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iAtlantic

INTEGRATED ASSESSMENT OF ATLANTIC
MARINE ECOSYSTEMS IN SPACE AND TIME



**Belém Statement on
Atlantic Research and Innovation Cooperation
Conference in Lisbon on 13-14 July 2017**

FOR THE
EUROPEAN UNION

FOR THE DEPARTMENT
OF SCIENCE AND
TECHNOLOGY, A
GOVERNMENT
DEPARTMENT OF THE
REPUBLIC OF
SOUTH AFRICA

FOR THE MINISTRY OF
SCIENCE,
TECHNOLOGY,
INNOVATIONS AND
COMMUNICATIONS OF
THE FEDERATIVE
REPUBLIC OF BRAZIL

Carlos Moedas

Commissioner for
Research, Science and
Innovation

Naledi Pandor

Minister of Science and
Technology

Gilberto Kassab

Minister of State for
Science, Technology,
Innovations and
Communications

Realising the mutual benefit that would accrue from **linking research activities in the South Atlantic and Southern Ocean with those in the North Atlantic**, and **exploring synergies with other initiatives** such as the interdisciplinary Atlantic Interactions Research Agenda and the AIR Centre; the Joint Programming Initiatives, the Strategic Forum for International Science and Technology Cooperation, the European Union's Earth Observation and Monitoring programme - Copernicus, and the Benguela Current Commission;

Increasing operational efficiencies by optimising the appropriate use and **sharing of research infrastructures**, and **access to and management of data and platforms**; together with **emerging methods of data science**; and,

Further **developing common understanding and deepening scientific knowledge** of marine ecosystems and the interrelations between oceans and climate change, oceans and food, and oceans and energy systems, as well as the dynamics of the Atlantic Ocean and its interconnected Circulation Systems from Antarctica to the Arctic.



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TOPIC : All Atlantic Ocean Research Alliance Flagship

Topic identifier: BG-08-2018-2019

Publication date: 27 October 2017

Types of action: CSA Coordination and support action

DeadlineModel: single-stage

Planned opening date: 31 October 2017

Deadline: 13 February 2018 17:00:00

Types of action: RIA Research and Innovation action

DeadlineModel: two-stage

Planned opening date: 31 October 2017

Deadline: 13 February 2018 17:00:00

2nd stage Deadline: 11 September 2018 17:00:00

Types of action: RIA Research and Innovation action

DeadlineModel: two-stage

Planned opening date: 16 October 2018

Deadline: 23 January 2019 17:00:00

2nd stage Deadline: 04 September 2019 17:00:00

Time Zone : (Brussels time)

iAtlantic start date 1 June, with kick-off meeting 18-20 June 2019

iAtlantic

- 33 partners
- €10.6M budget
- 11 international associate partners
- €30M programme of 32 cruises

