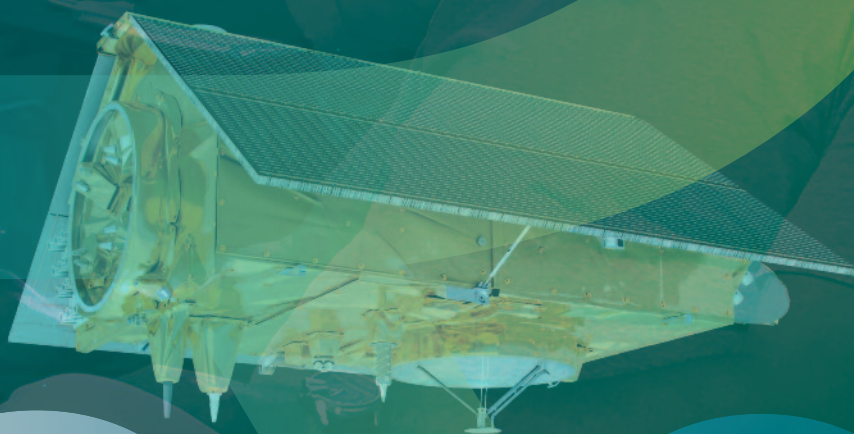


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Industry-Science-Government Dialogue  
on Atlantic Interactions, Praia, Cape Verde,  
07-08 May, 2018

# ATLANTIC INTERACTIONS



**MAY 2018**

**A PROCESS OF SCIENTIFIC DIPLOMACY:  
NOVEMBER 2017 – MAY 2018**

Integrating Space, Climate, Oceans and Data Sciences  
through North-South / South-North Cooperation

Towards the  
**Atlantic International Research Centre (AIR Centre)**





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Atlantic Interactions:  
Climate Change and Energy, Space and Oceans

# 1 INTRODUCTORY NOTES



## Scientific diplomacy to foster Atlantic Interactions: Establishing the Atlantic International Research Centre - AIR Centre

### Manuel Heitor

Minister for Science, Technology and Higher Education, Portugal

May 2018

The design of the AIR Centre has made significant progress over the last two years in terms of its goals to promote an integrative approach to space, climate change and energy, earth and ocean science in the Atlantic, fostered by emerging methods of data science, and to be continuously promoted in close alignment with the United Nations' Sustainable Development Goals (SDGs).

By May 2018, with the organization of the **“Third High-level Industry-Science-Government Dialogue on Atlantic Interactions”**, to be held in Praia, **Cabo Verde, 7-8 May 2018**, the progress achieved in establishing the AIR Centre with a sound and scientifically relevant R&D agenda on “Atlantic Interactions” will consider the definition of a preliminary Scientific Program and the preliminary identification of the first technical initiatives of the AIR Centre. This has been possible together with the setting up of a non-profit association to promote the AIR Centre, in a way to provide, promote and foster the bases of a truly international scientific agenda, organization and workforce.

The initial Scientific Program for the AIR Centre considers the following topics, without prejudicing their re-formulation or the inclusion of other pertinent topics to be identified:

- a) **Marine Resources and Biodiversity:** Promote Sustainable Fisheries, offshore aquaculture and ecosystem valorization;
- b) **Healthy and Clean Ocean:** Observing, modelling and monitoring oceans and coastal areas for a better management of the Atlantic resources and the protection of related marine and coastal ecosystems to avoid significant adverse impacts;
- c) **Systems Integration from Outer Space to Deep Ocean:** development, integration and use of sensors, devices and systems;
- d) **Mitigation and Adaptation to Climate Change:** including resilience of cities and coastal areas, disaster risk reduction and regional planning;
- e) **Sustainable Energy Systems:** including but not limited to marine renewable energy and the study of a transatlantic Ultra-High Voltage electrical connection between the Iberian Peninsula, Africa and Brazil.
- f) **Data science, artificial intelligence and learning systems for ocean, atmosphere dynamics and climate issues:** matching data producers and user needs.

In the meantime, a Cross-cutting Work Plan of initiatives is supporting the development of the Scientific Program of the AIR Centre in close cooperation with all relevant parts, to be approved in the Canary islands in November 2018 and aligned with the Belem Statement (July 2017) signed between the European Commission, Brazil and South Africa and the associated concerted and support actions. Those initiatives may include, among others:

- a) Developing coordinated actions to implement common standards for data sharing, using existing supranational e-infrastructures to test them, including a large collaborative platform involving the Texas Advanced Computing center (TACC), the Barcelona Supercomputer Centre (BSC), the Minho Advanced Computing center (MACC), and the LCC at the Federal University of Rio de Janeiro (UFRJ), among others;
- b) Defining Transatlantic alliances of clusters, coastal cities, infrastructures, and research centres to provide solutions for coastal regions and cities in Atlantic regions in mitigating carbon emissions, adapting to the challenges of climate change, creating jobs, and promoting blue economy;
- c) Sharing large-scale infrastructures and defining mobility and training programs;
- d) Aligning scientific policies to enhance ocean innovation or identifying and developing academia-industry knowledge transfer and encouraging collective capacity building measures.

In addition, we all must recognize the critically importance of promoting “Knowledge for all through the AIR Centre. Such thematic program should consider the urgent need to foster knowledge as our common future, and recognize the need to bring to the center stage all those in the margins of knowledge and knowledge-based economic activities as a way to increase social and gender equality and fostering inclusion for everyone, everywhere, anytime. The program must include activities fostering science citizenship, together with education and knowledge aimed to promote “Knowledge for Space” and its integration with ocean, earth and climate education in a holistic approach. It should be aimed to expand traditional education and science awareness programs to consider new horizons of space technologies in order to foster the access to education for all. This will be achieved by involving telecom operators, broadcast services and space providers in a “Space for Knowledge” network.

