

Three steps towards a research agenda on Climate Change and Energy, Space and Oceans for the Atlantic

The Atlantic is still mostly understudied in terms of its natural resources, ecosystems dynamics and interdependences with human activities. It is also a territory that enables specific integrative capacity for Climate Change and Energy, Space and related Earth and Ocean interactions.

A better understanding of the Atlantic, for the sustainable management of this common resource, requires the alignment of research strategies through international cooperation.

The Azores Archipelago has several advantages that make it a privileged place for harboring a dedicated structure for an ambitious research agenda (Azores International Research Center– AIR Center) in the above areas. This Center would be strategically placed for Atlantic observation, enabling the deployment of research and monitoring platforms.

In this context, the Fundação para a Ciência e a Tecnologia (FCT) is promoting three international workshops to define a new research agenda for the Atlantic, as detailed below:

WORKSHOP 1

New York city – USA, June 10th

GOAL

Launch a participatory discussion among a selected number of research leaders, on Climate Change and Energy, Space and related Earth and Ocean sciences

INTERIM STEPS

1. Collect individual written contributions - **May 31st**
2. Rapporteurs summary and recommendations of each thematic sessions as a first input for the research agenda document – **June 10th**
3. Submission of final versions of individual written contributions to FCT (AIR.workshops@fct.pt) – **June 15th**

WORKSHOP 2

Ponta Delgada, Azores, June 27th

GOAL

Consolidation of the discussion on the Atlantic centered research agenda on Climate Change and Energy, Space and Oceans

INTERIM STEPS

1. Preparation of a draft proposal of the research agenda to be distributed by FCT– **June 22nd**
2. Interdisciplinary working groups per thematic area to consolidate and agree on an Atlantic centered research agenda – **June 27th**
3. FCT will circulate the final version of the research agenda among all participants for approval – **July 17th**

WORKSHOP 3

Brussels – Belgium, September (date between 19-23)

GOAL

Presentation and discussion of the Atlantic centered research agenda with leading European stakeholders.

WORKSHOP 4

WORKSHOP 5

WORKSHOP 6

USA, November-December (dates to be defined)

Atlantic Interactions: Climate Change and Energy, Space and Oceans

A SERIES OF HIGH-LEVEL RESEARCH WORKSHOPS

June - December 2016

A dialogue towards establishing a new research agenda on **Data Science, Climate Change, Space and Oceans** to be centered on the Atlantic, together with the potential development of an Azores International Research Center (i.e., AIR Center), has been prepared by the Portuguese Science and Technology Foundation, FCT, through a series of high level research workshops to discuss multilateral scientific cooperation through an integrative approach benefitting from the unique environment offered by the Azores and the Atlantic.

The initial workshop "*Atlantic Interactions: Knowledge, Climate Change, Space and Oceans*", was organized in **New York City** at the Institute for International Education (IIE) on the **10th of June 2016**, by the occasion of the Day of Portugal celebrations. It was aimed to launch a participatory discussion amongst a selected number of research leaders from the international scientific community and will be followed by the other workshops with the ultimate goal to design a new transatlantic research agenda making use of the unique opportunities offered by Azores.

A second workshop will be organized in the University of Azores, in São Miguel, **Azores** on the **27th of June 2016**. It will be aimed to deepening and consolidating the initial discussion on a potential research agenda, paving the way for the establishment of an Azores International Research Center.

A major international conference will be held in **Lisbon in July 4**, during the Portuguese national science convention, "Ciência 2016", including a key-note lecture by Eric Lindstrom, NASA.

A third workshop will be held in **Brussels on the 19th of September**, and other workshops are being planned for mid-November and early December in the University of Texas at Austin, at Carnegie Mellon University and at Massachusetts Institute of Technology, in Cambridge, USA.

The contributions of the various workshops will be used by the Portuguese Science and Technology Foundation to prepare a white paper towards establishing a new research agenda on **Data Science, Climate Change, Space and Oceans** to be centered on the Atlantic, together with the potential development of an Azores International Research Center (i.e., AIR Center).

Atlantic Interactions: Climate Change and Energy, Space and Oceans

2nd WORKSHOP

DATE

June 27th, 2016

DURATION

1 day

VENUE

University of the Azores,
Ponta Delgada

Auditorium Norte
da Aula Magna

TIME-TABLE

09:00am to 6:00pm

DINNER

8:00pm

PARTICIPANTS

Scientific community and
Institutional representatives.