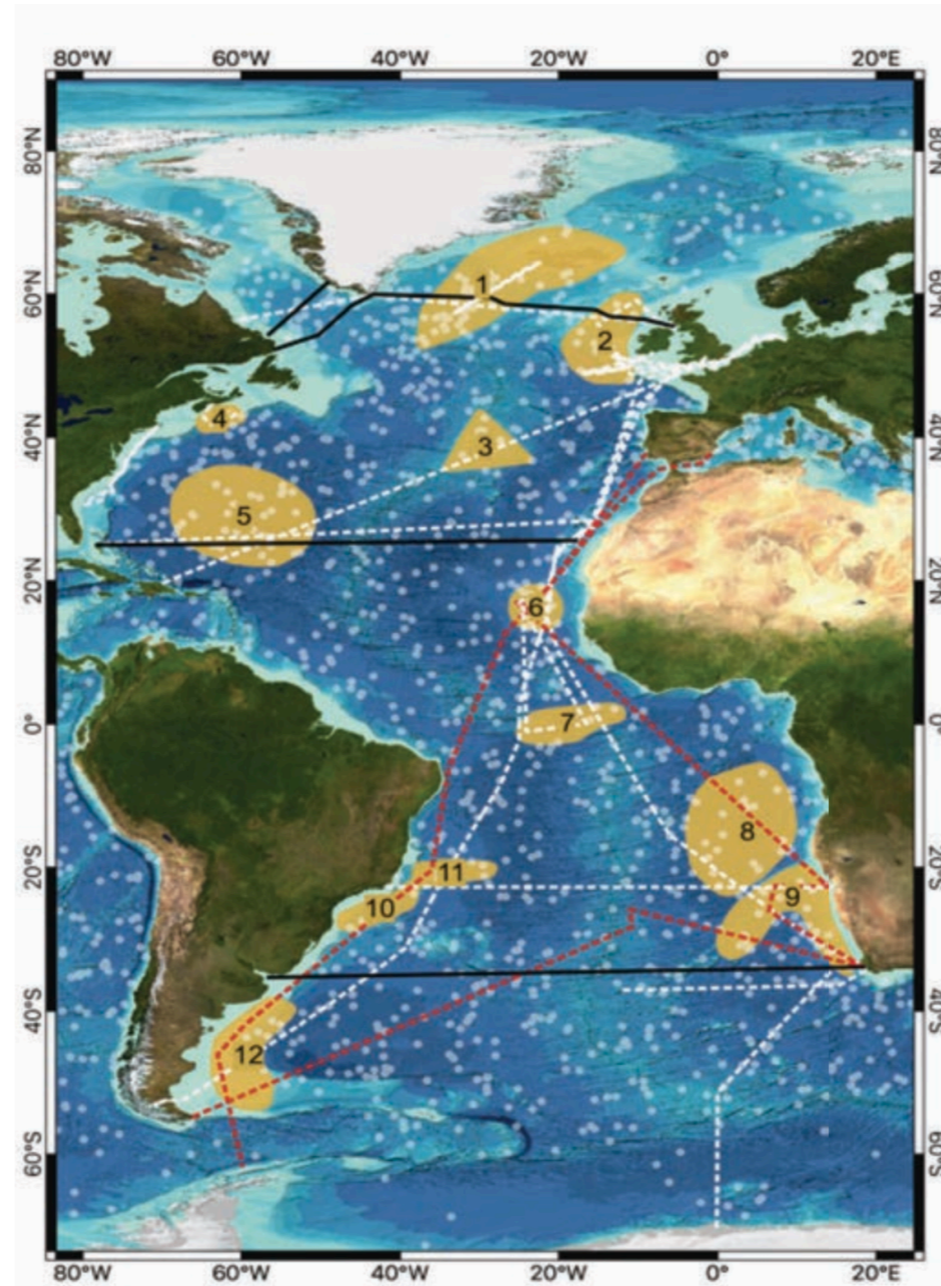


Figure 2: Chart illustrating the density of ARGO floats (grey circles) and positions of transatlantic monitoring arrays (black lines) providing oceanographic data to iAtlantic. Dashed white lines illustrate tracks of iAtlantic cruises with the two **S Atlantic Demonstrator Capacity Building cruises iMirabilis 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.

LEADS

WP1



Arne Biastoch
(GEOMAR)

WP2



Veerle Huvenne
(NOC)

WP3



Lea-Anne Henry
(UEDIN)

WP4



Andrew Sweetman
(HWU)

WP5



Telmo Morato
(IMAR-UAZ)

WP6



Vikki Gunn
(Seascope)

WP7



Tina Dohna
(UniHB)

DEPUTIES



Didier Jollivet
(SU)



Colin Devey
(GEOMAR)



Marjorlaine Matabos
(Ifremer)



Marina Carreiro-Silva
(IMAR-UAz)



Kate Larkin
(EMODnet)



Sebastian Unger
(TMG)



PANGAEA
(UniHB)

WP8



Murray Roberts
(UEDIN)

SW Atlantic



Angel Perez
(UNIVALI-Brazil)

SE Atlantic



AJ Smit
(UWC-South Africa)

NW Atlantic



Ellen Kenchington
(DFO Canada)

NE Atlantic



Stefán Áki Ragnarsson
(MFRI Iceland)