Again, the AIR Centre will become a reality if we all believe in building-up a stepwise and socially relevant process, to be inclusive for all countries and regions involved.

It is under this context that the progress achieved over the last two years, since early 2016, should be recognized. In fact the **“Third High-level Industry-Science-Government Dialogue on Atlantic Interactions”**, to be held in Praia, **Cabo Verde, 7-8 May 2018**, is the result of a continuous commitment of many people, researchers, government leaders and companies. Two major events and a wide set of workshops and events of scientific diplomacy in the last two years has facilitated an effective process of scientific diplomacy to foster Atlantic Interactions, which has resulted in a global process for establishing the Atlantic International Research Centre - AIR Centre.

I would like to acknowledge the commitment reached in the **“Second High-level Industry-Science-Government Dialogue on Atlantic Interactions”**, held in **Florianópolis Brasil 20-21 November 2017**, regarding the establishment of the AIR Centre - Atlantic International Research Centre, as an internationally distributed scientific organization across Atlantic countries, with international legal status, in association with scientific and research organizations worldwide, to be established in a stepwise process towards full institutional and scientific autonomy.

It should also be noted that the conclusions of the **“First High Level Industry-Science-Government Dialogue on Atlantic Interactions”**, held in **Terceira, Azores-Portugal, 20-21 April 2017**, that determined the establishment of an innovative R&D agenda on “Atlantic Interactions” in a way to promote a holistic, integrative and systemic approach to space, atmosphere, oceans, climate change and energy, earth and ocean science in the Atlantic, together with emerging methods of data science, while fostering an inclusive perspective to science, technology

and economic development to better understand emerging issues of climate change affecting our planet and the lives, prosperity and wellbeing of our citizens.

The meeting in Azores and the series of “High Level Industry-Science-Government Dialogues on Atlantic Interactions” that we are all currently involved in was made possible after the organization of more than 15 small workshops organized throughout the world, as initiated in **June 10, 2016 in New York City**, at the Institute of International education, IIE.

Now it is time to continue this global effort and to guarantee a stepwise process for the installation of the AIR Centre, with the completion of all necessary national processes regarding the acquisition of an international legal status for the Centre by 2020. This process should be achieved together with the guarantee of fully institutional autonomy by 2022, with adequate institutional, legal and financial structure, together with fully scientific autonomy as a multisite research organization.

Our common commitment is to help building the future with a truly inclusive orientation towards knowledge based societies.







## The AIR Centre: Ambition and Implementation Status

### António Sarmiento

Chair of the Steering Committee

April 2018

Following the 2nd High -Level Industry-Science-Government Dialogue in Florianopolis, Brazil, in November 2017, one of the main objectives of the Atlantic Interactions Initiative is the setting up of the Atlantic International Research Centre (AIR Centre), as expressed by the Florianopolis Declaration.

The ambition of the AIR Centre is to be a long-term platform for North-South, South-North, East-West and West-East collaboration in the Atlantic towards a holistic, integrative and systemic approach to knowledge on space, oceans, climate change impacts, energy and data sciences, while fostering an inclusive perspective to science, technology and economic development. The AIR Centre is meant to become a knowledge and data driven network organization, enabling innovative work through bottom-up initiatives that will face new and greater challenges and R&D gaps. Additionally, the AIR Centre intends to be inclusive, by promoting the development of projects aligned with the S&T priorities of the different research partners, which, to a certain extent, are at diverse stages of development.

The ambition to be a long-term platform for collaboration along and across the Atlantic deserves a special reference, as usually existing collaboration between governments, companies or research organizations are developed within projects, which do not provide conditions for the collaboration to continue after their end. A continuous platform for collaboration is essential to develop a long-term vision on the common challenges that the countries along and across the Atlantic face, and to develop strong links between the relevant stakeholders who are required to address these challenges and possible solutions with confidence and with success.

The AIR Centre aims at working for the benefit of people living on the margins of the Atlantic by addressing challenges that are common to different regions or countries and by promoting projects that require the transregional and/or transnational dimension that the AIR Centre can provide. A good example is the presence of plastics and microplastics in the ocean, its impact on human life and the identification of mitigation measures. This requires the observation and numerical simulation of the entire Atlantic Ocean. The implementation of the required mitigation measures implies, among others, new legislation and a change in the behavior of the population on the two sides and two hemispheres of the Atlantic. The AIR Centre is a unique facilitator not only to develop the science required to address the problem, but also to effectively disseminate the results among the governments and wider population.

Another relevant ambition for the AIR Centre is to work together with funding bodies, so that the identification of projects is aligned also with the priorities of S&T national and regional funding agencies, for science driven projects, and the priorities of the multilateral banks (BAfD, BID, BEI, WB) for projects with socioeconomic impact. The AIR Centre Steering Committee and Executive Committee (ExCo) were created in November 2017 by the Florianopolis Declaration in Brazil. Their mandate is to set-up the AIR Centre until November 2018 as a private non-for-profit association under the Portuguese law and to make it evolve to an international scientific network organization in a later phase. At the present stage, six months after the Florianopolis Declaration, several important milestones have been attained:

- The definition of a R&D agenda on “Atlantic Interactions” including a Basic Scientific Program and a Specific Thematic Program through consultation with different stakeholders in Brazil, Cape Verde, Nigeria, Spain, Portugal, USA, UK and Norway;
- The setup of a non-for-profit association to promote the AIR Centre under the Portuguese law with financial support from Portugal and the setup of a support team to assist the Steering Committee and Executive Committee in their mission;

- The attraction of partners in countries not yet formally involved in the AIR Centre to promote joint initiatives, such as from the USA, UK and Norway, as well as relevant international organizations such as the GEO Blue Planet, UNOOSA and World Bank;

- The promotion of MoUs between national and regional S&T funding agencies to support projects within the scope of the AIR Centre, and the understanding that initial projects should focus on mobility of researchers to strength the network and prepare better projects to be developed in 2019.

