Nature Scientific Reports 6: 34080
4. **Jones DOB**, Yool A, Wei C, Henson SA, Ruhl HA, Watson RA, Gehlen M (2014) Global reductions in seafloor biomass in response to climate change. Global Change Biology 20 (6): 1861-1872
5. **Robidart J**, Church M, Ryan J, Ascani F, Wilson S, Bombar D, Marin III R, Richards K, Karl D, Scholin C, Zehr J (2014) Ecogenomic sensor reveals controls on N_2-fixing microorganisms in the North Pacific Ocean. Multidisciplinary journal of Microbial Ecology 8: 1175-1185

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. *CLASS* – 'Climate-Linked Atlantic Sector Science', National Capability programme of the Natural Environment Research Council (UKRI), 04/2018-03/2022, £15.3Mfor NOC of £22.3M total.
2. *CODEMAP* – 'Complex Deep-sea Environments: Mapping habitat heterogeneity As Proxy for biodiversity'. ERC Starting Grant 258482, 04/2011-01/2017, 1.4M€
3. SERPENT – Scientific and Environmental Remotely operated vehicle Partnership using Existing industrial Technology. £3M Industry funded project 2002-present.
4. AtlantOS - Optimising and Enhancing the Integrated Atlantic Ocean Observing Systems. €2.2M to NOC of €21M total; 2015-2019
5. MARINeDNA - Development & application of eDNA tools to assess the structure and function of coastal sea ecosystems (NE/N006496/1) £236,312 (NOC) of £1.2M; 2015-2019

Infrastructures and facilities

The National Oceanography Centre is the home of the UK's Research Vessels and its deep-water marine autonomous and robotic systems, hosting an extensive fleet of vehicles including 4 large AUVs (Autosub series, including the 6000m-rated Autosub6000), a 6500m-rated work-horse scientific ROV (Isis), ca. 40 gliders and a variety of autonomous surface vehicles. Some of these vehicles are designed and developed at NOC (e.g. the Autosub series), demonstrating the unique capacity of the engineering teams. Thanks to the close integration between those innovation groups and the science departments at NOC, there is a unique collaboration and cross-fertilisation between scientists and engineers, leading to further innovation, top-level scientific breakthroughs, and a scientific community who have an extensive expertise in working with the latest technology. With respect to technology manufacturing and deployment, the Centre for Marine Microsystems (NOC & the University of Southampton) is known internationally as a leading research team in environmental microsensors. NOC (OTEG) have 85m^2 of instrumentation assembly clean rooms, advanced engineering laboratories and pressure testing facilities to 70 MPa with temperature control (-10 to +35 ^oC). eDNA analyses will be led by NOC, in state-of-the-art facilities including class II clean rooms for molecular and micro biology, equipped with the MiSeq II (NOC/UoS), high-throughput sample automation robots, complete RNA & DNA toolsets, isolation cabinets and three dedicated technical staff.

Participant No.	9
Short Name	GEOMAR
Country	Germany
Organization Type	RTD
Website	www.geomar.de/en

Partner Profile

GEOMAR is among the largest non-university research institutions in the field of marine sciences in Germany (1000 staff, including 450 experienced scientists and about 200 doctoral candidates), and a member of the Helmholtz Association, Germany's largest non-university scientific organisation. The centre's mandate is the inter- and multidisciplinary investigation of all relevant aspects of modern marine sciences, from sea floor geology through physical, chemical and biological oceanography to marine meteorology. Research is conducted worldwide in all oceans. The main research topics are grouped in four divisions: Ocean Circulation and Climate Dynamics, Marine Biogeochemistry, Marine Ecology, and Dynamics of the Ocean Floor. GEOMAR cooperates closely with national and international research institutions and with a number of SMEs active in marine technology and science.

Role in the project

GEOMAR (A Biastoch) leads WP1 and performs the high-resolution ocean and climate modelling (Task 1.1). Colin Devey is co-lead of WP2 and, together with Anne-Cathrin Wölfl, will be responsible for the assembly of all ship´s bathymetric data both for the basin-wide and regional study areas, working closely with the AtlantOS community. Timm Schoening contributes to WP2 by performing the machine learning for optical underwater image analysis and leads Task 2.4.2. Björn Fiedler contributes to WP3 (Task 3.1) by compiling oceanographic and ecological time series data from the Cape Verde Ocean Observatory (CVOO) to be included into the all-Atlantic time-series data set. Henk-Jan Hoving contributes to WP4 (lead Task 5.4) by organising the JAGO expedition to collect living deep-sea jellyfish, and by exposing jellyfish to stressors in lab experiments.

Key personnel

Prof Arne Biastoch (male) leads an ocean modelling group at GEOMAR and is professor for physical oceanography at the Kiel University. Before joining GEOMAR, he worked at the Scripps Institution of Oceanography, La Jolla, U.S.A. He has extensive experience in modelling the large-scale circulation of the ocean, with particular emphasis on mesoscale processes. His main interests are studying the Atlantic Ocean circulation variability, the dynamics in the Agulhas system and their combined effects on the AMOC and climate. He also works with strongly interdisciplinary foci, e.g. simulating the dispersal of organisms using Lagrangian frameworks. Prof Biastoch is the (co)-author of a total of 92 publications in the peer-reviewed literature and has a h-index of 28.

Prof Colin Devey (male) leads the research division "Dynamics of the Ocean Floor" at GEOMAR and has extensive experience in seafloor volcanology and petrology. He leads the German "Underway Bathymetry" initiative, collecting bathymetric data from research vessel on transit. He has led international programs such as "InterRidge" and was leader of a 6-year national research program on mid-ocean ridges. He has participated in over 30 scientific cruises of which he led 19. His interests are in the energy and mass budgets of volcanism on the seafloor and how these relate (or do not relate) to plate tectonic processes.

Dr Anne-Cathrin Wölfl (female) is a postdoctoral researcher in the research division 'Dynamics of the Ocean Floor' at GEOMAR. Dr Wölfl is an expert in seafloor and habitat mapping as well as geographic information systems (GIS), and has participated in several research cruises and temporarily led a field station in maritime Antarctica. Dr Wölfl has worked from tropical to polar environments and from the deep ocean to coastal areas and is also a member of the Atlantic Seabed Mapping International Working Group (ASMIWG) as part of the Atlantic Ocean Research Alliance. Dr Wölfl has received her doctoral degree at Hamburg University in cooperation with the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), investigating marine environments on King George Island, Antarctica. Her diploma degree was also received in in cooperation with the AWI at Trier University, where she investigated seafloor sediments in a Chilean fjord system.

Dr Björn Fiedler (male) is a postdoctoral researcher in the Department of Chemical Oceanography at GEOMAR, scientific coordinator for CVOO, investigates dynamics of the marine carbon cycle in the eastern tropical North Atlantic off Western Africa. Together with African partners, Dr Fiedler has established ocean time-series measurements near Cape Verde and is currently overseeing the scientific coordination of this observatory. During fieldwork at Cape Verde under various research projects he involved local students and technicians into his work. So far, he (co-) authored 18 peer-reviewed articles and currently has a h-index of 9. Dr Fiedler is also a member of the scientific steering group for the International Ocean Carbon Coordination Project (IOCCP) and is responsible for ocean time series efforts therein.

Dr Henk-Jan Hoving (male) leads an Emmy Noether Junior Research Group in deep-sea biology at GEOMAR. Hoving is interested in the biodiversity, behaviour and ecology of deep-sea and pelagic fauna, including macrozooplankton and nekton, and the role of these organism in linking the foodwebs of the pelagic and benthic realms. Hoving was a postdoctoral fellow at the Monterey Bay Aquarium Research Institute (USA), and a Future Ocean postdoctoral fellow at GEOMAR. At GEOMAR, Hoving is leading the development of novel technology for deep-sea biological research, and he joins and leads oceanic and field campaigns to obtain deep-sea in situ observations and samples using submersibles, benthic and pelagic camera systems as well as open and closing nets. Hoving has (co-) authored 36 publications in peer-reviewed journals and has an h-index of 15.

Dr Timm Schoening (male) is an independent researcher affiliated with the DeepSea Monitoring group at GEOMAR. Previously, he has worked at Bielefeld University and the University of the Azores. His research focuses on the semantic analysis of optical underwater imagery. He applies machine learning, pattern recognition, computer vision and further data science methods to heterogeneous underwater image data sets acquired by ROVs, AUVs, and other underwater camera platforms. He applied his expertise in collaboration with researchers providing image datasets from the UK (NOCS), Germany (AWI, BGR, GEOMAR), Portugal (IMAR/DOP, Okeanos), and Canada (ONC). He is co-chair and initiator of the Marine Imaging Workshop and its community. He has participated in national and international research projects, is (co-)author of 15 peer-reviewed publications and has an h-index of 7. He received the Briese PhD award for ocean research in 2017.

Experience - Relevant Publications

1. **Biastoch A**, Durgadoo JV, Morrison AK, van Sebille E, Weijer W, Griffies SM (2015) Atlantic Multi-decadal Oscillation covaries with Agulhas leakage. Nature Communications 6: 10082
2. Yeo IA, **Devey CW**, Le Bas TP, Augustin N, Steinfuehrer A (2016) Segment-scale volcanic episodicity: Evidence from the North Kolbeinsey Ridge, Atlantic. Earth and Planetary Science Letters 439: 81-87
3. **Hoving HJT**, Bush SL, Haddock SHD, Robison BH (2017) Bathyal feasting: post-spawning squid as a source of carbon for deep-sea benthic communities. Proceedings of the Royal Society of London B 284: 20172096
4. **Fiedler B**, Grundle DS, Schütte F, Karstensen J, Löscher CR, Hauss H, Wagner H, Loginova A, Kiko R, Silva P, Tanhua T, Körtzinger A (2016) Oxygen utilization and downward carbon flux in an oxygen-depleted eddy in the eastern tropical North Atlantic Biogeosciences 13: 5633-5647
5. **Schoening T**, Jones DOB, Greinert J (2017) Compact-morphology-based poly-metallic nodule delineation. Scientific reports 7 (1): 133338

Experience - Relevant previous actions or activities, connected to the subject of this proposal

GEOMAR is successful in acquiring external funding from both national and international sources. With regard to EU programmes, GEOMAR has had about 45 EU-FP7-projects and coordinates 7 of 20 Horizon 2020 projects.

1. ATLANTOS [H2020-BG-08-2014] Optimizing and Enhancing the Integrated Atlantic Ocean Observing System: The overarching objective of AtlantOS is to achieve a transition from a loosely-coordinated set of existing ocean observing activities to a sustainable, efficient, and fit-for-purpose Integrated Atlantic Ocean Observing System (IAOOS), by defining requirements and systems design, improving the readiness of observing networks and data systems, and engaging stakeholders around the Atlantic
2. ROBUST [H2020-SC5-11d-2015] Robotic subsea exploration technologies: There is a need to develop an autonomous, reliable, cost effective technology to map vast terrains, in terms of mineral and raw material contents which will aid in reducing the cost of mineral exploration, currently performed by ROVs and dedicated SSVs and crew. Furthermore, there is a need to identify, in an efficient and non-intrusive manner (minimum impact to the environment), the most rich mineral sites. This technology will aid the seabed mining industry, reduce the cost of exploration and the detailed identification of the raw materials contained in a mining sites, to enable targeted mining only of the richest resources.
3. Helmholtz Association (HGF) Earth System Modelling (ESM): framework project among all 8 Earth & Environment Centres to develop, evaluate and apply a world-leading Earth system modelling infrastructure in order to provide solutions to grand challenges faced by the Earth and environmental sciences. GEOMAR's role in ESM is to develop a Flexible Ocean and Climate Infrastructure (FOCI) with high-resolution ocean nesting capability.

Infrastructures and facilities

GEOMAR holds a large infrastructure for data storage and analysis, including a data management unit. In respect to the production of ocean and climate model experiments, GEOMAR is connected to national high-performance computing centres where computing time is applied for (at no direct cost). Since 2006, GEOMAR operates an open-ocean time series station off Cape Verde (Cape Verde Ocean Observatory, CVOO) in close collaboration with the local partner institute INDP and in co-location with the Cape Verde Atmosphere Observatory (CVAO). As part of this initiative, research capacity and human capital were built through training and exchange of research technicians and scientists between Cape Verde and Germany. Students from the local university in Mindelo, Cape Verde (UNICV) were involved in research projects for training and education.

Based on this successful collaboration GEOMAR has constructed a fully-fledged Ocean Science and Logistics Centre (OSCM) in Mindelo, Cape Verde which is being operated jointly with INDP. The OSCM will build significant capacity for national and international research but also provide infrastructure for knowledge transfer and education in the West African region.

GEOMAR owns the manned submersible JAGO, which enables in-situ data and specimen collection and observation by two persons, the pilot and a scientific observer, to water depths reaching 400 m. The submersible moves autonomously under water and is not connected by an umbilical cable to the support ship. The submersible is operated by three people; usage of JAGO thus requires relatively little manpower on board the support vessel. The submersible dives combine unique observations and high-quality imagery in the epi- and mesopelagic zone and careful and selective sampling of fragile organisms. JAGO sampling capabilities include a suction sampler and scoop tubes allowing capture of living deep-sea organisms. After the dive, the captured and alive organisms can be used for experiments under controlled laboratory conditions.

Participant No.	10
Short Name	Heriot-Watt University
Country	United Kingdom
Organization Type	HEI
Website	www.hw.ac.uk

Partner Profile

HWU is a research-led university specialising in science and engineering, business and management, languages and design. HWU is highly ranked and rising in the global QS top 'fifty under fifty' league table and is placed 18th in the UK in the Guardian University League tables. HWU has a world reputation for excellence in teaching and research. Of particular note is the emphasis on applied research, which a real impact on policy, application and manufacturing; HWU was rated as the 9th university in the UK and 1st in Scotland for research impact by the recent Research Excellence Framework (REF) assessment. The international dimension of HWU is impressive, with three campuses across Scotland, a campus in Dubai, a new Malaysia campus, which opened in 2013 and 50 international academic learning partners in 30 countries. The Institute of Life and Earth Sciences hosts the biologically orientated activities of HWU with over 60 academic staff engaged in a wide variety of research with an interdisciplinary emphasis; much of our research funding has been through the FP7 and Horizon 2020 programmes. The largest ILES research grouping (The Centre for Marine Biodiversity & Biotechnology) is primarily concerned with environmental research, which extends from the deep sea through the coastal zone with applied research focused on the challenges of understanding marine biodiversity, unlocking the biotechnological potential of marine organisms, assessing the effects of nanomaterials on the environment, and understanding how marine life can cope with environmental change. The Lyell Centre for Earth and Marine Science and Technology opened at Heriot-Watt University in early 2016 and is a collaboration between Heriot-Watt University and the British Geological Survey. The Lyell Centre's research themes are clustered in two main areas: applied geoscience and ecosystems science. Within these themes, research is being undertaken on a diverse range of topics including deep-sea exploration and assessing the impacts of man-made stressors (e.g. oil and gas activities, deep-sea mining) and climate change on deep-sea ecosystems. The Lyell Centre has invested heavily in deep-sea technologies, and currently houses one of the most advanced deep-sea lander facilities in Europe, as well as a state-of-the-art research aquarium where climate change exposure studies can be carried out.

Role in the project

HWU will co-lead WP4. Within WP4.1, HWU will undertake studies to assess the impact of ocean warming and acidification on pelagic organisms (with UWC), and ocean warming and mine tailings exposure on deep-sea gelatinous zooplankton (with GEOMAR). In WP4.2, HWU will study baseline ecosystem processes of bathyal and abyssal sediments in the North Atlantic and South Atlantic (with UFES) and undertake studies to assess pelagic food web structure at these study sites (with IMAR). HWU will coordinate the delivery of DL4.1 and co-lead the *iMirablis* cruise to the Cape Verde Islands. In WP4.5, HWU will undertake studies to assess the benthic ecosystem response to ocean warming and changes in phytodetritus composition and quality (with UFES), and contribute to the deliverable DL4.5. HWU will also contribute to the WP5.1 task (Compilation of regions of interest maps from existing data sources) and WP5.2 (Development of iAtlantic advanced web-based GIS-tools & collation of data layers from iAtlantic) together with IMAR and UNIHB, respectively.

Key personnel

Dr Andrew K Sweetman (male) is an Associate Professor in ILES at HWU, and head of the Marine Benthic Ecology, Biogeochemistry and *In situ* Technology research group at the Lyell Centre. He holds a PhD in deep-sea biology from the Max Planck Institute (Germany). Andrew is specialised on assessing the impact of anthropogenic stressors on shallow and deep-sea benthic ecosystems, and regularly uses isotope labelled substrates as deliberate tracers to assess C flow (and other ecosystem functions) in deep-sea habitats. He has extensive experience in using deep-sea landers for studying ecosystems at depth, and has worked and published numerous peer-reviewed deep-sea research papers. His current work includes assessing the impacts of climate change on deep-sea ecosystems, as well as assessing the impact of other anthropogenic impacts (e.g. polymetallic nodule extraction) on deep-sea ecosystems.

Experience - Relevant Publications

1. **Sweetman AK,** Thurber AR, Smith CR, Levin LA, Mora C, Wei CL, Gooday AJ, Jones DOB, Rex M, Yasuhara M, Ingels J, Ruhl HA, Frieder CA, Danovaro R, Würzberg L, Baco A, Grupe B, Pasulka A, Meyer KS, Dunlop KM, Henry L-A, Roberts JM (2017) Major impacts of climate change on deep-sea benthic ecosystems. Elementa: Science of the Anthropocene 5: 4
2. **Sweetman AK,** Chelsky A, Pitt KA, Andrade H, van Oevelen D, Renaud PE (2016) Jellyfish decomposition at the seafloor rapidly alter biogeochemical cycling and carbon flow through benthic food-webs . Limnology and Oceanography 61: 1449-1461
3. Mengerink KJ, Van Dover CL, Koslow T, Gjerde K, Ardron J, Ramirez-Llodra E, Lara-Lopez A, Squires D, Sutton T, **Sweetman AK**, Levin LA (2014) A call for deep-ocean stewardship. Science 344: 696-698
4. **Sweetman AK**, Smith CR, Dale T, Jones DOB (2014) Rapid scavenging of jellyfish carcasses reveals the importance of gelatinous material to deep-sea food webs . Proceedings of the Royal Society: Biological Sciences 281 (1796): 20142210
5. Thurber AR, **Sweetman AK,** Narayanaswamy BE, Jones DOB, Ingels J, Hansmann RL (2014) Ecosystem functions and services in the deep sea. Biogeosciences 11: 3941-3963

Experience - Relevant previous actions or activities, connected to the subject of this proposal

HWU has been involved in a variety of deep-sea research projects funded by the EC, including HERMIONE, HERMES, and MERCES. Recent activities are related to the impacts of resource extraction on deep-sea coral (*Lophelia pertusa*) and sponge (*Geodia barretti*) ecosystems, and marine ecosystem restoration in the deep sea. Furthermore, Andrew K Sweetman currently works on gathering baseline benthic ecological data in mining claim areas in the central Pacific (funded by the BGR, Germany), and assessing the impacts of deep-sea mining on seafloor habitats (funded by the Gordon and Betty Moore Foundation). In addition, Andrew K Sweetman has led/ co-led 21 research projects focusing on specific topics such as the effects of 1) climate change on the deep ocean, 2) deep-sea mining on seafloor habitats, 3) aquaculture activities and mine tailings discharge on fjord ecosystems, and 4) the role of gelatinous zooplankton in marine C cycles.

Infrastructures and facilities

ILES enjoys excellent research facilities, including access to marine stations in Orkney and the Berwickshire coast of eastern Scotland, freshwater and salt water aquaria, and analytical facilities for biochemical and physiological analysis. In addition to this, in collaboration with the British Geological Survey, ILES is a major partner in the purpose-built newly-established laboratory, The Lyell Centre for Earth and Marine Science and Technology jointly funded by UK and Scottish funders and HWU. The Lyell Centre is promoting innovative research at the core of geoscience and marine ecology. The Lyell Centre houses state-of-the-art biogeochemistry facilities, and an array of deep-sea infrastructure for in situ studies of the deep sea, including benthic chamber landers, deep-sea micro-profiling landers and under-water imaging technologies.

Participant No.	11
Short Name	UniHB
Country	Germany
Organization Type	RTD
Website	www.marum.de, www.pangaea.de

Partner Profile

The Centre for Marine Environmental Sciences (MARUM) at the University of Bremen (UniHB) is a central research facility offering a number of technical and scientific services in the field of ocean research and furthermore developing innovative technology in support of scientific operations. Within the last decade MARUM has become one of the leading institutions in Germany and Europe to develop and operate sophisticated equipment for marine science applications. In cooperation with the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI) MARUM operates PANGAEA, an information system and data publisher for geoscientific and environmental data. PANGAEA is the designated archive for the journal Earth System Science Data (ESSD) and recommended data repository of several international scientific journals such as 'Scientific Data' by the Nature publishing group. Furthermore, PANGAEA co-chairs the ICSU World Data System (WDS) and Research Data Alliance (RDA) working groups on data publication and holds mandates from the WMO (World Radiation Monitoring Center - WRMC). Essential services supplied by PANGAEA are data curation, long-term data archiving and data publication. Data curation includes quality control of metadata and the development of ontologies and vocabularies according to international protocols and standards. Metadata are extensive and each dataset can be cited using a universally unique Digital Object Identifier (DOI). The system is operated in the sense of the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities which is a follow up to the Budapest Open Access Initiative. MARUM comprises the DFG research centre and the cluster of excellence 'The Ocean in the Earth System'.

Role in the project

In WP3, MARUM will (1) identify critical environmental parameters responsible for the extinction or re-establishment of deep-sea ecosystems and define (semi-)quantitatively the tipping point values for extinction or re-establishment, and (2) detect past environmental changes that cross tipping points of deep-sea ecosystems (best documented for cold-water coral reefs) resulting in either their regional extinction on centennial (and longer) time scales or their re-establishment. MARUM has >15 years of experience in the exploration of the development of cold-water coral ecosystems in relation to changing environmental settings based on >10 marine expeditions in various parts of the Atlantic Ocean. Major results range from the discovery of substantial new cold-water coral ecosystems to the assessment of the vulnerability of the biodiversity of such ecosystems and to the first identification of critical environmental parameters controlling their vitality.

In WP7 (data management) PANGAEA will lead and will provide state-of-the-art data handling workflows in accordance with the H2020 Open Research Data Pilot. Focus will be on harmonising data and providing standardised interfaces to other infrastructures such as EMODnet. Datasets generated within iAtlantic will be uniquely and persistently identifiable through issuing a digital object identifier (DOI). A data management plan (DMP) will be produced which will describe the data handling procedures in iAtlantic. PANGAEA will also contribute to WP6 (capacity building) through involvement in training courses and WP8 (management). The information system PANGAEA has been active for 20 years and is operated as an Open Access library aimed at archiving, publishing and distributing georeferenced data from earth system research. The system guarantees long-term availability of its content through a commitment of the hosting institutions. Each dataset can be identified, shared, published and cited by using a Digital Object Identifier. PANGAEA also allows data to be published as supplements to science articles or as citable data collections in combination with data journals like ESSD, Geoscience Data Journal, Scientific Data, or others. PANGAEA is furnished with a well-developed interoperability framework thus allowing dissemination of metadata and data to registries, data portals, and other service providers.

Key personnel

Prof Dr Dierk Hebbeln (male) is a senior scientist at the Centre for Marine Environmental Sciences (MARUM) at UniHB. A paleoceanographer by training, he follows a comprehensive approach, not only looking on marine sediments as archives, but also trying to understand the sedimentation processes that finally produced these archives. Combining this approach with his growing interest in deep-sea ecosystems, he has been investigating the development of cold-water coral ecosystems and their sensitivity to environmental change for over 15 years.

Dr Michael Diepenbroek (male) is a geologist and computer scientist with a PhD in geology from the Free University of Berlin. He conceived and implemented the scientific information system PANGAEA®. He is working at MARUM, where he is responsible for the operation of PANGAEA® and he is the director of WDC-MARE. He took a leading role in the initiation of the ISCU World Data Centre for Marine Environmental Sciences (WDC-MARE), founded in 2001. He is a member of the Strategic Committee, later Scientific Committee of the ICSU World Data System.

Andree Behnken (male) is a geologist and software engineer, and joined the PANGAEA group at MARUM in 2008. He specialises in Sensor Web Enablement standards and is responsible for the implementation of various web services and other software components around PANGAEA. He led the data management work package for FixO³ and has been engaged in various other projects (ESONET NoE, HYPOX, SIOS, GFBio).

Dr Tina Dohna (female) is a marine molecular ecologist who has been working at the Marine Technology section of MARUM

since 2016 and will be joining the PANGAEA team in the autumn of 2018. She has worked on data sharing issues regarding European Research Infrastructures in the framework of the EU H2020 Project 'COOP+' and initiated several smaller environmental DNA projects. She is also an active member of GEO Biodiversity Observation Networks (GEO BON), among them the Marine BON and the Essential Biodiversity Variables (EBVs) Operationalization Working Group.

Experience - Relevant Publications

1. **Diepenbroek M**, Schindler U, Huber R, Pesant S, Stocker M, Felden J, Buss M, Weinrebe M (2017) Terminology supported archiving and publication of environmental science data in PANGAEA. Journal of Biotechnology 261: 177-186
2. **Hebbeln D**, Samankassou E (2015) Where did ancient carbonate mounds grow — In bathyal depths or in shallow shelf waters? Earth-Science Reviews 145: 56-65
3. Henry L-A, Frank N, **Hebbeln D**, **Wienberg C**, Robinson L, van de Flierdt T, Dahl M, Douarin M, Morrison CL, López Correa M, Rogers AD, Ruckelshausen M, Roberts JM (2014) Global ocean conveyor lowers extinction risk in the deep sea. Deep-Sea Research Part I 88: 8-16
4. **Hebbeln D**, **Wienberg C**, **Wintersteller P**, Freiwald A, **Becker M**, Beuck L, Dullo C, Eberli GP, Glogowski S, **Matos L**, Forster N, Reyes-Bonilla H, Taviani M, and the MSM 20-4 shipboard scientific party (2014) Environmental forcing of the Campeche cold-water coral province, southern Gulf of Mexico. Biogeosciences 11: 1799-181
5. Frank N, Freiwald A, López Correa M, **Wienberg C**, **Eisele M**, **Hebbeln D**, Van Rooij D, Henriet JP, Colin C, van Weering T, de Haas H, Buhl-Mortensen P, Roberts JM, De Mol B, Douville E, Blamart D, Hatte C (2011) Northeastern Atlantic cold-water coral reefs and climate. Geology 39: 743-746

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. *FP 5 – ECOMOUND* – Ecological Controls on Mound Formation along the European Continental Margin (1999-2003): Assessment of particle fluxes to cold-water coral ecosystems, assessment of the long-term development of Irish cold-water coral ecosystems
2. *FP 6 – HERMES* – Hotspot Ecosystem Research on the Margins of the European Seas (2005-2009): Assessment of the spatial dimension of cold-water coral ecosystems along the European margins, assessment of the response of cold-water coral ecosystems to global change
3. *FP 7 – HERMIONE* – Hotspot Ecosystem Research and Man's impact on European Seas (2009-2012): Assessment of changes in coral ecosystems related to key factors including climate change, other human impacts and the impact of large-scale episodic events
4. FP 7 – FixO³ – Fixed-Point Open Ocean Observatories (2007-2013): Integration of European open ocean fixed point observatories, harmonising data management standards and workflows
5. H2020 – ATLAS - A trans-Atlantic assessment and deep-water ecosystem based spatial management plan for Europe: Assessment of the sensitivity of cold-water corals to environmental change and related tipping points affecting the proliferation of cold-water coral ecosystems

Infrastructures and facilities

Hosted by MARUM, PANGAEA is the designated archive for the journal Earth System Science Data (ESSD) and recommended data repository of several international scientific journals such as "Scientific Data" by the Nature publishing group. Furthermore, PANGAEA co-chairs the ICSU World Data System (WDS) and Research Data Alliance (RDA) working groups on data publication and holds mandates from the WMO (World Radiation Monitoring Centre - WRMC). Essential services supplied by PANGAEA are data curation, long-term data archiving and data publication. Data curation includes quality control of metadata and the development of ontologies and vocabularies according to international protocols and standards. Metadata are extensive and each dataset can be cited using a universally unique Digital Object Identifier (DOI). The system is operated in the sense of the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities which is a follow up to the Budapest Open Access Initiative. In addition, MARUM offers a full range of infrastructures to conduct marine research in the field and in the laboratory. Sea-going expeditions can be equipped with one of MARUM's remotely operated vehicles (ROVs) or with its autonomous underwater vehicle (AUV) along with the entire suite of standard surveying and sampling equipment.

Participant No.	12
Short Name	USP
Country	Brazil
Organization Type	HEI
Website	www.usp.br

Partner Profile

Universidade de São Paulo (USP) is the largest University in Brazil and one of the most prestigious higher education and research institutions in Latin America. Its first school, the Law School, was established in 1827 and the University was founded in 1934 upon the unification of several pre-existing schools. USP is located in the state of São Paulo, the richest and most developed region of Brazil, with campuses distributed over eight cities: Bauru, Lorena, Piracicaba, Pirassununga, Ribeirão Preto, São Carlos, Santos and São Paulo. Its academic structure is organized into 42 schools, 6 specialized institutes, and four important museums. USP has quickly achieved a leading role in many different fields as a research centre and is responsible for around 20% of all Brazilian academic output. At the same time, undergraduate and graduate courses have always improved their quality and attracted the best students. As a public university, USP does not charge its students for tuition, and receives over 11,000 new students per year in the undergraduate courses, selected among over than 130,000 applicants. USP has over 90,000 undergraduate and postgraduate students, 5,900 faculty members, 87% of which have a full-time job contract.

Role in the project

In iAtlantic USP will participate in WPs 2, 3, 4 and 5, contributing expertise in the following areas: a deep-sea benthic ecologist, working on several aspects including community structure, trophodynamics, ecology and evolution; and a stable isotope geochemist. Current research projects in the South Atlantic together with new oceanographic cruises using our oceanographic vessel will be important to provide a complete picture of the whole Atlantic, since the South Atlantic is one of the least studied ocean basins. They will also serve as matching funds for the project, increasing the potential of exploration in this proposal. USP investigators have been working in this area for over 30 years in several ocean basins, such as the SE and NE Atlantic, NW and NE Pacific, Gulf of Mexico and Southern Ocean. During this period, different tools have been used, such as ecological image analysis, stable isotopes, lipid biomarkers, sediment traps, molecular biology, among others.

Key personnel

Professor Paulo Yukio Gomes Sumida (male) obtained his PhD from the University of Southampton and worked as a post-doctoral fellow at the University of Hawaii. In 2000, he joined the University of São Paulo where he works as an Associate Professor. Prof. Sumida works on several aspects of the ecology of deep-sea benthic organisms in different ocean basins, including the North and South Atlantic. He has participated in over 40 oceanographic cruises and several research submersibles dives down to 4200 m depth. Prof Sumida uses tools such as ecological image analysis, stable isotopes, lipid biomarkers, sediment traps and molecular biology to better understand community structure, trophodynamics, ecology and evolution in deep-sea benthic systems. He has published widely on several aspects of deep-sea benthic ecology, including the study of reducing environments, deep-water corals and fauna from abyssal polymetallic nodule areas.

Professor Christian Millo (male) is a stable isotope geochemist. He has interests in: Isotope fractionation processes, paleoclimatology, palaeoceanography, geomicrobiology, marine Geochemistry, application of stable isotope geochemistry to food research. He obtained his MSc in Stable Isotope Geochemistry at the University of Trieste (Italy) in 2001 and his PhD in Palaeoceanography at the Christian Albrechts Universitaet, Kiel (Germany) in 2005. From 2006 to 2011, Prof. Millo was a postdoctoral researcher at the Institute de Physique du Globe de Paris (France), working on the application of stable isotope geochemistry to geomicrobiology. From 2011 to 2014, he was a postdoctoral researcher at USP (Brazil), working on paleotemperature reconstruction based on oxygen isotope composition of fluid inclusion in stalagmites. At present, he is a marine geochemistry professor at the Institute of Oceanography of the University of Sao Paulo (IOUSP) and is co-investigator on the joint Brazil-UK research project Marine E-Tech.

Experience - Relevant Publications

1. Alfaro-Lucas JMJM, Shimabukuro M, Ogata IV, Fujiwara Y, **Sumida PYG** (2018) Trophic structure and chemosynthesis contributions to heterotrophic fauna inhabiting an abyssal whale carcass. Marine Ecology Progress Series 596: 1-12
2. Alfaro-Lucas JM, Shimabukuro M, Ferreira GD, Kitazato H, Fujiwara Y, **Sumida PYG** (2017) Bone-eating *Osedax* worms (Annelida: Siboglinidae) regulate biodiversity of deep-sea whale-fall communities. Deep-Sea Research II: 146: 4-12
3. **Sumida PYG,** Alfaro-Lucas JM, Shimabukuro M, Kitazato H, Perez JAA, Soares-Gomes A, Toyofuku T, Lima AOS, Ara K, Fujiwara Y (2016) Deep-Sea whale fall fauna from the Atlantic resembles that of the Pacific Ocean. Scientific Reports 6: 22139
4. **Sumida PYG** , Smith CR, Bernardino AF, Polito PS, Viera DR (2014) Seasonal dynamics of megafauna on the deep West Antarctic Peninsula shelf in response to variable phytodetrital influx. Royal Society Open Science 1: 140294
5. **Sumida PYG,** Yoshinaga MY, Madureira LAS-P, Hovland M (2004) Seabed pockmarks associated with deep-water corals off SE Brazilian continental slope, Santos Basin. Marine Geology 207: 159-167

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Deep-water coral from Campos and Santos Basins, SE Brazil. Petrobras R&D Project, 06/2018-06/2021 ~ € 1.2M. Coordinator: Paulo Sumida.
2. Biology and geochemistry of cold seeps off SE Brazil. Shell R&D Project, 2018-2021 ~ € 3.0M. Coordinator: Paulo Sumida.