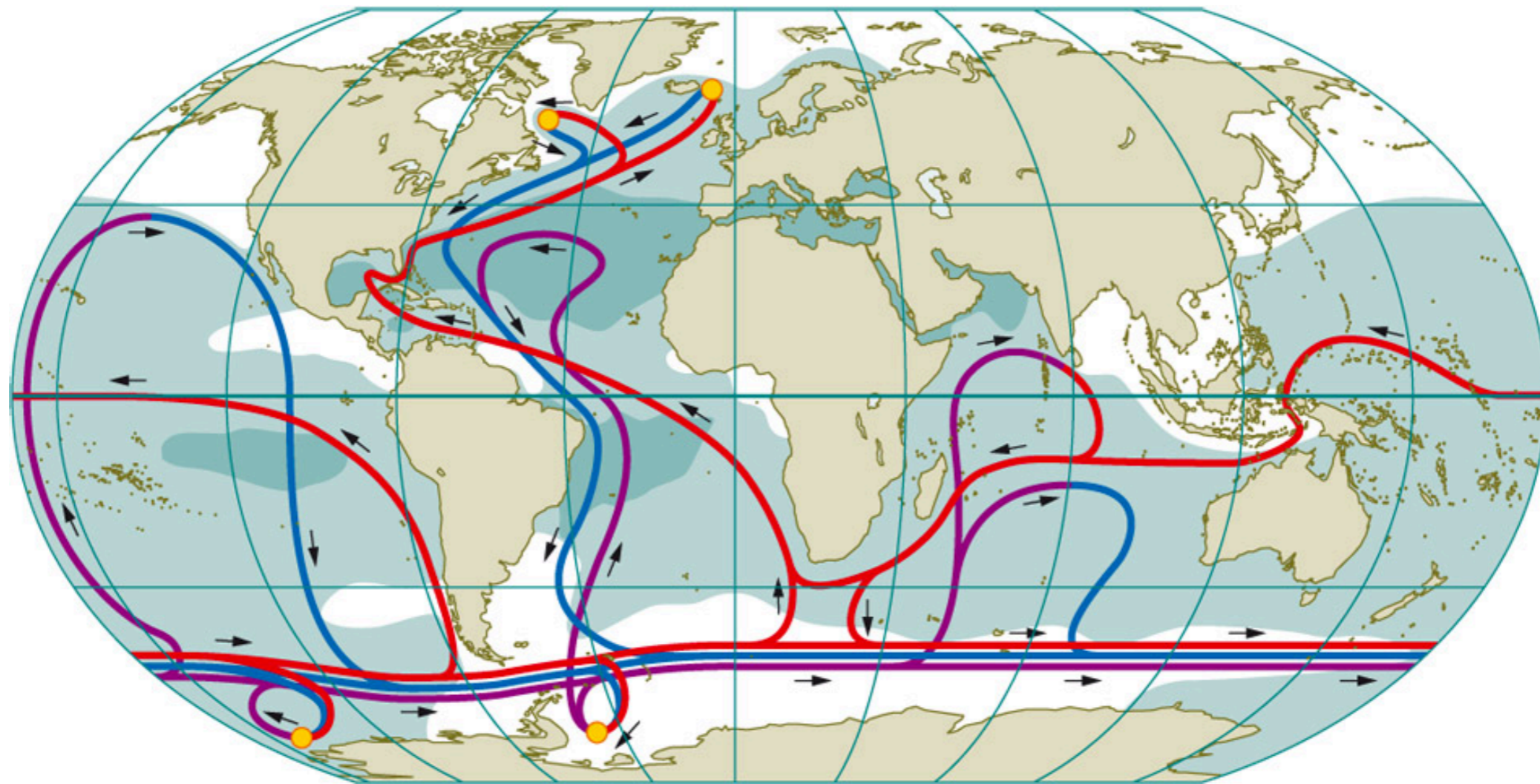
iAtlantic Steering Committee

Integrated assessment of Atlantic marine ecosystems in space and time

iAtlantic WP1

Atlantic oceanography and ecosystem connectivity

1. *Develop ocean hindcasts and forecasts*
2. *Enhance AMOC monitoring capacity in the SAMOC/SAMBA and OSNAP arrays*
3. *Develop ultra-high resolution ocean models at Lucky Strike and Walvis Ridge*
4. *Measure basin-scale spatio/temporal modes of physical variability*
5. *Conduct genomic studies*



Standardise South and North Atlantic Ocean observations to enable short, medium, and long-term assessments of Atlantic Ocean circulation and its physico-biogeochemical environment.