The AIR Centre's Scientific Program is aligned with the Sustainable Development Goals (SDGs) of the United Nations, namely SDGs 1, 2, 7, 11, 13 and 14 and includes S&T topics as different as resilient cities & coastal areas, invasive species & loss of biodiversity, satellite and in-situ observation technologies and data integration, offshore aquaculture, ocean litter or global energy interconnections and sustainable energy systems.

The AIR Centre's cross-cutting work plan of initiatives to support the development of the Scientific Program of the AIR has been initiated with focus on the following elements (aligned with UN's SDG 17):

- The AIR\_DataNet, a supercomputing network of facilities and expertise supporting advanced and complex simulation models of the ocean and atmosphere and large sets of data;

- The Atlantic Data Cube and Atlantic GEOSS, two complementary data access tools focused on the Atlantic Ocean;

- The Atlantic Research Infrastructures, a tool to facilitate the access, cooperation and standardization related to the research, test and demonstration facilities available within the scope of the AIR Centre;

- The Knowledge for All program intended to disseminate science and promote citizen science projects.

The milestones to be attained to setup the AIR Centre in the 4th High-Level Dialogues in the Canary Islands in November 2018 include i) the first versions of the roadmaps for the different topics under the Basic Scientific Program and the Specific Thematic Program, ii) the detailed specification of the projects to be developed in 2019, iii) the clarification on how the different affiliated organizations contribute to the AIR Centre, iv) the agreement on the final version of the AIR Centre statutes, v) the development of the terms of reference for job description for the initial staff of the AIR Centre and the selection of this staff and v) the election of the officers of the AIR Centre, so that the transition hand over to the permanent staff and officers can take place smoothly between November and the end of 2018.

The AIR Centre is being launched. Its future and success depend on our joint efforts and intelligence to make it happen in an inclusive, constructive and innovative way. Join us in this effort!

## Introductory Notes from Spain

**Juan María Vázquez Rojas,**

General Secretary for Science and Innovation from the Spanish Ministry of Economy,  
Industry and Competitiveness (MINECO)

April 2018

I thank the Portuguese Minister Manuel Heitor for his kind invitation to contribute to this new volume of “Atlantic Interactions”.

Spain is located in the crossroads of the Mediterranean Sea and Atlantic Ocean, and therefore it is naturally committed to join research and innovation programmes related with both areas. Last year the Partnership for Research and Innovation in the Mediterranean Area (PRIMA) was launched, while the Atlantic Interactions Programme (AIP) is making good progress to become a reality in the Atlantic Ocean domain, and Spain is actively participating in them.

AIP is an excellent opportunity to improve the quality of living of all citizens from the Atlantic neighboring nations, while preserving their cultural diversity and interconnected ecosystems. Moreover, the increase in human population is inducing important challenges at the global scale and posing significant threats on natural resources. The Atlantic Ocean is part of the global Atmospheric-Ocean-Terrestrial bonds and thus we are all responsible of maintaining it in the best condition to prevent the occurrence of dramatic climatic events, or at least reduce or anticipate their impact. This task can only be addressed through an international initiative focused on Science, Technology and Innovation, encompassing the efforts of all nations. AIP is certainly such a programme.

Environmental management in the Atlantic with a global perspective demands a wide scientific knowledge of the functioning of the Earth system combining different spatial scales. It has to be translated into algorithms and mathematical models, based on intensive and systematic monitoring of territories preferably compiled as long-term interoperable data bases. However, this scientific knowledge is far from being uniform throughout the Atlantic as some areas are still poorly covered. Unfortunately, those very regions are the ones facing the major threats associated to global change, and AIP needs to address this very crucial gap.

Technological developments are needed for providing better terrestrial, marine, aerial, and satellite sensors and connecting them to ICT platforms, analyzing the collected data, setting-up robust and reliable models, and delivering appropriate results through data-intensive computing centres. They can also help in promoting the sustainable use of resources and mitigating global change impacts. Access to both types of technologies is not evenly distributed across the Atlantic either, thus demanding AIP actions in this regard.

Moreover, AIP is a programme for the people. The above-mentioned need for scientific knowledge and technological developments and applications represent new business opportunities, which will result also in an increased wealth of our citizens actually based on a sustainable use of resources.

I am very pleased to see that AIP is moving fast from concept into action after the Azores and Florianopolis meetings. Portugal has already committed funds to make this happen, and Spain has also started to articulate efforts by establishing an AIP national node presently composed by innovation promoters, research centres and large facilities that will provide relevant scientific and technological expertise, research vessels, technological platforms, and computing power. During these days, we will be discussing in Cape Verde about a transient AIR Centre Association based in Azores, and setting up several transnational teams of researchers that will start defining the first projects of the programme, which will be supported at the country level by the respective national funding agency.

Spain is ready to take over the baton from Cape Verde as the next AIP meeting will be held in Las Palmas in the Canary Islands. We will make our best effort for continuing the cooperative and amicable spirit that has enabled us to reach that far in such a short time. In fact, one of the things I like the most from this programme is the vast list of enthusiastic friends supporting it; I feel very fortunate to form part of this community.