3. Biodiversity and connectivity of benthic communities living in organic-rich substrates (whale-bones and wood parcels) in the deep SW Atlantic. FAPESP, 08/2011- 10/2017. ~ € 500K. Coordinator: Paulo Sumida.
4. Effects of ocean acidification on the marine benthos metabolism and trophodynamics. FAPESP, 07/2011- 07/2013. ~ € 80K. Coordinator: Paulo Sumida.
5. Peregrino oil field environmental monitoring. Equinor R&D Project, 01/2010-12/2012 ~ € 1.8M. Coordinator: Paulo Sumida.

Infrastructures and facilities

1. USP has access to the RV *Alpha-Crucis*, a 65-m long all-purpose oceanographic vessel equipped with side-scan sonar, multibeam, ADCP, USBL, ROV (1500 m), coring devices (box-corer, piston and gravity corers), CTD Rosette and fishing winches. USP also has access to the RV *Alpha-Delphini*, a 26-m long oceanographic vessel, with ADCP, side-scan, multibeam and sampling devices. USP benthic laboratories have several stereo and light microscopes with coupled cameras, freeze-driers, -80 freezers, Inspection ROV (200 m), SCUBA Gear, MacLane Sediment traps (x7), 7x Teledyne Acoustic Releases, Luminometer (ATP analysis), and lipid extraction capabilities. The USP molecular Biology Lab has capacity for PCR, DNA extraction, and sample preparation and storage.

Participant No.	13
Short Name	UKN
Country	South Africa
Organization Type	HEI
Website	www.ukzn.za

Partner Profile

The University of KwaZulu-Natal formed in 2004 as an amalgamation between the Universities of Natal and Durban-Westville. The university is located on the east coast of South Africa and spans five campuses across two cities. Its mission is to promote scholarship over several key areas. These include African-led globalisation through African scholarship. We serve communities in a manner that adds value and earns their respect, admiration and trust through responsible community engagement and contribution of knowledge to the prosperity and sustainability of nation-building. UKN builds a research ethos that acknowledges the responsibility of academic staff to nurture its postgraduate students. We promote excellence in teaching and learning through creative and innovative curriculum design and development, pedagogical strategies, and assessment practices in accordance with the highest quality management principles.

Role in the project

UKZN is the academic centre for marine geology and seafloor mapping in the country. The School of Agricultural, Earth and Environmental Sciences' Geology department specialises in sea floor studies and has been involved for a number of years in trans-disciplinary studies on geology and benthic ecology. This expertise translates well into WP2, where UKZN will focus on bathymetric and ultra-high resolutions seismic data collection and interpretation of the seafloor. This expertise is based on a cumulative 64 peer-reviewed papers that have utilised these techniques, published over the last ten years. The marine geology group in the geology department is relatively small, so this project will also feed into capacity development initiatives as outlined by the South African government's Operation Phakisa. The direct training of graduate students and staff in trans-disciplinary methodologies and synergies will be a key outcome of the project for the institution.

Key personnel

Prof Andrew Green (male) is the foremost authority in South Africa on marine geology. He has an international profile of work and collaborations that span the entire globe, with over 60 peer-reviewed ISI-listed papers. He has graduated 30 BSc honours students, 12 MSc and four PhD students, and hosted a US Fulbright MSc scholar for a year. The last seven years of research have produced 29 student-driven publications as part of his mandate to promote the growth of postgraduate marine geology in South Africa. He has been cited 627 times with an H-index of 16. He has been responsible for research grants worth upward of ~ R7 000 000, mostly sourced from international grant applications such as H2020. He sits on the Steering Committee for Ocean Research, and is the Editor in Chief of Geo-Marine Letters.

Experience - Relevant Publications

1. Wiles EA, **Green AN**, Watkeys MK, Botes ZA, Jokat W (2018) Submarine canyons of NW Madagascar: a first geomorphological insight. Deep-Sea Research Part II (in press)
2. Hicks N, **Green AN** (2017) A Mid-Miocene erosional unconformity from the Durban Basin, SE African margin: A combination of global eustatic sea level change, epeirogenic uplift, and ocean current initiation. Marine and Petroleum Geology 86: 798-811
3. **Green AN**, McKay F (2016) Unconsolidated sediment distribution patterns of the KwaZulu-Natal Bight: the role of wave ravinement in separating relict versus passive sediment populations. African Journal of Marine Science 38: S65-S74
4. **Green AN** (2011) Submarine canyons associated with alternate sediment starvation and shelf-edge wedge development: northern KwaZulu-Natal continental margin, South Africa. Marine Geology 284: 114-126
5. **Green AN**, Uken R (2008) Submarine landsliding and canyon evolution from the northern KwaZulu-Natal continental shelf, South Africa, SW Indian Ocean. Marine Geology 254: 152-170

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Spatial solutions. This is an integrative decision-support research project involving 6 research institutes, 2 management agencies (national and provincial) and an NGO. The inter-disciplinary team will conduct a high-resolution assessment of the seafloor characteristics coupled to ecosystem and species distributions and oceanographic processes. The team plans a strategic sequential procedure for data collection, commencing with generation of large scale, high-resolution bathymetry and seismic data, which will separate habitats at a medium scale. The oceanographic data will then be spatially imposed over this geological landscape, followed by the biological data (distribution of habitats and species), to provide an integrated categorisation of the continental shelf and shelf edge suitable for use in the marine spatial planning (MSP) and conservation analyses. This project will also introduce an ecosystem services evaluation approach to understanding the value of MPAs using spatial data from one of the CBAs for a case study. Important extra components to the project are direct MPA stakeholder engagement and an innovative partnership to develop marine science capacity, driven directly through this project.
2. Imida. In this multi-disciplinary project we aim to combine bathymetric and geophysical surveys of benthic habitat with ecological surveys and predictive modelling to gain for the first time comprehensive information on the spatial distribution of ecologically sensitive areas. Multibeam surveys in the 20-200 m depth range will provide fine-scale bathymetric maps. Benthic grab, core and dredge sampling will be used to gain information on sediments and associated fauna. Remotely Operated Vehicle (ROV) surveys will assess invertebrate and fish diversity, validate habitats and provide quantitative descriptions of

benthic community structure in different ecosystem types. By combining sedimentological, geophysical and species composition data, predictive geo-statistical models will be developed to determine the occurrence and distribution of marine fauna and its habitats throughout the region. This information will be used to classify habitats and identify sensitive areas. The information will be of direct value for integrated Marine Spatial Planning in this of the Eastern Cape and for monitoring and management of the proposed MPA in terms of its biodiversity and fishery management objectives and the integration of students in all facets of this project will aid capacity building within marine geological, ecological, taxonomic and fisheries research

Infrastructures and facilities

High-end computing facilities with multibeam and seismic processing software suites.

Participant No.	14
Short Name	SAMS
Country	United Kingdom
Organization Type	HEI
Website	www.sams.ac.uk

Partner Profile

SAMS, founded in 1884, is one of the UK's leading marine laboratories. It employs about 150 staff members and students and is a multidisciplinary research institute and a collaborative centre of the UK NERC. It runs an undergraduate honours degree course in Marine Science and trains PhD students as an academic partner of the University of the Highlands and Islands. SAMS has been a partner in about 70 EU projects and coordinated at least six. SAMS' Physics and Technology Department employs 18 people and has long-standing interest in monitoring the circulation in the North Atlantic. This interest is maintained with i) annual cruises between Scotland and Iceland (the Ellett Line); ii) annual seaglider deployments between Scotland and Iceland iii) a multidisciplinary mooring at Kongsfjord, Svalbard; and iv) supporting Marine Scotland Science with monitoring transport in the Faroe-Shetland Channel (FSC). SAMS has developed an international reputation for long endurance underwater glider missions in the northern North Atlantic, is a partner in the EU GROOM glider infrastructure project; EU NACLIM, Atlas and AtlantOS projects; and hosts the North Atlantic Glider Base in Oban.

Role in the project

SAMS will lead on the development of south and north Atlantic observing systems towards a fuller description of physical, and crucially biogeochemical variability (WP1). SAMS will also lead on the analysis of spatial and temporal modes of physical variation, with relevance to ecosystem resilience and tipping points, using historical observational databases and new model output (WP1). SAMS will establish strong collaboration with ecosystem function and health investigators (in WP3) and quantify statistical likelihoods of adverse ecosystem consequences to observed and predicted changes to the physical systems (WP1). SAMS expertise in observational arrays and analysis of modes of ocean variability will be shared (WP6) to enhance capacity building between north and south Atlantic investigators

Key personnel

Prof Stuart A Cunningham (male) is a lead scientist in the SAMS Physics and Technology group. Cunningham is a physical oceanographer with twenty years of experience in making observations of the physical properties and circulation of the ocean using ships and arrays of moored instruments. From 2003-2012 he was the lead principal investigator of the NERC's Rapid Climate Change programme to monitor the Atlantic overturning circulation at 26.5°N (http://www.noc.soton.ac.uk.rapidmoc). He is now a PI in the UK-OSNAP and EU Atlas programmes, contributing to the International array of moorings across the sub-polar North Atlantic (http://www.ukosnap.org/). He has also been a PI in EU Framework 7 projects: North Atlantic Climate: Predictability of the climate in the North Atlantic/European sector related to North Atlantic/Arctic Ocean sea surface temperature and sea ice variability and change (NACLIM) and EU FP7 and Thermohaline Circulation at Risk? (THOR), EU FP7. C2.

Prof Mark E Inall (male) is leader of the Physical Oceanography group at SAMS and Director of the Scottish Alliance for Geoscience, Environment and Society (SAGES). Inall is a research scientist with authorship of 80 ISI listed research papers and two book chapters. His research focuses on studies designed to elucidate marine mixing processes. Specifically, internal wave generation by tidal flow over topography and subsequent decay to turbulence; in the Deep Sea (Mid-Atlantic Ridge, Wyville-Thomson Ridge), in Shelf Seas (Malin Shelf, Iberian Shelf, West Spitzbergen Shelf, SE Greenland), and in Coastal waters (NW European and Arctic fjords). Inall has been at the forefront of using technological innovation in physical oceanography: as part of the first UK team to make in situ marine turbulence measurements, initially from ships, and now from AUVs and Gliders; the first UK team to use Gliders for standard ocean sections (Extended Ellett Line). More recently, and working as honorary Professor at University of Edinburgh, his interests have moved towards teleconnections – causal links spanning thousands of kilometres and taking effect over long periods – between small-scale movements in the oceans and atmosphere and large-scale patterns in the global climate system.

Dr Clare Johnson (female) is a PDRA in physical oceanography at SAMS. Johnson has six years' (0.7 FTE) postdoctoral experience of research in the subpolar North Atlantic having worked as a PDRA on the FP7 North Atlantic Climate: Predictability of the climate in the North Atlantic/European section related to the North Atlantic/Arctic Ocean sea surface temperature and sea ice variability and change (NACLIM) and Horizon 2020 A Trans-Atlantic Assessment and deep-water ecosystem based spatial-management plan for Europe (ATLAS). Additionally, her PhD investigated water masses in the eastern subpolar North Atlantic. Johnson's research focuses on large scale circulation and fluxes in the North Atlantic and she often works at the interface between physical and chemical oceanography. Johnson has 10 peer-reviewed publications.

Experience - Relevant Publications

1. **Johnson C**, **Inall ME**, Häkkinen SM (2013) Declining nutrient concentrations in the northeast Atlantic as a result of a weakening Subpolar Gyre. Deep Sea Research I 82: 95-107
2. **Cunningham SA**, Roberts CD, Frajka-Williams E, Johns WE, Hobbs W, Palmer MD, Rayner D, Smeed DA, McCarthy G (2013) Atlantic Meridional Overturning Circulation slowdown causes widespread cooling in the Atlantic. Geophysical Research Letters 40: 6202-6207

3. **Cunningham SA**, Baringer MO, Johns B, Toole J, Osterhaus S, Fischer J, Piola A, McDonagah E, Lozier S, Send U, Kanzow TT (2010) The present and future system for measuring the Atlantic Meridional overturning circulation and heat transport. In Proceedings of OceanObs'09: Sustained Ocean Observations and Information for Society (Vol. 2), ESA Publication WPP-306
4. Hátún H, Azetsu-Scott K, Somavilla R, Rey F, **Johnson C**, Mathis M, Mikolajewicz U, Coupel P, Tremblay JÉ, Hartman S, Pacariz SV (2017) The subpolar gyre regulates silicate concentrations in the North Atlantic, Nature Scientific Reports 7: 14576
5. Lozier SM, Bacon S, Bower ASAS, **Cunningham SA**, de Jong FM, de Steur L, DeYoung B, Fischer J, Gary SF, Greenan BJ, Heimbach P, Holliday NP, Houpert L, **Inall ME**, Johns WE, Johnson HL, Karstensen J, Li F, Lin X, Mackay N, Marshall DP, Mercier H, Myers PG, Pickart RS, Pillar HR, Straneo F, Thierry V, Weller RA, Williams RG, Wilson C, Yang J, Zhao J, Zika JD (2017) Overturning in the Subpolar North Atlantic Program: A New International Ocean Observing System. Bulletin of the American Meteorological Society 98: 737-752

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Atlas EU Horizon 2020 (Project no. 678760) €682k funding
2. AtlantOS EU Horizon 2020 (Project no. 633211) €235k funding
3. NACLIM EU FP7 (Project No. 308299, North Atlantic Climate: Predictability of the 678760 ATLAS – Part B 107 climate in the North Atlantic/European sector related to North /Arctic sea surface temperature and sea ice variability and change)) €456k funding
4. OSNAP – RCUK funded through NERC (The UK Overturning in the sub -polar North Atlantic Program). Reference no. NE/K010875/1, Funding £653k
5. THOR EU FP7 ENV 2007(Project No. 212643, Thermohaline Overturning – at Risk?) Funding €380K.

Infrastructures and facilities

SAMS has modern research laboratory facilities and a technical support team expert in deep ocean moorings and marine robotics. SAMS is the host for Scottish Marine Robotics Facility (S-MRF), including the North Atlantic Glider Base (NAGB). S-MRF is a NERC-funded facility hosted by SAMS for the benefit of UK and International Glider and Marine Robotic users. It is closely linked with the MARS facility at NOC (Marine Autonomous Robotics Systems): both are funded by NERC as "National Capability". NAGB was set up in 2010 to formalise longstanding capacity of facilities at SAMS to support the testing, development and use of autonomous (smart) marine systems (dating back to the first ever Autosub trials), and with the forward vision of the North Atlantic as an exemplar hub for networks of Gliders.

Participant No.	15
Short Name	SHN
Country	Argentina
Organization Type	RTD
Website	www.hidro.gov.ar

Partner Profile

Servicio de Hidrografía Naval (SHN) is an organisation under the Ministry of Defence, which has offered nautical security in Argentina and to all the regions working jointly with the Hydrographic services from the neighbouring countries in the region for 140 years. The main working areas of SHN are Nautical Safety, Charting, Hydrography, and Oceanographic Research. SHN has several research lines including Ocean Dynamics, Coastal Oceanography, Tides, and Marine Geology. In particular, the Ocean Dynamics Unit is composed of 15 people (researchers, data scientists, and students).

Role in the project

SHN will participate in WP1 and WP7 of iAtlantic, contributing expertise in collecting and analysing in situ oceanographic observations and knowledge on the South Atlantic circulation. SHN will lead the deployment of a shelf mooring at the 700-m isobath in the Southwestern Atlantic at 34.5°S at the western edge of the South Atlantic Meridional Basin-wide Array (SAMBA) belonging to the South Atlantic Meridional Overturning Initiative (SAMOC) (see http://www.aoml.noaa.gov/phod/SAMOC_international/). The mooring will measure temperature, salinity, oxygen and currents at different depth levels. These measurements will be analysed in the context of other measurements from the SAMBA-SAMOC array and the RAPID/MOCHA and OSNAP arrays in the North Atlantic. M P Chidichimo leads Task 1.2 in WP1. SHN will also participate in WP7 through capacity building opportunities for students and data sharing.

Key personnel

Dr M P Chidichimo (female) is a researcher at SHN and Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET). Dr Chidichimo obtained her PhD at the International Max Planck Research School on Earth System Modelling and the University of Hamburg (Germany). For her PhD thesis she analysed the contribution of eastern boundary density variations to the Atlantic Meridional Overturning Circulation at 26.5°N based on the in situ data from the RAPID/MOCHA array. Afterwards she was a postdoctoral researcher at the Graduate School of Oceanography at the University of Rhode Island (US), where she studied the volume transport of the Antarctic Circumpolar Current (ACC) in Drake Passage analysing data from an unprecedented highly resolved array (cDrake). Currently at SHN, Dr Chidichimo is analysing data from the SAMBA/SAMOC array at 34.5°S for a variety of studies, mainly focused on the temporal variability of the volume and heat fluxes of the western boundary current in the Southwestern Atlantic and their relationship with the basin-wide MOC. Dr Chidichimo is a member of the GOOS/GCOS/WCRP Ocean Observations Panel for Climate, the CLIVAR/WCRP Atlantic Region Panel, and lead author of the IPCC Special Report on Oceans and Cryosphere in a Changing Climate.

Prof A R Piola (male) is a Research Director at SHN (Ocean Dynamics Unit), Senior Scientist at CONICET and Professor of Oceanography at Universidad de Buenos Aires (UBA). Prof Piola has published numerous papers on the large-scale ocean circulation of the Atlantic and Southern Oceans, on the biological and biogeochemical impact of the mesoscale circulation associated with ocean fronts and shelf-deep ocean exchanges. Piola Chairs the Executive Committee of the SAMOC initiative and the Data Management Working Group of the Integrated Marine Biosphere Research (IMBeR).

MSc D Valla (male) is an Assistant Researcher at SHN specialized in sea-going oceanography. His areas of interest include the large-scale ocean dynamics and circulation, physical processes in marine ecosystems and the physics of marine fronts. He has participated in 15 international oceanographic cruises and gained wide expertise in the operation of oceanographic instruments used for ocean monitoring. He is finalizing his PhD thesis at UBA studying the water masses variability in the Southwestern Atlantic.

MSc M Charo (female) is a data scientist at SHN and a sea-going physical oceanographer specialised in gathering, calibrating and analysing high-quality in situ data. Charo has extensive experience in post-processing and data management after cruise acquisition to ensure high quality measurement, and has participated in more than 30 oceanographic cruises. Charo is a member of a working group of the International Quality controlled Ocean Database initiative (IQuOD; http://www.iquod.org/).

Experience - Relevant Publications

1. Meinen CS, Speich S, **Piola AR**, Ansorge I, Campos E, Kersalé M, Terre T, Chidichimo MP, Lamont T, Sato OT, Perez RC, Valla D, Van Den Berg M, Le Hénaff M, Dong S, Garzoli SL (2018) Meridional Overturning Circulation Transport Variability at 34.5°S during 2009-2017: Baroclinic and Barotropic Flows and the Duelling Influence of the Boundaries. Geophysical Research Letters 9: 4180-4188
2. **Chidichimo MP,** Kanzow T, Cunningham SA, Johns WE, Marotzke J (2010) The contribution of eastern-boundary density variations to the Atlantic meridional overturning circulation at 26.5°N. Ocean Science 6: 475-490
3. **Chidichimo MP**, Donohue KA, Watts R, Tracey KL (2014): Baroclinic transport time series of the Antarctic Circumpolar Current measured in Drake Passage. Journal of Physical Oceanography 44: 1829-1853
4. Marrari M, **Piola AR, Valla D** (2017) Variability and 20-year Trends in Satellite-Derived Surface Chlorophyll Concentrations in Large Marine Ecosystems around South and Western Central America. Frontiers in Marine Science 4: 372

5. **Valla D, Piola AR**, Meinen CS, Campos EJD ((2018) Strong mixing and recirculation in the north-western Argentine Basin. Journal of Geophysical Research: Oceans, in press

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. South Atlantic Meridional Overturning Circulation (SAMOC); SAMOC is an international programme to study and analyse the meridional overturning circulation and its associated heat and freshwater transports in the South Atlantic Ocean. The SAMBA line is a trans-basin array deployed at 34.5°S with the aim of studying MOC at this latitude and it is a partnership between USA, Argentina, Brazil, South Africa and France. (2009-ongoing). A R Piola: Chair of Executive Committee. M P Chidichimo: Researcher. D Valla: PhD student. http://www.aoml.noaa.gov/phod/SAMOC_international/).
2. RAPID/MOCHA array (http://www.rapid.ac.uk/rapidmoc): Observing system continuously measuring the MOC at 26.5°N since 2004. M P Chidichimo: former PhD student.
3. Variability of Ocean Ecosystems around South America (VOCES; http://www.iai.int/voces-variability-of-ocean-ecosystems-around-south-america-crn-3070/?p=2620). Financed by IAI. Project objectives: Identify the exchange processes among the large marine ecosystems around South America and the deep ocean, determine its impact on the variability of the different marine species and the biogeochemical characteristics, and characterise the time-scales of variability. PI: A. R. Piola (2014-2019).
4. The relative ecosystem service of frontal areas in the South West Atlantic Large Marine Ecosystem. Financed by CONICET and IAI, aimed to determine if the services in the South West Atlantic Shelf Ecosystem arise from oceanographic fronts. PI: A.R. Piola. (2016-2019).
5. OCEANOBASE: Oceanographic database of South-western Atlantic Ocean, financed by the Ministry of Defence, Argentina. The main objective of the project is to rescue historical hydrographic data and metadata (Data Archaeology). PI: M. Charo (Data Scientist at SHN).

Infrastructures and facilities

SHN has all the necessary infrastructures; laboratories and arrangements to undertake the tasks envisaged in the project and fulfil its specific role. This includes the following equipment that will be directly linked with activities of SHN within the project; two SBE 911 CTD profilers equipped with state-of-the-art temperature, conductivity, dissolved oxygen, fluorometer, and turbidity sensors, 12 and 24 bottle rosette systems for full-depth water sample collection; full-depth 300 and 150 KHz RDI Acoustic Doppler Current Profiles (ADCP) for CTD operation; five SBE microCATs (T/S), one 300 KHz ADCP, and numerous Benthos glass spheres for mooring installation. Ship time for carrying out SAMOC cruises at the western edge of the SAMBA array (SAMOC-West) is requested on a yearly basis. Since 2009, SHN has led SAMOC-West hydrographic and Lowered-ADCP data collection and has carried out nine SAMOC-West cruises, including deployment, recovery and turnaround of moored equipment. The Argentine research vessels *Puerto Deseado* and *Austral* are capable of carrying out full-depth CTD casts and deep-sea mooring deployment and recovery operations.

Participant No.	16
Short Name	University College Cork
Country	Ireland
Organization Type	HEI
Website	www.ucc.ie

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Partner Profile

University College Cork is an award-winning institution with a history of independent thinking stretching back over 170 years. UCC is proud to be ranked in the top 2% of universities in the world. The University is a research-intensive, student-centred, international top-tier university. UCC is a globally-oriented, research-led university. It provides a full range of disciplines, serving regional, national and international students. UCC attracts disproportionately high numbers of top school leavers compared to other universities. It offers programmes in the arts, humanities, social sciences, business, law, engineering, architecture, science, food science, medicine, dentistry, pharmacy, nursing and the clinical therapies. UCC is committed to development through interdisciplinary collaboration. UCC has 21,000 students. These include 15,000 in undergraduate programmes, 4,400 in postgraduate study and research, and 2,800 adults in continuing education across undergraduate programmes, postgraduate programmes and short courses. Its student body includes 3,300 international students, representing more than 100 countries worldwide. UCC has educational outreach programmes in over 40 locations nationwide. With a staff of 2,800, the university is one of the largest employers in the region. UCC prioritises research in areas that are significant at the highest international levels. This creates a significant impact and uptake in the community beyond the university. Several of Ireland's top research centres are based in UCC.
UCC competitively secured research funding of over €96 million in 2016 representing a 21% increase over a five-year period and a historical high for the university. UCC continues to secure Ireland's highest level of research funding per academic, according to the Irish HEA. UCC mission is "creating, understanding and sharing knowledge and applying it for the good of all".

Role in the project

University College Cork will participate in the creating of seabed habitat maps in the Porcupine Bank Canyon, Rockall Trough (WP2) and through environmental monitoring will establish the main habitat drivers in this dynamic system. This will be enabled through the development of models at nested high-resolution scales from ship's multibeam echosounder coverage, to ROV multibeam, echosounder coverage to photogrammetry models (WP2). The models, in combination with lander data, will be used to understand particle flow and the influence of microtopography on organismal distribution (WP2).

Key personnel

Prof Andy Wheeler (male) holds a PhD (1994) from Cambridge University and holds the Chair in Geology at UCC and is currently the Head of the School of Biological, Earth & Environmental Sciences and co-PI in the Irish Centre for Research in Applied Geosciences. He is a member of the Royal Irish Academic Geosciences & Geographical Sciences Committee. He has extensive experience leading offshore surveys (shelf and deep water: geological, geophysical, exploration and multidisciplinary) and published over 70 peer-reviewed papers (H-index = 26) including Science (cited 694 times) as well as coordination of national/international multi-partner programmes. He has supervision of 17 postgraduates and 3 post-docs. His research interests focus on the geology of cold-water corals, benthic boundary layer processes, Quaternary marine environmental records and marine resources. He has experience in both deep-waster and shelf settings. He currently holds a c.€1m SFI-funded Investigator grant on cold-water coral ecosystem functioning in submarine canyons.

Dr Aaron Lim (male) holds a BSc (Hons) Earth Science (2012) and PhD (2017) from University College Cork. He has an interest in the geology of cold-water corals with a specialism in seabed mapping and deep-sea benthic geomatics. He is currently working on the c.€1m SFI funded Investigator grant on cold-water coral ecosystem functioning in submarine canyons where he uses data from landers, ROV-mounted and hull-mounted multibeam echosounders to determine contemporary processes throughout the Porcupine Bank Canyon. He also combines this data with 3D photogrammetric reconstructions to determine the drivers controlling habitat variability.

Experience - Relevant Publications

1. **Lim A**, Huvenne VAI, Vertino A, Spezzaferri S, **Wheeler AJ** (2018) New insights on coral mound development from groundtruthed high-resolution ROV-mounted multibeam imaging, Marine Geology 403: 225-237
2. **Lim A**, Kane A, Arnaubec A, **Wheeler AJ** (2018) Seabed image acquisition and survey design for coral mound characterisation. Marine Geology 395: 22-328
3. **Lim A**, **Wheeler AJ**, Arnaubec A (2017) High-resolution facies zonation within a cold-water coral mound: the case of the Piddington Mound, Porcupine Seabight, NE Atlantic, Marine Geology 390: 120-130
4. Dorschel B, **Wheeler AJ**, Monteys X, Verbruggen K (2010) Atlas of the Deep-water seabed: Ireland. Dordrecht Heidelberg London Ney York: Springer.
5. Roberts JM, **Wheeler A,** Freiwald A, Cairns S (2009) Cold-Water Corals: the Biology and Geology of Deep-Sea Coral Habitats. Cambridge: Cambridge University Press.

Experience - Relevant previous actions or activities, connected to the subject of this proposal

4. Mapping, monitoring and modelling key processes and controls on cold-water coral habitats in submarine canyons - Science Foundation Ireland Investigator Award, 2018 – 2022: €863.5k. This project is studying environmental thresholds time and space in a submarine canyon through advanced mapping, coring, lander deployments and policy advice
5. Coral Carbonate Mound Archives for Submarine Canyon Exchange Processes – Science Foundation Ireland –iCRAG PhD project, 2015 – 2020: €131.5k. This project is mapping at coral elemental geochemistry to produce a record of seasonal environmental data
6. Irish Centre for Research in Applied Geosciences – SFI Research Centres Award, 2015-2021 - €22 million. This research centre delivers applied research for the marine, hydrocarbons, raw materials, groundwater and environmental geoscience sectors. It hosts significant platform infrastructure in analytical geochemistry, 3D modelling, and seismic processing.
7. Flexible environment monitoring platforms – Marine Institute Specialist Marine Research Equipment and small Infrastructure Award, 2017-2019: €178k. This project develops two multidisciplinary, flexible lander platforms from shallow and deep-water deployment
8. Marine Protected Areas Management and Monitoring - INTERREG VA, 2018-2022: €595.5k. This project builds predictive species distribution maps for shelf sea management practices.

Infrastructures and facilities

UCC has 8 benthic landers with sediment traps and ACDP. 2 landers have pH, DO, temperature sensors and cetacean hydrophones. The Holland I ROV (via grant-aided funding) has multibeam, video, sampling and sensing capabilities in addition to MS3000 particle sizers. UCC has fully equipped biological, geological and environmental labs with technical support

Participant No.	17
Short Name	SAIAB
Country	South Africa
Organization Type	RTD
Website	www.saiab.ac.za

Partner Profile

The original JLB Smith Institute of Ichthyology (est. 1980) was renamed the South African Institute for Aquatic Biodiversity (SAIAB) in 2001. As a National Facility of the NRF, SAIAB serves as a major scientific resource for knowledge and understanding the biodiversity and functioning of globally significant aquatic ecosystems. With both marine and freshwater biogeographical boundaries, southern Africa is ideally placed to monitor and document climate change. SAIAB's mission is to serve the nation through the generation, dissemination and application of knowledge to understanding and solving problems on the conservation and wise use of African aquatic biodiversity.

Role in the project

SAIAB will contribute primarily to WP2 (Mapping Atlantic ecosystems) in a supporting role, providing an experienced, sea-going marine geologist (myself) and a SAIAB intern who would assist with acquisition, processing, and interpretation of multibeam bathymetric data.

Key personnel

Dr Errol Wiles (male) holds a PhD in Marine Geology from the University of KwaZulu Natal, South Africa. His research interests include abyssal sediment/current dynamics, coastal processes and shoreline change. He has participated in three multinational research cruises in the southwest Indian Ocean where he was engaged in survey planning, acquisition and processing of multibeam bathymetry data, and conceptualising themes for publication.

Experience - Relevant Publications

1. Dorschel B, Jensen L, Arndt JE, Brummer GJ, De Haas H, Fielies A, Franke D, Jokat W, Krocker R, Kroon D, Pätzold J, Schneider R, Stollhofen H, Uenzelmann Neben G, Watkeys G, **Wiles E** (2018) The Southwest Indian Ocean Bathymetric Compilation (swIOBC). Geochemistry, Geophysics, Geosystems 19 (3): 968-976
2. **Wiles E**, Green A, Watkeys M, Botes R, Jokat W (2018) Submarine canyons of NW Madagascar: a first geomorphological insight. Deep-Sea Research Part II, Topical studies in Oceanography: IIOE-2, (1)
3. Breitzke M, **Wiles E**, Krocker R, Watkeys M, Jokat W (2017) Seafloor morphology in the Mozambique Channel: evidence for long-term persistent bottom-current flow and deep-reaching eddy activity. Marine Geophysical Research: 1-29
4. **Wiles E**, Green AN, Watkeys MK, Jokat W (2017) The Zambezi Channel: a new perspective on submarine channel evolution at low latitudes. Geomorphology 286: 121-132
5. **Wiles E**, Green AN, Watkeys MK, Jokat W (2017) Zambezi continental margin: compartmentalized sediment transfer routes to the abyssal Mozambique Channel. Marine Geophysical Research 1-14

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. MOCOM project - The crustal structure of Beira High, Central Mozambique - Combined investigation of wide-angle seismic, potential field, and bathymetric data
2. AISTEK III - Close the gaps of the previous two expeditions (AISTEK I/II). Marine geophysical data were systematically acquired across the ridge as well as in the southern and northern Natal basins to supplement the existing information, in order to allow an enhanced reconstruction for this area of early Gondwana break-up.
3. MA-RAiN - Sediment deposits as archives for Late Quaternary climatic variations. The research activity of the underlying project RAiN focuses on the reconstruction of climate variations and dynamics in southern Africa during the Late Quaternary.

Infrastructures and facilities

SAIAB has all the necessary infrastructures, laboratories and arrangements to undertake the tasks envisaged in the project and fulfil its specific role. The following are main specific equipment that will be directly linked with project activities of WP2 (Mapping Atlantic ecosystems):
Multibeam Echosounder data processing workstation.
Multibeam Echosounder data processing software (Hypack/Hysweep)
Visualisation software (Fledermaus)

Participant No.	18
Short Name	UFES
Country	Brazil
Organization Type	HEI
Website	www.ufes.br

UNIVERSIDADE FEDERAL DO ESPÍRITO SANTO

Partner Profile

The Universidade Federal do Espírito Santo (UFES), was created in 1954, and is included within the Brazilian Federal University Network which includes 60 Universities. UFES is mainly funded by the Brazilian Government, with a small contribution of other public and private funding to research initiatives, projects and specialised services. UFES mission is to include excellence in teaching, research and outreach, with societal and socioeconomic benefits locally in the city of Vitória, and at regional levels throughout the state of Espirito Santo.

Role in the project

UFES will be involved through its Department of Oceanography supporting research on Marine Benthic Ecology. The University will support data acquisition, laboratory analysis and data synthesis related to WP2 (Mapping Ecosystems) and WP4 (Impacts of Multiple Stressors and Adaptive Potential). In WP2, UFES will coordinate data mining and synthesis of benthic assemblages from deep-sea slope ecosystems obtained from previous governmental and private companies as part of Environmental Impact Assessments. UFES will also support new sampling and data acquisition along selected regions of Brazil's deep-sea margin, and will collaborate with other Brazilian partners (Dr Angel Perez, Dr Paulo Sumida, Dr Alberto Lindner) to secure funding for regional research cruises. If funding for research cruises can be secured, UFES will collaborate on sample and data analysis. In WP4, if funding can be secured for research cruises, UFES will collaborate on lander deployment and data analysis of benthic assemblages and metabolism experiments in the South Atlantic.

Key personnel

Dr Angelo F Bernardino (male) is the only UFES personnel involved in iAtlantic, although students and collaborators will be involved throughout the project. Dr Bernardino has a PhD in Biological Oceanography (2009) from University of Sao Paulo, with a 2-year period as a visiting student in Craig Smith's lab at University of Hawaii-USA. During his PhD, Bernardino's thesis focused on the ecology and assemblage succession of deep-sea chemosynthetic ecosystems from wood , kelp and whale falls, which resulted in several highly cited scientific papers. Dr Bernardino has also worked with deep-sea biology (Animal Genetics) at Prof Kenneth Halanych's lab in Auburn University-USA during a sabbatical year (2016), focusing on genetic diversity, genomic analysis, phylogeography and population connectivity of deep-sea fauna associated with wood-falls in the South Atlantic. Dr. Bernardino has additionally been involved with deep-sea ecology off Brazil's margin since 2008, collaborating or leading private research for the offshore industry during mapping and biological assessments (benthic) on offshore sedimentary basins of interest to Oil and Gas exploration. More recently, Dr Bernardino has been involved with INDEEP and DOSI initiatives towards actions that support conservation and management of deep-ocean basins, especially those that result in better governance of deep-sea natural resources. Since 2018, Dr Bernardino is part of DOSI's Advisory Panel.