FORMAT

Key-notes and Round table
discussions with moderators
and rapporteur(s)

THE WORKSHOP

The goal of the workshop is to launch a participatory discussion amongst a selected number of research leaders from the international scientific community leading to a new transatlantic research agenda oriented to improve our knowledge on Climate Change and Energy, Space and related Earth and Ocean interactions, making use of the unique environment of the Azores. A round table will be organized with the participation of scientists, experts and institutional representatives to discuss the state of research and technology and future challenges in the abovementioned areas oriented to the Azores region and the Atlantic.

The workshop will be attended by the Portuguese Minister for Science, Technology and Higher Education, Manuel Heitor, the President of the Regional Government of the Azores, Vasco Cordeiro and with the participation of researchers and experts from various institutions worldwide and representatives from the Portuguese industry related to the Space and Ocean sectors.

08:45 REGISTRATION

09:00 WELCOME

Manuel Heitor, Minister for Science, Technology and Higher Education – Portuguese Government
 Vasco Cordeiro, President of the Regional Government of the Azores
 Ricardo Serrão Santos, Member of the European Parliament
 João Luís Gaspar, Rector, University of the Azores, PT
 António Cunha, President of CRUP, PT
 Fausto Brito e Abreu, Azores Regional Secretary for the Ocean, Science and Technology, PT

9:30 Summary: Primary orientations of the 1st workshop, June 10 in New York

Paulo Ferrão, President of the Fundação para a Ciência e a Tecnologia (FCT), PT

10:00 KEY-NOTE SPEAKERS

Dan Stanzione, UT Austin , USA

“iAtlantic: e-science/cyber infrastructure for data management at AIRC”

Tiago H. Silva and Rui L. Reis, 3B’s Research Group, ICVS/3B’s, University of Minho, PT

“Valorization of marine resources and by-products for high added-value applications in the biotech, pharma, biomedical and regenerative medicine sectors”

João Luís Gaspar, University of the Azores , PT

“Geophysics and earth Dynamics in the Atlantic – observing vulcans in the Azores”

11:00 COFFEE BREAK

11:30 - 13:30 PARALLEL SESSIONS – THEMATIC WORKING GROUPS | VENUE: Scientific Complex Rooms

Data Science, Energy Systems, Atmospheric Science and Climate Change in the Atlantic

CHAIR: Fausto Brito e Abreu

Bruce Tidor, MIT
 Carlos Santos Silva, IST
 Douglas Hart, MIT
 Eduardo Azevedo, UAzores
 João Luís Gaspar, U Azores
 Juan Sanchez, UTAustin
 Miguel Miranda, IPMA
 Paulo Fialho, UAzores
 Pedro Arezes, U. Minho
 Ronald G. Prinn, MIT
 Soumya Kar, CMU
 Teresa Ferreira, U Azores
 Zong-Liang Yang, UT Austin
 João Barbosa, UTAustin

Space Science and Systems for the Atlantic

CHAIR: Robert Peterson

Eduardo Nunes, Embraer
 Imaculada Serrano, Deimos
 Juan Tomas Hernani, Satlantis
 Marco Bravo, UT Austin
 Miguel Bello Mora, Deimos
 Nuno Ávila, Deimos
 Paulo Chaves, ISQ
 Ricardo Conde, Edisoft
 Ricardo Mendes, Tekever
 Sergio Barbedo, Edisoft
 Sérgio Carvalho, Embraer
 Tiago Pardal, Omnidea

Ocean Science and Technology for the Atlantic

CHAIR: Helder Silva

António Cândido. IH
 Arthur Baggeroer, MIT
 Filipe Castro, CIIMAR
 Filipe Costa, UMinho
 Francisco Cunha, CEIIA
 João Tasso, LSTS, UP
 José Mesquita Onofre, IH
 Kristin Thorud, RCN
 Luis Menezes Pinheiro, UAveiro
 Maria João Bebianno, CIMA
 Marina Cunha, UAVEIRO
 Ramiro Neves, MARETEC
 Rui Reis, 3 B’s Research Group
 Tiago P. Cunha, F. Oceano Azul
 Tiago Silva, 3 B’s Research Group