Atlantic Interactions:  
Climate Change and Energy, Space and Oceans

# 2

## SELECTED IDEAS AND CONTRIBUTIONS





## MARINE PROTECTED AREAS AND ECOSYSTEM SERVICES IN A CHANGING ATLANTIC OCEAN (MARCHANGE)

Marcelo Soares

LABOMAR

The project aims to **evaluate the importance of the marine protected areas of the Atlantic Ocean, quantifying the human impacts, associated ecosystem services, and social benefits and developing predictive models about the future of these systems**. A pioneering approach will be adopted, comparing MPAs that have different governance structures, biodiversity, environmental constraints, and human impacts (local, regional, and global) but sharing a common conceptual framework.

The **Atlantic is the perfect framework for such comparisons** due to the range of marine ecosystems and MPAs, and the long history of research conducted by multiple institutions that are partners of the Atlantic International Research Centre (AIR Centre). Approaching different ecosystems and MPAs with common protocols, we can map cumulative impacts and ecosystem services **from the North to the South Atlantic**, including coastal and offshore MPAs. An exercise of this sort would be a challenging but practical way to increase the understanding of what we are losing or what may be lost if degradation continues at the same pace. This information would contribute to the improvement of ocean governance and the sustainability of exploitation of marine resources in the changing Atlantic Ocean.

### CONTEXT

Marine protected areas are increasingly being established to achieve global conservation targets, promote sustainable use of ocean resources[1], and meet geopolitical goals[2]. The establishment of these MPAs have been enabling the countries bordering the Atlantic Ocean to benefit from several legal mechanisms to strengthen their sovereignty over sea spaces, including the management of their Economic-Exclusive Zones, their natural resources, and their ecosystems goods and services (EGS).

The EGS term integrates two concepts: i) the ecosystem goods, which represent marketable products, such as food and raw materials, are obtained from ecosystems for human use, and ii) ecosystem services, which include all the conditions and processes through which coastal and ocean ecosystems, and the species that make them up, sustain and fulfill human needs[3][4]. The mapping and assessment of the EGS provided by marine environments in the Atlantic Ocean would be a highly valuable source of information and would contribute to an understanding of their current and potential benefits to society. Some marine ecoregions in Atlantic Ocean show increased human impact, driven mostly by fishing, plastics, shipping, and climate change pressures[5]. However, the impact these factors have on ecosystem goods and services in MPAs is still poorly understood. Comparing how those impacts act on protected and unprotected areas within different marine ecoregions can reveal important aspects to improve large-scale conservation and management strategies in the oceans.

### OBJECTIVES AND EXPECTED RESULTS

A pioneering approach will be adopted, comparing MPAs that have different governance structures, biodiversity, environmental constraints, and human impacts (local, regional, and global), but sharing a common conceptual framework. The following specific Objectives (Fig.1) will be developed to achieve the primary goal:

- 1• Develop a common theoretical and practical framework for the human pressures and conservation in Atlantic MPAs through an ecosystem approach across different disciplines (Governance, Ecology, Conservation, Sustainable Management, and Restoration);

- 2 • Mapping and assessment of the ecosystem goods and services provided by marine environments in Atlantic MPAs;
- 3 • Identify the local and global pressures, as well as quantify the degree of damage inflicted by the threats to the ecosystem services.

Fig. 1 • Goals, methodology and expected impacts



This AIR Centre project can provide knowledge and a comprehensive set of data on the impacts and economic value of the ESG. Moreover, it will establish an interdisciplinary scientific cluster connecting different research groups working on marine conservation in various fields, fostering synergies around new knowledge, conservation aims and restoration actions using a large-scale approach across the Atlantic. The proposed **MARCHANGE** project offers an opportunity to consolidate this emerging scientific topic in Atlantic Ocean, sharing and standardizing study methodologies, exploring the services provided by the ecosystems, and assessing management, conservation plans, and restoration programs in Atlantic waters (Europe, Africa, and South America). The network will be essential to the provision of scientific knowledge and a better understanding of the ecosystems; and this in turn will help achieve the main objective of the **Marine Strategy Framework Directive** (MSFD, Directive 2008/56/EC), which is to reach the **Good Environmental Status** (GES) for healthy oceans under global / climate change current and future scenarios including the Goal 14 (Sustainable Development Goals) and the “Decade of Ocean Science” by UNESCO. The network would ultimately advise public governments, NGOs, and multiple stakeholders regarding conservation and sustainable development issues.

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## A NEW PARADIGM FOR THE USE OF OCEAN RESOURCES

**José Joaquín Hernández-Brito**

### PLOCAN

Some initial ideas for the vision and the roadmap to work out during the initial phase of collaborative work in the area of ocean resource use are presented in the following. An initial milestone will be the creation of a network of interdisciplinary specialised and smart nodes, focused on the local harnessing of the ocean resources, but with a new approach based on the circular economy, open to knowledge and innovation and a more friendly attitude towards the ecosystems.

The ocean provides a vast source of both renewable and non-renewable natural stocks with the potential to produce high social, economic and cultural benefits. However, the management and the harnessing of the resources have often been made unwisely, and unsustainability from those viewpoints, especially in Islands and peripheral coastal regions, usually used just as seaports infrastructures or fishing grounds to extract protein without any control or responsibility for the present or future.

The AIR initiative will try to contribute to steward marine resources with a new paradigm where local communities play an essential role, integrating success both of conservation and the well-being. Those communities will work together learning and interact to develop a new blue and circular economic niches, closing loops more locally. Coastal regions and Islands both have the challenge and the mission to accomplish within this approach, to carry out a more smart and sustainable use of resources, providing a more distributed and local governance to harness value while keeping the system under control. These approaches demand more knowledge and technology to monitor and operate those systems, more qualification and skilled human resources locally, a better understanding of the natural processes and the effect of anthropogenic interactions. Sustainability here also means local valorisation, creating and capturing the business community at the regional scale to start more stable interactions with monitored ecosystems, avoiding wild depredations, and regressions in the conservation of the environmental status.