Experience - Relevant Publications

1. Almada GVMB, **Bernardino AF** (2017) Conservation of deep-sea ecosystems within offshore oil fields on the Brazilian margin, SW Atlantic. Biological Conservation 206: 92-101
2. **Bernardino AF**, Berenguer V, Ribeiro-Pereira VP ((2016) Bathymetric and regional changes in benthic macrofaunal assemblages on the deep Eastern Brazilian margin, SW Atlantic. Deep-Sea Research Part 1 111: 110-120
3. **Bernardino AF,** Li Y, Smith CR, Halanych KM (2017) Multiple introns in a deep-sea Annelid (Decemunciger: Ampharetidae) mitochondrial genome. Scientific Reports 7: 4295
4. **Bernardino AF**, Sumida PYGS (2017) Deep risks from offshore development. Science, 358 (6361)
5. Cordes EE, Jones DOB, Schlacher TA, Amon DJ, **Bernardino AF**, Brooke S, Carney R, DeLeo DM, Dunlop KM, Escobar-Briones E, Gates AR, Genio L, Gobin , Henry L-A, Herrera S, Hoyt S, Joye S, Kark S, Mestre NC, Metaxas A, Pfeifer S, Sink K, Sweetman AK, Witte U (2016) Environmental Impacts of the Deep-Water Oil and Gas Industry : A Review to Guide Management Strategies. Frontiers in Marine Science 4: 1-26

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Deep-sea slope research on benthic assemblages in Brazil margin – Funded by Petrobras
2. Biodiversity of bone- wood-fall fauna in the deep Brazilian margin
3. Foodbancs project – Antarctic deep-sea benthos in response to climate change impacts

Infrastructures and facilities

We have laboratory space in Vitória-ES and basic equipment for sediment (grain size, TOM) and benthic assemblage analysis (stereoscopes, microscopes).

Participant No.	19
Short Name	NMU
Country	South Africa
Organization Type	HEI
Website	www.mandela.ac.za

NELSON MANDELA UNIVERSITY

Partner Profile

Nelson Mandela University is a dynamic African university, recognised for its leadership in generating cutting-edge knowledge for a sustainable future. NMU brings together the best traditions of technical and university education and draws on more than a century of quality higher education. NMU has approximately 27 000 students and approximately 2 500 staff members, based on six campuses in the Nelson Mandela Metropole and George. The Department of Ocean Sciences undertakes research in shallow water ecosystems, law of the sea, earth systems science, marine spatial planning and ocean science and food security.

Role in the project

NMU will be involved in WP2 Mapping Atlantic Ecosystems through participation in the research surveys where benthic megafaunal communities and seafloor substrate types will be evaluated from extensive photographic surveys. The team will also participate in developing capacity related to deep-water camera technology, image analysis through machine-learning techniques and eDNA approaches during these seabed habitat surveys. NMU will also be involved in WP5 in areas on spatial planning, EBSAs and identifying priority areas for ocean protection. Both Dr Sink and Dr Kirkman are currently leading these research aspects in South Africa. In addition, Dr Kirkman is regionally engaged in EBSA work through the Benguela Current Commission activities. If surveys do take place in South Africa, they will ensure that data collected are applied in regional marine management. They are also interested in collaborating on high seas initiatives adjacent to the South African EEZ. Finally, NMU will contribute to WP6 through hosting capacity building workshops in South Africa that will be aligned with a broader objective currently being developed through the Deep Ocean Stewardship Initiative (DOSI).

Key personnel

Dr Kerry Sink (female) is a Marine Biologist with expertise in marine biodiversity conservation research and marine planning, policy and management. In addition to her role at NMU, Kerry is the Marine Programme Manager and Principal Scientist for the **South African National Biodiversity Institute** and is actively involved in the development of a network of new Marine Protected Areas to protect offshore ecosystems, species and the processes that sustain them. Kerry leads the marine component of the National Biodiversity Assessment which draws marine science into one place and undertakes new analyses with partners to identify what needs to be done to derive long term benefits from South Africa's marine biodiversity. Kerry also spends time working with the new cohort of marine scientists and managers, training post graduate students and working with managers in the fields of fisheries, threatened species and ecosystems, marine mining and petroleum.

Dr Lara Atkinson (female) is a research associate at the University of Cape Town and NMU and an offshore marine scientist at the **South African Environmental Observation Network (SAEON)**. Lara leads the long-term offshore, epifauna monitoring programme in collaboration with the Department of Fisheries collating foundational offshore biodiversity data. Lara is also leading the Benthic Trawl Experiment situated on the west coast of South Africa where research is currently underway to assess the impact of the demersal trawl fishery in this ecosystem. Lara leads a team of researchers through post-graduate student supervision associated with universities and mentors interns on an annual basis. Lara has established national and international networks spanning academia, government and industry.

Dr Steve Kirkman (male) is a marine scientist for the Oceans and Coasts branch of **South Africa's Department of Environmental Affairs**. He has conducted considerable research in the Benguela Current Large Marine Ecosystem, regarding: conservation status and trends of marine top predators and their use as indicators of ecosystem changes; understanding effects of climate variability and other changes on biological communities and populations; and identifying areas of conservation importance.

Ms Prideel Majiedt (female) is a young marine scientist at the **South African National Biodiversity Institute**. She has conducted a systematic conservation plan in the South Eastern Atlantic along the West coast of South Africa. This involved the collation of several datasets and resulted in the prioritisation of several areas for protection that are currently being considered by the South African government for implementation. Prideel is a member of the South African National Marine Spatial Planning Working Group and has experience in multi-sector ocean management (e.g. fishing, mining, and biodiversity management).

Experience - Relevant Publications

1. Cordes EE, Jones DOB, Schlacher TA, Amon DJ, Bernardino AF, Brooke S, Carney R, DeLeo DM, Dunlop KM, Escobar-Briones EG, Gates AR, Génio L, Gobin J, Henry L-A, Herrera S, Hoyt S, Joye M, Kark S, Mestre NC, Metaxas A, Pfeifer S, **Sink K,** Sweetman AK, Witte U (2016) Environmental Impacts of the Deep-Water Oil and Gas Industry: A Review to Guide Management Strategies. Frontiers in Environmental Science 4: 58

2. Karenyi N, **Sink K**, Nel R (2016) Defining seascapes for marine unconsolidated shelf sediments in an eastern boundary upwelling region: The southern Benguela as a case study. Estuarine, Coastal and Shelf Science 169: 195-206
3. Karenyi N, Nel R, Altwegg R, **Sink K** (2016) Incorporating species detectability into conservation targets based on the species-area relationship. Diversity and Distributions 22(7): 758-769
4. **Kirkman** S, Yemane D, **Atkinson LJL**, Kathena J, Nsiangango S, Singh L, Axelsen BE, Samaai T (2015) Regime shifts in demersal assemblages of the Benguela Current Large Marine Ecosystem: a comparative assessment. Fisheries Oceanography 24 (1): 15-30
5. von der Meden C, **Atkinson LJ**, Branch GM, Asdar S, Ansorge IJ, van den Berg M (2017) Long-term change in epibenthic assemblages at the Prince Edward Islands: a comparison between 1988 and 2013. Polar Biology 40 (11):2171-2185

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. The African Coelacanth Ecosystem Programme (ACEP) Deep Secrets project. The project aims to develop multi-disciplinary offshore research capacity and knowledge to support improved management of poorly studied outer shelf, shelf edge and upper bathyal ecosystems of the Agulhas Ecoregion.
2. National Research Foundation- Foundational Biodiversity Programme (NRF-FBIP) SeaKeys Project. The SeaKeys Project is a large collaboration that aims to collate and increase marine biodiversity information and translate this information into products to support decision making and the development of new benefits for the South African society
3. The African Coelacanth Ecosystem Programme (ACEP) Deep Forests Project. The project aims to advance research on the taxonomy, phylogeny, habitat, ecology and benefits of deep coral habitats in South Africa. The project aims to build capacity and the knowledge economy covering priority marine ecosystems and habitat forming species with a key contribution to local and international barcoding initiatives.
4. Benthic Trawl Experiment: This is a six-year project (2014-2019) that aims to assess the impact of commercial trawl fishing in the shelf edge and slope of the Southern Benguela (South East Atlantic) using a towed benthic camera to survey for epifauna and fish and grab sampling to assess for infauna and sediment properties.
5. MARISMA –'Marine Spatial Management and Governance of the BCLME'. This is a regional project to develop and introduce ecosystem-based MSP, nationally and regionally, and is co-ordinated by the Benguela Current Commission (BCC) and supported by the German Federal Environment Ministry.

Infrastructures and facilities

The NMU team has been involved in several planning exercises to develop capacity in marine biological science and have engaged with international experts to bring their expertise to the local community. We will capitalise on the momentum developed within existing work programmes to foster further capacity development within the iAtlantic project. A National workshop to identify human and technical capacity needs for offshore research is envisioned. If the project is funded, SANBI will host a multi-project capacity development workshop with Brazil, Trinidad and Tobago, and Namibia. A seep Science workshop is envisaged for learning exchange between north and south scientists. International organisations that will be involved include DOSI, BBNJWG and the Women in Ocean Initiative through the African Coelacanth Ecosystem Program's Deep Secrets Project. A cohort of students will be developed and it is envisaged that local NRF bursary funds may be accessed if research cruise opportunities are supported by this project. Current young/early career scientists (within and outside of relevant government departments) within the sector have already been identified for capacity development and cruise participation.

Participant No.	20
Short Name	UGOT
Country	Sweden
Organization Type	HEI
Website	www.gu.se

UNIVERSITY OF GOTHENBURG

Partner Profile

The University of Gothenburg, UGOT, was established in 1891 and is among the largest universities in Europe (approx. 37000 students and 6000 employees). With its eight faculties, UGOT is also the most wide-ranging and versatile university in Sweden. The Department of Marine Sciences is Sweden's most complete environment for marine research and marine education and is one of only a few such organisations in Europe. The department brings together research focuses within oceanography, geology, chemistry, biology and conservation. The infrastructure includes a 45 m research vessel, *Skagerak*, and two marine research stations, Tjärnö and Kristineberg.

Role in the project

UGOT and the Department of Marine Sciences will be involved in WP 4 assessing the effects of climate change and other environmental stressors on deep-sea ecosystems. Due to our unique expertise in laboratory rearing of cold-water coral larvae, we will be involved in task 4.5 testing the impact of a range of stressors on larvae of key benthic species. Through our previous work at the Tjärnö research station with involvement in several different projects, we have a broad competence in both laboratory-based and field-based work on the deep-water coral *Lophelia pertusa*. In recent years, the research has concentrated on *L. pertusa* reproduction with a specific focus on larval traits affecting dispersal and recruitment. During this work, we have had corals spawning in the laboratory and successfully reared larvae during several consecutive years. Our role in the project is to assess the effects of environmental stressors on *L. pertusa* embryo and larvae and to advise other partners in larval rearing.

Key personnel

Dr Ann Larsson (female) has a degree in Marine Biology (1999) and a PhD in Marine Ecology (2006) at the University of Gothenburg. Dr Larsson is an Associated professor, specialising in cold-water coral ecology and biohydrodynamics. She has more than 15 years of research experience, has participated in 2 international and 4 national research projects (PI in one) and has close to 30 international peer-reviewed publications. Through 3 of these projects, she has gained experience working with the deep-water coral *Lophelia pertusa,* including the larval ecology of this species. Dr Larsson is presently working in a project on Norway Lobster olfactory navigation and in a project on biophysical modelling of larval dispersal in *L. pertusa* where she is also co-supervising a PhD-student.

Experience - Relevant Publications

1. Strömberg SM, **Larsson AI** (2017) Larval behavior and longevity in the cold-water coral *Lophelia pertusa* indicate potential for long distance dispersal. *Frontiers in Marine Science* 4: 411
2. **Larsson AI**, Järnegren J, Strömberg SM, Dahl MP, Lundälv T, Brooke S (2014) Embryogenesis and larval biology of the cold-water coral *Lophelia pertusa*. PLoS ONE 9(7): e102222
3. Mueller CE, **Larsson AI**, Veuger B, Middelburg JJ, van Oevelen D (2014) Opportunistic feeding on various organic food sources by the cold-water coral *Lophelia pertusa*. Biogeosciences 11: 123-133
4. **Larsson AI**, Lundälv T, van Oevelen D (2013) Skeletal growth, respiration rate and fatty acid composition in the cold-water coral *Lophelia pertusa* under various long-term food conditions. Marine Ecology-Progress Series 483: 169-184
5. **Larsson AI**, van Oevelen D, Purser A, Thomsen L (2013) Tolerance to long-term exposure of suspended benthic sediments and drill cuttings in the cold-water coral *Lophelia pertusa.* Marine Pollution Bulletin 70: 176-188

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Biophysical modelling of *Lophelia pertusa* larval dispersal in the Skagerrak. 2018-ongoing, funded by UGOT. The project includes studies of larval traits affecting dispersal. Co-supervisor of a PhD-student.
2. Cold-water coral reefs in Kosterhavet Marine National Park – laying the foundation for active management of a keystone species. 2013-2016 funded by the Swedish research council FORMAS. The project focused on early life history traits of *Lophelia pertusa* with implications for dispersal. Main supervisor of a PhD-student.
3. Coral Risk Assessment Monitoring and Modelling (CORAMM). 2007-2010, funded by Statoil. The project investigated the impact of sediment and drill-cutting exposure on the deep-water coral *Lophelia pertusa*. Post-doc position.

Infrastructures and facilities

At the University of Gothenburg Department of Marine Sciences and the Tjärnö Marine Laboratory, all necessary equipment to research cold-water corals are existing. There are three available remotely operated vehicles (ROVs) for the collection of corals. We also have access to the research vessel, R/V Nereus, suitable for working in the Koster-Hvaler archipelago. Through well-established procedures and collaboration with Norwegian authorities and the management of the Ytre Hvaler National park, we are allowed to collect samples of *Lophelia pertusa* for spawning purposes from the easily accessible and closely situated Tisler reef. We are also aware of the necessity to apply for export and import permission of Stony corals (CITES). For coral rearing and maintenance in the laboratory we have fully-equipped, constant-temperature rooms with a flow-through system of deep seawater with the ability to mimic in situ conditions needed for long-term maintenance of adult corals. Climate chambers are available for exposure of embryos and larvae to various temperatures, a gentle rotation wheel for exposure to suspended sediments and equipment for exposure of embryo and larvae to different CO_2 conditions.

Participant No.	21
Short Name	UFSC
Country	Brazil
Organization Type	HEI
Website	www.ufsc.br

Partner Profile

UFSC (Universidade Federal de Santa Catarina) is a University established in 1960, currently with 2.500 professors and more than 45.000 students. It is one of the largest universities in Brazil, with 600 research groups and international cooperation agreements with more than 40 countries. The largest of the University's five campuses is located in the coastal city of Florianópolis, the state capital. The University holds numerous undergraduate and graduate programs related to marine sciences (e.g. Oceanography, Biology, Ecology, Aquaculture and Geology) and leads numerous projects in marine sciences, including the Brazilian Marine Biodiversity Network.

Role in the project

UFSC will participate in WP2 providing its expertise in taxonomy and biodiversity of deep-water corals, as part of ecosystem mapping goals. It will provide species identifications through images and collected specimens, and the description of new species. UFSC will participate in WP2 to help organise and teach a 1-2 day course on deep-water coral taxonomy for members of all WPs and external participants through the WP6 fellowship and capacity building programme.

Key personnel

Prof Alberto Lindner (male) has a degree in Biology (1998) and a MSc (2000) in Zoology from the University of Sao Paulo, and a PhD in Biology (2005) from Duke University. He currently works as Associate Professor at Universidade Federal de Santa Catarina (UFSC), where he teaches in the undergraduate programs in Oceanography, Biology and Aquaculture, and in the graduate programs in Ecology and Oceanography. His research focuses on Taxonomy, Ecology and Evolution of marine organisms, in particular corals, at both regional and ocean-wide scales. He has contributed to research projects in the North and South Pacific that lead to the discovery of several new species of deep-water corals, and for the past years has focused on Taxonomy, Ecology and Evolution of shallow and deep-water corals in the Atlantic Ocean. He is a member of the Brazilian Marine Biodiversity Network (http://www.sisbiota.ufsc.br/index_ing.html) and leads the Marine Biodiversity Laboratory at UFSC.

Experience - Relevant Publications

1. de Souza JN, Nunes FL, Zilberberg C, Sanchez JA, Migotto AE, Hoeksema BW, Serrano XM, Baker AC, **Lindner A** (2017) Contrasting patterns of connectivity among endemic and widespread fire coral species (*Millepora* spp.) in the tropical Southwestern Atlantic. Coral Reefs 36: 701-716
2. Santos MEA, Kitahara MV, **Lindner A,** Reimer JD (2016) Overview of the order Zoantharia (Cnidaria: Anthozoa) in Brazil. Marine Biodiversity 46: 547-559
3. **Lindner A**, Cairns SD, Zibrowius H (2014) *Leptohelia flexibilis*gen. nov. et sp. nov., a remarkable deep-sea stylasterid (Cnidaria: Hydrozoa: Stylasteridae) from the southwest Pacific. Zootaxa 3900: 581-591
4. Lobato FL, Barneche DR, Siqueira AC, Liedke AM, **Lindner A**, Pie MR, Bellwood DR, Floeter SR (2014) Diet and Diversification in the Evolution of Coral Reef Fishes. PLoS ONE 9: e102094
5. Capel KC, Segal B, Bertuol P, **Lindner A** (2012) Corallith beds at the edge of the tropical South Atlantic. Coral Reefs 31: 75

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Long-Term Ecological Research Program (PELD/CNPq), Oceanic Islands site, Brazil (2013-2019): The LTER site includes three oceanic islands (St Peter and St Paul's Archipelago, Fernando de Noronha Archipelago, Trindade Island Complex), and the only atoll of the south Atlantic (Rocas Atoll). These oceanic systems are an important repository of endemic species within the Brazilian Marine Province. Given their isolation, these islands concentrate a large biomass of fishes and other marine resources in comparison to coastal areas, representing some of the most pristine marine regions in Brazil. The role of UFSC's Marine Biodiversity Laboratory in iAtlantic is to gather new data on sessile shallow-water benthic organisms and on the ecology of sea urchins. For more information: http://www.sisbiota.ufsc.br/peld.html
2. Brazilian Marine Biodiversity Network (SISBIOTA-Mar/CNPq/FAPESC, since 2011): The Network was established in 2011 and is mainly concerned with the Brazilian reef biota. For more information: http://www.sisbiota.ufsc.br/index_ing.html
3. Marine Biodiversity Project, state of Santa Catarina (FAPESC, 2010-2018): This is a regional project at the southern limit of the tropical Atlantic. The project is led by UFSC's Marine Biodiversity Laboratory. For more information: http://biodiversidade.ufsc.br/ (Portuguese only)
4. Monitoramento Ambiental da Reserva Biológica Marinha do Arvoredo (ICMBIO/UFSC/PETROBRAS, 2013-2018): This was a regional project aimed to study the biodiversity of an important Marine Reserve in southern Brazil. The role of UFSC's Marine Biodiversity Laboratory was to search for invasive marine species, in particular, the sun coral *Tubastraea coccinea*, which was detected by our team inside the Reserve.
5. Since 2014 Dr Linder has collaborated with Dr Flavia Nunes (IFREMER, France) in a project aimed to use historical information to investigate changes in South Atlantic reefs.

Infrastructures and facilities

The Marine Biodiversity Laboratory at UFSC has the necessary equipment for taxonomic research, including computers, digital cameras, two stereomicroscopes and a microscope with camera; space for specimen storage, including freezer, refrigerator, separate rooms for storage of dry and wet biological specimens; and all necessary equipment to obtain DNA sequences to help species identification, including centrifuge, gradient PCR thermal cycler etc.

Participant No.	22
Short Name	UCT
Country	South Africa
Organization Type	HEI
Website	www.uct.ac.za

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Partner Profile

UCT is an inclusive and engaged research-intensive African university that inspires creativity through outstanding achievements in learning, discovery and citizenship; enhancing the lives of its students and staff, advancing a more equitable and sustainable social order and influencing the global higher education landscape. It is an institute with over 25,000 students and 5,000 staff and currently is the highest-ranking University in Africa. The Department of Oceanography, the only one of its kind in sub-Saharan Africa, aims to advance our knowledge of all facets of the oceans around Africa and in the Southern Hemisphere, and to use this knowledge for the benefit of people everywhere. Emphasis is on the physical environment in the oceans and atmosphere and their interactions. As the only university department of its kind in sub-Saharan Africa, it is the major focus for teaching and research in physical oceanography, atmospheric science and climatology in South Africa and elsewhere in Africa. The Department has Research groupings in sea-going observations, satellite marine remote sensing, coastal oceanography, numerical modelling, the science underpinning operational oceanography, marine and coastal meteorology, severe weather, and climate change and variability.

Role in the project

Access to ship time on the SA *Agulhas II* is available through the South African National Antarctic Programme in which the department is involved in through a number of projects. Furthermore, the department offers world-class training laboratories that will be used to further support the iAtlantic programme.

Key Personnel

Prof Isabelle Ansorge (female) is the Lead PI of the SAMOC-SA project and an executive committee member on the International SAMOC line. Ansorge's research has crossed a number of disciplinary boundaries, collaborating with ocean modellers, marine biologists, ornithologists, meteorologists and, since 2014, seismic oceanographers at the Naval Research Laboratory in New Orleans, USA. The projects in which Ansorge is currently involved in examine the influence of the Southern Ocean, south of Africa, on the oceanographic, climatic and background biological dynamics of the areas between the Indian and Atlantic Ocean basins. Notably, these projects contribute to a better understanding of the influence the Southern Ocean has on global climate change and marine biodiversity. Through these projects, Ansorge continues to strengthen a broad network of collaboration with leading international and national researchers. A recent example of the success of such multi-national research can be seen from the 2014 publication Ansorge et al. (2014) and the recent Meinen et al. (2018) GRL paper. Both articles highlight the continued current mooring array south-west of South Africa (deployed from the South African RV SA *Agulhas II* in September 2013) and features contributions from 15 co-authors working at institutes ranging from NOAA, University of Sao Paulo, University of Brest, Rosenstiel School of Marine and Atmospheric Science-University of Miami, Scripps Institution of Oceanography and Navy Hydrographic Office -Buenos Aires. As the PI of SAMOC-SA, Ansorge is involved in ensuring that these moorings remain in place, are recalibrated, and data downloaded every second year of their operation. Ansorge is responsible for the hands-on seagoing training of all postgraduate students and leads the 'SEAmester' Floating University programme in South Africa. www.seamester.co.za

Dr Tarron Lamont (female), is based at the South African National Department of Environmental Affairs (DEA), and is a Research Associate within the Oceanography Department at the University of Cape Town (UCT). Larmont is also a co-PI of the SAMOC-SA project, that focusses on the management and maintenance of the eastern portion of the trans-basin SAMBA array in the South Atlantic Ocean. Lamont's research focusses on investigating large-scale circulation patterns and driving forces of dynamics and variability in the Benguela Current Large Marine Ecosystem (BCLME) and the Agulhas-Somali Current Large Marine Ecosystem (ASCLME), including the impacts of offshore dynamics on shelf systems. In addition, her research also examines the influence of these large-scale circulation patterns and driving forces on the biomass, adaptation and distribution patterns of biological organisms, and phytoplankton in particular. Lamont contributes to the education of post-graduate students through thesis supervision and at-sea training, and maintains strong national, regional, and international collaboration through participation in multi-disciplinary research projects and programmes, such as MESOBIO and Nansclim, which have resulted in the publication of special issues of Deep-Sea Research II (Vol. 100) and Fisheries Oceanography (Vol. 24 S1), respectively. Most recently, she has contributed to the publication of proceedings from the 'Benguela Symposium 2016: Opportunity, Challenge, and Change' in a Journal of Marine Systems special issue (Vol. 188).

Experience - Relevant Publications

1. du Plessis M, Swart S, **Ansorge IJ**, Mahadevan A (2017) Submesoscale processes promote seasonal restratification in the Subantarctic Ocean. Journal of Geophysical Research: Oceans, 122 (4): 2960-2975
2. Riser SC, Freeland HJ, Roemmich D, Wijffels S, Troisi A, Belbéoch M, Gilbert D, Xu J, Pouliquen S, Thresher A, Le Traon PY, Maze G, Klein B, Ravichandran M, Grant F, Poulain P-M, Suga T, Lim B, Sterl A, Sutton P, Mork K-A., Vélez-Belchí PJ, **Ansorge I**, King B, Turton J, Baringer M, Jayne SR (2016) Fifteen years of ocean observations with the global Argo array. Nature Climate Change 6 (2): 145-153
3. Venkatachalam S, **Ansorge IJ**, Mendes A, Melato LI, Matcher GF, Dorrington RA (2017) A pivotal role for ocean eddies in the distribution of microbial communities across the Antarctic Circumpolar Current. PLoS ONE 12 (8): e0183400

4. Braby L, Backeberg BC, **Ansorge I**, Roberts MJ, Krug M, Reason CJ (2016) Observed eddy dissipation in the Agulhas Current. Geophysical Research Letters 43 (15): 8143-8150
5. Hutchinson K, Swart S, Meijers A, **Ansorge I,** Speich S (2016) Decadal-scale thermohaline variability in the Atlantic sector of the Southern Ocean. Journal of Geophysical Research: Oceans, 121 (5):): 3171-3189

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. South African National Antarctic Programme – SAMOC SA 2012-2021
2. SEAmester – South Africa's Floating University 2016-2020
3. DEIMEC – 2008-2012 – Modelling Subantarctic Island ecosystems

Infrastructures and facilities

Access to the world-class SA *Agulhas II* for any deployment requirements during the programme. The SA *Agulhas II* vessel comes equipped with eight fixed and six removable container laboratories specifically designed for oceanographic, climate change, meteorological, biodiversity, marine geology or geoscience (including deep coring facilities) and marine engineering research. A large hangar door on the side of the ship allows the lowering of deep-water sampling probes and a moon pool can be used for sampling when the ship is working in ice conditions. A drop keel containing transducers for the measurement of plankton density and ocean currents can be lowered through the bottom of the ship to a depth of 3 m below the keel. The ship's stern also has a hydraulic A-frame for towing sampling nets and dredges with an associated research poop deck including laboratory access for sample handling. A specially constructed masthead lookout station facilitates underway observations of seabirds and marine mammals.

Participant No.	23
Short Name	SBE
Country	Belgium
Organization Type	SME
Website	www.seascapebelgium.be

Partner Profile

Seascape Belgium comprises a team of marine science, data and policy experts providing research management and communication support, marine data management and GIS support, stakeholder facilitation and high-level advice to the marine and maritime sector. Seascape experts have expertise in the fields of marine biotechnology, oceanography, marine biodiversity, ecosystems and habitat mapping, GIS, marine data and ocean observation, ocean governance and stakeholder engagement. Seascape Belgium is a partner in the Horizon 2020 project SOPHIE on Oceans and Human Health and its staff currently coordinates the European Marine Observation and Data Network (EMODnet).

Role in the project

Seascape Belgium will contribute to WP5 on spatial and temporal management and protection, and WP6 on Data Management. In WP5 Seascape Belgium will take the lead on Task 5.2 (Development of iAtlantic advanced web-based GIS-tools). In Task 5.1 Seascape Belgium will apply its expertise in geospatial data management to set-up and maintain an advanced web-based GIS platform catering for the needs of the iAtlantic partners and explore options to develop a dynamic GIS tool to generate on the fly species distribution maps. SBE will facilitate the process to embed the tool into the EMODnet website's community pages which are managed by SBE as part of its role in administrating the EMODnet Secretariat. In WP7, Seascape Belgium will take the lead on Task 7.4 (Interfacing with Marine Observation Data Portals for wider dissemination). This task, it will systematically analyse and improve existing interfaces, establishing new ones where necessary, between the iAtlantic consortium and the marine observation and data communities. The overall aim is to ensure that data and products (e.g. geospatial data layers, maps) generated by iAtlantic are made available for re-use as widely as possible via key marine observation and data sharing facilitates, in particular via EMODnet.

Key personnel

Dr. Pascal Derycke (male) (EMODnet Secretariat Technical Coordinator, Seascape Belgium) obtained a PhD in Science at the University of Metz (France) in the field of physics in 1996. After his degree, he pioneered in IT and web design and developed an excellent understanding of all aspects involved in web communication. He was managing a web agency in Metz when he moved to Brussels in 2002 where he was offered a position as IT manager by the NGO GRIP (Group for Research and Information on Peace and security). In 2011, Pascal joined the Marine Department of the Institute for Environment and Sustainability (EC/JRC/IES) as a scientific programmer and data analyst where he expanded his skills to earth observation science and GIS technologies used in the monitoring of climate change and assessment of the environmental status of marine and coastal waters. During these six years he was responsible for the maintenance and upgrading of the marine geo-portal EMIS (Environmental Marine Information System) and provided scientific programming support for mapping bio-geophysical products. Alongside this, he contributed to the development of INSPIRE services and server applications related to the marine environment and participated in the release of the JRC data catalogue and the MSFD Marine Competence Centre. Derycke brings his expertise in data and GIS to Seascape's EMODnet team in Ostend.

Dr Oonagh McMeel (female) Senior Project Officer for Seascape Belgium, McMeel trained as a molecular biologist and has a PhD in molecular phylogenetics (fisheries). Previously she worked as a research scientist in several academic and government institutions including Queen's University Belfast, the National University of Ireland, Galway, the Agri-Food and Biosciences Institute in Northern Ireland and the Irish Marine Institute. Her research focused primarily on the use of molecular techniques to address basic and applied life-history questions in salmonids for aquaculture and conservation management purposes. At the Irish Marine Institute, McMeel worked in the Marine Environment and Food Safety Service Area to support the implementation of relevant directives governing the health of aquaculture animals and products. In 2012 she joined a Belgian marine research consultancy as Senior Scientist. As Work Package Leader in the FP7 PharmaSea project, her work focused on optimising the science-policy interface in support of ocean governance, specifically addressing the access and use of marine genetic resources for biodiscovery. In April 2015, McMeel joined Seascape Consultants and later moved to Seascape Belgium to work at the EMODnet Secretariat in Oostende, focusing on knowledge transfer to promote the uptake and application of EMODnet resources by marine and maritime stakeholders from industry, policy, science and civil society.

Jan-Bart Calewaert (male) Calewaert is the Managing Director of Seascape Belgium and Head of the Secretariat of the European Marine Observation and Data Network (EMODnet), a long-term marine data initiative supported by the European Commission Directorate-General for Maritime Affairs and Fisheries. Prior to that, Calewaert worked for more than six years at the Marine Board-ESF Secretariat where he coordinated foresight and policy activities in various working areas including marine biotechnology, oceans and human health, climate change impacts on the marine environment and marine pollution. Calewaert trained as a bio-engineer in cellular and genetic biotechnology at the University of Ghent in 2001 and completed an additional Masters in Marine Environment Management from the Free University of Brussels and the University of Antwerp in 2004. Through most of his career, Jan-Bart has worked at the interface between science and policy, combining his broad expertise in marine sciences with knowledge of the marine and maritime policy landscape in Belgium and Europe. Calewaert

started his career working in Belgium for (among others) Flanders Marine Institute (VLIZ), the Maritime Institute (UGent) and the Laboratory of Environmental Toxicology and Aquatic Ecology (UGent).

Experience - Relevant Publications

1. **Calewaert JB**, McDonough N (2011) A new dawn for marine biotechnology in Europe. Biotechnology Advances 29(5): 453-456
2. Lallier LE, **McMeel O**, Greiber T, Vanagt T, Dobson ADW, Jaspars M (2014) Access to and Use of Marine Genetic Resources: Understanding the Legal Framework. Natural Product Reports 31 (5): 612-616
3. **Calewaert JB**, Weaver P, Gunn V, Gorringe P, Novellino A (2016) The European Marine Data and Observation Network (EMODnet): Your Gateway to European Marine and Coastal Data. Quantitative Monitoring of the Underwater Environment. Quantitative Monitoring of the Underwater Environment 6: 31-46
4. **McMeel O**, **Calewaert JB** (2016) Marine Data Portals and Repositories and their role in Knowledge Transfer to support Blue Growth. Deliverable 4.2 H2020 COLUMBUS Project No.652690
5. Hoepffner N, **Derycke P**, Dubroca L (2016) The EMIS-R Marine Analyst – an aid to the monitoring and management of marine areas, including marine protected areas. ICAN Newsletter Nov 2016

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. EMODnet Secretariat (2013-current): the European Marine Observation and Data Network (EMODnet) is a network of European organisations working together to observe the oceans, to make the marine data collected freely available and interoperable, to create seamless data layers across sea-basins and to distribute the data and data products through the internet. The primary aim of EMODnet is to unlock existing but fragmented and hidden marine data and make them accessible for a wide range of users including private bodies, public authorities and researchers. Seascape Belgium provides the Secretariat for the EMODnet community, funded by the European Commission's Directorate General for Maritime Affairs and Fisheries. Since 2017, the duties of the EMODnet Secretariat also include the management and further development of the European Atlas of the Seas (EAS). For more information, please see www.emodnet.eu and https://ec.europa.eu/maritimeaffairs/atlas_en
2. H2020 SOPHIE Project: Funded by the European Union's Horizon 2020 programme, the Seas, Oceans and Public Health in Europe project (SOPHIE) is helping to build new research capacity for the emerging scientific discipline of Oceans and Human Health. Seascape Belgium is responsible for analysing marine environmental data repositories to establish links with public health research to assess usability and gaps to support oceans and human health research in Europe. For more information, please see https://sophie2020.eu/
3. H2020 INMARE: Industrial Applications of Marine Enzymes project is focused on the development of innovative screening and expression platforms to discover and use the functional protein diversity from the sea. In this project, Seascape Belgium coordinates the work package on communication and dissemination. For more information please visit www.inmare-h2020.eu

Infrastructures and facilities

Seascape Belgium is a consultancy service provider and does not own major infrastructures or large equipment. As administrators of the EMODnet Secretariat on behalf of the European Commission Directorate-General for Maritime Affairs and Fisheries (DG MARE), Seascape Belgium plays a central role in the coordination of the European Marine Observation and Data Network which can be considered as a large distributed marine data infrastructure.