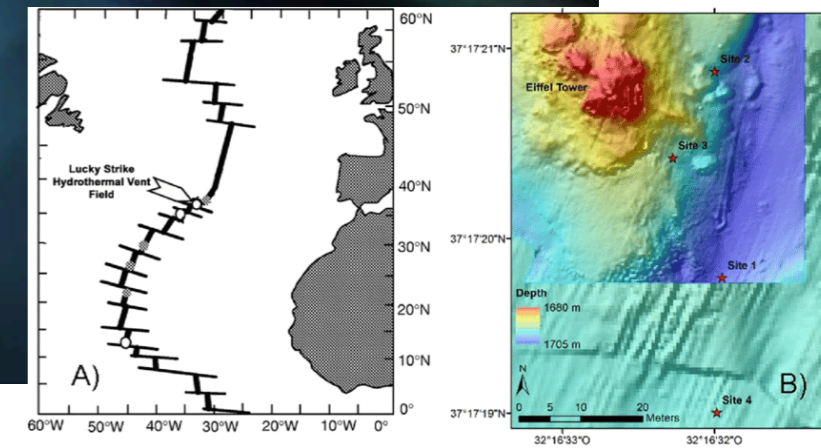
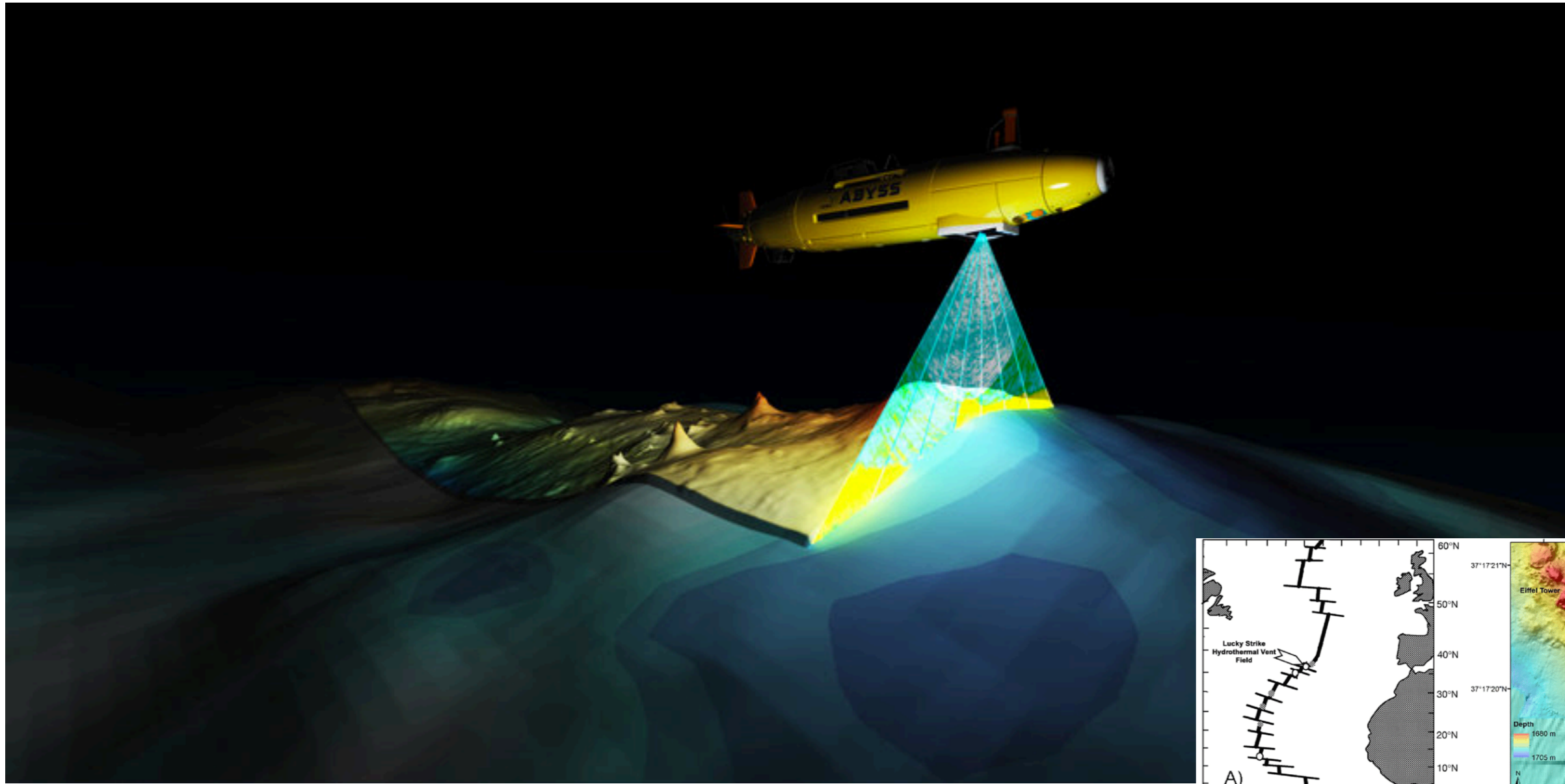
SAMOC enhancement

Atlantic 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).

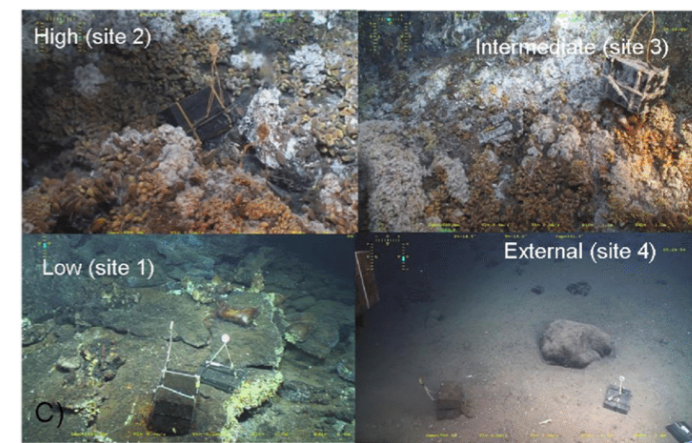
iAtlantic WP2

Mapping Atlantic ecosystems

1. Basin-wide (all-Atlantic) data collation and analysis
2. Regional-scale mapping in iAtlantic's 12 regions (100-1000 km)
3. Local scale habitat mapping (1-10s km)
4. Advance the technology readiness level of new mapping technologies
5. Analysis of spatial patterns in ecosystem drivers



Map deep and open-ocean ecosystems at basin, regional, and local scales.



iAtlantic WP3

Drivers of ecosystem change and tipping points

1. *Create an inventory of inter-annual to multidecadal data*
2. *Trial and report on use of ancient eDNA (aDNA) to create ecosystem timeseries*
3. *Analyse drivers of ecosystem change and tipping points over centennial to millennial timescales*
4. *Analyse ecosystem changes, drivers and tipping points over inter-annual to multidecadal timescales*
5. *Assessment of scenarios of oceanographic change and impact on ecosystem dynamics*



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.