The local empowerment also provides a more global reliance and biodiversity, mitigating abrupt uncontrolled changes, and at the same time give more responsibility to local users and attachment to their natural environments. The AIR approach also requires creating distributed cross-sectorial networks of integrated learning communities, connected to extract and distribute knowledge more openly. The objective of this initiative is to progress on this process in areas related to harnessing biological stocks, ocean renewable energy resources and ecosystem valorisations. The identification of core initiatives, projects and actions are essential to germinate and to nucleate nodes to loop. The experiences available have to be used to build a network of pilots and demonstrations areas where to learn in a parallel progression, building regional capacities and a new engagement with the sea as a source of benefits that should be better protected and understood.

## GLOBAL ATLANTIC – FROM LOCAL TO GLOBAL ATLANTIC SCALE

Ramiro Neves

IST-MARETEC

### Summary

This project aims to use data from local and regional studies carried at national/regional level to improve the Global Atlantic solution that can subsequently be used to improve local/regional solutions. The project will use local/regional data to improve the Copernicus (CMEMS) Atlantic forecasts and will make the improved solution available to the whole Atlantic basin countries, giving value visibility to local/regional studies and creating an effective collaborative network.

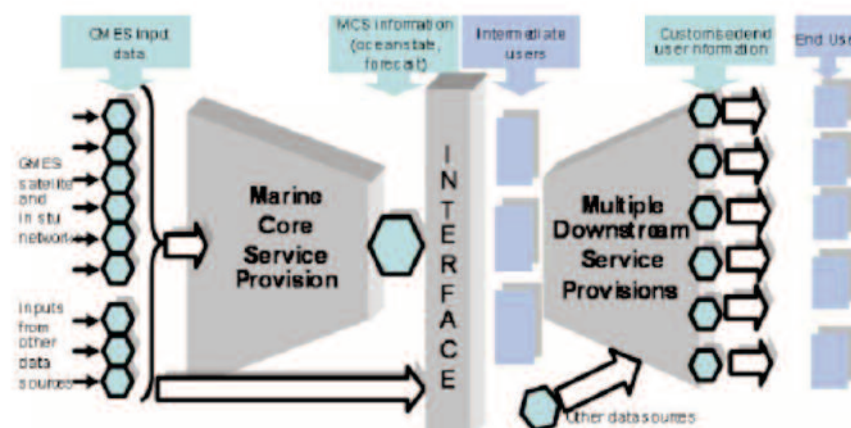


Figure 1: Butterfly structure proposed by the project myOcean and subsequently adopted by CMEMS. One wing is the Core Service and the other are the downstream services created locally by the users, that would access the data through the interface. These 3 elements form the butterfly.

### The context

The Copernicus Marine Environment and Monitoring System, <http://marine.copernicus.eu/> (CMEMS) has data and forecasting components following a “One Point Shopping Solution” and the “butterfly” strategy defined in the myOcean Project<sup>1</sup>. According to this strategy (Figure 1) a Core Service should be created, that would concentrate as much data as possible which would be subsequently made available by a user interface for downstream use.

The forecast service included into CMEMS assimilates the data on the left and produces a global solution for the entire world both on hindcast and forecast perspectives (see e.g. <http://www.actionforecast.com>). These solutions can subsequently be used by local/regional users to provide initial and boundary conditions to Local/Regional models that, using improved spatial resolutions and data should generate improved local solutions. The global solution does not include the tide, that is irrelevant at that scale. The tide is however critical at the local scale, especially into estuaries and coastal lagoons where most marine activities take place. The inclusion of tide is thus a major job for local teams, as is the study of ecological processes that control biological processes and thus the exploitation of biological resources.

This strategy represented a huge progress and made much easier the resolution of regional/local scales essential for the progress of the Maritime Economy. This solution can however be improved, using local solutions.

<sup>1</sup> [https://www.researchgate.net/publication/269134257\\_Ocean\\_Monitoring\\_and\\_Forecasting\\_Core\\_Services\\_the\\_European\\_MyOcean\\_Example](https://www.researchgate.net/publication/269134257_Ocean_Monitoring_and_Forecasting_Core_Services_the_European_MyOcean_Example)



In the “butterfly description, there is only a sense for the flux of information, from the left to the right. In the improved solution a feedback solution would be created, generating a flux from the right to the left, i.e., from the local user to the global community. This flux would improve the global solution and would improve the global solution through its use. This is straight forward in the hindcast solution. In the forecast solution it will generate an interactive procedure.

## Project Objectives

**The project has 2 objectives:**

- a) To set up a global solution for the Atlantic based on the assimilation of the local/regional solution into the global CMEMS solution;
- b) Develop a Platform with webservices to upload and merge the local solutions in a single interface, still giving visibility to the data generators (like Google Earth).

## Suitability for AIR Centre

This project is suitable for AIR Centre because it is a collaborative project that gives visibility to the products developed by each collaborative and because each team can improve its own results by using results of others. This project is also suitable because it goes beyond the state of the art, that remains at the myOcean “butterfly”.

## Methodology

**The project will have 3 major workpackages:**

### DEVELOPMENT OF AN IMPROVED GLOBAL ATLANTIC OCEAN SOLUTION

This solution will be created combining field data, the Copernicus global solution and the partners local/regional solutions. This WP will include the development of data assimilation tools, the assessment of global atmospheric circulation models and of river discharges.