** 5 minutes presentations for new participants*

Agenda

13:00 LUNCH

14:30 PLENARY SESSION

Filipe Costa, University of Minho, PT

"Azores and new generation environmental and biodiversity monitoring"

Kristin Thorud, Research Council Norway, NO

"Joint Programming for healthy and productive Seas – JPI Oceans"

Ronald R. Prinn, MIT

"Benefits of a world-class Climate and Greenhouse Gas Observatory in the Azores"

Zong-Liang Yang, UT Austin

"An earth system modeling approach to understanding climate, energy, water, and the environment"

Tiago Pardal, Omnidea

"Azores – a gateway to Space"

Ricardo Mendes, Tekever

"UAS and Satellite Constellations as a multi-purpose infrastructure for Atlantic Exploration"

Eduardo Nunes, Embraer

"Embraer"

Piero Messina, ESA

"European Space Agency"

16:30 COFFEE BREAK

16:45 PLENARY SESSION

Towards a research agenda for the establishment of an International Research Center ("AIR Center")

RAPPORTEURS – Chairs of the parallel sessions

Discussion and Q&A

17:30 CLOSING SESSION

Rui Amen, Director of the Operational Program for the Azores, PT

Ricardo Serrão Santos, Member of the European Parliament

Elizabeth Konick, Principal Officer US Consulate in Ponta Delgada and Consul, US

Raquel Franco, Administradora da Sociedade para o Desenvolvimento Empresarial dos Açores, SDEA, PT

Manuel Heitor, Minister for Science, Technology and Higher Education, PT

18:00 CLOSING

20:00 DINNER

List of Participants in the 2nd workshop

NAME	ORGANIZATION
Ana Quartin	Fundação para a Ciência e a Tecnologia (FCT)
António Cunha	CRUP
António M.C. Coelho Cândido	Instituto Hidrográfico
Arthur B. Baggeroer	MIT
Benjamim Rockwell	US Portugal Embassy
Bruce Tidor	MIT
Carlos Santos Silva	IST, Universidade de Lisboa, PT
Carolina Rêgo Costa	Ministry of Science, Technology and Higher Education (MCTES)
Dan Stanzione	UTAustin
Douglas Hart	MIT
Eduardo Brito de Azevedo	University of the Azores
Eduardo Nunes	Embraer
Elizabeth Konick	US Consulate in Ponta Delgada
Emir Sirage	Fundação para a Ciência e a Tecnologia (FCT)
Fausto Brito e Abreu	Government of the Azores
Filipe Castro	CIIMAR
Filipe Costa	University of Minho
Francisco Cunha	CEIIA
Gabriela Queiroz	University of Azores
Gui Menezes	IMAR/MARE, University of the Azores
Helder Silva	IMAR/MARE, University of the Azores
Imaculada Serrano	Deimos
João Barbosa	UT Austin
João Luís Gaspar	University of the Azores
João Tasso de Sousa	FEUP
José M. Onofre	Instituto Hidrográfico
José Manuel Baptista	Universidade da Madeira
Juan Sanchez	UTAustin
Juan T. Hernani	Satlantis
Luis Menezes Pinheiro	UAveiro
Luis Santos	Government of the Azores
Kristin Thorud	Research Council Norway
Kristin Vogford	Icelandic Meteorological Office

NAME	ORGANIZATION
Manuel Heitor	Minister for Science, Technology and Higher Education (MCTES)
Marco Bravo	IC2 Institute - UTAustin
Maria João Bebianno	CIMA /University of Algarve
Marina Cunha	University of Aveiro
Megan Ihrle	US Portugal Embassy
Miguel Bello Mora	Elecnor Deimos
Nemesio Perez	ITER
Nuno Ávila	Deimos Engenharia Portugal
Nuno Catarino	Deimos
Nuno Simões	Uavision
Paulo Chaves	ISQ
Paulo Ferrão	Fundação para a Ciência e a Tecnologia (FCT)
Paulo Fialho	University of the Azores
Pedro Arezes	UMinho
Piero Messina	ESA
Ramiro Neves	IST, Universidade de Lisboa, PT
Raquel Franco	Sociedade para o Desenvolvimento Empresarial dos Açores, SDEA
Ricardo Conde	Edisoft
Ricardo Mendes	Tekever
Ricardo Serrão Santos	European Parliament
Rita Silva	Fundação para a Ciência e a Tecnologia (FCT)
Robert A. Peterson	IC2 Institute - UTAustin
Ronald Prinn	MIT
Rui Amen	Director of the Operational Program for the Azores
Sérgio Barbedo	Edisoft
Sérgio Carvalho	Embraer
Soumya Kar	CMU
Sue Loughlin	British Geological Survey
Teresa Ferreira	University of the Azores
Tiago Pardal	Omnidea
Tiago Pitta e Cunha	Blue Ocean Foundation
Tiago Silva	3B's Research Group
Vasco Cordeiro	President of the Regional Government of the Azores
Zong-Liang Yang	UT Austin