Participant No.	24
Short Name	TMG
Country	Germany
Organization Type	RTD
Website	www.tmg-thinktank.com

Partner Profile

TMG Research gGmbH - Thinktank for Sustainability is as an independent non-profit organisation founded in 2017 in Berlin - Germany, and works to support sustainability transformations at local, national, and global levels. At TMG, we initiate and accompany transitions to a sustainable future in areas such as agriculture and food systems, climate change mitigation and adaptation, land and oceans governance, and energy. Together with stakeholders from science, civil society, local communities, politics, and the private sector, we co-develop innovative strategies to overcome complex challenges to sustainable development. We also facilitate local and global stakeholders to bridge gaps between global agreements and local realities to ensure solutions for structural problems are inclusive and based on the needs of all. TMG is an international team of 25 staff from different scientific backgrounds.

Role in the project

TMG will provide scientific and technical expertise with regard to ocean governance, will help to ensure that relevant global and regional stakeholders are involved in this project, and that stakeholders benefit from appropriate and effective capacity building. Specifically, TMG will lead Task 6.5 on Ocean Governance and function as Deputy Leader for WP6 (Capacity Building, Policy, Stakeholder Engagement and Outreach)

Key personnel

Sebastian Unger (male) has a background in biology and political science and 15 years' experience in international ocean policy. He leads research into Ocean Governance at the Institute for Advanced Sustainability Studies (Potsdam) and works as Senior Policy Advisor at TMG. His research focuses on global governance processes for ocean sustainability, including the development of a new international agreement for marine biodiversity in areas beyond national jurisdiction, the UN Sustainable Development Goals (SDGs), and the governance of deep seabed mining. Sebastian lectures on marine conservation at Potsdam University. Previously he was appointed Deputy Secretary to the OSPAR Commission, the international convention for the Protection of the North-East Atlantic, in 2007. In that role, he was instrumental in developing the world's first network of marine protected areas on the 'high seas' and participated in negotiations on new international legislation in the fields of marine biodiversity, impacts of human activities, and the offshore oil and gas industry. He also served at the German Federal Foreign Office, where he coordinated international maritime affairs.

Alexander Müller (male) is the current head of a global study by the UN Environment Program on "The Economics of Ecosystems and Biodiversity for Agriculture and Food" (TEEBAgriFood). From 2006 to 2013 he served as Assistant-Director General of the Food and Agriculture Organization of the United Nations (FAO), where he was involved in the creation of the landmark Voluntary Guidelines for Responsible Governance of Tenure (VGGT). In June 2009 the UN Secretary-General nominated Müller as a member of the Advisory Group on Energy and Climate Change (AGECC) to advise on the energy-related dimensions of climate change negotiations. This constellation led to the creation of the forum "Sustainable Energy for All" (SEforALL). In 2017 he, along with Klaus Töpfer and Harmut Gaßner founded "TMG - Töpfer, Müller, Gaßner GmbH, ThinkTank for Sustainability" in Berlin, where he works as managing director focusing on Food and Nutrition; Climate and Ocean; as well as Land and Natural Resources.

Experience - Relevant Publications

1. **Unger S**, **Müller A**, Rochette J, Schmidt S, Shackeroff Theisen JMJM, Wright G (2017) Achieving the Sustainable Development Goal for the Oceans. - IASS Policy Brief 1
2. Schmidt S, Neumann B, Waweru Y, Durussel C, **Unger S**, Visbeck M (2017) SDG 14 - Conserve and Sustainable Use the Oceans, Seas and Marine Resources for Sustainable Development. - In: Griggs D, Nilsson M, Stevance A, McCollum D (Eds.). A Guide to SDG Interactions: from Science to Implementation, Paris: International Council for Science (ICSU), p. 174-218
3. Shackeroff Theisen JM, Atkinson SR, Awad A, Beaudoin Y, Canals P, Durussel C, Edwards, PET, Gombos M, Hornidge A-K, Lameier M, Nakamura T, Philibotte J, Porsché I, Pratt C, Robertson LF, Schwab P, **Unger S,** Winter A (2016) Capacity Development for Oceans, Coasts, and the 2030 Agenda. - IASS Policy Brief 3
4. Rochette J, **Unger S**, Herr D, Johnson D, Nakamura T, Packeiser T, Proelss A, Visbeck M, Wright A, Cebrian D (2014) The regional approach to the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. - Marine Policy 49: 109-117
5. **Müller A**, Sukhdev P (2018) The Economics of Ecosystems and Biodiversity (TEEB) Measuring what matters in agriculture and food systems: a synthesis of the results and recommendations of TEEB for Agriculture and Food's Scientific and Economic Foundations report. Geneva: UN Environment

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Partnership for Regional Ocean Governance (joint initiative by IASS, IDDRI, TMG and UN Environment): PROG's main aim is to identify and promote integrated regional models for cross-sectoral oceans governance and to advance regional cooperation for the conservation and sustainable use of marine ecosystems and resources. Established as a platform at the science, policy,

society interface, PROG focuses on facilitating dialogue processes that foster greater regional cooperation and better integrated and coherent governance frameworks at regional and national levels (www.prog-ocean.org).
2. Marine Regions Forum (funded by German government and the EU): To develop effective cross-sectoral regional governance concepts for the protection and sustainable use of the oceans. The Marine Regions Forum represents a new format for solution-oriented learning and exchange among different marine regions, which the PROG will develop, test, and establish at the interface of science and marine policy.
3. Strengthening Regional Ocean Governance for the High Seas (STRONG High Seas): Project implemented by IASS and partners (Sebastian Unger is project lead). This project started in 2017 and ends in 2022. The aim is to develop innovative governance solutions for the conservation and sustainable use of marine biodiversity in Areas Beyond National Jurisdiction (ABNJ). Priority regions are the South-East Atlantic (coinciding with this project's focus regions) and the South-East Pacific.
4. Climate-SDGs Integration Project: Supporting the implementation of the Paris Agreement and the 2030 Agenda through ecosystem-based adaptation: The project supports the implementation of ecosystem-based adaptation (EbA) in Guatemala and India as a contribution to the synergetic achievement of NDCs and SDGs. Implemented by TMG, funded by German Ministry for the Environment (BMU)
5. TEEB for Agriculture & Food ('TEEBAgriFood') is a study that will provide guidance and illustrations for comprehensive evaluations (i.e. including of the most significant externalities) of 'eco-agri-food systems', whilst demonstrating that the economic environment in which farmers operate is distorted by significant externalities, both negative and positive, and a lack of awareness of our dependency on nature. TEEBAgriFood is hosted by UN Environment, funded primarily by the Global Alliance for the Future of Food and other institutional and government donors. Alexander Müller is Study Leader of the U.N. Environment Programme (UNEP) hosted project. http://teebweb.org/agrifood/scientific-and-economic-foundations-report

Infrastructures and facilities

In addition to its office facilities, TMG has a conference room with up to 15 seats and a 75'' presentation screen equipped with a camera and video conferencing sound system. Additionally, there is a smaller meeting room for five persons available. The office is equipped with two large printers and media equipment such as cameras and voice recorders to facilitate the team's meetings, workshops and associated discussions.

Participant No.	25
Short Name	CNRS
Country	France
Organization Type	RTD
Website	www.cnrs.fr/languedoc-roussillon/index.htm

Partner Profile

For over 30 years, ISEM developed research on the origin and dynamics of biodiversity, the modalities and mechanisms of its evolution. Our research covers a wide range of organisations and backgrounds and combines field approaches, experimental and theoretical approaches. Research conducted by ISEM includes the acceleration of the means of production data and the ability to understand the different structural and functional dimensions of life (from genes to ecosystems), which should lead to an overall level of understanding of the evolutionary mechanisms.

Role in the project

The team is a partner of the national eDNAbyss project that has parallel goals (in abyssal plains) to those of iAtlantic: contributing to the assessment of biodiversity through eDNA analysis (WP2), and provide a better understanding of the evolutionary forces shaping the evolution of deep-sea organisms through genome scan analysis (WP1). The partner will contribute the WP1 by analysing the connectivity of Transatlantic species and WP2 by contributing to the molecular characterisation of biodiversity through eDNA of sediments, following by well-validated molecular and bioinformatics protocols from the eDNAbyss project.

Key personnel

Dr Nicolas Bierne (male) is a population geneticist with broad interests in evolutionary biology. His team combines genome sequencing, lab experiments and field studies, as well as theoretical developments, to investigate the mechanisms at play during adaptation and speciation (mainly in marine organisms). They have studied speciation and hybridization in marine species for 20 years, revealed the heterogeneity of introgression rates across the genome in mussels), in seabasses , and in sea squirts . They have emphasised pitfalls and have developed new hypotheses about genome scans, and also have expertise on genome evolution. They have contributed to a project of comparative genomics in animals that uncovered the determinant of genetic diversity, and co-piloted an international network on marine connectivity (https://wwz.ifremer.fr/gdrmarco/;).

Christine Arbiol (female) is a technician expert in New Generation Sequencing, particularly genome scan analysis, and will contribute to the construction of genomic libraries.

Experience - Relevant Publications

1. Fraisse C, Belkhir K, Welch JJ, **Bierne N** (2016) Local inter-species introgression is the main cause of outlying levels of intra-specific differentiation in mussels. Molecular Ecology 25: 269-286
2. Romiguier J, Gayral P, Ballenghien M, Bernard A, Cahais V, Chenuil A, Chiari Y, Dernat R, Duret L, Faivre N, Loire E, Lourenco JM, Nabholz B, Roux C, Tsagkogeorga G, Weber AAT, Weinert LA, Belkhir K, **Bierne N**, Glemin S, Galtier N (2014) Comparative population genomics in animals uncovers the determinants of genetic diversity. Nature 515(7526): 261
3. Gagnaire PA, Broquet T, Aurelle D, Viard F, Souissi A, Bonhomme F, Arnaud-Haond S, **Bierne N** (2015) Using neutral, selected, and hitchhiker loci to assess connectivity of marine populations in the genomic era. Evolutionary Applications 8(8): 769-786
4. **Bierne N**, Bonhomme F, Arnaud-Haond S (2016) Dedicated population genomics for the silent world: the specific questions of marine population genetics. Current Zoology 62(6): 545-550
5. Ament-Velásquez SL, Figuet E, Ballenghien M, Zattara EE, Norenburg JL, Fernández-Álvarez FA, Bierne J, **Bierne N**, Galtier N (2016) Population genomics of sexual and asexual lineages in fissiparous ribbon worms (Linnaeus, Nemertea): hybridization, polyploidy and the Meselson effect. Molecular Ecology 25(14): 3356-33693369

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. co-piloted an international network on marine connectivity (https://wwz.ifremer.fr/gdrmarco/)
2. eDNAbyss project (France Genomique-National platform supporting large-scale genomic projects): unravelling the biodiversity and genomics in the abyss (https://www.france-genomique.org/spip/spip.php?article208)
3. ANR HiFlo studied the genetic basis and history of adaptive differentiation in high gene flow marine species
4. ANR HySea studied hybridization in the sea, a key yet neglected process influencing marine biodiversity

Infrastructures and facilities

The ISEM has a fully-equipped molecular lab and shares facilities with the Cemeb GenSeq platform (http://www.labex-cemeb.org/en/genotyping-sequencing-genseq), so the preparation of DNA for metabarcoding and RAD libraries, as well as all sequencing, can be done indoors. Bioinformatics analysis for New Generation Sequencing, Isem is hosted by the MBB platform (http://mbb.univ-montp2.fr/MBB/index.php) as well as the ISEM's HPC cluster with 400 cores running a Linux distribution. The MBB staff is composed of three engineers providing support and maintaining NGS up-to-date software and homemade pipelines wrapped on local Galaxy servers.

Participant No.	26
Short Name	SU
Country	France
Organization Type	HEI
Website	www.sorbonne-universite.fr

Partner Profile

Sorbonne University is a multidisciplinary and research-intensive university with world-famous origins founded in 1257. Continuing the humanist tradition of the Sorbonne, it is devoted to meeting the scientific challenges of the 21st century and spreading the knowledge created in its laboratories by its research teams and transmitted to its students and to society as a whole. Sorbonne University has three faculties in humanities, medicine and science, each with the wide-ranging autonomy necessary to conduct ambitious programs in both research and education. The University's 53,500 students, 3,400 professor-researchers and 3,600 administrative and technical staff members who help it run every day, contribute to a University that is diverse, creative, innovative, and global in outlook.

To understand the quickly changing world, Sorbonne University promotes excellence and develops knowledge in each discipline while simultaneously developing numerous interdisciplinary programs to meet today's complex challenges, such as climate change, the conservation and transmission of cultural heritage, the data revolution, and personalised medicine. Sorbonne University contributes to the public debates that cross our contemporary societies through multiple events that are open to all. It also participates in the dissemination of knowledge through courses, conferences and events intended for not only students, but for the broadest possible audience. The University's policy of innovation and technology transfer enables research to be useful to the economy and the society at large.

Among its institutes, the Station Biologique de Roscoff represents the oldest and biggest marine station in France dealing with many aspects of marine biology and oceanography from benthic and plankton ecology, marine genomics to algal biotechnology, with people working on a great variety of biological models and marine environments (from picoplankton species of the enlightened water masses of the ocean to the deep-sea hydrothermal vent animals). The station is sub-divided into four main research units: (1) Integrative biology of marine organisms, (2) Adaptation and Marine Diversity, (3) Evolutionary Biology and Ecology of Algae, and (4) Protein phosphorylation and Human Diseases.

Role in the project

The Station Biologique de Roscoff (SU) will participate to the WP1 "Atlantic Oceanography" and more specifically in task 1.6 dealing with connectivity studies on the deep-sea fauna associated with reduced environments such as hydrocarbon seeps and hydrothermal vents. The Station Biologique will provide its expertise in larval dispersal modelling and population genetics studies aiming at quantifying gene flow between seep/vent populations across the Atlantic using innovative NGS technologies such as ddRAD marker sequencing along the genome of several targeted species.

Key personnel

Dr Didier Jollivet (male) is a senior scientist in population genetics and has worked over the last 25 years on deep-sea hydrothermal and seep fauna. He is presently the head of the research team "Dynamics of Marine Diversity" (18 persons) dealing with the ecology and evolutionary biology of deep-sea, polar and temperate coastal and intertidal marine invertebrates.

Prof Eric Thiébaut (male) is a professor in marine ecology at the Sorbonne University and is presently deputy director of the Station Biologique de Roscoff. He has spent most of his time working on the dynamics of benthic assemblages and has modelled larval dispersal of key benthic species in the English Channel and the Bay of Biscay.

Dr Amandine Nicolle (female) is an oceanographic physician who is currently developing Lagrangian dispersal models for marine species in the team "Dynamics of Marine Diversity".

Experience - Relevant Publications

1. Olu–Le Roy K, von Cosel R, Hourdez S, Carney SL, **Jollivet D** (2007) Amphi-Atlantic cold seep *Bathymodiolus* complexes of species across the Equatorial belt. Deep-Sea Research I 54: 1890-1911
2. Jolly MT, Guyard P, Ellien C, Gentil F, Viard F, **Thiébaut E, Jollivet D** (2009) Population genetics and hydrodynamic modelling of larval dispersal dissociate contemporary patterns of connectivity from historical expansion into European shelf seas in the polychaete *Pectinaria koreni* (Malmgren). Limnology and Oceanography 54 (6): 2089-2106
3. Faure B, **Jollivet D**, Tanguy A, Bonhomme F, Bierne N (2009) Speciation in the deep sea: Multi-locus analysis of divergence and gene flow between two hybridizing species of hydrothermal vent mussels. PLoS One 4(8): e6485
4. Breusing C, Biastoch A, Drews A, Metaxas A, **Jollivet D**, Vrijenhoek RC, Bayer T, Melzner F, Sayavedra L, Petersen JM, Dubilier N, Schilhabel MB, Rosenstiel P, Reusch TBH (2016) Biophysical and population genetic models predict presence of 'phantom' stepping stones connecting Mid-Atlantic Ridge vent ecosystems. Current Biology 26(17): 2257-2267
5. **Nicolle A**, Dumas F, Foveau A, Foucher E, **Thiébaut E** (2013) Modelling larval dispersal of the king scallop (*Pecten maximus*) in the English Channel: examples from the bay of Saint-Brieuc and the bay of Seine. Ocean Dynamics 63: 661-678

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. VENTOX European Project [EVK3 CT1999-00003] Hydrothermal vents: a natural polluted laboratory (coord. D.R. DIXON, NOC) -Thermal adaptation of Atlantic hydrothermal vent species: coord. D. Jollivet)
2. Marine Genomics Europe (MGE) [GOCE-CT-2004-505403], Transcriptome sequencing projects of deep-sea hydrothermal vent species in EDD and F&S WPs (PI on projects: D. Jollivet, SBR)
3. PNEC-AT (EC2CO national transversal action) Coupling benthic ecology with larval dispersal modelling in the English Channel: models et methods (coord. D. Jollivet & E. Thiébaut).
4. CERBERUS ANR Blanche [ANR-17-CE02-0003-01] Population connectivity and resilience of deep-sea hydrothermal vent communities in the western Pacific back-arc basins (coord. S. Hourdez & D. Jollivet)
5. PERCEBES European Biodiversa programme [PCIN-2016-028] Connectivity and resilience of stalked barnacle *Pollicipes pollicipes* along the European Atlantic coasts (coord. José Luis Acuña).

Infrastructures and facilities

The Station Biologique de Roscoff possesses several research platforms in marine genomics including sequencing facilities with Illumina MiSeq, MinION and ABI 16-capillaries SANGER sequencers, and bioinformatic facilities with the ABIMS platform which has a cluster of 450 To for doing genomic analyses and running larval dispersal simulations with adapted equations from oceanographic 3D models. The Dynamics of Marine Diversity research group has all the lab facilities in molecular biology to develop ddRAD libraries and other genetic markers such as microsatellites or SNP microarrays. After being tested on our sequencing platform, ddRAD libraries will be then sequenced at the Genoscope d'Evry as part of the France Génomique eDNAbyss project coordinated by S Arnaud-Haond.

Participant No.	27
Short Name	AU
Country	Denmark
Organization Type	HEI
Website	www.au.dk

Partner Profile

Aarhus University (AU) is an academically diverse and strongly research-oriented institution that creates and shares knowledge. It covers the entire research spectrum including basic research, applied research, strategic research and research-based advice to authorities. Aarhus University is a top ten university among universities founded within the past 100 years. It has a long tradition of partnerships with some of the world's best research institutions and university networks. It has a strong commitment to the development of society that is realised through its collaboration with government agencies and institutions and the business community.

The activities of the Department of Bioscience cover both fundamental and applied research in very diverse fields of biology and oceanography. The department has excellent research facilities and laboratories, including the interdisciplinary Arctic Research Centre (ARC). It is also an integrated part of the National Centre of Environment and Energy acting as a major advisor for the national government and other agencies. The department has a broad modelling expertise and experience from former and ongoing internationally and nationally funded projects. This includes the implementation and operation of a wide range of hydrodynamic, ecological and statistical models for applications and problems in the North Sea, Baltic Sea, fjords, estuaries and various deep-sea ecosystems in the Atlantic and Mediterranean Sea. The department also provides expertise in GIS and decision support tools for spatial management. With approximately 430 staff and more than 500 students at Bachelor and Master levels as well as 130 thesis-writing students, it makes for an exciting and inspiring working and study life.

Role in the project

AU's major activities in the iAtlantic project will build on its broad expertise in hydrodynamic and ecosystem modelling, as well as field measurements and data analysis in deep-sea environments from participation in former and ongoing internationally and nationally funded projects, (e.g. ATLAS, CoralFISH, Arctic Research Center, BENTHIS, OASIS). AU will contribute to the development and application of high-resolution hydrodynamic models to examine ecosystem function in iAtlantic case study areas (WP1). AU will also collaborate with other project partners to integrate results from WP1 in other work packages.

Key personnel

Dr Eva Friis-Møller (female). Friis-Møller is a senior Scientist at the Department of Bioscience, Aarhus University. her main interests include biological oceanography, food web interactions and bentho-pelagic coupling. She has 17 years of experience in marine ecology, including laboratory work, field studies and modelling. She has participated in > 20 national and international research cruises/field campaigns. Involvement in ongoing and past EU projects include ATLAS, KEYCOP, OPEC and EUROBASIN, as well as a number of national projects. She has published 49 peer-reviewed articles.

Dr Christian Mohn (male). Mohn is a senior Scientist at the Department of Bioscience, Aarhus University. His main interests are physical oceanography, bio-physical interactions and marine ecosystem modelling. He has 17 years of experience in observational and theoretical oceanography with a focus on fluid dynamics and flow-topography interactions in deep-sea ecosystems of the Atlantic and adjacent seas. Mohn is involved in ongoing and past EU projects including ATLAS, Blue Nodules, SEFOS, OASIS, BaltSeaPlan, CoralFISH, MyOcean. He has published 31 peer-reviewed articles and more than 35 reports and guidelines.

Experience - Relevant Publications

1. **Mohn C,** Rengstorf A, White M, Duineveld G, Mienis F, Soetaert K, Grehan A (2014) Linking benthic hydrodynamics and cold water coral occurrences: A high resolution model study at three cold-water coral provinces in the NE Atlantic. Progress in Oceanography 122: 92-104
2. Rengstorf AM, **Mohn C**, Brown C, Wisz MS, Grehan A (2014) Predicting the distribution of deep-sea vulnerable marine ecosystems using high-resolution data: Considerations and novel approaches. Deep-Sea Research I 93: 72-82
3. **Møller EF**, Bohr M, Kjellerup S, Maar M, Møhl M, Swalethorp R, Nielsen TG (2016) *Calanus finmarchicus* egg production at its northern border. Journal of Plankton Research 38: 1206-1214
4. Petersen ME, Maar M, Larsen J, Møller EF, Hansen PJ (2017) Trophic cascades of bottom-up and top-down forcing on nutrients and plankton in the Kattegat, evaluated by modelling. Journal of Marine Systems 169: 25-39
5. M Maar, **Møller EF**, Gürkan Z, Jónasdóttir SH, Nielsen TGTG (2013) Sensitivity of Calanus spp. copepods to environmental changes in the North Sea using life-stage structured models. Progress in Oceanography 111: 24-37

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. ATLAS (EU Horizon 2020, 2016-2020)
2. Blue Nodules (EU Horizon 2020, 2016-2020)
3. MyOcean (EU FP7, 2009 - 2015)

4. CoralFISH (EU FP7, 2008 – 2012)
5. Arctic Research Center at Aarhus University since 2012

Infrastructures and facilities

AU hosts a high-performance computer server infrastructure, supplemented by additional local Linux clusters operated by the Department of Bioscience. AU has excellent research facilities and laboratories.

Participant No.	28
Short Name	AWI
Country	Germany
Organization Type	RTD
Website	www.awi.de

Partner Profile

The Alfred Wegener Institute, Hemholtz Centre for Polar and Marine Research (AWI) is a member of the Helmholtz Association of German Research Centres (HGF). With a staff of more than 1000 employees, about half of them scientists at levels between graduate students and full professors, AWI conducts multidisciplinary research in the Arctic and Antarctic, as well as in temperate latitudes. AWI coordinates the polar research in Germany and provides the necessary equipment, infrastructure, and logistics for other German institutions performing polar research. The AWI was established as a public foundation in 1980 and includes the AWI headquarters in Bremerhaven, the research unit in Potsdam, the Biological Institute on the island of Helgoland (BAH), the Wadden Sea Station on the island of Sylt and the Helmholtz Institute for Functional Marine Biodiversity at the University of Oldenburg (HIFMB). The AWI has an annual budget of more than 100 million Euros. The institute keeps the German federal government updated on its research results, and provides advice for the development of environmental policies.

Role in the project

AWI's role in iAtlantic to provide bathymetric data from the Atlantic recorded during transit voyages of *RV Polarstern*. Furthermore, training opportunities with regards to bathymetric data collection, processing and analyses will be provided.

Key personnel

Dr Boris Dorschel (male) received his PhD titled Late Quaternary Development of a deep-water Carbonate Mound in the northeast Atlantic at the University of Bremen in 2003. Following his PhD, he continued cold-water coral carbonate mound research with a 2-year postdoc position at the Zentrum für Marine Umweltwissenschaften (MARUM) at the University of Bremen. In 2005, he received a fellowship from the Irish Research Council for Science, Engineering, and Technology and moved to the University College Cork (UCC) in Ireland where he stayed until 2012. During the time at UCC, he commenced working on cold-water corals in the scope of various Irish and EU projects. Over the years, in addition to the work on cold-water corals, his research included increasingly GIS and bathymetry components until these components became the main focus of his research. Consequently, in 2012, he started his current employment as head of the bathymetry working group at the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI) in Bremerhaven, Germany where he researches the bathymetry and seafloor morphology of the high latitudes.

Experience - Relevant Publications

1. Arndt JE, Jokat W, **Dorschel B** (2017) The last glaciation and deglaciation of the Northeast Greenland continental shelf revealed by hydro-acoustic data. Quaternary Science Reviews 160: 45-56
2. Bohoyo F, Larter RD, Galindo-Zaldivar J, Leat PT, Maldonado A, Tate AJ, Gowland EJ, Arndt JE, **Dorschel B**, Kim YD, Hong JK, Flexas MM, Lopez-Martinez J, Maestro A, Bermudez O, Nitsche FO, Livermore RA, Riley TR (2016) Bathymetry and geological setting of the Drake Passage, BAS GEOMAP 2 Series. British Antarctic Survey, Cambridge
3. **Dorschel B**, Gutt J, Huhn O, Bracher A, Huntemann M, Huneke W, Gebhardt C, Schröder M, Herr H (2015) Environmental information for a marine ecosystem research approach for the northern Antarctic Peninsula (RV Polarstern expedition PS81, ANT-XXIX/3). Polar Biology 39: 765-787
4. **Dorschel B**, Jensen L, Arndt JE, Brummer GJ, De Haas H, Fielies A, Franke D, Jokat W, Krocker R, Kroon D, Pätzold J, Schneider RR, Spieß V, Stollhofen H, Uenzelmann-Neben G, Watkeys MK, Wiles EA (2018) The Southwest Indian Ocean Bathymetric Compilation (swIOBC). Geochemistry, Geophysics, Geosystems 19(3): 968-976
5. Mayer LA, Jakobsson M, Allen GL, **Dorschel B**, Falconer R, Ferrini V, Lamarche G, Snaith H, Weatherall P (2018) The Nippon Foundation—GEBCO Seabed 2030 Project: The Quest to See the World's Oceans Completely Mapped by 2030. Geosciences 8: 63

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Participation in the Nippon foundation – GEBCO Seabed 2030 Project

Infrastructures and facilities

AWI operates the research icebreaker *RV Polarstern*, which allows year-round operation in the ice-covered waters, as well as several smaller research vessels, polar aircrafts and underwater research facilities. The AWI logistics team has long-standing experience with planning and organisation of expeditions. The AWI bathymetry group has experience with the acquisition, processing and interpretation of bathymetric data.

Participant No.	29
Short Name	University College London
Country	United Kingdom
Organization Type	HEI
Website	www.ucl.ac.uk

Partner Profile

Founded in 1826, University College London is London's leading multi-disciplinary university, with 11000 staff, 35000 students and an annual income of over £1bn. It is the top-rated university in the UK for research strength (REF2014). UCL's Department of Geography is one of the largest and most distinguished in the country, ranked consistently in the highest category for research excellence in all UK national research assessments to date. Its mission is to produce world-leading research and to translate this into impact in all its forms (scholarly, pedagogical, enterprise, public engagement, policy). Research is centred around six clusters, including 'Past Climates', 'Recent Environmental Change & Biodiversity' and 'Science, Politics and Government'.

Role in the project

UCL Geography, led by Dr Thornalley, will contribute to WP3 on Ecosystem Change and Tipping Points. This will be via three components: (i) The generation new palaeoceanographic and ecosystem datasets from iAtlantic regions including decadal resolution from the sub-polar North Atlantic off Iceland, Reykjanes Ridge, Northwest Atlantic shelf and slope; centennial resolution from Sargasso Sea (ii) UCL will lead (in collaboration with MARUM and UCC) a compilation of all-Atlantic centennial-to-millennial (and better) ecosystem time series, analyse drivers, and identify any tipping points in relation to proxied oceanographic changes. (iii) UCL will undertake pilot studies of ancient eDNA as a tool to reconstruct deep and open-ocean ecosystem time series, comparing eDNA results to other palaeoceanographic, geochemical and ecosystem reconstructions.

Key personnel

Dr David J R Thornalley (male) is a Senior Lecturer in Palaeoceanography and Paleoclimatology in the Department of Geography, UCL, and Woods Hole Oceanographic Institution Adjunct Scientist. He is a recent recipient of a Philip Leverhulme Prize for outstanding internationally recognised early-career scientists. He has expertise in collecting and working on marine sediment cores to reconstruct past physical, chemical and ecological properties of the Atlantic, focusing on both the abrupt changes of the glacial termination and the climate of the last millennia. He has received numerous invitations to present at renowned international conferences (Fall AGU: 2009, 2014, 2018; Goldschmidt: 2011, 2016; ICP 2013) and invited plenary talks at US CLIVAR workshop 2016, USAMOC 2018 and the Gordon Conference on Polar Oceans 2019. He has 15 years of experience in multiple proxy techniques, including foraminiferal faunal assemblage, stable isotope and trace metal analysis, and sediment property and grain size analysis. He is currently working with Prof. A Cooper (Director – Australian Centre for Ancient DNA) on analysing ancient eDNA in marine sediments. He has over 10 years of experience in training and supervising research technicians and students, and as a Co-I or PI managing large research projects. In summer 2014 he was Co-Chief on cruise *Endeavor 539* that collected ~20 new multicores from the subpolar Northeast Atlantic suitable for high-resolution palaeoceanographic study in iAtlantic. He has over 25 international publications examining Atlantic circulation change; 4 first author papers in *Nature* and *Science*.

Dr Peter T Spooner (male) is a PDRA at UCL with expertise in palaeoceanography, focussing on geochemistry, marine sediments, climate model analysis, and marine ecosystems. He is investigating North Atlantic circulation variability and its effect on ecology over the last millennium, coupling model, observational and paleo-proxy data to generate and analyse high-resolution climate records. He has 7 international publications, 2 in Nature/Science.

Experience - Relevant Publications

1. **Thornalley DJ**, Oppo DW, Ortega P, Robson JI, Brierley CM, Davis R, Hall IR, Moffa-Sanchez P, Rose NL, Spooner PT, Yashayaev I, Keigwin LD (2018) Anomalously weak Labrador Sea convection and Atlantic overturning during the past 150 years. Nature: 556: 227-231
2. Spooner P, **Thornalley DJR,** Ellis P (2018) Grain size constraints on glacial circulation in the southwest Atlantic. Paleoceanography and Paleoclimatology 33**: 21-30**
3. Thornalley DJ, Bauch HA, Gebbie G, Guo W, Ziegler M, Bernasconi SM, Barker S, Skinner LC, Yu J (2015) A warm and poorly ventilated deep Arctic Mediterranean during the last glacial period. Science 349: 706-710
4. Moffa-Sánchez P, Born A, Hall IR, **Thornalley DJ**, Barker S (2014) Solar forcing of North Atlantic climate over the last millennium. Nature Geoscience 7: 275-278
5. **Thornalley DJ**, Elderfield H, McCave IN (2009) Holocene Oscillations in Temperature and Salinity of the Subpolar North Atlantic. Nature: 457: 711-714

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. "Using high-resolution marine sediment cores to reconstruct past ocean circulation and climate change and explore the underlying mechanisms" Philip Leverhulme Prize, £100k. Thornalley – PI (2017-2020).
2. "ATLAS: A Trans-AtLantic Assessment and deep-water ecosystem-based Spatial management plan for Europe" EU Horizon 2020, €9m consortium. Thornalley – Deputy WP leader and Co-I, 204,000 euros for UCL (2016-2020); Spooner – 2.5 yr PDRA.

3. “Holocene reconstructions of Iceland-Scotland Overflow and the Deep Western Boundary Current.” NSF (OCE-1304291), $545k. PIs: D. Oppo, D. Thornalley, L. Keigwin (2013-2016). Including Co-Chief Scientist on R/V Endeavor cruise EN539, May-June 2014 collecting high-resolution sediment cores south of Iceland.
4. “The role of North Atlantic circulation during past abrupt climate change.” WHOI Postdoctoral Research Scholarship to D. Thornalley, Institute of Ocean and Climate Change. $90k. 2011-2013.
5. “A direct link between ocean circulation and abrupt climate change?” NERC (NE/I006370/1). PI: S. Barker; Researcher Co-I: D. Thornalley; Co-I: I.R. Hall. UKIODP/NERC. £60,000. 2011-2012.

Infrastructures and facilities

High-resolution palaeoceanographic reconstruction work will be performed at UCL using: UCL’s Bloomsbury Environmental Isotope Facility (BEIF), which houses 1 dual inlet (Finnigan MAT253) and 2 continuous flow (Finnigan Delta V & Delta Plus XP) mass spectrometers with a variety of peripheral systems capable of measuring stable isotopes and a CN Elemental Analyser. UCL Department of Geography also has a dedicated trace-metal clean laboratory for preparing and cleaning foraminifera and is equipped with a Varian 720 ES ICP-OES and a Varian ICP-MS for trace metal analysis, and a Mettler-Toledo micro-balance (precision 0.1 µm). UCL Geography also houses a Sediment Analysis Suite equipped with a Malvern Master Laser, SediGraph III 5120, and Coulter Counter Multisizer 4. UCL Geography also has in-house 210Pb dating facilities and sediment XRF equipment. UCL has a dedicated ‘Ancient DNA facility’ that provides a high-containment ultra-clean environment for the extraction and first-stage processing of nucleic acids from archaeological and paleoenvironmental materials and is positioned well away from any post-PCR molecular biology activities.