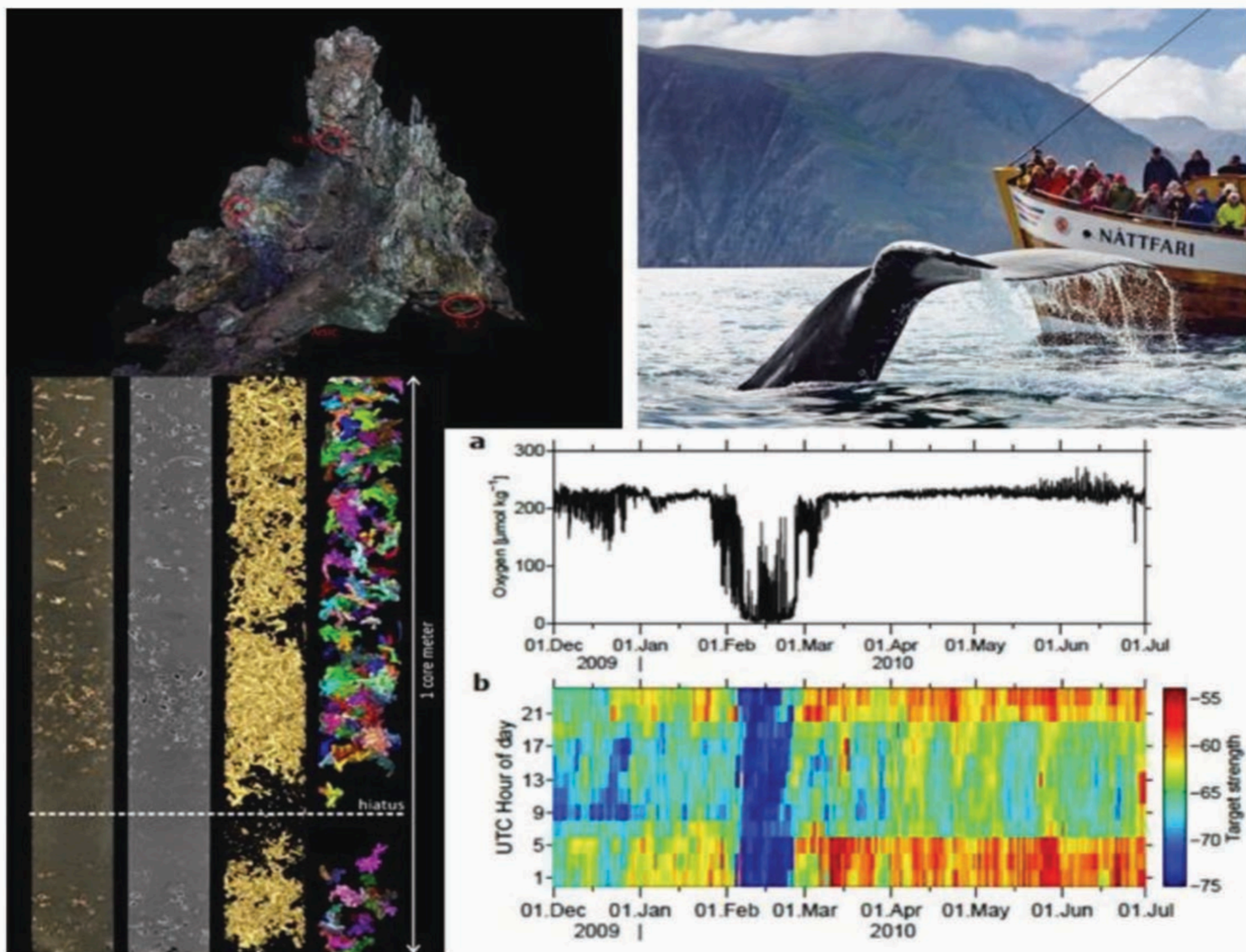
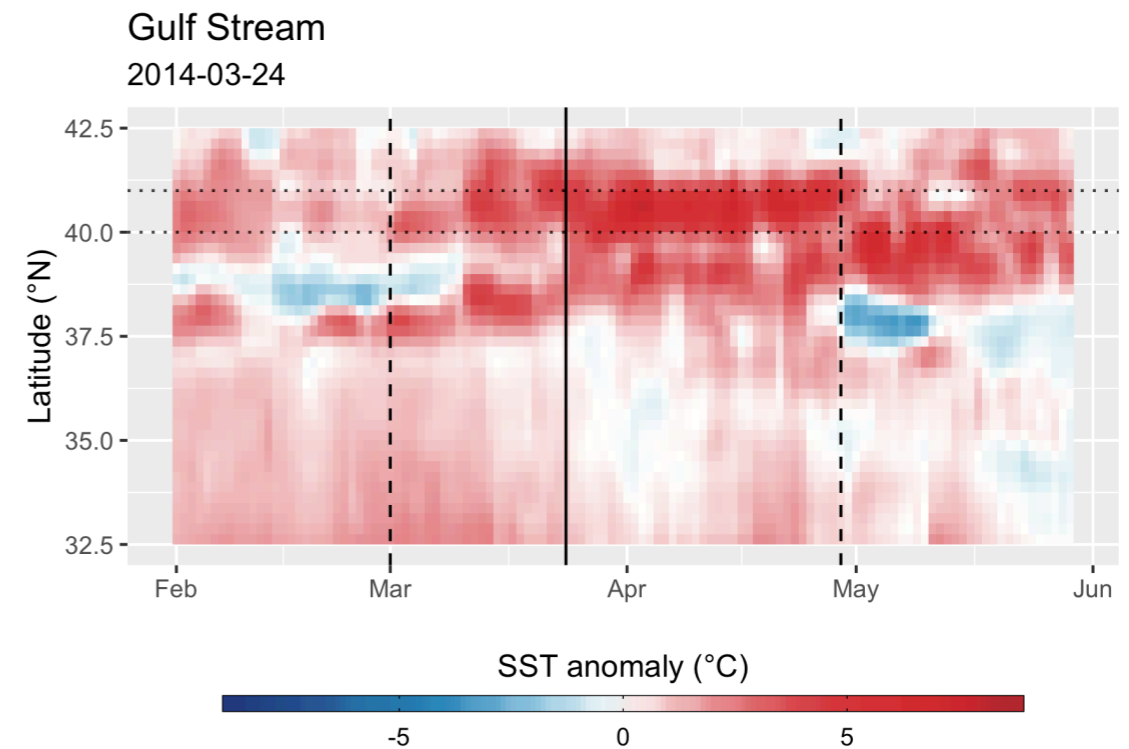