Azores International Research Center (AIR Center): A preliminary note

The potential installation of an Azores International Research Center (AIR Center), based on existent infrastructures, namely the Portugal-USA Lajes airbase in Terceira Island, the DOE-ARM facilities in Graciosa or the Department of Oceanography of the University of the Azores in Faial, is briefly discussed in this note.

The AIR Center, as an integrative and distributed research platform could provide a shared and international environment to support and foster new climate, earth, space and marine research activities, benefiting decision makers, public users, universities and industry, as well as contributing to retain highly skilled human resources and to regional growth.

In particular, the AIR Center may provide a unique opportunity to drive multilateral cooperation in complex systems engineering and science through an integrative approach to climate and energy, earth, space, and ocean R&D in the Atlantic.

This Center, through a flexible international governance model with international statute and international legal personality (i.e., emulating from the CERN experience, in Geneva, among others), would provide immunity from legal process, surpassing national constrains and providing an adequate regulatory framework, such as staff regulations, financial contributions and definition of the several scientific programs.

Potential research infrastructures that can enable joint international collaboration

AIR Center to Implement ASORES (Action plan for Sustainability, Operational protection and Resilience of Earth and Space systems).

The ASORES stakeholders (C3P, FCT, FLAD, NASA and ESA) find the Azores islands to be optimal Space analogue laboratories for developing scientific and technological projects. ASORES projects may include emergency and resilience against hazards, sustainable energy systems, new materials and greener manufacturing, monitoring human activities at sea, greener fuels, resilience of space Center or launcher's sites, environment monitoring.

Antenna for VLBI/SKA in São Miguel: AIR Center to receive the data center of the São Miguel large VLBI antenna.

There is potential for the large antenna (32m) to become a strategic asset (location and antenna size) in the scope of the EVN (European network of infrastructures for Very Long Baseline Interferometry), subject to viability analysis of the infrastructure.

Azores International Research Center (AIR Center): A preliminary note

Potential research infrastructures that can enable joint international collaboration

Space debris radar in Azores: The boom in commercial, governmental and military satellites is dramatically increasing the number of objects in orbit (active satellites and inactive debris), to currently over 1 million objects. Azores can use its low air traffic flux and unique geographic location for hosting space surveillance and tracking radar, and provide a continuous coverage over the Atlantic. The target radar (13m) is based in the USA HAX tracking radar operated by MIT LL. Cooperation with leading universities (e.g., MIT) is welcome for technology and support development. The HAX radar is similar in physical characteristics, performance and latitude.

Atlantic Spaceport: The Lajes Airfield in Terceira has all the adequate infrastructures and free air space to host a spaceport for low cost access to space, including launchers for mega constellations and micro satellites.

Lab-Horta@DOP & Cold Water Coral Lab: Deep sea ecosystem research related light infrastructures that allow the artificial creation of natural deep sea environment conditions, generating new research opportunities in the area of hydrothermal activity, deep biosphere, marine biology and geology and oceanography.

ESA/NASA incubation Center for Atlantic cooperation: The ESA incubation model in place in many EU countries could have a spin-out model in Azores, attracting Private Capital from EU and USA (eventually implemented through a PPP model). Installation of a “startup campus” for “high risk, high reward” companies may be planned.

Host a COPERNICUS national IP site and in-situ data: In-situ data from sensors, floaters, vessels, atmospheric profiles, 3D ocean models, campaigns, can be hosted.