Participant No.	30
Short Name	MFRI
Country	Iceland
Organization Type	RTD
Website	www.hafogvatn.is

MARINE & FRESHWATER RESEARCH INSTITUTE

Partner Profile

The Marine and Freshwater Research Institute (MFRI) is a government institute under the auspices of the Ministry of Industries and Innovation. The institute employs around 190 staff, operates 2 research vessels and has 10 branches around the country, including an aquaculture experimental station. MFRI conducts various marine and freshwater research and provides the Ministry with scientific advice based on its research on marine and freshwater resources and the environment. MFRI is leading in marine and freshwater research in Icelandic territories and the Arctic, providing advice on sustainable use and protection of the environment with an ecosystem approach by monitoring marine and freshwater ecosystems. The main research priorities are research on marine and freshwater ecosystems, sustainable exploitation of main stocks, ecosystem approach to fisheries management, research on fishing technology and seafloor and habitat mapping.

Role in the project

The Marine and Freshwater Research Institute will contribute mainly to WP2 and WP3 but also to WP4 and WP5. The work will be carried out with other partners in an integrated manner, such as to standardising methodology, analysis of data and dissemination of findings. The contribution to WP2 will involve providing information about the status of mapping of the seafloor concerning physical (e.g. bathymetry) and biological (e.g. species composition and habitats) features. Further, the distribution of key pelagic species and oceanographic variables will be mapped in the water column. Species distribution models will be applied to predict the distribution of Vulnerable Marine Ecosystem indicators species on the seafloor, but also for key pelagic species. The MFRI contributes to WP3 by developing indicators of potential regime shifts and tipping points by examining spatial and temporal trends of several ecosystem components in relation to environmental forcing and human pressures. The tasks include 1) identifying the environmental drivers that influence the density, spatial and temporal patterns of baleen whales, 2) evaluating the effect of environmental forcing and human pressures on the long-terms trends in recruitment success of fish communities, and 3) analysing drivers that structure the long-term trends in shrimp biomass/distribution. The contribution to WP4 and WP5 involves examining the effect of climate and human pressures on seafloor and pelagic habitats. MFRI will also be the regional coordinator for the NE Atlantic.

Key personnel

Dr Stefán Áki Ragnarsson (male) (PhD from University of Aberdeen in 1995) has worked at the Demersal Division at Marine and Freshwater Research Institute (MFRI) of Iceland from1996 onwards. He has a broad research focus in marine ecology. His research has mainly focused on evaluating impacts of fishing activities and recently aquaculture on benthic communities and habitats, fish and habitat interactions, mapping of vulnerable benthic habitats and research related to ecosystem approach to fisheries. Highly involved in the work of ICES at many levels and several other international organisations. Wide-ranging experience with project management and been involved in a number of international projects, including those funded by the EU.

Dr Gísli A Víkingsson (male) has a degree in Biology, University of Iceland, Cand Scient in Zoology, University of Copenhagen and Doctor Philosophiae in Cetology from the University of Tromsø. From 1986 onwards, working on cetacean research at the Marine and Freshwater Research Institute (MFRI), Iceland, and head of the cetacean research unit (since 1998). In recent years, the focus has been on assessing the abundance and distribution of the large cetacean species in large-scale sightings surveys in cooperation with other nations in the Northeast Atlantic. Other research responsibilities include monitoring and sampling of cetaceans from whaling operations, maintaining a photo-identification catalogue, managing stranding observations and bycatch estimations and cooperation with scientists from other nations.

Dr Bjarki Þór Elvarsson (male) has BSc degree (2003) and MSc (2005) in Mathematics and PhD in Statistics (2015) from the University of Iceland. His professional career has been focused on statistical modelling of marine resources and ecosystems, in particular, the methodological developments for the Gadget modelling framework. He has participated in several national and international advisory committees (e.g. ICES, IWC and NAMMCO) and has been involved in the development of the advisory methods for a number of demersal fish and marine mammal species. He was the case study leader for Icelandic waters case-study of the European Framework 7 project MareFrame. He is currently employed at the MFRI as a researcher in the Demersal division.

Dr Hrönn Egilsdóttir (female) works for the MRFI. She has a MRes degree in Marine Biology from the University of Plymouth, England (2008) and PhD degree from the University of Iceland, awarded in 2017. Both the MRes and PhD work focused on the effect of ocean acidification and other environmental changes on physiology, species traits, ecological functioning and species distributions. Current work includes habitat mapping of benthic species on the Reykjanes Ridge. Hrönn is currently employed at the MFRI as a researcher in the Demersal division.

Experience - Relevant Publications

1. **Víkingsson GA**, Pike DG, Valdimarsson H, Schleimer A, Gunnlaugsson T, Silva T, Elvarsson BÞ, Mikkelsen B, Øien N, Desportes G, Bogason V (2015) Distribution, abundance and feeding ecology of baleen whales in Icelandic waters: have recent environmental changes had an effect? Frontiers in Ecology and Evolution 3: 1-18
2. **Víkingsson GA**, Elvarsson BÞ, Ólafsdóttir D, Sigurjónsson J, Chosson V, Galan A (2014) Recent changes in the diet composition of common minke whales (*Balaenoptera acutorostrata*) in Icelandic waters. – A consequence of climate change? Marine Biology Research 10: 138-152
3. **Ragnarsson SA**, Burgos JM (2018) Associations between fish and cold-water coral habitats on the Icelandic shelf. Marine Environmental Research 136: 8-15
4. **Ragnarsson SA**, Burgos JM, Kutti T, van den Beld I, **Egilsdóttir H**, Arnaud-Haond S, Grehan AJ (2017) The impact of anthropogenic activity on cold-water corals. Chapter in the book "Marine Animal Forest. The Ecology of Benthic Biodiversity Hotspots" Editors: Rossi S, Bramanti L, Gori A, Orejas Saco del Valle C. (Eds.)
5. **Egilsdottir H**, Noisette F, Noël M-LJ, Olafsson J, Martin S (2013) Effects of pCO_2 on physiology and skeletal mineralogy in a tidal pool coralline alga *Corallina elongate*. Marine Biology 160: 2103-2112

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Projects focusing on cetaceans including a) distribution and abundance Icelandic and adjacent waters (1987-2015), b) feeding ecology and energetics, c) migration and behaviour (photo-identification and satellite telemetry), c) age determination and reproductive biology and d) population ecology and providing stock assessments.
2. CoralFISH (2008-2013, FP7 grant. no. 213144). Assess the interaction between cold-water corals, fish and fisheries, in order to develop monitoring and predictive modelling tools for ecosystem-based management in the deep waters of Europe and beyond. http://eu-fp7-coralfish.net/
3. ATLAS (2016-2020, H2020 grant. no. 678760). Improve understanding of complex deep-sea ecosystems and their associated species, predict future changes to these ecosystems and species together in the face of climate change and approaches to translate science to management strategies and Blue Growth initiatives. https://www.eu-atlas.org.
4. NovasARC (2016-2018). Nordic Council funded. Mapping the distribution of VME indicator species and evaluation of fisheries impacts, http://novasarc.hafogvatn.is/
5. MareFrame (2014-2017). FP7. contract no. 613571. Advance the implementation of ecosystem-based fisheries management. http://mareframe-fp7.org/

Infrastructures and facilities

MFRI has the necessary infrastructure and facilities to be undertaken in this project.

1) Two highly equipped research vessels are used to carry out various research on the marine environment. This includes monitoring programs, such as annual or bi-annual assessment of fish stocks, zooplankton and phytoplankton and on physical environment (e.g. oceanography and seawater chemistry). Various other regular surveys are carried out to estimate whale densities and of benthic habitats and species. These research vessels can be fitted with various research equipment that enable accurate surveying of the seafloor, with respect to benthic habitats and seafloor properties.

2) Extensive datasets from monitoring projects that can be used in the present study. This includes data that will be used in the present study, on fish stocks, zooplankton and cetaceans, but also on oceanographic variables. There are also extensive data from mapping projects on seafloor bathymetry and on benthic habitats.

3) The institute has good research facilities, such as laboratories for biological and chemistry studies.

4) Scientists that have in-depth knowledge on the data-sets and on the Icelandic waters.

Participant No.	31
Short Name	TEMPLE
Country	USA
Organization Type	HEI
Website	www.temple.edu

Partner Profile

Temple University is a state-related research university located in Philadelphia, Pennsylvania, United States. Temple's College of Science and Technology houses the departments of Biology, Chemistry, Computer & Information Sciences, Earth & Environmental Science, Mathematics, and Physics. It is one of the largest schools or colleges of its kind in the Philadelphia region with more than 230 faculty and 4,000 undergraduate students. The Department of Biology at Temple University is a diverse department that teaches ~1500 undergraduate majors, runs multiple graduate programs including a PhD program in biology with research emphases in computational evolutionary genomics (computational biology), ecology, neuroscience, and cell/molecular biology. The Department hosts the Centre for Biodiversity which is involved in the research, education, and conservation of species. Research in the Centre for Biodiversity seeks to understand how species evolved (the tree of life), what currently exists (systematics and taxonomy), how species interact with each other and the environment (ecology), and how we can save species from extinction (conservation). The Centre hosts workshops and meetings that facilitate biodiversity and conservation science.

Role in the project

TEMPLE will interact with many of the iAtlantic workpackages and will increase the scope of the work to include the ecosystems of the east coast of the US through his leadership of the DEEP SEARCH research program (US BOEM, USGS, and NOAA OER). Through the partnership with this research program, TEMPLE will contribute data and expertise to compliment WP1 Atlantic Oceanography, WP2 Mapping Ecosystems, WP3 Ecosystem connectivity, and WP5 Impacts of multiple stressors and adaptive potential.

Key personnel

Dr Erik Cordes (male) has worked on the ecology of the deep sea for over 20 years, spending over a year at sea on over 25 research cruises and making over 35 dives in manned submersibles. His work is centred around the ability of organisms to shape their environment and increase habitat heterogeneity but has increasingly become focused on the ability for humans to impact these processes in the deep sea. He received his M.S. from Moss Landing Marine Labs, his PhD from Penn State University and was a post-doctoral fellow at Harvard University. Cordes is among the Pool of Experts for the ongoing UN World Ocean Assessment, the Chair of the Oil & Gas Working Group of the Deep Ocean Stewardship Initiative, and on the Board of Directors for a non-profit conference centre in New Hampshire.

Experience - Relevant Publications

6. Kurman MD, Gómez CE, Georgian SE, Lunden JJ, **Cordes EE** (2017) Intra-specific variation reveals potential for adaptation to ocean acidification in a cold-water coral from the Gulf of Mexico. Frontiers in Marine Science 4: 111
7. Quattrini AM, Gómez CLS, **Cordes EE** (2017) Environmental filtering and neutral processes shape octocoral community assembly in the deep sea. Oecologia 183: 221-236
8. **Cordes EE**, Arnaud-Haond S, Bergstad O-A, da Costa Falcao AP, Freiwald A, Roberts JM (2016) Chapter 42: Cold-Water Corals. In: The First Global Integrated Marine Assessment: World Ocean Assessment I. Eds: Inniss L and Simcock A, under the auspices of the United Nations General Assembly
9. Georgian SE, DeLeo D, Durkin A, Gomez CE, Kurmann M, Lunden JJ, **Cordes EE** (2016) Oceanographic patterns and carbonate chemistry in the vicinity of cold–water coral reefs in the Gulf of Mexico: implications for resilience in a changing ocean. Limnology and Oceanography 61: 648-665
10. **Cordes EE**, Carney SL, Hourdez S, Carney RS, Brooks, JM, Fisher CR (2007) Cold seeps of the deep Gulf of Mexico: Community structure and biogeographic comparisons to Atlantic equatorial belt seep communities. Deep-Sea Research I 54: 637-653

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. 2017-present: Program Manager, DEEP SEARCH Program. 5-year contract from US Bureau of Ocean Energy Management.
2. 2017-present: Pool of Experts, Second U.N. World Ocean Assessment
3. 2017-present: Restoration Planning Team, Deep Benthic Communities. NOAA Office of Response and Restoration
4. 2016: Co-Chair of Organizing Committee, 6th International Symposium on Deep-Sea Corals
5. 2014-2017: Coral Working Group, Gulf of Mexico Fishery Management Council

Infrastructures and facilities

Laboratory: Cordes' laboratory consists of 1800 sq. ft. of laboratory space, and two walk-in cold rooms are available for this project. The laboratories are fully equipped with standard small equipment, two fume hoods, ethernet connections, gas and air.

Computers: Cordes' facilities include four PC desktops with Windows Vista, a Mac Mini running two 32 Tb RAID5 servers, three iMac desktops, plus 4 laptop PCs operating in the offices and laboratories. One of the laptops is dedicated to the two

thermocyclers and the spectrophotometer. A dedicated 73 Tb server with full RAID backup redundancy is housed and maintained in the College. The lab also contains a scanner and an HP colour printer.

Office: Office space is available for all personnel working on this grant, and desk space is available in the laboratory for undergraduate researchers.

Major Laboratory Equipment: Equipment housed in the molecular side of the Cordes laboratory includes an Eppendorf Mastercycler Realplex thermocycler for quantitative PCR, an Eppendorf Mastercycler ProS thermocycler for standard PCR, a Nanodrop spectrophotometer, benchtop centrifuges, hotplates, a shaker-incubator, a hybridization oven, gel rigs and an imaging system, two -80°C freezers, a -20°C freezer, and a refrigerator. The wet lab contains a Mettler Toledo DL15 Potentiometric Titrator, an Ocean Optics USB4000 spectrophotometer, 2 pH meters, a muffle furnace, drying oven, Leica S6D dissecting microscope with attached Nikon D300 digital-SLR camera, Wild dissecting scope, two Zeiss compound microscopes and glassware. There are two 150-gallon marine aquaria used as a reservoir for all of the live corals currently housed in the laboratory, and a series of six experimental aquaria fully equipped to manipulate different aspects of the carbonate system.

Other Resources: Through the Department of Biology, and the Temple University Medical School, Cordes' group has access to a full spectrum of major equipment for molecular phylogenetic analyses; light, confocal, and electron microscopy; and technical assistance.

Participant No.	32
Short Name	GC
Country	Netherlands
Organization Type	SME
Website	N/A

GC

Partner Profile

Gianni Consultancy is a sole proprietor consultancy specialising in marine policy and international law, in particular in relation to the management of activities in the deep-sea. Gianni Consultancy has conducted research and provided technical, legal political and policy advice on matters related deep-sea conservation to a wide variety of governments, NGOs, intergovernmental organizations and EU institutions. Gianni Consultancy has been incorporated in the Netherlands since 2009 and is registered with the Amsterdam Chamber of Commerce (KvK/Amsterdam Chamber of Commerce number 52585775).

Role in the project

Gianni Consultancy will contribute knowledge of relevant EU and international political and regulatory bodies and processes to the iAtlantic project. GC will help formulate policy recommendations and contributions from the project to target fora – e.g. UN General Assembly, UN FAO, North and South Atlantic regional fisheries management organisations (RFMOs) and bodies (RFBs), the European Commission, European Parliament and other relevant EU institutions and EU Member States. GC will disseminate the results of the project to civil society organisations and other stakeholders as well as assist with capacity building on bringing science to policy-makers.

Key personnel

Matthew Gianni (male), director of Gianni Consultancy, is an independent researcher, consultant, advisor and advocate for marine conservation and provides political, legal and technical advice relating to fisheries conservation and management, marine biodiversity and oceans policy, law and governance to a range of governmental and non-governmental organisations. He co-founded the Deep Sea Conservation Coalition (DSCC) in 2004, a coalition of over 80 organisations worldwide that has successfully advocated for new regulations for the management of deep-sea fisheries in the high seas. Gianni continues to advise the DSCC on the implementation of UN General Assembly resolutions on deep-sea fisheries and over the past 5 years has also been advising the DSCC and others the development of deep-sea mining regulations by the International Seabed Authority. Gianni has been involved in international marine conservation negotiations at various UN Summits, the UN General Assembly, the UN Food and Agriculture Organization, a variety of regional fisheries management bodies and other fora for almost 30 years. He has authored a number of reports on deep-sea fisheries, marine biodiversity and oceans governance for the UN FAO, IUCN, governments and NGOs. Gianni has participated in a variety of UN FAO expert workshops and negotiations related to deep-sea and high seas fisheries and been a panellist at meetings of EU and intergovernmental fora on deep-sea conservation, including hearings of the Fisheries Committee of the European Parliament and meetings of the United Nations Informal Consultative Process on Oceans and Law of the Sea. He has also participated in meetings of the International Seabed Authority (ISA) since 2014 and in a number of workshops sponsored by the ISA on environmental regulations, regional environment management plans, criteria for determining preservation and impact reference zones and related issues. Gianni was a member of the Executive Committee of the North Sea Advisory Council (2006-2008), a partner in the FP7 MIDAS Project (2013-2016) and is currently a partner in the Atlas Project. Prior to working as an independent consultant, Gianni worked for Greenpeace International (1989-2002) and was the coordinator of Greenpeace International's Oceans Campaign from 1997-2002. Prior to his work with NGOs, Gianni was a commercial fisherman for 10 years.

Experience - Relevant Publications

1. Van Dover CL, Arnaud-Haond S, **Gianni M**, Helmreich S, Huber JA, Jaeckel AL, Metaxas A, Pendleton LH, Petersen S, Ramirez-Llodra E, Steinberg PE, Tunnicliffe V, Yamamoto H (2018) Scientific rationale and international obligations for protection of active hydrothermal vent ecosystems from deep-sea mining. Marine Policy 90: 20-28
2. Niner HJ, Ardron JA, Escobar EG, **Gianni M**, Jaeckel A, Jones DO, Levin LA, Smith CR, Thiele T, Turner PJ, Van Dover CL, Les Watling KMG (2018) Deep-Sea Mining With No Net Loss of Biodiversity--An Impossible Aim. Frontiers in Marine Science 5: 53
3. Van Dover CL, Ardron JA, Escobar E, **Gianni M**, Gjerde KM, Jaeckel A, Jones DO, Levin LA, Niner HJ, Pendleton L, Smith CR C, Thiele T, Turner PJ, Watling L, Weaver PPE (2017) Biodiversity loss from deep-sea mining. Nature Geoscience volume 10: 464-465
4. **Gianni M**, Currie DE, Fuller S, Speer L, Ardron J, Weeber B, Gibson M, Roberts G, Sack K, Owen S, Kavanagh A (2016) Unfinished business: a review of the implementation of the provisions of UNGA resolutions 61/105 and 64/72 related to the management of bottom fisheries in areas beyond national jurisdiction. Deep Sea Conservation Coalition
5. Bensch A, **Gianni M**, Greboval D, Sanders JS, Hjort A (2009)) Worldwide review of bottom fisheries in the high seas. FAO Fisheries and Aquaculture Technical Paper 522 (1): 145

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Partner in the EU Midas Project on the potential environmental impacts of deep-sea mining (2013-2016)
2. Partner in the ATLAS Project (2016-2020)

3. Working with the European Commission, Parliament and Council/Member States on drafting new EU legislation for the management of deep-sea fisheries in EU waters (2012-2016)
4. Development of regulations by regional fisheries management organisations in the Atlantic for the implementation of UN General Assembly resolutions for the management of deep-sea fisheries and participation in reviews by the UN FAO and the UN General Assembly of the implementation of the resolutions and related agreements (2016 – ongoing)
5. Working on the drafting and adoption of a Regional Environment Management Plan for the regulation of deep-sea mining along the Mid-Atlantic Ridge and the drafting of mining regulations by the International Seabed Authority (2014-ongoing).

Infrastructures and facilities

N/A

Participant No.	33
Short Name	SAEON
Country	South Africa
Organization Type	OTHER
Website	www.saeon.ac.za

Partner Profile

The South African Environmental Observation Network (SAEON), established in 2002, is an institutionalised network of departments, universities, science institutions and industrial partners. The vision was to establish a long-term in-situ environmental observation platform supporting the various mandates of the different participating organisations, and overall for the public good. SAEON seeks to coordinate and support long-term in-situ environmental observation systems through three tiers of stakeholder advisory committees - political, technical and operational. The Department of Environmental Affairs (DEA) and other relevant departments are members of the SAEON Advisory Board and Technical Steering Committee. SAEON is composed of six nodes that coordinate and facilitate observation and information systems for four biome-based terrestrial regions, the coastal zone (divided into three bio-geographic regions) and offshore-marine systems (divided into three Large Marine Ecosystems). In addition to its nodes, SAEON also coordinates and sponsors domain-specific data centres such as the Southern African Data Centre for Oceanography (SADCO), and the African Ocean Biodiversity Information System (AfrOBIS). Through its recently established seventh node, SAEON is involved in the development of Global Change Research Data Infrastructure. In addition, SAEON also runs a successful science education outreach programme that focuses on empowerment of science and mathematics teachers in secondary schools through training and involvement in observation projects.

Role in the project

SAEON will contribute to the management of research data generated by iAtlantic activities (WP7) through processing of data collected within the South African EEZ and the management of data collected by South African researchers in the conduct of any iAtlantic cruises or associated fieldwork. SAEON will work closely with Partner 9 UNI-HB to develop and implement the iAtlantic data management plan and explore routes to facilitate the push through of iAtlantic data to relevant ocean observatories and platforms (WP5)

Key personnel

Dr Wim Hugo (male) is the Chief Data and Information Officer for the South African Environmental Observation Network (SAEON) and part of its executive management. He is responsible for the provision of Earth and Environmental research data and decision support infrastructure in South Africa, working with a large number of stakeholders. He was until recently vice-chair of the ICSU World Data System and is currently a board member of CoreTrustSeal. In addition, Hugo is a member of the CoDATA task group for the preservation of scientific data in developing countries and is part of the team developing the GEO Data Management Principles and Implementation Guidelines. He contributes to data management guidance for the ILTER network and assists the South African National Research Foundation in the e-Infrastructure tasks of the Belmont Forum.

Experience - Relevant Publications

1. López-Ballesteros A, Beck J, Bombelli A, Grieco E, Lorencová EK, Merbold L, Brümmer C, **Hugo W,** Scholes R, Vačkář D (2018) Towards a Feasible and Representative Pan-African Research Infrastructure for GHG Observations, Environmental Research Letters 13(8): 085003
2. Mirtl M, Borer ET, Djukic I, Forsius M, Haubold H, **Hugo W**, Jourdan J, Lindenmayer D, McDowell WH, Muraoka H, Orenstein DE, Pauw J, Peterseil J, Shibata H, Wohner CC, Yu X, Haase P (2018) Genesis, goals and achievements of Long-Term Ecological Research at the global scale: A critical review of ILTER and future directions. Science of The Total Environment 626: 1439-1462
3. **Hugo W**, Hobern D, Kõljalg U, Tuama ÉÓ, Saarenmaa H (2017) Global Infrastructures for Biodiversity Data and Services. In: Walters M., Scholes R. (eds) The GEO Handbook on Biodiversity Observation Networks. Springer, Cham
4. **Hugo W** (Contributing Author) (2015) GEO Data Management Principles: Implementation Guidelines, GEO-XII – 11-12, Document 10.
5. Cilliers L, **Hugo W**, Malan N (2011) Coastal Spatial data Infrastructure in South Africa: The Needs of a Transforming Society in a Developing Country. Proceedings of the CoastGIS. Conference, Oostende, Belgium, September 2011.

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Development of South African Research Data Infrastructure for Global Change data access, integration of infrastructure with GEO and GEOSS.
2. Architecture and guidance development for international initiatives: GLOBIS-B, GEO, GEO-BON, ILTER, World Data System, SEACRIFOG
3. Contributions to and management of marine data systems in South Africa: SADCO, MIMS, OCIMS (in future)
4. Decision, Policy, and Planning Support Systems development for Risk and Vulnerability in South Africa

Infrastructures and facilities

Research data infrastructure facilities, software, and data services in Cape Town and Pretoria, South Africa. Team of 24 individuals, spread over systems development, infrastructure management, data curation, and data product development/ stakeholder engagement.

Participant No.	34
Short Name	OSU
Country	USA
Organization Type	HEI
Website	www.ceoas.oregonstate.edu

Partner Profile

The College of Earth, Ocean, and Atmospheric Sciences (CEOAS) of Oregon State University is a 56-year, internationally recognised institution that is a leader in the study of the Earth as an integrated system. It spans the natural science disciplines and creates strong linkages with the social sciences both within the college and university. CEOAS mission is to enhance scientific understanding of the planet on which we live through innovative and relevant research, creative and effective teaching, and significant and practical outreach and engagement in support of Oregon State University's role as a land, sea, space, and sun grant university.

Role in the project

OSU will participate in WP1 and support the development and execution of numerical experiments to elucidate the physical processes underlying the fertilisation of the coastal region of eastern South America and western Africa.

Key personnel

Prof Ricardo P Matano (male) holds a PhD in Atmospheric and Oceanic Sciences from Princeton University (USA). Presently he is a professor of physical oceanography at the College of Earth, Ocean & Atmos. Sc. of Oregon State University. His expertise is in numerical modelling of physical processes. Matano specialises in numerical modelling and has more than 30-years of experience in the study of the South Atlantic circulation. Matano also has expertise is in meso-scale dynamical processes and in shelf/deep-ocean interactions. During the last decade he has focused his research to the study of shelf/deep-ocean interactions.

Experience - Relevant Publications

1. **Matano RP**, Combes V, Piola AR, Guerrero R, Palma ED, Strub PT, James C, Fenco H, Chao Y, Saraceno M (2014) The salinity signature of the cross-shelf exchanges in the southwestern Atlantic Ocean: numerical simulations. Journal of Geophysical Research: Oceans 119: 7949-7968
2. Combes V, **Matano RP** ((2014) A two-way nested simulation of the oceanic circulation in the Southwestern Atlantic. Geophysical Research: Oceans 119: 731-756
3. Garzoli SL, **Matano RP** (2011) The South Atlantic and the Atlantic Meridional Overturning Circulation. Deep-Sea Research Part II 58: 1837-1847
4. **Matano RP**, Palma ED, Piola AR ((2010) The influence of the Brazil and Malvinas currents on the southwestern Atlantic shelf. Ocean Sciences 6: 983-995
5. **Matano RP**, Palma ED (2008) On the upwelling of downwelling currents. Physical Oceanography 38: 2482-2500

Experience - Relevant previous actions or activities, connected to the subject of this proposal

1. Upwelling and Cross-Shelf Exchanges in the Southwestern Atlantic. This 3-year project (2018-2020) has been financed by NASA and intends to identify the physical process controlling the exchanges between the deep ocean and the shelf regions of Brazil and Argentina. R. Matano PI.
2. Cross-shelf exchanges in the EBC/WBC system. This 4-year project (2017-2017) has been funded by NASA and focus on the interaction between the Agulhas Current and the shelf regions around Africa. R. Matano co-I.
3. Southern Ocean/Patagonia shelf interactions. This 3-year project (2016-2019) has been funded by the National Science Foundation and its goal is to investigate the physical processes controlling the mass exchanges between the Southern Ocean and the Patagonian shelf. R. Matano PI.
4. Natural Iron Fertilization from the Patagonian and South Georgia Island Shelves to the Open Waters of the Southern Ocean. This 3-year project (2015-2018) has been funded by the National Science Foundation. It focuses on the physical and biological processes underlying primary production in the Patagonian and South Georgia regions. R. Matano co-I

Infrastructures and facilities

Local computer cluster and access to super-computing facilities in national supercomputing centres.

4.2 Third Parties Involved in the Project

UEDIN

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
Subcontracts will be awarded on the basis of best value and capabilities of subcontractors. Due to the highly specialist expertise required these may be justified as single source subcontracts through the UEDIN procurement process. UEDIN will subcontract: the collation of observation data on humpback whales in the Sargasso Sea for inclusion in the timeseries analyses in Task 3.2 (€12,000). DUKE will contribute their expertise to the specific analyses and preparation of GIS layers and visualisations for the regions of interest maps Task 5.1 (€60,000) and facilitate workshops on the evaluation of the management scenarios produced in T5.3 (€63,186)	
Does the participant envisage that part of its work is performed by linked third parties	N
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	Y
The Department of Fisheries and Oceans Canada (DFO) will cooperate with the iAtlantic consortia under the terms of the 2016 "Administrative Arrangement between the Government of Canada and the European Commission for Cooperation between Researchers Funded Separately by the Government of Canada and Granting Agencies and the European Union's Framework Programmes for Research and Innovation" (the Administrative Arrangement). DFO will be regional coordinator for the NW Atlantic, contribute to WP1, WP2, WP3, WP4, WP6 and WP8 and work under the direction of UEDIN as project coordinator. The U.S. National Oceanic and Atmospheric Administration (NOAA) will cooperate with the iAtlantic consortia under the terms of the 2016 "Implementing Arrangement between the Government of the United States of America and the European Commission for Cooperation between Researchers Funded Separately by the United States and the European Union's Framework Programmes for Research and Innovation" (the Implementing Arrangement). NOAA will contribute to WP2, WP4 and WP8 and work under the direction of UEDIN as project coordinator The Université de Montréal (UM) will cooperate with the iAtlantic consortia under the terms of the 2016 "Administrative Arrangement between the Government of Canada and the European Commission for Cooperation between Researchers Funded Separately by the Government of Canada and Granting Agencies and the European Union's Framework Programmes for Research and Innovation" (the Administrative Arrangement). UM will contribute to WP3 and work under the direction of UEDIN as WP3 leader. Dalhousie University (DU) will cooperate with the iAtlantic consortia under the terms of the 2016 "Administrative Arrangement between the Government of Canada and the European Commission for Cooperation between Researchers Funded Separately by the Government of Canada and Granting Agencies and the European Union's Framework Programmes for Research and Innovation" (the Administrative Arrangement). DU will contribute to WP3 and work under the direction of UEDIN as WP3 leader. The Bermuda Institute of Ocean Sciences (BIOS) will cooperate with the iAtlantic consortia under the terms of the 2016 "Implementing Arrangement between the Government of the United States of America and the European Commission for Cooperation between Researchers Funded Separately by the United States and the European Union's Framework Programmes for Research and Innovation" (the Implementing Arrangement). BIOS will contribute to WP3 and work under the direction of UEDIN as WP3 leader.	

UWC

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
The stable isotope samples will be analysed by the NRF's iThemba Labs stable isotope facility, or the University of Cape Town Archeometry Department Light Stable Isotope Laboratory. The value of the analysis is approximately 8,800 Euros	
Does the participant envisage that part of its work is performed by linked third parties	N
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N

Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	N

IEO

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties	N
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	Y
Estrutura de Missão para a Extensão da Plataforma Continental (EMEPC) will provide access to the *Luso* ROV for deployment on the iAtlantic demonstrator cruise to support training transects and sample collection. The value of the 3rd party contribution is €250,000.	
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	Y
Ensenada Center for Scientific Research and Higher Education (CICESE) will contribute to WP1 and carry out time-series observations in the central South Atlantic and will support the inclusion of a zonal component in the South Atlantic Meridional Overturning Circulation ocean observation system. CICESE will collaborate with IEO in the delivery of Task 1.2	

UKRI-NOC

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	Y
UKRI will subcontract sequencing services for 18S rRNA and Cytochrome oxidase I (COI) sequencing from eDNA sampler collections from each study sit (€37,500)	
Does the participant envisage that part of its work is performed by linked third parties	N
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	Y
The Memorial University of Newfoundland (MUN) will cooperate with the iAtlantic consortia under the terms of the 2016 "Administrative Arrangement between the Government of Canada and the European Commission for Cooperation between Researchers Funded Separately by the Government of Canada and Granting Agencies and the European Union's Framework Programmes for Research and Innovation" (the Administrative Arrangement). MUN will contribute to WP2 under the direction of UKRI as WP2 Leader. Nova Scotia Community College (NSCC) will cooperate with the iAtlantic consortia under the terms of the 2016 "Administrative Arrangement between the Government of Canada and the European Commission for Cooperation between Researchers Funded Separately by the Government of Canada and Granting Agencies and the European Union's Framework Programmes for Research and Innovation" (the Administrative Arrangement). NSCC will contribute to WP2 under the direction of UKRI-NOC as WP2 Leader	

GEOMAR

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties	N
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	Y
The GEOMAR partner Instituto Nacional de Desenvolvimento das Pescas (INDP) will support the local organisation of the iAtlantic regional capacity building workshop, including local costs for catering and meeting infrastructure (€12,500).	

Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	Y
The Universidade de Cabo Verde (UCV) and Instituto Nacional de Desenvolvimento das Pescas (INDP) will contribute to WP3 and WP6	

UCL

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	N
Does the participant envisage that part of its work is performed by linked third parties	N
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	N
Does the participant envisage that part of the work is performed by International Partners (Article 14a of the General Model Grant Agreement)?	Y
The University of Adelaide will contribute to WP3 Task 3.2, conducting genomics and creating and analysing genome libraries. UA will work in collaboration with UCL as task leader.	

5. ETHICS AND SECURITY

5.1 Ethics

The research delivered by the iAtlantic project will be performed to the highest ethical standards and will comply with national and international legal and ethical rules concerning the handling of samples and data.

Research involving animals

iAtlantic WP1, WP2, WP3 and WP4 will make use of both new samples collected in iAtlantic research areas, and existing samples available from beneficiary labs. The iAtlantic partners providing and working with biological samples will ensure that their work complies with their national legislation and ethical principles and will ensure relevant ethical approvals and permits are in place prior to the start of their work.

The samples collected will include colony forming corals, gorgonians, black corals, sponges and other megabenthic organisms, which are the main habitat-forming species and VME indicator taxa in the Atlantic. Samples will also include other kinds of organism, including deep-sea gelatinous zooplankton (WP4). In all cases the sample procedures and sample conservation will take into consideration Directive 2010/63/EU on the protection of animals used for scientific purposes.

All scleractinian corals and some black corals belonging to the families Schizopathidae and Aphanipathidae are included in CITES Annex II listed species and as such the partners transferring and receiving scleractinian and black coral samples will fulfil CITES Article IV - Regulation of Trade in Specimens of Species Included in Appendix II and obtain a certificate from a Management Authority of the State of introduction prior to any work being carried out.

Research involving animals will also comply with the principles of Replacement, Reduction and Refinement. Those principles will apply throughout the project. Specifically, all iAtlantic experiments are designed to minimise the number of samples needed and those using live organisms are designed to minimise any stress to the specimens. All at sea sampling methods used in the project will rely on minimally invasive approaches (e.g. use of visually guided samplers on ROVs and manned submersibles) to minimise impact on seabed and water column communities.