### DEVELOPMENT OF A DATA SYSTEM

A data system is necessary (a) to manage field and remote sensing data for the whole Atlantic that will be used to improve the Atlantic Global solution and (b) to manage local/regional model solutions and the improved Global solution.

### DEVELOPMENT OF A INFORMATION PLATFORM

This platform will be used to disseminate results and data to non-experts and to perform some local simulations based on the existing data. Examples of the functionalities of the platform are: Simulation of oil spills, search and rescue, visualization of time series, calculation of integrated parameters relevant for coastal regional management (e.g. Marine Framework Strategy Directive, Habitats Directive, Regional Planning Directive).

## Partners

The project must include IT science Partners, modellers and data generators, from several countries.

## TRANS-ATLANTIC UHVDC INTERCONNECTION AS PART OF A GLOBAL SUPER GRID

**António Sarmento**

AIR Centre

China has launched the interesting idea of connecting the world through Ultra-High Voltage DC Power Grid (UHVDC). This would smooth power peaks both at day-to-night and summer-to-winter levels, the first through East-West connections and the second through North-South connections. The stabilization of the power consumption and production at world level also leads to a higher penetration of renewable energy, reduces the cost of energy and increases energy security of supply, which is aligned with UN Sustainable Development Goal 7.

The technology for onshore UHVDC lines is already mature with several lines already in operation. The biggest of these lines will be in operation in China in 2018, the Zhundong-Wannan line, with a voltage of  $\pm 1100$  kV, a rated power of 12 GW and a total length of 3400 km. However, the technology for underwater connection is not yet developed.

A trans-Atlantic UHVDC interconnection brings several technological, logistic, environmental and financial challenges that are also interesting opportunities for innovation and business development. Indeed, the availability of power across the Atlantic may induce the development of new businesses such as deep-water energy storage, offshore renewable energy, electric powered ships, subsea mining, deep-water ocean observatories, etc. It will also contribute to the supply of cheap energy and stable grids to the Atlantic islands and allow the integration of significant amounts of renewable energy produced in these islands.

This long-term project of connecting the countries around the globe through an ultra-high voltage transport grid requires establishing the electrical connection between the two margins of the Atlantic. This, indeed, is a priority, as connecting the two margins of the Pacific is a much bigger challenge and not necessarily a must. Three obvious links can be identified: i) connecting Europe to North America via the British Islands, Iceland and Greenland in a length of 2400 km and depths getting to 2000 m; ii) connecting continental Africa, Cape Verde, Fernando Noronha and continental Brazil in a length of 3100 km and water depths reaching 3000 m, with possible connections to the Canary Islands and Madeira and iii) Lisbon, Azores and New York in a length of 7500 km and depths over 3000 m. The first two alternatives are shown in Fig. 1.



Fig. 1 – Two possible trans-Atlantic UHVDC interconnections

An interesting project would be to clarify and quantify what are the challenges and opportunities involved in these connections, the best alternative routes and layout for the electrical lines and improve solutions/innovations in what concerns the cables manufacture, deployment, inspection and operation and maintenance, including but not limited to underwater robotics, new business opportunities and innovative electrical components.

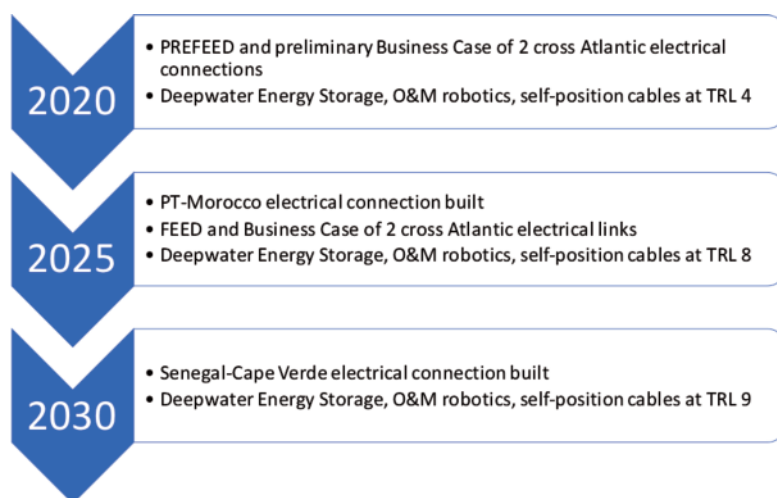


Fig. 2 – Draft schedule for a R&D program

This research and innovation program should comprise three phases as illustrated in the figure below. Such a research and innovation program need to address the following points:

1. Layout of the transport grid, including the number and size of electrical connections to be established and where they should be laid based on the long-term spatial distribution of energy consumption and renewable energy production, ocean bathymetry and type of soil, intensity of ocean currents, involved costs, new business opportunities, etc.;
2. Logistic, infrastructure and technology requirements and availability involved in manufacturing, deploying and operating the transatlantic grid;
3. Assessment of associated environmental, technological, safety and economic risks;
4. Potential for energy production and storage along the transatlantic grid;
5. Potential to associate in-situ ocean monitoring devices to the transatlantic grid;
6. Innovation and new business opportunities triggered by such a project;
7. Development of new components.