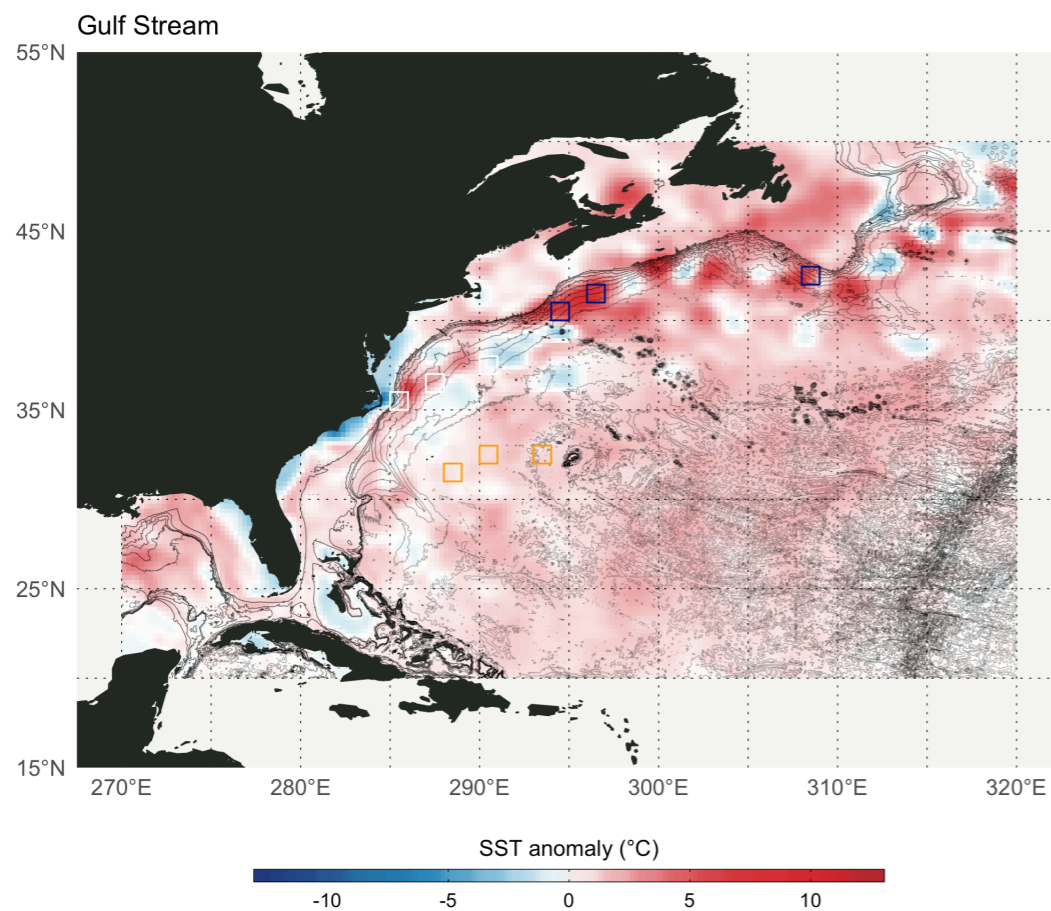