The samples collected by WP1, WP2, WP3 and WP4 will also include potential Marine Genetic Resources that may be used beyond the project for the development of biotechnologies. The consortium will respect the "*exercise of due diligence*" required by Regulation (EU) No 511/2014 EU and Council Decision 93/626/EEC by following a rigorous protocol for sample traceability (see also WP7). This will include the collection of metadata for each individual sample, taxa identification, the GPS coordinates and the depth indicating whether samples were collected on the seafloor or in the water column. All metadata will be gathered through WP7 ensuring these potential resources are available for future academic or private research consortia. Making these data openly available will ensure that the data to comply with the Nagoya protocol and the Access and Benefit Sharing (ABS) obligations for samples collected in Exclusive Economic Zones.

For samples collected in ABNJ the iAtlantic project will run in parallel to the ongoing United Nations General Assembly negotiations to agree on a governance framework for the conservation of Biodiversity and ABS of MGRs. iAtlantic is therefore an opportunity to feed future Conservation and Management plans that will establish a framework for use of biodiversity data and to contribute to establishing a protocol for sampling, storing and using material collected in ABJN. This protocol will be designed to take account of the governance framework developed by the United Nations for Marine Genetics Resources.

Aspects related to research involving European and non-European countries

The iAtlantic consortium involves several non-European countries from the North West Atlantic (Canada, USA), North East Atlantic (Cape Verde), South West (Brazil, Argentina) and South East (South Africa) Atlantic.

Environment, Health and Safety

As mentioned previously, all scleractinian corals and some black corals belonging to the families Schizopathidae and Aphanipathidae are included in CITES Annex II listed species and as such the partners transferring and receiving Scleractinian and black corals samples will comply with CITES Article IV - Regulation of Trade in Specimens of Species Included in Appendix II.

The IUCN Red List of Threatened Species refer to 15 scleractinian corals with the status of Vulnerable, Endangered or Critically Endangered in the Atlantic. None of these species will be affected by the field work of iAtlantic as they are all shallow-water species occurring in areas that iAtlantic is not operating.

Two new technologies for sampling will be tested during the project: The MAPS eDNA sampler deployed from the Autosb6000 AUV and low-cost stereo camera systems. Furthermore, two analytical procedures will be also applied: machine learning approaches and hyperspectral imaging. None of the new technologies cause harm to the environment, indeed the technologies will enhance the scientific community's ability to further minimally invasive survey and sampling approaches.

Regarding marine protected areas, iAtlantic partners will comply with relevant national legislation related to the protected areas in national waters as well as with the international conventions for ABNJs. This will apply to the research cruises scheduled and samples collected in national waters. All necessary permits will be obtained before the start of the cruises.

The Project Office will ensure copies all permits and certificates relating to iAtlantic work will be catalogued and stored.

Health and safety

iAtlantic's work includes work onshore in laboratories and offshore on the substantial number of offshore expeditions the partnership has compiled. All activities, on land or sea, will be preceded with risk assessments to identify hazards and ensure measures to mitigate these hazards are applied. It is important to note that all vessels involved in iAtlantic activities are dedicated Research Vessels from the partner's countries and fully comply with national and international law related to safety and security at sea (i.e. SOLAS or the London Convention). European and national legislation (e.g. EU Directive 2009/13/CE or Directive 2013/54/EU) will be respected to ensure the Health and Safety of both crew and scientific staff involved in all iAtlantic operations at sea.

5.2 Security

The activities and expected results of the research proposed by iAtlantic do not raise any security issues

The project does not involve 'EU Classified information' as background or results.

6. Letters of Support

EXPERT ADVISERS	
1	GLOBAL OCEAN TRUST - TORSTEN THIELE
2	NATURAL HISTORY MUSEUM - DR GORDON PATTERSON
3	SCRIPPS INSTITUTION OF OCEANOGRAPHY - PROF LISA LEVIN
4	UNIVERSITY OF EAST ANGLIA - DR PHILLIP WILLIAMSON
5	IUCN – KRISTINA GJERDE – *SEE IUCN LETTER 8*
6	IOGP - WENDY BROWN – *SEE OGP LETTER 18*
ASSOCIATED PARTNERS	
GOVERNMENT AND POLICY	
1	ABIDJAN CONVENTION SECRETARIAT
2	BENGUELA CURRENT CONVENTION SECRETARIAT
3	BIRDLIFE SOUTH AFRICA
4	DEEP-SEA CONSERVATION COALITION
5	CONVENTION ON BIOLOGICAL DIVERSITY SECRETARIAT (CBD)
6	DEPARTMENT OF FISHERIES AND OCEANS (CANADA)
7	INSTITUTO NACIONAL DE DESENVOLVIMENTO DAS PESCAS (INDP)
8	INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN)
9	MINISTRY FOR ECOLOGICAL TRANSITION
10	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
11	SARGASSO SEA COMMISSION
12	WWF INTERNATIONAL
INDUSTRY	
13	AQUABIO TECH GROUP
14	AQUARIUM FINISTERRAE
15	BP PLC
16	CBBA SL
17	ECOTONE AS
18	ETME HYDRO ENGINEERING
19	INTERNATIONAL ASSOCIATION OF OIL AND GAS PRODUCERS (IOGP)
20	KONGSBERG MARITIME AS
21	ONEMIND DATA SCIENCE SA
22	PROOCEANO
23	TECNOLOGIA MARINA XIMO SL (MAREXI)
24	WOODSIDE ENERGY LIMITED
RESEARCH UNIVERSITIES AND INSTITUTES	
25	UNIVERSITY OF ADELAIDE
26	UNIVERSITY OF BARCELONA- SEABIRD ECOLOGY
27	UNIVERSITY OF CAPE VERDE
28	UNIVERSITY OF WELLINGTON - INTERNATIONAL CABLE PROTECTION COMMITTEE (ICPC)
29	DALHOUSIE UNIVERSITY
30	UNIVERSITY OF ICELAND RESEARCH CENTRE
31	OCEAN FRONTIER INSTITUTE - MEMORIAL UNIVERSITY
32	MARINE INSTITUTE - MEMORIAL UNIVERSITY
33	UNIVERSITY OF MONTREAL
34	NOVA SCOTIA COMMUNITY COLLEGE
OTHER	
35	AQUAVITAE PROJECT
36	BERMUDA INST OF OCEAN SCIENCES
37	CLASS PROGRAMME (UK)
38	EUROPEAN SPACE AGENCY (GEOSS)
39	MARINE BIODIVERSITY OBSERVATION NETWORK (MBON)
40	WHALES BERMUDA

6.1.EXPERT ADVISORS

1. Global Ocean Trust – Torsten Thiele

Torsten Thiele, Clara-Zetkin-Strasse 24, 14471 Potsdam, Germany

4 September 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend my support for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely, highly relevant and support the important work on ecosystem based management.

Global Ocean Trust and I have focussed on innovative finance for ocean ecosystem science and opportunities for blue growth related ventures and will be pleased to offer my expertise to the programme.

I would be delighted to contribute to the project's success as member of the iAtlantic Expert Advisory Board. I understand this will involve reviewing project documents and attending meetings to provide advice and guidance to the consortium in my area of expertise.

You have my support and best wishes for the success of this innovative project.

Yours faithfully,

Torsten Thiele

Founder, Global Ocean Trust

2. NATURAL HISTORY MUSEUM – Dr Gordon Patterson

Department of Life Sciences

Natural History Museum

London SW7 5BD, UK

28 August 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend my support for the H2020 Research and Innovation Project Proposal, *Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic)*.

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant. The data which will be generated from this project, specifically those which provide greater understanding of the Mid-Atlantic Ridge and deep-sea ridges off Brazil, will have direct relevance to the environmental assessment of deep-sea mining activities being targeted on these areas. This knowledge is vital in the development of sustainable and credible regional management plans being developed by bodies such as the ISA.

I would be delighted to contribute to the project's success as member of the iAtlantic Expert Advisory Board. I understand this will involve reviewing project documents and attending meetings to provide advice and guidance to the consortium on the science relevant to Deep Sea Mining, and management needs from a scientific perspective.

You have my support and best wishes for the success of this innovative project.

Yours sincerely,

Dr Gordon L J Paterson

Scientific Associate, NHM

3. SCRIPPS INSTITUTION OF OCEANOGRAPHY – Prof Lisa Levin

UNIVERSITY OF CALIFORNIA, SAN DIEGO UCSD

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

LISA A. LEVIN
SCRIPPS INSTITUTION OF OCEANOGRAPHY, MAIL CODE 0218
INTEGRATIVE OCEANOGRAPHY DIVISION
TEL: (858) 534-3579

9500 GILMAN DRIVE
LA JOLLA, CALIFORNIA 92093-0218
EMAIL: LLEVIN@UCSD.EDU

Aug. 7, 2018

RE: iAtlantic Project

Dear Professor Roberts:

This letter is to extend the support of Lisa Levin, Scripps Institution of Oceanography, for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and are highly relevant both to my research, and to several scientific networks with which I am involved. My research focus on the intersection of climate change and human activities on continental margin ecosystems is highly complementary. The missions of the Deep-Ocean Observing Strategy (DOOS), the Deep-Ocean Stewardship Initiative (DOSI) and the Global Ocean Oxygen Network (GO2NE), with which I am very involved, are complimentary as well.

I am pleased to offer expertise to the programme in the following areas: connection to international scientific resources, alignment with GOOS and DOOS including Essential Ocean Variable concepts, linkages with international policy efforts in BBNJ, Decade for Ocean Science, UNFCCC/IPCC, ISA, and FAO, and assistance with outreach, training and capacity building efforts in W. Africa and elsewhere.

I would be delighted to contribute to the project's success as member of the iAtlantic Expert Advisory Board. I understand this will involve reviewing project documents and attending meetings to provide advice and guidance to the consortium in the areas of benthic ecosystem structure, function and services.

You have my support and best wishes for the success of this innovative project.

Sincerely yours,

Lisa A. Levin
Distinguished Professor, Scripps Institution of Oceanography

4. UNIVERSITY OF EAST ANGLIA – Dr Philip Williamson

School of Environmental Sciences
University of East Anglia
Norwich NR4 7TJ

Dr Phil Williamson
p.williamson@uea.ac.uk
dir tel: +441603 593111

Professor Murray Roberts
Grant Institute: The King's Buildings
University of Edinburgh
James Hutton Road
Edinburgh EH9 3FE

4 September 2018

Dear Murray

RE: iAtlantic Project

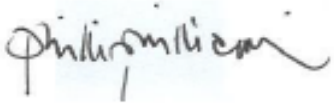
Thank you for not only sharing with me information on your iAtlantic proposal, to be submitted to the H2020 Research and Innovation Project (Integrated Assessment of Marine Ecosystems in Space and Time), but also for inviting me to chair the iAtlantic Expert Advisory Board. I have given your proposal careful consideration and wish to congratulate you on the project's strategic vision and the high quality team that you have brought together. I am therefore delighted to confirm my own involvement and support, and am honoured to accept the role of Expert Advisory Board Chair.

I am particularly impressed by the coordinated and novel approaches you have developed to assess ecosystem status, project future conditions and promote marine science-to-society activities in both the North and South Atlantic, reflecting the commonalities of the two ocean basins. As you will be aware, my own coordination work over the past ~25 years for the International Geosphere Biosphere Programme, the Natural Environment Research Council and the Global Ocean Acidification Observing Network has helped demonstrate the added value of well-planned international research effort (e.g. via the Joint Global Ocean Flux Study, the Global Ocean Ecosystems Dynamics project, and the Surface Ocean-Lower Atmosphere Study). Further policy-relevant experience has been gained through my advisory role with the UK Department of Environment, Food and Rural Affairs (Defra), and with the Intergovernmental Oceanographic Commission of UNESCO, the UN Convention on Biological Diversity, and the Intergovernmental Panel on Climate Change (Special Report on Ocean, Cryosphere and Climate Change).

I understand that chairing of the iAtlantic Expert Advisory Board will involve developing a well-informed and independent overview of the project – by reviewing relevant documents, attending meetings to provide advice and guidance to the project team, and assisting in the wider dissemination of project outcomes.

I greatly look forward to contributing to the project's implementation in this way, working closely with other Board members and yourself, and wish the iAtlantic proposal all success.

Yours sincerely



(Dr) Phillip Williamson

1. ABIDJAN CONVENTION SECRETARIAT

Division des Ecosystèmes / MCEB
Convention d'Abidjan - WACA

ONU environnement
Programme des Nations Unies pour l'environnement

o/Ref: iAtlantic/09/2018 -AB

Abidjan on 9th of September 2018

Dear Professor Roberts

The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region (Abidjan Convention), covers a marine area from Mauritania to South Africa, which has a coastline of just over 14,000 km. This UNEP Regional Seas Convention provides an overarching legal framework for all marine-related programmes in West, Central and Southern Africa. It has been ratified by 19 of its 22 signatories.

On behalf of the Abidjan Convention Secretariat I am writing to support the proposal for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). I also welcome the initial dialogue that iAtlantic Project Partners have already initiated with the Benguela Current Commission (BCC), the Benguela Current being one of three Large Marine Ecosystems that drive the dynamic resources of the West African marine environment.

In particular I appreciate the ambition of the project proposal to strengthen scientific knowledge and build capacity. This is a key subject of on-going negotiations to establish a legally-binding Implementing Agreement to the United Nations Convention on the Law of the Sea for Biodiversity `beyond National Jurisdiction. The Abidjan Convention supports such efforts. For example, forty five French and American scientists met in Galveston (Texas, USA) from 17 to 19 January, 2018 to study the issue of Sargassum. This was an international workshop organized by the Service for Science and Technology (SST) of the Consulate of France in Houston and shows how transatlantic work can help address issues of concern to African countries.

The Abidjan Convention also has a record of cooperation with the OSPAR Commission (the Convention for Environmental rotation of the North-East Atlantic) and works in international partnership with other sectoral organisations including the International Maritime Organisation and the South East Atlantic Fisheries Organisation (SEAFO). The Maritime Areas of the two Regional Seas Conventions together cover the Eastern Atlantic from the North Pole down to South Africa, with the exception of a small gap between the two.

Secrétariat de la Convention d'Abidjan,
Rue Harris Memel Fotêh, Deux-Plateaux Vallons,
01 B.P. 1747, Abidjan, Côte d'Ivoire
Tel +225 22 514 600 | abidjanconvention@unep.org
www.abidjanconvention.org

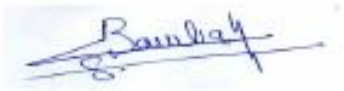
Division des Ecosystèmes / MCEB
Convention d'Abidjan - WACA

ONU environnement
Programme des Nations Unies pour l'environnement

This cooperation is vital not only for sharing of knowledge and experience between regions but it is also necessary to achieve a coherent implementation of the ecosystem approach which requires both conventions to look beyond their borders. I believe that projects such as iAtlantic can strengthen and support this integrated ocean governance.

Yours sincerely,

Abou Bamba



Executive Secretary
Abidjan Convention

Professor Murray Roberts
School of Geosciences
University of Edinburgh
Scotland, UK

Secrétariat de la Convention d'Abidjan,
Rue Harris Memel Fotêh, Deux-Plateaux Vallons,
01 B.P. 1747, Abidjan, Côte d'Ivoire
Tel +225 22 514 600 | abidjanconvention@unep.org
www.abidjanconvention.org

2. BENGUELA CURRENT CONVENTION SECRETARIAT

Dr Hashali Hamukuaya
Executive Secretary
Benguela Current Convention (BCC)
Private Bag 5031
1 Strand Street
Swakopmund, Namibia
6 September 2018

Prof Murray Roberts
School of Geosciences
University of Edinburgh
Scotland, UK

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of the Benguela Current Convention for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).
The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. In particular, access to the new scientific information and survey data that iAtlantic plans to collect from our region will enhance our work in sustainably managing and protecting the Benguela Current Large Marine Ecosystem.

In particular, iAtlantic's proposed programme of work will generate valuable new insights into the biodiversity, habitats, ecosystem functions and natural processes of the southeastern South Atlantic, and provide information on the vulnerability of these ecosystems to stressors and change. As well as collaborating on the scientific aspects, the BCC welcomes the opportunity for scientists from our member countries to engage with iAtlantic's capacity building activities, including partnering on research cruises, participating in technical workshops and training events, and exchanging knowledge and skills across a range of marine disciplines.

You have our support and best wishes for the success of this innovative project.

Yours Faithfully,

Dr Hashali Hamukuaya

•1 Strand Street •Private Bag 5031 Swakopmund •Tel: +264 64 406 901•Fax: +264 64 406904 •www.benguelacc.org•

BirdLife
SOUTH AFRICA
Giving Conservation Wings

BirdLife South Africa is a partner of BirdLife International, a global partnership of nature conservation organisations.
Member of IUCN (International Union for Conservation of Nature).
Reg No: 001 – 298 NPO
PBO Exemption No: 930004518

Dr Ross Wanless
BirdLife South Africa
Isdell House
17 Hume Road
Dunkeld West
2196
Johannesburg
South Africa

Dear Professor Roberts,

Re: iAtlantic Project

This letter serves to motivate our support for the ambitious H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). Our interests in marine ecology and conservation, primarily the protection of seabirds, are well aligned with the goals of the project.

Seabirds are recognized as being excellent ecosystem indicators. This means that the health of seabird populations reflects the health of the ecosystems. Monitoring seabirds can give scientists and conservationists insights into many important factors that underlie their ecology, including but not limited to fish stocks, environmental conditions, and climate change. Seabirds are the great global wanderers, with many species circumnavigating the globe between returning to land to breed each year. As global ecosystem indicators, seabirds are a necessary, even vital, inclusion in the iAtlantic project.

BirdLife South Africa manages the Atlas of Seabirds at Sea (AS@S), which is an open-access global database of at-sea observations of seabirds. These data are collected onboard vessels at sea by citizen scientists, using a rigorous and scientifically robust protocol to ascertain seabird distribution and abundance. The data collected for AS@S are useful for marine conservation planning, for example through the establishment of marine Bird and Biodiversity Areas (marine IBAs) or Marine Protected Areas (MPAs), as well as to measure ecosystem health.

Isdell House, 17 Hume Road
Dunkeld West, Gauteng 2196
Private Bag X16, Pinegowrie
2123, South Africa
Tel: +27 (0)11 789 1122
Fax: +27 (0)11 789 5188
Email: info@birdlife.org.za
www.birdlife.org.za

The iAtlantic project's research cruises provide a significant opportunity for data collection on seabirds via AS@S, as well as for collaboration between benthic, demersal, and pelagic scientists, and those working on different biological taxa, which will help to further our mutual understanding of the ocean. The inclusion of seabird and mammal observers on the research cruises will also increase the research productivity during the 'passage' periods, during which other research projects that require static sampling cannot collect their data.

We support the iAtlantic project proposal due to its potential for impactful results in the sphere of marine ecosystems and marine conservation. We wish you and the rest of the iAtlantic team success in your proposal, and look forward to opportunities to support the work through placing observers onboard the planned cruises.

Yours Sincerely

Dr Ross Wanless
Seabird Conservation Programme Manager
BirdLife South Africa

Isdell House, 17 Hume Road
Dunkeld West, Gauteng 2196
Private Bag X16, Pinegowrie
2123, South Africa
Tel: +27 (0)11 789 1122
Fax: +27 (0)11 789 5188
Email: info@birdlife.org.za
www.birdlife.org.za

Postbus 59681
1040 LD AMSTERDAM
Netherlands

7 September 2018

Dr. J Murray Roberts
University of Edinburgh
Coordtinator, iAtlantic Project
murray.roberts@ed.ac.uk

Dear Dr. Roberts,

We are writing to inform you that the Deep Sea Conservation Coalition (DSCC) would find the work of the iAtlantic project, should it go forward, to be of significant value and use to the work of civil society organsations related to the conservation of the deep-sea marine environment.

The DSCC is a coalition of over 80 organisations worldwide, including many based in Europe and the Americas. It was created to promote effective regulation of activities in the marine environment to prevent damage to deep-sea ecosystems. The DSCC works toward these ends in a variety of fora, including UN General Assembly oceans related processes, regional fisheries management organisations, the International Seabed Authority and EU regulatory processes and political fora.

The DSCC places strong emphasis on the importance of good science and international efforts to better our understanding of the biology and ecology of deep-sea ecosystems as a basis for regulating activities in the deep sea.

Sincerely,

Sian Owen
Global Coordinator
Deep Sea Conservation Coalition

United Nations Decade on Biodiversity

Ref.: SCBD/SPS/CSU/DC/JL/JA/87586 7 August 2018

Dear Mr. Roberts,

Thank you for informing the Secretariat of the Convention on Biological Diversity of the proposed *iAtlantic Integrated Assessment of Atlantic Marine Ecosystems in Space and Time* project. The activities of the proposed project are very much in line with objectives of the Convention on Biological Diversity, and would provide an important contribution to efforts to achieve the Aichi Biodiversity Targets. In particular, the elements of the proposed project would contribute to the achievement of Aichi Biodiversity Target 11 on area-based conservation, Target 14 on ecosystem services, Target 15 on ecosystem resilience to climate change and Target 19 on the advancement and sharing of science and technologies.

We are pleased to see that many of the proposed project's study areas overlap with a number of areas described as Ecologically or Biologically Significant Marine Areas (EBSAs) through the CBD process of regional workshops to facilitate the description of EBSAs. The project's proposed goal to enhancing understanding of the resilience of these areas to broad-scale changes in the marine environment can provide an essential basis to inform management efforts.

In addition, the project aligns with the Voluntary Specific Workplan on Biodiversity in Cold-water Areas within the Jurisdictional Scope of the Convention, which was adopted by Conference of the Parties to the Convention at its thirteenth meeting in 2016. We are also pleased to see that the proposed project's activities specifically respond to many of the monitoring and research needs for supporting the implementation of the voluntary specific workplan, as outlined in annex III of decision XIII/11 of the Conference of the Parties to the Convention.

We look forward to the initiation of this proposed project and to identifying potential areas of collaboration, with a view to facilitating the implementation of the Convention and the achievement of the Aichi Biodiversity Targets.

Yours sincerely,

David Cooper
Deputy Executive Secretary

Mr. J. Murray Roberts
Chair in Applied Marine Biology and Ecology
University of Edinburgh
Edinburgh, United Kingdom
E-mail: murray.roberts@ed.ac.uk

UN environment
United Nations Environment Programme

25 YEARS Convention on Biological Diversity SAFEGUARDING LIFE ON EARTH

Secretariat of the Convention on Biological Diversity
United Nations Environment Programme
413 Saint-Jacques Street, Suite 800, Montreal, QC, H2Y 1N9, Canada
Tel : +1 514 288 2220 Fax : +1 514 288 6588
secretariat@cbd.int www.cbd.int

6. DEPARTMENT OF FISHERIES AND OCEANS (CANADA)

Fisheries and Oceans / Pêches et Océans

Maritimes Region
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, NS B2Y 4A2

Région des Maritimes
Institut océanographique de Bedford
C.P. 1006
Dartmouth (N-É) B2Y 4A2

July 6, 2018

Prof J Murray Roberts FRSB
Head Changing Oceans Research Group
School of GeoSciences
University of Edinburgh
Grant Institute
James Hutton Road
Edinburgh
EH9 3FE

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Fisheries and Oceans Canada for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). Our research scientists Drs. Ellen Kenchington (marine ecology), Igor Yashayaev (physical oceanography) and Zeliang Wang (physical oceanography), all from the Bedford Institute of Oceanography, Dartmouth, Nova Scotia, have been identified as key participants in the project.

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast its change and identify regions under greatest threat are timely and highly relevant to our organisation, where at the national and international levels, we have identified key areas of concern:

1. Identification and protection of sensitive marine ecosystems, communities, species, and habitat;
2. The sustainable management of straddling and highly migratory fish stocks in the Atlantic and Pacific oceans, and the surrounding ocean ecosystems;
3. Ocean variability and climate change; and
4. Sustainable fisheries practices and harvesting strategies that consider a precautionary approach.

Bedford Institute of Oceanography
Institut océanographique de Bedford

St. Andrews Biological Station
Station biologique de St. Andrews

Canada

In our view we see iAtlantic as contributing directly to all of these bullets. Science in these research areas informs Canada's participation in regional management fisheries organizations, including the Northwest Atlantic Fisheries Organization (NAFO) and the International Commission for the Conservation of Atlantic Tunas (ICCAT). In addition, science informs the work of Departmental policy and management sectors as they endeavor to meet Canada's commitments and global conventions such as the Convention on Biological Diversity (CBD).

In particular the inclusion of a Canadian case study (Area 4 Scotian Shelf and Gully Canyon) solidfies our direct colalboration, commitment and common interest to the success of this project. This is an area where we have a long time series of oceanographic and biological data of direct relevance to the project. Consequently, I am pleased to offer expertise to the programme in the form of access to data, samples, and knowledge exchange. To the extent possible we will support the collection of new data/samples and cruise participation for the iAtlantic consortium through our ongoing Atlantic Zone Monitoring Program (AZMP) and Atlantic Zone Off-shelf Monitoring Program (AZOMP) annual cruises.

Specifically, our above named scientists will contribute to WP1 goals to identify regional physical processes dominating variability of the local ecosystem environment of Case Study 4 and broader global models; providing inter-annual to multidecadal ecosystem timeseries for WP3 which couples biological and oceanographic timeseries with the aim to assess the risks posed by future oceanographic changes on regional ecosystem dynamics and tipping points; and to WP2 where we will assist with the production of the Atlantic habitat map, predicting the distribution of habitats and functional traits at a variety of scales in locations where data are limited towards predicting the location of vulnerable marine ecosystems and ecologically or biologically significant regions in the Atlantic.

You have our collective support and best wishes for the success of this innovative project.

Yours faithfully,

Louise Laverdure
A/Director General
Ecosystem Science Directorate
Fisheries and Oceans Canada

Alain F. Vézina
Regional Director, Science
Maritimes Region
Fisheries and Oceans Canada

INSTITUTO NACIONAL DE DESENVOLVIMENTO DAS PESCAS

Instituto Nacional de Desenvolvimento das Pescas

Cova D'Inglesa- Dji De Sal, caixa postal 132, São Vicente- Cabo Verde

5th of august 2018

LETTER OF SUPPORT

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Instituto Nacional de Desenvolvimento das Pescas (INDP) for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. INDP has a long-standing cooperation with the German GEOMAR institute and is running jointly with GEOMAR the Cabo Verde Ocean Observatory (CVOO) since 2008. Since 2017 INDP and GEOMAR also operating the Ocean Science Centre Mindelo (OSCM) which serves as a logistical facility to support all kinds of marine and atmospheric research in West Africa.

We are pleased to offer expertise to the programme in the form of providing time-series data from CVOO to the iAtlantic consortium for scientific analysis. Furthermore, via OSCM we can provide logistical support for iAtlantic field work and any capacity building activities that may take place in the cabo-verdean region.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Maria Osvaldina Sousa Duarte Silva

/ President of INDP/

8. INTERNATIONAL UNION FOR CONSERVATION OF NATURE (IUCN)

IUCN
Rue Mauverney 28
1196 Gland
Switzerland

Tel. +41 22 999 0000
Fax +41 22 999 0002
mail@iucn.org
www.iucn.org

RE: iAtlantic Project

29 August, 2018

Dear Professor Roberts,

This letter is to extend the support of IUCN's Global Marine and Polar Programme for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic) and to recognize the role of Kristina Gjerde, our Senior High Seas Advisor, as a member of the iAtlantic Expert Advisory Board.

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to the international community that is engaged in the development of a new international legally-binding instrument for the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction, and in the midst of developing regulations to govern deep sea mineral exploitation in the international seabed Area. Both intergovernmental processes will benefit from the scientific advances gained from the project, in particular, seafloor mapping, understanding of cumulative impacts, and forecasting climate-related impacts, thereby contributing to the conservation of marine biodiversity and sustainability of marine operations. The iAtlantic project's inclusion of a training and capacity development component is particularly important to enhance understanding in key countries that are major players at the United Nations and the International Seabed Authority. As envisaged the project can also serve as an inspiration for and important contribution to the upcoming UN Decade of Ocean Science for Sustainable Development.

Kristina Gjerde, Senior High Seas Advisor for IUCN's Global Marine and Polar Programme would be delighted to contribute to the project's success as member of the iAtlantic Expert Advisory Board. We understand that this will involve reviewing project documents and attending meetings to provide advice and guidance to the consortium on the international legal and policy related aspects of the project and to assist in identifying opportunities for enhancing the direct policy engagement of the project at the United Nations, the International Seabed Authority and other relevant international fora in which IUCN is engaged.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

François Simard
Director ad-interim, IUCN Global Marine and Polar Programme

INTERNATIONAL UNION FOR CONSERVATION OF NATURE

9. MINISTRY FOR ECOLOGICAL TRANSITION

MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA

SECRETARÍA DE ESTADO
DE MEDIO AMBIENTE

DIRECCIÓN GENERAL DE
SOSTENIBILIDAD DE LA COSTA Y
DEL MAR

SUBDIRECCIÓN GENERAL
PARA LA PROTECCIÓN DEL MAR

Letter of Support to the research proposal "Integrated Assessment of Atlantic Marine Ecosystems in Space and Time-iAtlantic"

To whom I may concern,

We have been informed about the Research proposal "**Integrated Assessment of Atlantic Marine Ecosystems in Space and Time-iATLANTIC**", as submitted to the Horizon 2020 call "H2020-BG-2018-2020".

The Ministry for the Ecological Transition is very interested in the research activities foreseen by the iATLANTIC proposal, in particular in the role played by the Spanish Institute of Oceanography (IEO), which is a full partner of iATLANTIC and propose to lead two relevant multidisciplinary research cruises within the project. Three researchers from different IEO headquarters (Madrid, Tenerife and Mallorca) are involved in iATLANTIC covering oceanographic, geologic and ecological studies.

The main objective of the project is to align and integrate North and South Atlantic approaches to assess ecosystem status, forecasts ecosystem change and identify regions in the deep-sea and open ocean under greatest threat where management will be urgently needed. Within this vast context, we consider the objectives of IATLANTIC very relevant, as the project will produce important outputs contributing for instance to enlarge the existent mapped areas of the deep and open-ocean of the Atlantic ecosystems applying new technologies.

This will allow among others, to further identify vulnerable marine ecosystems and posible Ecologically or Biologically significant marine áreas (EBSAs), across the whole Atlantic. Moreover IATLANTIC aim to improve the assessment of the ecosystem status, working at different temporal and spatial scales (from local to basin scale), and contributing to assess the vulnerability and risks of the deep-sea ecosystems considering the future climate scenarios as well as scenarios of resource exploitation.

Other important aspects included in iATLANTIC as a BG project is the strong link with the industry as well as with regulatory and governmental stakeholders in order to be able to inform policy makers with the main aim to avoid adverse impacts and assure a sustainable exploitation on resources. We also appreciate the importance of capacity building across the proposal which will be also an important part of the two research cruises proposed by IEO within iATLANTIC.

Due to all the explained above, the Subdirectorate General for the Protection of the Sea, Ministry for the Ecological Transition (MITECO), expresses the support for this proposal.

THE COORDINATOR

Fdo. Mª Sagrario Arrieta Algarra

MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA
Secretaría de Estado de Medio Ambiente
Dirección General de Sostenibilidad de la Costa y del Mar

www.mapama.gob.es
buzon-proteccionmar@mapama.es

PZA. SAN JUAN DE LA CRUZ, S/N
28071 - MADRID
TEL: 91 597 6463
FAX: 91 597 6902

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Oceanic and Atmospheric Research
Office of Ocean Exploration and Research
1315 East-West Highway
Silver Spring, Maryland 20910-3283

Professor J. Murray Roberts
Head, Changing Oceans Research Group
School of GeoSciences
University of Edinburgh
Edinburgh, Scotland
EH9 3FE
UK

Dear Professor Roberts:

It is my pleasure to submit this letter of support for the proposal, Integrated Assessment of Atlantic Marine Ecosystems in Space and Time (iAtlantic), which addresses call topic BG-08 [B]-2018-2019, Assessing the status of Atlantic marine ecosystems. As the primary organization within the U.S. National Oceanic and Atmospheric Administration's (NOAA) focused on deepwater benthic areas as well as the pelagic ecosystem, there are numerous linkages between your proposal and our planned exploratory efforts in the coming years.

Throughout our relatively short history, NOAA's Office of Ocean Exploration and Research (OER) has conducted numerous expeditions to collect foundational information in support of NOAA's deep sea science and management efforts in the western Atlantic Ocean. Much of this work has focused on sonar-based mapping and deepwater remotely operated vehicle-based, characterization of the geology and biology of the canyons and seamounts found in the U.S. Exclusive Economic Zone within the western Atlantic Ocean, thereby enabling efforts to develop a systematic approach to establishing baselines for previously unknown and poorly known areas, which we intend to build upon.

We are now at the beginning stages of work associated with out next major Atlantic field campaign, the Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE). ASPIRE is a major multi-year, multi-national collaborative ocean exploration field program focused on raising collective knowledge and understanding of the North Atlantic Ocean. This initiative under the EU-US-Canada Atlantic Ocean Research Alliance will provide data to inform and support research planning and management decisions in the region.

Specific goals of ASPIRE are to:

- Improve knowledge of unexplored areas within the U.S. Exclusive Economic Zone (EEZ) and in deep-sea areas that have been mapped for the U.S. Extended Continental

Shelf Project to inform management needs for sensitive habitats, geological features, maritime heritage sites, and potential resources;

- Locate and characterize deep-sea coral, sponge, and chemosynthetic communities;
- Characterize water column habitats throughout the Atlantic basin using acoustics, visual observations, and emerging technologies;
- Enhance predictive capabilities for vulnerable marine habitats and submarine geohazards;
- Extend bathymetric mapping coverage in the U.S. EEZ and international waters in support of Seabed 2030;
- Increase understanding of deep-sea ecosystem connectivity across the Atlantic basin;
- Improve international collaboration and serve as a major contribution to the Galway Statement on Atlantic Ocean Cooperation and the Atlantic Ocean Research Alliance's deep-sea mapping and exploration efforts; and
- Leverage international partnerships to conduct coordinated exploration and mapping of priority high-seas areas of the North Atlantic, including the Mid-Atlantic Ridge.