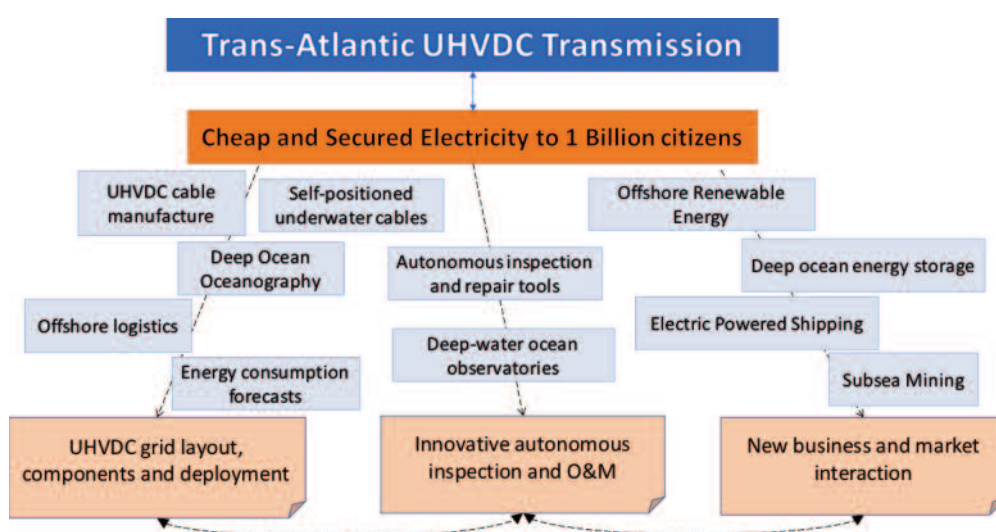


Fig. 3 – Schematics of a mission for a Trans-Atlantic UHVDC interconnection

Fig. 3 shows schematically a mission for a trans-Atlantic Subsea power interconnection. The AIR Centre provides an excellent context to develop a project with this ambition due to its transnational and transregional nature and the availability of competences in its partners, both companies and research centers.

## THE CLEAN AND HEALTHY ATLANTIC 2030 MISSION

**António M. Cunha,**

Instituto de Polímeros e Compósitos da Universidade do Minho

**Miguel Caetano,**

Instituto do Mar e da Atmosfera de Portugal

**António Sarmento,**

AIR Centre

*“The whole of the ecosystems of the world are based on a healthy ocean. And if that part of the planet becomes dysfunctional, goes wrong, then the whole of life on this planet will suffer”, David Attenborough, interviewed in the documentary A Plastic Ocean, by Craig Leeson.*

Oceans’ Health is a matter of concern. Among other problems there is an exponential increase in the amount of plastics produced worldwide (about 340 Mtonnes in 2017, with an average expected growth rate of 4% in the next 30 years) and part of it ends up in the ocean. As time passes, these “ocean plastics” degrade, break down, and ultimately become microplastics. Microplastics, with particle sizes smaller than 5 mm, are usually found between 3 and 10 meters below the ocean free surface, and eventually deposit in the bottom (although the typical density range of plastics varies from 0.9 to 1.4, fouling phenomena reduce their buoyancy). Microplastics constitute a global problem, as they i) exhibit a global distribution and have been detected in all levels of the marine environment, ii) may transport non-indigenous marine species, which threaten marine biodiversity and the food chain, iii) can accumulate toxic substances or act as a vector of toxic pollutants in the food chain, with potentially severe health implications.

Due to their size and location in the ocean, microplastics cannot be seen or detected by current satellite observation methods, either aerial or in situ, its presence being identified through the inspection of fish stomachs or by filtering specifically taken water samples, necessarily limited methods. The outcome of this is a very poor understanding of the microplastics cycle, its quantity in the ocean and its circulation, concentration, dispersion, breakage, pollutants adsorption and deposition processes.

Both at the UN and EU levels, ocean contamination by plastics and microplastics are topics of concern and led to strategies based in the circular economy, including: reduction of plastics use, by promoting reutilization and light-weighting; use of biodegradable plastics in disposable applications, and enhanced capture at wastewater treatment stations. These strategies are very relevant, as they help preventing or at least mitigating continued ocean contamination.

However, we can only manage what we accurately know, and this justifies an effort to monitor and measure the generation and presence of plastic and microplastics in the ocean and their cycles and circulation patterns. A better understanding of these features allows to i) monitor the effectiveness of the UN and EU strategies’ implementation, ii) identify measures to eliminate or mitigate the impact of microplastics in humans, animals and the environment, iii) design recovery strategies and iv) support worldwide communication policies on the size of the problem and the need of take abatement measures.

The microplastics generation process is very dependent of the material composition of both the polymer matrix and its additives (including, as most abundant, those with only aliphatic chains as PE or PP, or containing aromatic groups, as PS or PET, vinyl compounds and crosslinked structures as epoxies or vulcanized rubbers) and on the environment conditions (temperature, UV exposure and mechanical abrasion). Furthermore, the so called “plastics soup” is very heterogeneous, comprising materials with different morphologies, as bulk products, films, fibres and low density foams, as well as an enormous variety of shapes, including hallow products as bottles or containers. Accordingly, prediction of microplastics generation is a geo-dependent process, requiring the coupling of data on consumption, societal behaviour, weather patterns, and ocean characteristics, such as currents and biogeochemical parameters.

Considering the above impacts and scientific challenges, the AIR Centre proposes the Clean and Healthy Atlantic 2030 Mission, heretofore referred to as “the Mission”, focused on a drastic reduction of microplastics in the Atlantic Ocean through:



- **Mapping the generation and distribution of microplastics in the Atlantic Ocean**, building consensus around methodologies for collection and identification, combining satellite monitoring, aerial and in-situ observations, coupled with specific sampling and analysis, and data science with advanced numerical models to assess the quantity of microplastics in the Atlantic Ocean and to predict its correlation with floating and immersed plastics, degradation, deposition cycles and circulation patterns;
- **Reduce in 2/3, until 2030, the actual amount of plastic residues in the Atlantic Ocean**, by improved technologies for collecting, recycling and elimination of those materials and other wastes;
- **Reduce in 90%, until 2030, the disposal of non-biodegradable plastics to the Atlantic Ocean**, by proposing concerted legal, behaviour and technological actions in the Atlantic countries.