Figure 6: Examples of novel methods to create ecosystem timeseries. Clockwise from top left: 3D reconstruction of benthic communities at the Lucky Strike hydrothermal vent using photomosaics; whale fluke identifications from Iceland and Bermuda to reconstruct temporal changes in population size; inter-annual 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).

iAtlantic WP4

Impact of multiple stressors

1. Conduct ex situ multiple stressor impact experiments on mesopelagic zooplankton communities
2. Compare natural spatial gradients in deep pelagic and benthic ecosystem functioning
3. Conduct ex situ single and multiple stressor experiments on hard-bottom VME species
4. Conduct ex situ single and multiple stressor experiments on soft-sediment ecosystems
5. Evaluate impacts of single and multiple stressors on pelagic larvae of VME species



Ecosystem and species responses to multiple stressors will be enabled by targeted *in situ* and *ex situ* experimental studies.

iAtlantic WP5

Spatial and temporal management and protection (sustainable management)

1. *Compilation of regions of interest maps from existing data sources*
2. *Development of iAtlantic advanced web-based GIS-tools*
3. *Regional prioritisation and scenario development*
4. *Evaluation of sustainable management planning scenarios*



The infographic is set against a blue background. On the left, the number "14" is large, followed by the text "LIFE BELOW WATER". Below this, there are three white wavy lines representing water and a white silhouette of a fish. On the right, under the heading "SDG 14 TARGETS:", there are seven numbered targets (14.1 to 14.7) describing goals for marine pollution, ecosystem management, ocean acidification, overfishing, marine area conservation, fisheries subsidies, and economic benefits for developing countries. At the bottom, there are logos for "SUSTAINABLE DEVELOPMENT GOALS" and "NEREUS PROGRAM Predicting Future Oceans".

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 WP6

Capacity building, policy, stakeholder engagement and outreach

1. Development of dissemination, communication and engagement plan
2. Innovation and exploitation
3. Outreach and dissemination
4. Stakeholder engagement
5. Capacity building
6. Ocean governance



Agreement in principle for industry sponsorship to enhance iAtlantic fellowship scheme.

Align and enhance human, technological, and data inter-operability capacities for cost-effective cooperation and planning across the Atlantic.