The goals of ASPIRE are clearly aligned with the overall concept and objectives of the iAtlantic proposal and OER's planned activities most directly align with iAtlantic efforts to *map deep and open-ocean Atlantic ecosystems at basin, regional and local scales*. If your proposal is selected for funding we propose coordination of the activities among various vessels and entities to both build on existing baselines and establish new baselines for other poorly known areas. With appropriate lead-time, and assuming appropriate resources and working agreements[1] exist, we can organize multi-ship operations including complementary mapping and ROV investigations. We are confident our working together will result in additional high quality data and cost-savings to further our mutual goals and objectives.

We appreciate your proactive efforts to develop partnership opportunities and will look forward to hearing the results of the European H2020 competition. Good luck with the competition!

Sincerely,

Alan P. Leonardi, Ph.D.

[1] As in the past, the U.S. National Oceanic and Atmospheric Administration will cooperate with the consortia under the terms of the 2016 "Implementing Arrangement between the Government of the United States of America and the European Commission for Cooperation between Researchers Funded Separately by the United States and the European Union's Framework Programmes for Research and Innovation".

11. SARGASSO SEA COMMISSION

Prof J Murray Roberts FRSB
Head, Changing Oceans Research Group
Co-ordinator European H2020 ATLAS project
School of GeoSciences, University of Edinburgh
Grant Institute, James Hutton Road
Edinburgh EH9 3FE UK

31 August 2018

Dear Professor Roberts,

RE: iAtlantic Project

This letter is to extend the support of the Sargasso Sea Commission for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). The activities proposed that aim to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to the Sargasso Sea Commission.

The Commission is extremely supportive of this work. The overarching vision in this project is tremendous and the Commission is delighted to note that the Sargasso Sea is one of the 12 study areas - selected on the basis of oceanography, biological characteristics and likely importance to blue growth. The questions to be addressed include many of the key concerns of the Sargasso Sea Commission, whose mission – established by the 2014 Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea and now signed by 10 governments* - is the "Stewardship" of this unique high seas ecosystem.

The Commission notes that the project will look at the current status of the 12 areas in time and space; their likely resilience to change; the drivers of change and the ability of areas to maintain ecosystem functioning. Future management issues are an important component. Pelagic ecosystems from whales to plankton are the focus in the Sargasso Sea, the latter leaning heavily on the time series data sets at Bermuda Institute for Ocean Science (BIOS). The proposers have also made excellent links with relevant researchers, many of whom are formal Collaborating Partners with the Commission, including the Bermuda Humpback Whale project run by Andrew Stevenson who has a unique whale fluke

* Azores, Bahamas, Bermuda, British Virgin Islands, Canada, Cayman Islands, Dominican Republic, Monaco, UK and US

1630 Connecticut Avenue NW, Suite 300, Washington, DC, 20009.

identification set. The biological and oceanographic data will be used to test the model predictions from the Atlantic Viking20x model. Assuming that these data fit well with the model it is expected that the model will be able to predict future change with some accuracy. These issues are central to the Sargasso Sea Commission's detailed mandate given to it by the Hamilton Declaration to keep the "health, productivity and resilience [of the Sargasso Sea] under continual review."

The Commission was established in 2014, but since 2011 the Sargasso Sea Project, led by the Government of Bermuda, has been commissioning research and developing important links with scientists and with relevant regional and global organisations. The Commission will be pleased to share whatever relevant information it may have and to support this research project in any way that it is feasible.

This sort of large scale programme, bringing together oceanography, ecosystem dynamics, predictive modelling and appropriate management, all cast in terms of time and space, is at the cutting edge of modern research. The Sargasso Sea is a very special place and you have the wholehearted support of the Sargasso Sea Commission and our very best wishes for the success of this innovative project.

Yours sincerely

Dr David Freestone
Executive Secretary,
Sargasso Sea Commission

WWF for a living planet®

WWF International
Avenue du Mont-Blanc
1196 Gland
Switzerland

Tel: +41 22 364 9111
Direct: +41 22 364 J
Fax: +41 22 3640332
panda.org

10 September 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of WWF for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to WWF in support of our policy advocacy activities on e.g. CBD Ecologically and Biologically Sensitive marine Areas (EBSAs), the ongoing negotiations of a new legally binding instrument under UNCLOS to conserve and sustainably use biodiversity of areas beyond national jurisdiction (BBNJ), as well as in regional fora in which we advocate for integrated ecosystem based ocean management.

I am pleased to offer expertise to the programme in the form of knowledge exchange and policy advise, among other issues.

You have my support and best wishes for the success of this innovative project.

With my very best regards,

Jessica Battle

Senior Expert Global Ocean Governance and Policy

13. AQUABIO TECH GROUP

AquaBioTech Limited

Central Complex
Naggar Street,
Targa Gap, Mosta
MST 1761
MALTA G.C.

Tel: (+356) 2258 4100
E-mail: info@aquabt.com

Company Registration #: C22950 • VAT Number: MT 1517 0707 • Bankers: HSBC Bank (Malta) p.l.c • 1 August 2018

iAtlantic

Integrated Assessment of Atlantic Marine Ecosystems in Space and Time

Thematic: iAtlantic Associated Industry Partners

To: Neil Stewart | Moduys Research and Innovation
Cc: Miguel Hernandez | Oceanographic Institute of Spain

Dear Sirs,

in response to your invitation for associated industry partners, we would like to express our interest to participate to the project activities and contribute by providing our feedback and expertise when this will be requested.

Any results produced from the iAtlantic consortium that can help us assess socioeconomic impacts to fishery and aquaculture communities and activities would be of our interest.

Furthermore, in response to your request, find a list of activities we can offer within the project framework:

Aquaculture developments

Stakeholder engagement
Assess the impacts on current/future aquaculture activities

Marine Protected Areas

- policies, success stories, identification, management guidelines in relation to international treaties and local frameworks
- management and assessment indicator setting and estimates

Stakeholder identification management

- Major organisation in each bordering country
- Survey on stock take
- Workshops and stakeholder actions coordination in West Africa

Ecosystem services per type

- Fisheries (provisioning)
- MPA (supporting) - EUNIS classification
- Energy production (oil) (provisioning)
- Recreational (cultural)
- Habitat (included in general plan) (regulation/supporting)
- Climate regulation ((included in general plan) (regulating)
- Maritime transportation (supporting)
- Management and assessment indicator setting and estimates

Work to be accomplished includes:

- description
- mapping
- valuation
- effects of stressors analysed in project on their efficiency/externalities

Connection with other EU project funded initiatives:

Soclimpact project: Socioeconomic impacts of climate change. Among others within the project framework we have case studies of in European Outermost Regions (Azores, Madeira, Canary Islands. We would be able to contribute to capacity building or knowledge exchange and connect the on-going project with the iAtlantic proposal. http://soclimpact.org/

References and relevant work experience

- SOCLimpact - DownScaling CLImate ImPACTs and decarbonisation pathways in EU islands, and enhancing socioeconomic and non-market evaluation of Climate Change for Europe, for 2050 and Beyond (HORIZON 2020 Contract: 776661)

- TAPAS - Tools for Assessment and Planning of Aquaculture Sustainability is a four-year EU Horizon 2020 collaborative research project, which began in March 2016. It aims to promote and consolidate the environmental sustainability of the European aquaculture. http://tapas-h2020.eu/
- ARCH: Architecture and roadmap to manage multiple pressures on lagoons (7FP, Contract 282748)

- PEGASO: People for Ecosystem-based Governance in Assessing Sustainable Development of Ocean and coast (7FP, Contract 244170)

Thanking you in advance for your invitation as an associate industry partner. We invite you to contact us should you require any further information or clarifications.

Yours faithfully,

George D. Mantas
Business Development Director
AquaBioTech Group
www.aquabt.com

Central Complex
Naggar Street
Targa Gap, Mosta
MST 1761
Malta G.C.

Email / Skype: gdm@aquabt.com / gdm-abtg
Mobile: +356 9994 0835
Direct Line: +356 2258 4121

P "Please consider the environment before printing this e-mail"

14. AQUARIUM FINISTERRAE

Aquarium Finisterrae (Museos Científicos Coruñeses)
Excmo. Ayuntamiento de A Coruña
Paseo Marítimo Alcalde Francisco Vázquez, 34
15002 A Coruña

August, 10th 2018

Subject: support letter and declaration of interest in the EuH2020 proposal iAtlantic

Dear Professor Roberts,

this letter is to express our interest in the EU H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic), as well as to extend the support of the Aquarium Finisterrae.

A good number of the activities proposed to align and integrate North and South Atlantic approaches, and for instance to assess ecosystem status and forecast change and identify regions under greatest threat, are highly relevant to our organisation that is addressing since years the influence of the environmental factors and changes in different marine species. The expected outputs from iAtlantic will allow future environmental assessment projects of the Atlantic marine environment to have a deeper knowledge base, as well as the tools developed, both technological advances to capture data and advances in techniques for analyzing and evaluating the state of the environment ecosystem, will improve our research capacities, which are an obligation for Spanish public aquaria.

The Aquarium Finisterrae is specifically interested in:

- Collaborate in the acquisition of coral specimens for experimental purposes
- Participate in the design of the experimental set-ups that will be planned for the iAtlantic ex-situ experiments devoted to study the effects of multiple stressors in benthic organisms
- To be engaged in some of the experimental set-ups planned in iAtlantic to study the effects of the multiple stressors in benthic invertebrates (e.g. corals)
- To be enrolled, whenever possible in scientific cruises where the collection and maintenance as well as the experimental work with benthic animals on board will be planned
- Participate in some of the outreach actions planned in the project

The Aquarium Finisterrae has large experience harvesting deep-sea fauna and has been successful maintaining different species of benthic animals, among others cold-water scleractinian corals (e.g *Lophelia pertusa* and *Dendrophyllia cornigera*) as well as gorgonias (e.g. *Leptogorgia sarmentosa*). We have also design a large tank to maintain organisms alive on board that could be very useful within iAtlantic for some of the planned cruises. Further the Aquarium Finisterrae has large experience conducting experimental research with benthic organisms (including deep-sea) in our infrastructure.
For iAtlantic we can offer the use of our aquaria infrastructure for the performance of some of the planned experimental set-ups during around 6 to 7 months with dedication from aquarists from the

Ayuntamiento de A Coruña
Concello da Coruña

Aquarium Finisterrae. This work will be conducted in close collaboration with the Spanish Institute of Oceanography (IEO) that will support the set-up of the experiments as well as the whole process, visiting the Aquaria installations periodically.
This collaborative work will contribute to improve our research capacities and skills and enhance the internationalization of the institution. We are also really interested in to know more about the *in-situ* experimental work planned in iAtlantic, and learn more in the work conducted with lander and the deployment of sensors to measure in situ the environmental conditions around deep-sea benthic ecosystems.
From the other side we believe that our large experience in benthic invertebrate maintenance and the facilities we can offer to the project would be also of interest for the iAtlantic community.

Last but not least, we would be very interested in to participate in the General Assembly meetings during the project duration as well as in potential aside workshops dealing specifically with experimentation with benthic invertebrates *in-situ* and *ex-situ*. We also be happy contributing to the cruise planning preparatives and supply if it would be of interested some of our infrastructures, as it could be the case of the previously mentioned maintenance tank for organisms on board.

The participation of the Aquarium Finisterrae in this research project does not obligate the Aquarium Finisterrae to financially contribute to the project nor any financial commitment from the side of the A Coruña City Hall (local government).

You have our enthusiastic support and best wishes for the success of this innovative project.

Yours faithfully,

P.D.

Francisco Franco del Amo
Director Técnico *Aquarium finisterrae*
Museos Científicos Coruñeses
Excmo. Ayuntamiento de A Coruña
http://www.coruna.gal/mc2/es/aquarium-finisterrae

BP plc
S&OR, Lakeview,
Chertsey Road
Sunbury on Thames
Middlesex
TW16 7LN
United Kingdom
Tel: 44 (0)7787 523037
Mark.johnston@uk.bp.com

31st August, 2018

Letter of support for iAtlantic

Dear Sir/madam

We are most delighted to provide a letter support for the iAtlantic proposal. iAtlantic is unique in that it will bring together an innovative partnership to address the growing concerns and issues on ocean ecosystems, climate change on how society needs to plan for sustainable blue growth and how to manage these large ocean systems. Understanding the complex deep-sea ecosystem functions is fundamental to BPs global operations. With over 75% of our operations located within the marine environment, understanding the way marine systems work is critically important for improving the way we manage our activities and minimise our potential impacts.

We support the innovative, strong science-based and inter-disciplinary approach iAtlantic is taking. Making links between ecosystem function, and the ecosystem services and socioeconomic benefits we all get from the marine environment is fundamental to improved management and sustainability. Linking good science, with data sharing, with environmental policy development and improved maritime spatial planning must be complimentary at a regional level in order to achieve longer-term international sustainable development goals.

We support marine policy frameworks which help manage and minimise potential conflicts among marine activities, so long as they are flexible, transparent, developed in consultation with relevant stakeholders and underpinned by robust science. We also believe that the marine environment should be governed and managed for long term sustainable use, and improving the understanding of marine science and technology is critical to effective spatial and temporal management and protection of ocean ecosystems.

BP supports industry-wide marine research, and hence our wholehearted support for iAtlantic. This is of particular interest because:

- The work will be focusing on the functionality of the marine system, the connectivities and inter-relationships in a complex environment and the research will help significantly in the understanding of these systems and help improve the way we manage our environmental impacts.
- The Atlantic is of particular interest to BP due to a several significant offshore activities BP is currently involved in, notably in the Nova Scotia, Foz do Amazonas in NW Brazil, in our Tortue fields off Mauritania and Senegal, and our operations offshore in Angola, as well as other new prospects along the West African coast.
- We hope to share the data from our previous and current research activities from areas where we are operating with iAtlantic, and in addition the data from iAtlantic will be invaluable in helping us understand the marine environment in which we operate.
- The work will bring together international experts with clear trans Atlantic collaboration, and will bring together and strengthen the latest thinking in marine research and knowledge which can then be applied in a business context, both for BP and wider oil & gas global operations.
- Capacity building as part of iAtlantic will be of particular interest, not only in terms of providing opportunities for our staff and stakeholders to attend specific training activities, but also to support iAtlantic with internships. Internships which can provide iAtlantic

researchers the opportunity to spend time in company on marine research activities and viz versa.

- iAtlantic brings together an international team of experts who will have been proactive in ensuring that both its deliverables and planned activities align with business interests and ways of working. For more than ten years BP has worked within many of those involved in proposal and we have every confidence in their scientific rigour and approach which will be needed to ensure delivery and will deliver and enable constructive business participation.

We are also most delighted to be able to be a member of the iAtlantic Advisory Board, to discuss and contribute to stakeholder workshops, as appropriate. In addition, as BPs representative and Vice Chair the IPIECA biodiversity and ecosystem services working group, I am hoping that we will be able to share the key findings from these studies across the sector and explore opportunities for further collaborations and business involvement.

Yours faithfully,
for BP p.l.c.

Dr Mark Johnston
BP Group Ecology Expert & Technical Advisor
Environment, Social Responsibility and HSSE Compliance, S&OR

16. CBBA SL

CBBA

Centre Balear de Biologia Aplicada SL
C/ Lluc major, 18 (antiga C/ Capità Ramonell Bolx)
07006 Palma de Mallorca - Tel. 971 467 805 - Fax 971 771 446
a/e: cbba@cbba-online.com - web: www.cbba-online.com

Subject: support letter and declaration of interest in the EuH2020 proposal iAtlantic

Dear Professor Roberts,

this letter is to express our interest in the EU H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic), as well as to extend the support of Centre Balear de Biologia Aplicada (CBBA).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation, given that the information generated will allow future environmental assessment projects of the Atlantic marine environment to have a deeper knowledge base, as well as the tools developed, both technological advances to capture data and advances in techniques for analyzing and evaluating the state of the environment ecosystem, will improve the performance of the entity.

CBBA is specifically interested in:

The identification of new species of deep-sea invertebrates that may present bio active compounds potentially usable for different purposes (e.g. pharma industry), and that can be artificially synthesized. CBBA would be interested in to have access to collect fragments of specimens (e.g. sponges) for further analyses at CBBA and potential synthesis of bio-active compounds in our laboratory. This process will always strictly follow the European and Spanish regulations in order to accomplish with all legal and ethical requirements as the European Directive 2010/63/EU of the European Parliament and of the council of 22 September 2010 on the protection of animals used for scientific purpose and all the permits required will be obtained.

The advances within iAtlantic in the authomatisation of the underwater video and image analyses are one of the aspects very interesting for CBBA. We already have some expertise in video analyses, but we would be highly interested in improve our expertise in underwater video and image analyses. Consequently we will be very kin to attend to any potential workshops in these issues that could take place within the project as well as in the project meetings in order to follow the progresses in image analyses, improve our expertise and also share whenever it would be possible our own experience.

We actively work conducting studies of environmental impact in different frameworks (e.g. constructions of harbors, monitoring of marine protected areas, among others), for this reason, one of the main tasks of the iAtlantic proposal, the improvements in the evaluation of the state of the ecosystems, is of paramount interest for the CBBA. We are highly interested in following the development of new tools to assess environmental impact and ecosystem status, in order to adapt and apply those to the marine regions where we usually conduct our work.

Last but not least, we would be very interested in to participate in workshops with stakeholders and contribute if possible to the cruise planning preparatives.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Francisco Mir Massanet

Managing Director

CENTRE BALEAR DE BIOLOGIA APLICADA
C.I.F. B-07791454
Correo: C/ Lluc major, 18 Bjs.
Tel.: 971 46 78 05
Fax: 971 77 14 46
07006 PALMA DE MALLORCA

felab eurolab España

17. ECOTONE AS

ecotone

Ecotone AS
Postboks 1255 Torgarden
N-7462 Trondheim

Direct:: +47 911 89 395
web: www.ecotone.com
org. nr. 895.336.122

Professor J. Murray Roberts
University of Edinburgh

Date : 5th September 2018
Our ref. : IE
Your ref. : iAtlantic

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Ecotone for the H2020 Research and Innovation Project Proposal, *Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic)*.

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. Ecotone, having developed camera systems and associated software and methods for Hyperspectral Imaging under water (UHI), find your research proposal to be highly relevant to our focus areas, experience and application of our technology.

We are pleased to offer expertise to the programme in the form of supporting Ifremer and other relevant partners in their use of our technology, both related to practical applications during mapping of ecosystems, interpretation of data and presentation of results.

You have our full support and best wishes for the success of this innovative project.

Yours faithfully,
for Ecotone

Ivar Erdal
CEO

18. ETME HYDRO ENGINEERING

E.T.ME. LTD.
ENVIROMENTAL & HYDRAULIC WORKS CONSULTANTS

43 SINOPIS St., 115 27, ATHNES, GREECE
TEL +30 7473 427 – 210 7751 608, FAX +30 210 7473 488,
email: secretary@etme.gr

To: Modus Research and Innovation
To the attention of Neil Stewart
7-11 Melville Street
Edinburgh
EH3 7PE
United Kingdom

Subject: Letter of Support concerning iAtlantic project

Athens, August 8th, 2018

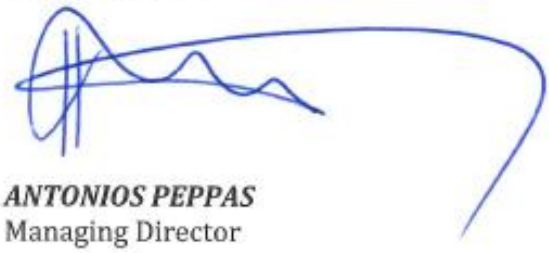
Dear Mr Stewart,

We would like to express our interest in regards to the results of the iAtlantic project as described in your confidential overview. As our company is developing under the SME Instrument Phase 2 Blue Growth funding scheme and Grant Agreement #784040 an offshore platform for full and integrated environmental, oceanographic and atmospheric measurements in the ocean, we have a strong interest in the following deliverables of your project:

- The sites that the deployment of a permanent monitoring sea platform can provide data of high value to the simulation and monitoring of the impacts of climate change to the ocean ecosystems.
- A qualitative (which parameters) and a quantitative (in percentage terms) assessment of possible benefits (real time data, model calibration, better understanding of ocean circulation and ecological processes) of a permanent moored monitoring platform in regards to the simulation models.
- The types of new sensors that should be used/proposed and the relevant measured parameters in such monitoring positions.
- The overall results and in particular of WP3 and WP4.

We hope you succeed in your proposal and we would be happy to collaborate in case you wish to explore the capabilities of our observation and monitoring sea platforms (www.floatmast.com).

Yours sincerely,



ANTONIOS PEPPAS
Managing Director

19. INTERNATIONAL ASSOCIATION OF OIL AND GAS PRODUCERS (IOGP)

International Association of Oil & Gas Producers

City Tower
40 Basinghall Street
14th Floor
London EC2V 5DE
United Kingdom

T +44 (0)20 3763 9700
F +44 (0)20 3763 9701
reception@iogp.org
www.iogp.org

Professor J Murray Roberts
Head Changing Oceans Research Group
School of GeoSciences
University of Edinburgh
Grant Institute
James Hutton Road
Edinburgh EH9 3FE

31 August 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of the International Association of Oil and Gas Producers (IOGP) as an industry partner for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). Our Environment Director, Wendy Brown, has been identified as our key IOGP participant in the project on behalf of our interested IOGP members which include BP, ExxonMobil, Equinor, Shell, Petrobras, Total and Woodside amongst others, whilst some members may also participate as individual companies.

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. Our participation in this project is fully consistent with our IOGP Environment Committee's mandate which includes undertaking scientific investigations, analyses and research to develop appropriate science-based risk management approaches. Anticipated opportunities for IOGP and interested members of our role as iAtlantic industry partner include to:

- raise awareness of the iAtlantic project and provide an interface between industry and the scientific community to enhance opportunities for industry involvement and sharing of results;
- take a positive active role in improving understanding of deep water marine ecosystems;
- contribute to the development of sustainable management measures for future economic activities in the Atlantic region;
- build capacity with regulators and other stakeholders about science based sustainable management approaches.

We are pleased to offer expertise to the programme in the form of the following areas of collaboration and common interest identified to date:

- Access to data (metocean, biological, chemical) from previous surveys undertaken by IOGP members in the iAtlantic study areas (data available in Areas 9, 10, and possibly others);
- Opportunities for iAtlantic project scientists to partner with IOGP member companies to the extent possible on planned future marine surveys in iAtlantic study areas during project period (Areas to be confirmed);
- Opportunities for IOGP member company representatives to take part in oceanographic cruises organized by iAtlantic partners, and work together in the definition of the marine surveys (especially off Area 10)
- Human capacity building opportunities in countries bordering the Atlantic on marine survey equipment and human expertise – funding and/or in-kind contributions from IOGP members to the proposed 'Atlantic Fellows scheme' agreed in principle with funding amounts to be determined if project moves ahead;

- Sharing of learnings and experiences with use of new technologies in iAtlantic project activities such as eDNA tools, autonomous and robotic systems, low-cost camera solutions, 'big data' enhanced analysis – potential interfaces with Joint Industry Programme on Environment Genomics.

Wendy Brown would be delighted to contribute to the project's success as a member of the iAtlantic Expert Advisory Board. I understand this will involve reviewing project documents and attending meetings to provide advice and guidance to the consortium on oil and gas industry activities and science based sustainable management approaches.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Gordon Ballard
Executive Director, IOGP

KONGSBERG

Who may concern

Deres ref/Your ref	*Referencia*	*Fecha*
	VC/DO	4th of July 2018

Kongsberg Maritime – Subsea

Subject: support letter and declaration of interest in the EuH2020 proposal iAtlantic

Dear Professor Roberts,

This letter is to express our interest and extend the support of Kongsberg maritime for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).
The goals and topics of the proposal are entirely within the interests of Kongsberg Maritime which is considered a benchmark company in the offshore industry, particularly in the development of underwater acoustics and marine systems.
Our concerns about a sustainable blue growth lead us to support, with our technology and experience, any well designed initiative looking for the insights of marine ecosystems since this knowledge will help us to minimize the impact of offshore activity through the improvement of our products. We are convinced that iAtlantic deserve all our collaboration to achieve the objectives of the proposal and we are aware of the importance of the targeted issues and the scientific and technical capacity of the participants as many of them are regular customers with a wide experience using our products.
We are willing to cooperate in the project providing support and access to our products as we are persuade that this collaboration will bring substantial benefits to the future technological development of marine devices for research and will help to show the full capacity and quality of our products to the scientific community and to the general public sector as well. Kongsberg maritime would be very pleased to include iAtlantis outcomes in our open forum for multibeam users (FEMME).

You have our support and best wishes for the success of this innovative project.

Yours faithfully,
Kongsberg Maritime AS

Vicente Carrasco
Subsea Sales Manager
Kongsberg Maritime

Kongsberg Maritime - Subsea
Strandpromenaden 50, NO-3183 Horten Norway
P.O.Box 111, NO-3191 Horten, Norway
Telephone +47 33 03 41 00 Telefax +47 33 04 47 53 www.km.kongsberg.com
Enterprise number 979750730

OneMind-DataScience

Plaza Alonso Martinez, N° 7, floor 4, office 45, Z.C. 09003, Burgos, Spain.

August, 22, 2018

Subject: support letter and declaration of interest in the EuH2020 proposal iAtlantic

Dear Professor Roberts,

This letter is to express our interest and extend the support of **OneMind-DataScience (hereafter OneMind)** for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic)

OneMind considered iAtlantic as an ambitious project an due to the extent of the field and experimental work, will be a challenging project in terms of data treatment, management and analysis. As **OneMind** works in the field of data analysis and statistical consulting, including advice and design of sampling and experimental protocols, selection of statistical test and analysis protocol, raw data entry, exploratory data analysis, post-processing, statistical modeling and data visualization, our company is highly interested in to collaborate in iAtlantic contributing to identify new trends and improvements in sampling design and new technologies of data analysis.

Moreover, iAtlantic include a large number of proposals and actions on capacity building, which fits also very well in one of the main activities of **OneMind**, as we offer different statistical courses and lectures from basic to higher levels. Thus, we offer from a starting point courses on statistical programming using the state-of-the-art data science software (R and Python), experimental design and introductory courses on classical statistical analysis like temporal series analysis, non-parametric statistics and analysis of ecological data, among others. From the advance perspective we go deep in the aforementioned analysis , adding several lectures in statistical modelling using linear/additive and mixed effects models and species distribution modelling. Beside this, we offer the chance to develop specific course "on-demand" that satisfies the full necessities of our client.

Summarising, we believe that **OneMind** could contribute to iAtlantic offering its extensive experience in sampling and experimental design for the different cruises planned, acting as advisor during the cruises preparative, and contributing with its expertise in data analysis, assessing the project partners in tasks related to data treatment and processing. Further, the experience of **OneMind** in statistical training could be also an interesting contribution from **OneMind** to iAtlantic.From our side, **OneMind** would be interested in establishing a direct contact with iAtlantic partners and be involved in project meetings related to data treatment, for instance potential workshops or meetings organized within WP7 (Data Management) as well as the general annual project meetings.Also, **OneMind** would be interested in contribute, if possible,to the cruise planning preparatives.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Dr. Antonio Canepa (OneMind Co-founder)

Dr(c) Patricia De La Fuente (OneMind Co-founder)

22. PROOCEANO

Julio Augusto de Castro Pellegrini

Avenida Rio Branco, 311/1205, Centro, Rio de Janeiro, 20.040-009, Brazil

06/09/2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Prooceano Serviço Oceanográfico e Ambiental Ltda., a CLS Group Company, based in Rio de Janeiro, Brazil, for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation, considering that by collecting these type of environmental data we will have the opportunity to correlate with all metocean data we use to work with, improving knowledge and understanding of Atlantic Ocean.

As interfaces to be highlighted, we can present:

- Regional Hydrodinamic numerical modelling;
- Ocean monitoring (physico-chemical and biological parameters) by using seagliders.

We are pleased to offer expertise to the programme in the form of knowledge exchange considering our experience in the South Atlantic region.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Julio A.C. Pellegrini

Diretor Geral

PROOCEANO

TECNOLOGIA MARINA XIMO SL (MAREXI)

Av. Da Beiramar 23, 36202, Vigo. Pontevedra. Spain

25 of July 2018

Subject: support letter and declaration of interest in the EuH2020 proposal iAtlantic

Dear Professor Roberts,

This letter is to express our interest and extend the support of MAREXI for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation, since MAREXI works in the development of marine technologies. The iAtlantic is highly challenging and ambitious, and we consider that the results that will be achieved within the project, will allow from one side to test some of the newest technological advances to work in the deep-sea, and also to identify the future technological needs of the different actors and entities that work in the marine environment (e.g. Universities, Research centers, Blue economy companies, etc ...). It will be of high interest for MAREXI to be part of this process and focus its efforts in identifying potential collaboration with stakeholders from the Academic and Industry sectors.

Marexi could contribute to iAtlantic offering its extensive experience in the development of marine technology, in various fields such as underwater image recording, image editing and postprocessing for habitat and species identification. Further MAREXI has experience in the development of algorithms for underwater image recognition, as well as in underwater acoustics and robotics.

Within the framework of the project iAtlantic MAREXI is interested in the advances in the authomatisation of the underwater video and image analyses including automatic image identification technologies. One of the novel research lines MAREXI is interested in is the development of technologies for the automatisation of *in situ* biological and physical analysis (e.g. measurements of dissolve oxygen, identification of microorganisms) and transmission of the results of the analyses through acoustic technology.

MAREXI would be also very pleased to participate in workshops with stakeholders and contribute if possible to the cruise planning preparations.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Iñaki Miniño Arbilla

Director

Please direct all responses/queries to:
Luke Smith
T: +618 9348 4588 F: +618 9214 2833
E: Luke.Smith@woodside.com.au

Woodside Energy Ltd.
ACN 005 482 986
Woodside Plaza
240 St Georges Terrace
Perth WA 6000
Australia
T +61 8 9348 4000
F +61 8 9214 2777
www.woodside.com.au

3/09/2018

Attn: Professor J Murray Roberts
Head Changing Oceans Research Group
School of GeoSciences
University of Edinburgh
Grant Institute
James Hutton Road
Edinburgh EH9 3FE

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Woodside Energy for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. Woodside has oil and gas interests in offshore West Africa and Ireland, and the knowledge from iAtlantic will broadly support the ongoing understanding and management of these offshore waters by governments, industry and non-government organisations.

Woodside is pleased to offer expertise to the programme in the form of an industry perspective and input, and data sharing where it would be beneficial to the program. Dr Luke Smith, our Chief Environmental Scientist and Adjunct Professor at University of Western Australia, can support this project. Luke has worked in numerous countries around the world, on projects to understand offshore biological and ecological features, and potential impacts of O&G activities upon them. Luke will be Woodside focal point for iAtlantic.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Jarrod Pittson

General Manager | Environment

Woodside Energy Ltd.
Woodside Plaza
240 St Georges Terrace
Perth WA 6000
Australia

T: +618 9348 5757
E: Jarrod.Pittson@woodside.com.au
www.woodside.com.au

25. UNIVERSITY OF ADELAIDE

THE UNIVERSITY OF ADELAIDE
AUSTRALIA

AUSTRALIAN CENTRE FOR ANCIENT DNA
SCHOOL OF BIOLOGICAL SCIENCES
FACULTY OF SCIENCES

DARLING BUILDING
UNIVERSITY OF ADELAIDE
AUSTRALIA SA 5005

TELEPHONE +61 8 8313-3952
www.adelaide.edu.au/ACAD
Gravatar: en.gravatar.com/acadedelaide

05/09/2018
Re – Letter of Support for *iAtlantic*

To whom it concerns,

I am writing to confirm my support for the EU consortium proposal *iAtlantic* and our collaboration with Dr David Thornalley at University College London. The Australian Centre for Ancient DNA (ACAD) is a world-leading laboratory that has extensive expertise in working with ancient DNA. ACAD is involved in a variety of genetic studies of long-term records of environmental change and human impact on biodiversity, ecosystems, and landscape stability. ACAD has experience working with diverse source materials, including sedimentary deposits (lake, river, marine), biominerals, ice cores, and animal and plant products.

I am engaged in work examining the suitability of marine sediment cores for ancient DNA (aDNA) analysis in a range of settings throughout the global ocean, and via collaboration with Dr Thornalley and *iAtlantic*, my group will extend this work to key sites within the Atlantic Ocean. The proposed work within *iAtalntic* complements our ongoing projects including studies in the Antarctic Ocean, which are also analysing aDNA in marine sediment cores to examine ecological changes.

In collaboration with Dr Thornalley, pilot aDNA work will be conducted on 6 Atlantic cores, first examining the preservation of aDNA in different sediment types, water depths and sediment age, before conducting more detailed analysis on the most suitable/promising sites. ACAD will lead the DNA analysis and bioinformatics analysis, in close collaboration with Dr Thornalley who will provide the necessary paleoceanographic, climate and ecological context. DNA will be extracted using protocols optimised for aDNA recovery from marine sediments, and metagenomic libraries prepared at our dedicated ultra-clean ancient DNA facility. Bioinformatic analyses will be performed using optimised computational workflows. This work will examine the (dis)similarity between broad community compositions at key time intervals identified from other paleoceanographic proxy work. This will be combined and compared with microfossil assemblage data to provide broader insight into past ecosystem changes.

Please contact me if you have any further questions.
Yours sincerely,

Prof. Alan Cooper
ARC Laureate Fellow
Sir Hubert Wilkins Chair of Climate Change
South Australian Scientist of the Year 2016 / 2017

Director
Australian Centre for Ancient DNA (ACAD) / Kanthipartuku trruku munana ngutulitya tudnunthi

Professor Alan Cooper, ARC Laureate Fellow
Email: alan.cooper@adelaide.edu.au Phone: +61 (0)8 8313 5950 /3952

UNIVERSITAT DE BARCELONA

B:KC Barcelona Knowledge Campus
Campus d'Excel·lència Internacional

Jacob González-Solís

Dept. de Biologia Evolutiva
Ecologia i Ciències Ambientals
Avda. Diagonal, 643
jgsolis@ub.edu

Tel.+34 934 034 802
Fax +34 934 035 740
08028 Barcelona

13th August 2018

Subject: **support letter and declaration of interest in the EuH2020 proposal iAtlantic**

Dear Professor Roberts,

This letter is to express our interest in the EU H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic), as well as to extend the support of the **Seabird Ecology Lab** from the University of Barcelona (https://www.researchgate.net/profile/Jacob_Gonzalez-Solis) to this project.

A good number of the activities proposed to align and integrate North and South Atlantic approaches, and for instance to assess ecosystem status and forecast change and identify regions under greatest threat, are highly relevant to our research line as we am addressing since years the influence of the environmental factors and changes in different seabird species. The expected outputs from iAtlantic will allow future environmental assessment projects of the Atlantic marine environment to have a deeper knowledge base, as well as the tools developed, both technological advances to capture data and advances in techniques for analyzing and evaluating the state of the environment ecosystem, will improve our knowledge of the Atlantic as a whole and especially increasing the current knowledge on the South Atlantic as well as our forecast capacity.

Some of the cruises planned within the iAtlantic will cover long navigation transits, such as the transit from **Usuahia to Cape Town** and from **Cape Town (or Walvis Bay) to Cape Verde**. These long transits offer on one side a unique opportunity **to perform census of seabirds** and increase knowledge on their distribution, abundance, migratory routes and movements during a period when many South Atlantic, subantarctic and Antarctic seabirds are actually migrating north. On the other side, the Cape Town/Walvis Bay to Cape Verde transit is a unique opportunity **to train Cape Verdean technicians in vessel-based seabird surveys and in seabird identification**.

Our team is one of the most active research groups studying seabird movements in the Atlantic, with a special emphasis in the central (including Cape Verde) and south Atlantic region, including the Southern Ocean. Our research applications are usually colony-based studies to deploying different sort of electronic devices on the birds in order to study their migratory and foraging movements. However, for a number of reasons our knowledge on seabird movement trough tracking is usually restricted to breeders, whereas possibly half of the seabird population is formed by immature birds that we know behave differently. In addition, there is a substantial number of seabird species that cannot be tracked, whose distributions and abundances are still poorly known. In this regard, **vessel-based seabird surveys are an excellent complement to our tracking data obtained from colony-based studies**. This data can also be combined with remotely-sensed measures of marine habitat, proxies of abundance and distribution of prey or human activities (particularly fishing) and other threats.

Moreover, we are currently leading part of a large project on seabird conservation in Cape Verde funded by the MAVA foundation and coordinated by BirdLife International. The first phase of the project will end up in December 2019, but it is expected to be renewed for three more years, ending in December 2022. One of the major components of this project is building capacity among technicians and scientists in Cape Verde. We are currently hiring 5 capeverdean technicians that are being formed in all the skills we usually undertake in colony-based studies. Nevertheless, by having the opportunity to participate in these transients, **these technicians would have a unique opportunity to be formed in vessel-based seabird surveys and in seabird identification**.

Therefore, we are specifically interested in be enrolled in the long transits considered within the research cruises of iAtlantic, specifically:

- We are interested in having two people, if possible, in the transit from **Usuahia to Cape Town**, with the main objective of **seabird censusing**. Having two people will allow us to cover most of the transit whereas if only one person is admitted, censusing will only be partially covered.

- We are also interested in having up to 4 people in the transit from **Cape Town**/Walvis Bay **to Cape Verde**. In this case the objectives are twofold: **seabird censusing and training capeverdean technicians** in vessel-based seabird surveys and in seabird identification**.**

From the other side we believe that our large experience on research in seabird biology and conservation can also be of interest for the iAtlantic community, since it can contribute to the objectives of the iAtlantic community in several ways:

- We can provide new information on the distribution and abundance of poorly know seabirds as well as on the distribution of seabird hotspots, which can contribute to identify ecologically relevant marine areas.
- We can provide training in vessel-based seabird surveys and in seabird identification to technicians from undeveloped countries and therefore contribute to the capacity building of the project.
- We can contribute to take scientific profit of the transit periods, which are necessary for undertaking the project but usually underused in term of scientific purposes, thus giving more sense to these long transits.

Last but not least, we would be very interested in participating in the General Assembly meetings during the project duration.

You have our enthusiastic support and best wishes for the success of this innovative project.

Yours faithfully,

Jacob González-Solís
Profesor, Departament de Biologia Evolutiva, Ecologia i Ciències Ambientals
Facultat de Biologia, Universitat de Barcelona

Universidade de Cabo Verde
Pró-REITORIA das Pós-Graduações e Investigação
Plateau, Praça António Lereno, CP - 379C, Praia Cabo Verde
Phone: (+238 33 40 406) | Fax: (+238 261 2660) | Ext. 437
www.unicv.edu.cv

Scientia vis est

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Universidade de Cabo Verde (UniCV) for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. *Being a small island developing state, Cabo Verde lacks the capacity to sufficiently assess the state of the marine resources and to gain knowledge about processes driving the resources.*

We are confident that the iAtlantic project will contribute significantly to a better understanding of the ecosystem on our doorstep. In particular, we would appreciate support from the iAtlantic consortium in helping us to develop capacities that enable us to conduct own hydroacoustic biomass observations in the future on our own.

We are pleased to offer expertise to the programme in the form of *gathering local expertise and knowledge that can contribute to an assessment of the local ecosystem. We will be also willing to provide local logistical support to any kind of potential iAtlantic activities that may take place in Cabo Verde in the future.*

At the moment, UniCV is implementing an international master programme about "Climate Change and Marine Sciences" at UniCV, which is part of the WASCAL programme (West African Science Service Centre on Climate Change and Adapted Land Use). The master programme, in which 2 students from each of the 11 West African member states will participate, will begin in spring 2019 and we foresee many synergies between iAtlantic and the WASCAL programme which will create a win-win situation for both sides.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Praia, 2018/09/05

Pro-Rector for Postgraduate and Research

Aristides R Silva

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

Professor Lionel Carter
Antarctic Research Centre,
Victoria University of Wellington,
PO Box 600,
Wellington, New Zealand.

18 August, 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Professor Lionel Carter of Victoria University of Wellington for the H2020 Research and Innovation Project Proposal, *Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic)*.

The activities proposed are to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. Such information will allow informed decisions to be made regarding wise and sustainable use of the ocean while protecting ocean ecosystems. This is particularly relevant with respect to current United Nations negotiations regarding Biodiversity Beyond National Jurisdiction.

My interests focus on the global network of subsea fibre-optic cables that underpin the Internet as well as accounting for over 95% of trans-oceanic voice communications and data transfer. In that context, a healthy ocean and efficiently functioning global communications network of exceptional socio-economic and strategic value.

I am pleased to offer expertise to the programme in the form of knowledge exchange – that knowledge being based, in the first instance, on peer-reviewed science and supported by working experience with subsea cables.

You have my support and best wishes for the success of this innovative project.

Yours faithfully,

Lionel Carter

Lionel Carter FRSNZ (Professor of Marine Geology).

DALHOUSIE UNIVERSITY

Dalhousie University
1355 Oxford St,
Halifax, NS, Canada, B3H 4R2
owen.sherwood@dal.ca
902-494-3604

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend my support for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to research in my Stable Isotope Biogeochemistry Laboratory, which is part of the Ocean Frontier Institute at Dalhousie University.

One of my research priorities is on reconstructing long-term ecological change in the oceans as recorded in sedimentary cores and in bio-archives such as cold-water corals. I employ novel geochemical techniques involving isotopic analysis of amino acids in organic materials to tackle problems in nutrient-plankton dynamics associated with climate forcing and its impact on the supply of export productivity to the benthos. In this respect, my research aligns with several of the proposed iAtlantic workplans including WP1 (Atlantic Oceanography and Ecosystem Connectivity), WP3 (Drivers of Ecosystem Change), and WP4 (Impact of Multiple Stressors).

I would be delighted to contribute to the project's success as member of the iAtlantic Expert Advisory Board. I am willing to lend my expertise and advice to the network of researchers working on the research themes identified above, particularly with respect to the mapping, collection and geochemical analysis of deep-sea biota (including cold-water corals), and on the use of geochemical data to inform climate-ecosystem prediction models. I understand that my nomination to the Advisory Board will involve reviewing project documents and attending meetings to provide advice and guidance to the consortium.

You have my full support and best wishes for the success of this innovative project.

Sincerely,

Owen Sherwood, PhD
Assistant Professor, Dalhousie Earth Sciences

FACULTY OF SCIENCE | *Department of Earth Sciences*
Life Sciences Building | Room 3613 | 1355 Oxford St | Halifax | NS | B3H 4R2 | Canada
902.494.3604 | CELL: 902.414.3812 | FAX: 902.494.6889 | owen.sherwood@dal.ca
DAL.CA

The University of Iceland's Research Center in Húsavík

Hafnarstétt 3

640 Húsavík

Iceland

http://rannsoknasetur.hi.is/husavik/husavik

Húsavík 2nd of September 2018

Letter of Support to : iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of The University of Iceland's research center in Húsavík for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. Photo-identification and Sighting data has been collected in Skjálfandi Bay since 2001 and the research center is also a partner in a Nordic Center of excellence: ARCPATH (https://ncoe-arcpath.org/) linking human activities with climate change and the ecosystem. We can provide humpback whale sighting data for the last 17 years, the main interest of the research center is research on marine mammals, especially cetaceans.

We are pleased to offer expertise to the programme in the form of sighting data of humpback whales for the last 17 years, capacity building and knowledge of exchange.

You have my support and best wishes for the success of this innovative project.

Yours faithfully,

Marianne Rasmussen

MEMORIAL UNIVERSITY
Newfoundland & Labrador, Canada
Department of Ocean Sciences

7 September, 2018

Professor Murray Roberts
Head Changing Oceans Research Group
School of GeoSciences, University of Edinburgh
Grant Institute, James Hutton Road
Edinburgh, EH9 3FE, United Kingdom

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Memorial University of Newfoundland for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). As you know, Memorial University leads the NSERC Canadian Healthy Oceans Network, which addresses conservation strategies for sustainable oceans, and is a co-lead on the Ocean Frontier Institute, which focuses on safe and sustainable ocean use. Both programs have significant research activity in the North Atlantic.

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. In particular, the iAtlantic focus on new approaches to ocean observation, particularly in the context of biodiversity, changing oceans, and seafloor mapping align perfectly with the research of many Memorial University faculty, and particularly with activities in CHONe and OFI. Indeed, we have projects on ecosystem functioning, tipping points, and indicators of change as major drivers of our program.

As a lead representative of my university and those major research programs I am pleased to offer expertise to the programme in the form of expert advice, potential student exchanges, shared sessions at major international meetings, and potential collaboration on data analysis and manuscripts of common interest. This approach has served us well on other programs such as ATLAS and in broad efforts to promote the Galway Statement though the Atlantic Ocean Research Alliance (AORA).

You have my support and best wishes for the success of this innovative project.

Yours truly,

Paul Snelgrove

Dr. Paul Snelgrove
University Research Professor

1 Marine Lab Road, St John's, Newfoundland, Canada A1C 5S7. * Tel: (709) 864-3709. * Fax: (709) 864-3220

MARINE INSTITUTE

Fisheries and Marine Institute
155 Ridge Rd
St. John's, NL
A1C 5R3
Canada

13 August 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of the School of Ocean Technology, Fisheries and Marine Institute of Memorial University for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities that propose to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organisation. As Atlantic Canada's largest university, Memorial University is committed to achieving national and global impact while fulfilling a special obligation to the province of Newfoundland and Labrador, for whom the maritime sector represents 35.7% of the provincial gross domestic product and 24.5% of the employment. Since the inception of the School of Ocean Technology (SOT) in 2007, ocean mapping has been an underpinning focus area, and the 2018 establishment of an Ocean Mapping Research Lab, through the Canada Research Chair program, significantly strengthens our research capacities. Current efforts aim at mapping ecologically and biologically significant areas along the Scotian and Newfoundland and Labrador Shelves to produce seafloor and habitat maps which support evidence-based management and monitoring of marine resources.

As such, we see clear areas of collaborations with iAtlantic, particularly with respect to local and regional scale habitat mapping as well as the identification of the spatial environmental drivers of ecosystems across scales. Through this collaboration, our aim is to help develop optimal standard approaches to the production of habitat maps that can facilitate comparisons across regions and improve management of common resources across national boundaries. Consequently, SOT, through funds awarded to the Canada Research Chair in Ocean Mapping, is pleased to fund one MSc or PhD student at Memorial University, and in collaboration with

researchers at Nova Scotia Community College and Fisheries and Ocean Canada, to work on building habitat maps for The Gully Marine Protected Area.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Paul Brett
Head, School of Ocean Technology

Université de Montréal

September 4, 2018

Prof. J. Murray Roberts, F.R.S.B.,
Head, Changing Oceans Research Group,
School of GeoSciences, University of Edinburgh,
Grant Institute,
James Hutton Road,
Edinburgh EH9 3FE, Scotland

Re: iAtlantic project

Dear Professor Roberts,

This letter is to indicate that I am fully supporting the EU H2020 – iAtlantic cooperative project, which aims at producing an assessment of the status of Atlantic marine ecosystems and identify regions and ecosystems under greater risk of substantial change. Combining ecosystems observations and integrated knowledge of physical and biogeochemical drivers, the project will not only enhance baseline knowledge of the status and dynamics of Atlantic ecosystems, but also determine regions with faster and larger changes that are more likely to undergo shifts and reach tipping points in ecosystem function over the next century. I am especially interested in Work Package 3 (WP3), which will look at the nature and drivers of the short and long-term changes in the Atlantic based on existing ecological time-series across the south and north Atlantic.

I also agree to become a member of the Scientific Advisory Council of the project and to participate in discussion meetings about specific questions as needed. The proposed capacity-building and training workshop organised midway through the project (spring 2021) aims at determining and defining relevant and appropriate statistical analyses and approaches for a better integration of all ecological time-series across the whole Atlantic. This event, to be held in Cape Verde, is of particular interest to me and I agree to contribute my expertise and run this workshop with the Work Package leaders, Lea-Anne Henry and Marjolaine Matabos.

I believe I can contribute something to discussions about the best ways of analysing the data collected in the course of the project, especially those that aim at comparing community surveys across survey times and determine the locations (sites) where important changes have taken place in ecosystems. A new and challenging objective will be to look at these temporal changes at different spatial scales throughout the Atlantic. I would be delighted to work with the people who have the data necessary to study these scale-dependent changes. This will add a new challenge to the iAtlantic endeavour.

With best regards,

Pierre Legendre, F.R.S.C.
Professor of quantitative ecology

Département de sciences biologiques
Université de Montréal
C.P. 6128, succursale Centre-ville
Montréal, Québec H3C 3J7, Canada

Courriel : Pierre.Legendre@umontreal.ca
Téléphone : (514) 343-7591
Télécopieur : (514) 343-2293
Page WWWeb : http://www.numericalecology.com/

nscc
Applied Research

Dr. Craig Brown
NSERC Industrial Research Chair: Integrated Ocean Mapping Technologies
Nova Scotia Community College
Ivany Campus, 80 Mawiomi Place
Dartmouth, Nova Scotia B2Y 0A5

21 August, 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Nova Scotia Community College (NSCC), and Dr. Craig Brown, NSERC Research Chair leading the Applied Oceans Research Group (AORG) at NSCC, for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our organization.

The core mandate of NSCC is to build Nova Scotia's economy and quality of life through education and innovation. NSCC has an expanding portfolio of ocean-related programs and activities across its 13 campuses, with the goal of responding to the needs of Ocean Sector Industries throughout the province of Nova Scotia and beyond. This includes the introduction of a new core graduate-level program in Ocean Technology in 2014 that complement other existing NSCC marine programs offered across a number of the provincial campuses. In addition, expansion of capacity and scope of applied research projects since 2000 has resulted in a multi-million dollar research operation at NSCC that is equipped to respond to the needs of the population.

The Applied Oceans Research Group (AORG) is based at the Ivany Campus in Dartmouth, Nova Scotia, and conducts applied research on a wide variety of topics associated with the development and application of ocean technologies to support offshore activities across the full spectrum of ocean sector industries. The research group focuses on the recognized needs for better ocean-floor science to benefit industry at regional, national and global scales. AORG are working closely with industry partners (technology companies and ocean-related end-user companies), along with Canadian government departments (e.g. Fisheries and Oceans Canada - DFO, Natural Resources Canada, Canadian Hydrographic Service) to develop novel technologies that will result in far greater observational and seafloor mapping capacity for a wide range of ocean activities. Specifically, AORG works along the R&D

Applied Research
Nova Scotia Community College
Email: craig.brown@nscc.ca

continuum, from the integration and validation of existing acoustic remote sensing technologies (i.e. multibeam sonar, sidescan sonar, synthetic aperture sonar), with more reliable data recording and processing, to incorporating new in-situ visualization processes and hardware (i.e. underwater camera systems), and seafloor sampling. Over the past four years, applied research awards of over $5 million have been secured within this field of research. We are therefore equipped with resources, facilities and expertise to support iAtlantic through capacity building and knowledge exchange.

We are pleased to offer expertise to the programme in the form of participation under iAtlantic WP2 (Mapping Ecosystems). NSCC AORG will support the activities of Task 2.2 (Regional scale habitat mapping) through collaboration with other iAtlantic Canadian partners (Memorial University and DFO). Currently funded AORG seafloor mapping projects in the Bay of Fundy and Scotian Shelf also align with Task 2.3 – Local scale habitat mapping, and Task 2.4 – New mapping technologies. The results from these NSCC applied research projects are of relevance to the proposed iAtlantic research activities, and NSCC offers to participate in international workshops to present these results and participate in knowledge exchange. The activities of iAtlantic will also be highly relevant to guide future R&D and seafloor mapping in Canada, and participation in the project will allow NSCC to engage with government and industry in Canada to advance this field of science. Participation in this way will therefore offer mutual benefits.

NSCC is also a founding member of the Canadian Ocean Mapping Research and Education Network (COMREN), a consortium of higher education institutions in Canada established to advance the field of seafloor mapping. Links between COMREN and iAtlantic would also offer multual benefits, and NSCC participation in iAtlantic will facilitate establishing links between iAtlantc researchers, and the wider COMREN network.

You have our support and best wishes for the success of this innovative project.

Yours faithfully,

Dr. Craig J. Brown
NSERC Industrial Research Chair

Dr. Alain Joseph
Director, NSCC Applied Research

Applied Research
Nova Scotia Community College

Email: craig.brown@nscc.ca

6.5.Other associate partners

35. AQUAVITAE PROJECT

Nofima
Norwegian Institute of Food, Fisheries and Aquaculture Research

To whom it may concern

Your ref.: Our ref.: LSH Tromsø, 27 August 2018

RE: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of Aquavitae for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic).

The activities proposed in iAtlantic to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our proposed activities, particularly in relation to the implementation of the Balem Statement and the establishment of collaborative links between member states.

Of particular relevance to Aquavitae are the activities in Work Package 1 of iAtlantic which proposes to quantify the present, and predict likely future velocity of environmental change (physical and biochemical properties) across the Atlantic Ocean. Of primary interest to Aquvitae are the iAtlantic sites situated adjacent to shelf seas, in which the world's aquaculture industry are located. These oceanic sites act not only as a significant nutrient source to the highly productive shelf seas, but also flush the shelf seas on a variety of time scales with oceanic waters, the physical and biochemical properties of which change on timescale dictated by natural variability and climate change, and are the subject of iAtlantic WP1 investigations.

We pleased to offer expertise to the iAtlantic in the form of knowledge exchange and collaborative efforts in ecosystem monitoring.

You have our support and best wishes for the success of this innovative project.

Yours Sincerely
Nofima AS

Philip James
Coordinator, AquaVitae application

Bermuda Institute of Ocean Sciences
Ferry Reach, St. George's, GE 01, Bermuda
Tel: (441) 297-1880; Fax: (441) 297-1880; http://www.bios.edu

To: Prof J Murray Roberts FRSB
School of GeoSciences
University of Edinburgh
Grant Institute
James Hutton Road, Edinburgh, EH9 3FE, UK

From: Prof. Nicholas R. Bates, Ph.D., D.Sc. (1), (2)
(1) Professor of Ocean Biogeochemistry
Dept. of Ocean and Earth Science (OES), University of Southampton
European Way, Southampton, SO14 3ZH, UK
(2) Senior Scientist and Director of Research
Bermuda Institute of Ocean Sciences (BIOS)
17 Biological Lane, Ferry Reach, St. Georges, GE01, Bermuda,
Tel. 1-441-297-1880; E–mail: nick.bates@bios.edu

Re: iAtlantic Project

Dear Professor Roberts,

This letter is to extend the support of myself, Professor Nick Bates of the University of Southampton, UK and Bermuda Institute of Ocean Sciences for the H2020 Research and Innovation Project Proposal, **Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic)**.

The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to both organisations that I represent. The project is highly relevant to the oceanography programs that I run as Principal Investigator including the U.S National Science Foundation projects Bermuda Atlantic Time-series Study (BATS) and Hydrostation S that have been investigating North Atlantic Ocean physics, chemistry and biology for the past thirty and sixty-five years, respectively. As a chemical and biological oceanographer, I have thirty-year experience of studying the ocean carbon and nutrient cycles, marine ecosystem change and ocean acidification of North Atlantic and other regions from the Southern Ocean to the Arctic.

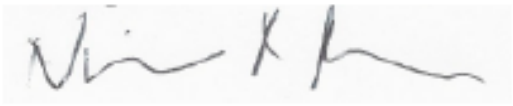
I pleased to offer expertise to the programme in the form of scientific collaborator and provision of scientific understanding for the iAtlantic project, i.e., access to shiptime, data, samples, capacity building, and knowledge exchange. My expertise would be helpful for the following work packages in particular.

1

For WP3, on Ecosystem Timeseries and Tipping Points, the BATS time-series for the Sargasso Sea will represent one of the key regions for understanding the drivers of ecosystem change. BATS provides open data access and context for analysing biological time-series (e.g., primary production, zooplankton biomass) over the past thirty years since 1988. Temporal changes in productivity, biomass, abundance will be assessed relative to physical oceanographic drivers using outputs from hindcasts of the VIKING20x oceanographic model, and signs of ecosystem tipping points (e.g., thresholds in productivity, biomass, abundance) identified. Such analyses provide critically needed information for predicting future ecosystem tipping points.

For WP4, the assessment of the effect of declining POC flux will be substantively aided by using BATS data in order to compare benthic and demersal ecosystem processes in eutrophic and oligotrophic abyssal study sites (e.g., a space for time study), as well as how shifts from diatoms to picoplankton (that may result from enhanced water column stratification and changes in the supply of nutrients to the eutrophic zone) will alter benthic systems.

Yours faithfully



Organization: Bermuda Institute of Ocean Sciences (BIOS)
Organization: University of Southampton

Date: 7 September 2018

National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

Professor Angela Hatton
Director, Science and Technology
National Oceanography Centre
European Way
Southampton SO14 3ZH
United Kingdom

Tel: +44 (0)23 8059 6017
Mobile: +44 (0)7880 788877
http://noc.ac.uk

Professor J. Murray Roberts – by email to murray.roberts@ed.ac.uk
Head of Changing Oceans Research Group
Co-ordinator European H2020 ATLAS project
School of GeoSciences
University of Edinburgh
Grant Institute
James Hutton Road
Edinburgh EH9 3FE

17 August 2018

Dear Professor Roberts

Re: **iAtlantic Project**

This letter is to express the support of the National Oceanography Centre (NOC) for the H2020 Research and Innovation Project Proposal "Integrated Assessment of Marine Ecosystems in Space and Time" (iAtlantic).

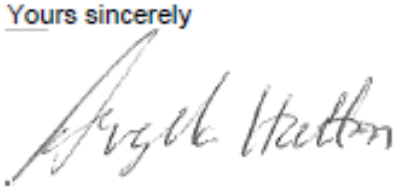
The NOC leads a multi-centre NERC National Capability Programme aimed at delivering the knowledge on the Atlantic Ocean needed by stakeholders working in this region, in order to help them make evidence-based decisions for management, conservation, exploration and economic development (Climate-Linked Atlantic Sector Science: CLASS). CLASS is a five year, £22.3M programme (2018-2023) combining top-level scientific research with its core activities of long-term ocean observation, world-class model development and state-of-the-art technology development in order to quantify and understand key climate regulation and ocean services, and to predict how the ocean will evolve as a result of climate change and intensified human exploitation.

The activities proposed in iAtlantic are timely and highly relevant to the CLASS programme, and to the NOC research mission as a whole, aligning well with both the CLASS science objectives and the NOC's long-term strategy. In terms of science, the CLASS objectives to study biological dynamics in a changing Atlantic Ocean, and to investigate seafloor disturbance and recovery, will find particular resonance with iAtlantic. The CLASS programmes of sustained observations coincide with several of the study regions in the iAtlantic proposal. For example, CLASS has planned repeat visits to the Porcupine Abyssal Plain, the Rockall Trough and Bay of Biscay, all within Region 2 (Rockall Trough to Porcupine), which will tie in with WP2 on mapping and WP3 on time-series analysis. Similarly, CLASS will conduct full-depth hydrographic sections across the Atlantic as part of the GO-SHIP programme that will align with WP1 on Atlantic oceanography and ecosystem connectivity. Finally, the technological innovations in terms of sensors and platforms, championed within the CLASS consortium, are strongly aligned with the work proposed in T2.4.

Hence the NOC is pleased to offer expertise to the iAtlantic programme in the form of access to datasets (e.g. from the Porcupine Abyssal Plain long-term observatory) and collaborative work on benthic and oceanographic studies. In particular, the CLASS consortium would be very happy to host colleague researchers from iAtlantic on board its research cruises. This way CLASS will support the iAtlantic research aims, but also its capacity building and knowledge exchange programmes (WP6) by offering berths to early career researchers or colleagues from institutes that do not have similar access to sea-going facilities or the high-tech observational equipment that is commonly used in the CLASS programme.

You have my full support and best wishes for the success of this innovative project.

Yours sincerely



Professor Angela Hatton
Director, Science and Technology
National Oceanography Centre

Date: 06 September 2018
To whom it may concern.

,
Subject: Letter of Support for the "Integrated Assessment of Atlantic Marine Ecosystems in Space and Time (iAtlantic)" project proposal.

The European Space Agency expresses keen interest in supporting the "Integrated Assessment of Atlantic Marine Ecosystems in Space and Time (iAtlantic)" project proposal in response to a European Commission's Horizon 2020 Blue Growth call for projects 'assessing the status of Atlantic marine ecosystems' and to benefit from the ESA contributions to the GEOSS Platform, in particular benefitting from developments resulting from the H2020 co-funded project EDGE (short for European Direction in GEOSS Common Infrastructure Enhancements), grant agreement No 776136 and other ESA contributions to the GEOSS Platform.

Given the scope and the importance of the endeavour that the iAtlantic strategic partners are pursuing, ESA considers that its inclusion, providing discoverability and accessibility of data and data products through the current and emerging mechanisms of the GEOSS Platform, is of added value to identified and possibly newly to be identified GEOSS Communities. As such, research outcomes, generated datasets and algorithms, together with the in-situ and ground-truthing data, will be evaluated for inclusion in GEOSS, thus supporting the growth of data resources within GEOSS and around thematic international communities. In turn, appropriate datasets available through GEOSS may be used to enable iAtlantic to meet its objectives.

Should the project proposal for the "Integrated Assessment of Atlantic Marine Ecosystems in Space and Time " be selected for funding, like any initiative interested, the project shall coordinate as soon as possible with the GEO Secretariat for formalizing the collaboration. Depending on the project needs, ESA - on a best-effort basis - will support the integration of the project results by leveraging the already existent and future GEOSS Platform instruments in coordination with the GEO Secretariat and other GEOSS stakeholders as relevant.

Sincerely,

J.G. van Bemmelen, ESA representative in GEOSS Platform Developments

Digitally signed by Joost van Bemmelen
DN: cn=Joost van Bemmelen, o=ESA, ou=ESRIN, email=joost.van.bemmelen@esa.int, c=IT
Date: 2018.09.06 15:17:21 +02'00'

LoSiAtlantic.docx
Page 1/1

European Space Agency
Agence spatiale européenne

From: GEO BON Marine Biodiversity Observation Network (MBON)
Frank Muller-Karger, University of South Florida

To: Murray Roberts, University of Edinburgh, UK

Subject: Letter of Support for the "Integrated Assessment of Atlantic Marine Ecosystems in Space and Time (iAtlantic)" project proposal.

Dear Dr. Roberts,

We hereby express MBON support and interest in the iAtlantic project.

This project is important for the Marine Biodiversity Observation Network (MBON) of the Group on Earth Observations Biodiversity Observation Network (GEO BON). Your project would make an important contribution to ecosystem understanding by collecting and providing coordinated field observations from a large number of ocean-scale monitoring programs, which also focus on better aligning North-South marine observation capacities in the Atlantic Ocean, an MBON focus (Pole to Pole or P2P campaigns). By providing climate-based predictions of areas under greatest change and efforts to ground truth the concept of ecosystem tipping points and critical threshold values, iAtlantic can supplement MBON's efforts in understanding, predicting and protecting marine ecosystems. We value the potential and evolution of platforms to provide new information on ecosystem biology through hyperspectral imaging and autonomous collection of eDNA.

There are several areas where we see important interactions between MBON and iAtlantic. Specifically:

-The data from iAtlantic will be an important contribution to OBIS Brazil within the project timeframe. MBON can advise on requirements for both observation and data working closely with your team.

-iAtlantic Advisory Committee: The MBON co-chairs would welcome working with iAtlantic as part of the Science Council, if you can cover related costs.

-MBON Working Group of GEO BON: We invite the iAtlantic leadership team to participate actively in the MBON Working Group of the GEO BON. This could be as advisors, in developing capacity building programs, offering presentations at meetings and webinars and other outreach efforts, and facilitating the distribution of documentation on methods, standards, etc.

-OBIS and GOOS outreach: The MBON, OBIS, and GOOS have developed a formal collaboration intended to promote the observation of life in the ocean as part of the Global Ocean Observing System, and to facilitate the interoperable linkages between the OBIS

datasets and other databases. MBON will work with iAtlantic to facilitate active linkages between your observing elements and OBIS.

We emphasize that we strongly support the iAtlantic proposal, and look forward to see the project engaged in the MBON process.

Respectfully,

Frank Muller-Karger
Co-Chair, Marine Biodiversity Observation Network
University of South Florida
carib@usf.edu

40. WHALES BERMUDA

Whales Bermuda

3 Mill Shares Road,

Pembroke HM 05

Bermuda

August 30th 2018

Dr. Lea-Anne Henry
School of GeoSciences, Grant Institute
King's Buildings, James Hutton Road
Edinburgh, UK
EH9 3FE

RE: iAtlantic Project,

Dear Professor Henry,

This letter confirms the support of myself, Andrew Stevenson of Whales Bermuda for the H2020 Research and Innovation Project Proposal, Integrated Assessment of Marine Ecosystems in Space and Time (iAtlantic). The activities proposed to align and integrate North and South Atlantic approaches to assess ecosystem status, forecast change and identify regions under greatest threat are timely and highly relevant to our own work.

Humpback whales are observed in Bermuda waters from late December to mid-May, a wider time window than previously thought. Challenger Bank, an open-ocean seamount fifteen miles SW of Bermuda, is one of many seamounts on the humpbacks' migratory route. Dedicated research (2007-2018) on Challenger Bank and around the Bermuda platform has provided a carefully curated catalogue of almost 1,500 individual humback fluke IDs. Additional annual re-sightings (n=200+) of the same individual humpback in different years providing iAtlantic's WP3 on Ecosystem Drivers of Change and Tipping Points with data needed for mark-recapture models to assess whether cohorts maintain fidelity to a fixed migratory route and timetable, and to measure changes in population size over time. The relevance of the iAtlantic research to our own research is significant in the protection of sensitive marine ecosystems, the humpback species and habitat, ocean variability and climate change.

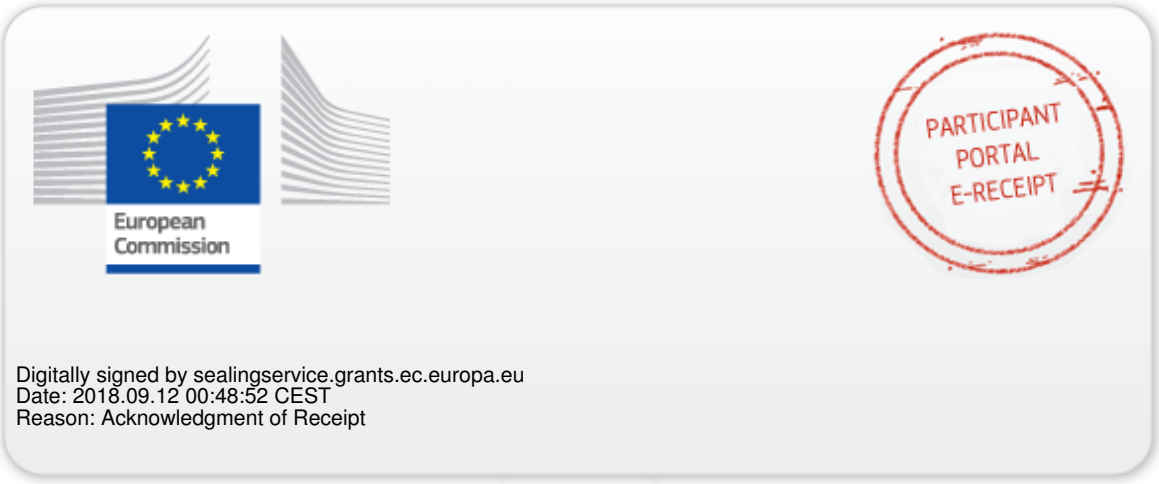
I am pleased to offer my expertise in the collection and re-analysis of humpback IDs included in my catalogue to assess the total population of humpbacks in the North Atlantic as a baseline study to determine the overall health and size of this population.

You have my support and best wishes for the success of this innovative project.

Yours faithfully,

Andrew Stevenson

www.whalesbermuda.com



This electronic receipt is a digitally signed version of the document submitted by your organisation. Both the content of the document and a set of metadata have been digitally sealed.

This digital signature mechanism, using a public-private key pair mechanism, uniquely binds this eReceipt to the modules of the Participant Portal of the European Commission, to the transaction for which it was generated and ensures its full integrity. Therefore a complete digitally signed trail of the transaction is available both for your organisation and for the issuer of the eReceipt.

Any attempt to modify the content will lead to a break of the integrity of the electronic signature, which can be verified at any time by clicking on the eReceipt validation symbol.

More info about eReceipts can be found in the FAQ page of the Participant Portal. (http://ec.europa.eu/research/participants/portal/page/faq)