iAtlantic WP7

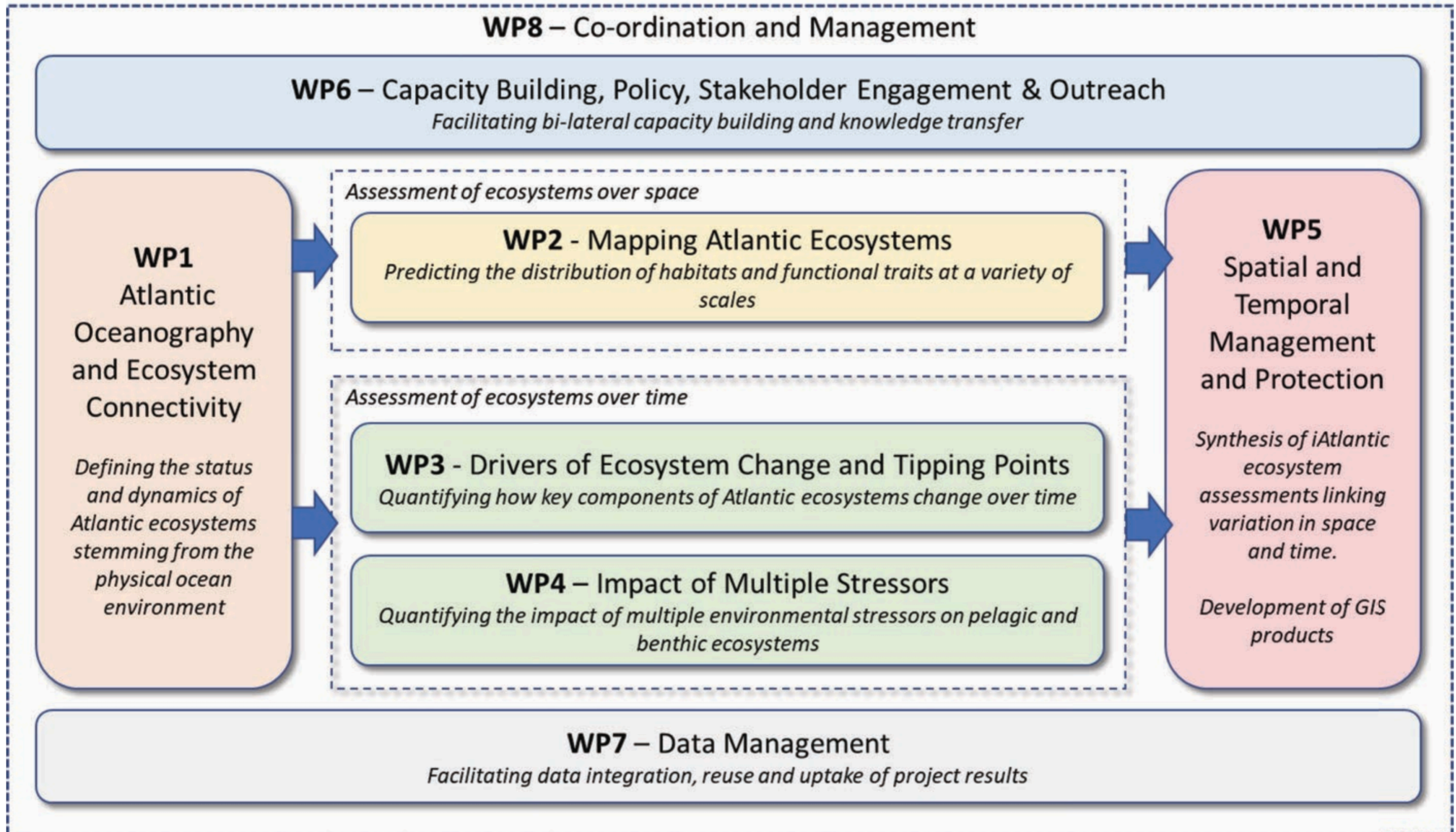
Data management

iAtlantic WP8

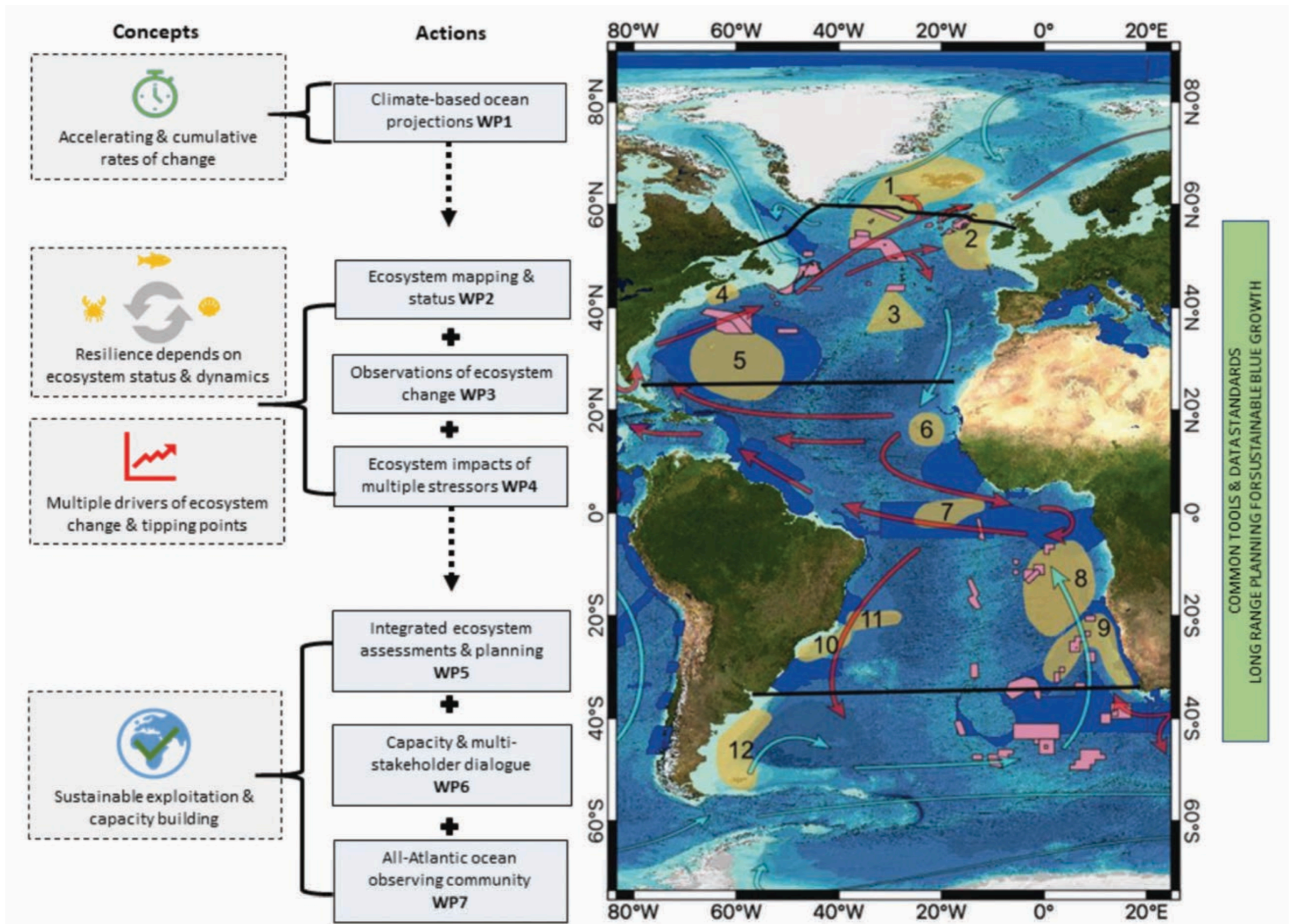
Coordination and management

iAtlantic

Integrated assessment of Atlantic marine ecosystems in space and time



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 INTEMARES 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).



iAtlantic Beneficiaries

Integrated assessment of Atlantic marine ecosystems in space and time



Pêches et Océans
Canada

Fisheries and Oceans
Canada

iAtlantic International Partners

Integrated assessment of Atlantic marine ecosystems in space and time



Phil Williamson (Chair)



Lisa Levin



Kristina Gjerde



Wendy Brown



GLOBAL OCEAN TRUST



Thorsten Thiele



Gordon Paterson
(Chair Science Council)



Alan Leonardi

iAtlantic Advisors

Integrated assessment of Atlantic marine ecosystems in space and time

Thank you