The Mission would include the development of new standardized technologies and methodologies for sampling, quantifying, monitoring and identifying microplastics in the ocean and coastal areas. These actions will certainly help society to address the challenge of preventing, reducing and mitigating plastic pollution, through an integrated approach, from space to deep sea, across the south and north Atlantic, with emphasis in the most threatened coastal areas. An open data cube will be available to support the development of local, regional and national policies to create a sustainable framework for pollution reduction and to actively mobilize all interested stakeholders.

Furthermore, the mission will use an Open Science approach and will aim to engage with other initiatives in the planet, once Oceans' Health is a global interconnected challenge.

Being a new international scientific organization with direct involvement of different governments along and across the Atlantic, the AIR Centre offers a unique platform for transnational and transregional ocean observation, public engagement and governmental communication.



## THE AIR CENTRE DATA INTELLIGENCE NETWORK - AIR\_DataNet

Rui Oliveira

University of Minho

The AIR Centre (Atlantic International Research Centre) promotes a holistic, integrative and systemic approach to knowledge on space, atmosphere, oceans, climate-energy, and data sciences in the Atlantic, while fostering an inclusive perspective to science, technology and economic development.

One of its major goals is to become a knowledge and data driven network organization, enabling innovative work through bottom-up initiatives that will face new and greater challenges and R&D gaps.

This goal will be achieved through the AIR Centre Data Intelligence Network (**AIR\_DataNet**) developed in close collaboration with the AIR Centre and involving institutions from the respective partner countries. The founding institutions are MACC (Minho Advanced Computing Centre), Portugal, BSC (Barcelona Supercomputing Centre), Spain and TACC (Texas Advanced Computing Center), USA. Other current partners include COPPE, LNCC and INPE, from Brazil.

The **AIR\_DataNet** will act as the AIR Centre data foundry. It will be able to manage all sorts of data relevant to the AIR Centre projects (e.g. datasets, source code, publications) duly curated and catalogued enabling the fulfillment of its research mission. The **AIR\_DataNet** procedures and services will be fully aligned with the Open Science agenda in the Pan-European Research Area.

Accordingly, the objectives of the **AIR\_DataNet** are:

- a) To enable and support a very large capacity federated data infrastructure providing ready-to-use data focused on the scientific domains of the AIR Centre;
- b) To provide a one-stop shop data management facility for Open Data storage, processing and retrieval facility, a FAIR (findable, accessible, interoperable and reusable) Data & Metadata Catalogue, Persistent IDs and versioned mid & long-term storage;
- c) To provide state-of-the-art presentation and visualization data services and tools.

The AIR\_DataNet will be based on a one-stop shop data management facility and will have the following main features:

- Highly scalable Open Science Cloud node
- Open Data storage, processing and retrieval facility
- Native, user-defined and 3rd party processing library
- FAIR Data & Metadata Catalogue
- Persistent IDs and versioned mid & long-term storage
- State-of-the-art presentation services and tools.



Atlantic Interactions:  
Climate Change and Energy, Space and Oceans

# 3

## SECOND HIGH-LEVEL INDUSTRY-SCIENCE -GOVERNMENT DIALOGUE ON ATLANTIC INTERACTIONS

## FLORIANÓPOLIS, BRAZIL • NOVEMBER 20TH- 21ST 2017

### SUMMARY

During the second Atlantic Interactions Summit, held in Florianópolis in November 2017, the Atlantic Interactions Research Centre was formally created. The “Florianopolis Declaration” was signed by the governments of Portugal, Brazil, Spain, Angola, Cape Verde, Nigéria, Uruguay and São Tomé and Príncipe, together with the regional government of the Azores. The United Kingdom and South Africa are involved as Observers at this stage.

Based in the Azores, the AIR Centre will be a platform for the development of research activities on climate, land, space and ocean. It will create scientific jobs for highly qualified human resources, while enabling integrated research on the Atlantic.

### AGENDA

**Venue: Costão do Santinho, Florianópolis, Brazil**

#### OVERALL DRAFT AGENDA

##### SUNDAY, 19TH NOVEMBER 2017

**8:30-18:00** - Arrival of Delegations to Florianópolis

**19:00-20:30** - Welcome reception and Dinner

##### MONDAY 20TH NOVEMBER 2017

**8:30-9:00** - REGISTRATION

**9:00-9:30** - WELCOME REMARKS: SETTING THE STAGE

**9:30-12:30** - MINISTERIAL ROUNDTABLE AND INDUSTRY-SCIENCE-GOVERNMENT DIALOGUE, PART I

**13:00-14:00** - FAMILY PHOTO AND LUNCH

**14:00-16:30** - MINISTERIAL ROUNDTABLE AND INDUSTRY-SCIENCE-GOVERNMENT DIALOGUE, PART II AND CLOSING REMARKS

**17:00-18:00** - COCKTAIL AND CULTURAL EVENT

**20:30** - OFFICIAL DINNER

##### TUESDAY 21ST NOVEMBER 2017

**8:30-9:00** - REGISTRATION

**9:00-12:30** - PARALLEL SCIENTIFIC WORKSHOPS ON THE ‘AIR CENTRE RESEARCH AGENDA’

**Workshop 1:** Earth observation, climate, energy and ecosystem variability

**Workshop 2:** From deep sea to space, from space to deep sea

**Workshop 3:** Data analytics and artificial intelligence for interdisciplinary research

**13:00-14:00** - LUNCH

**14:00-16:30** - MINISTERIAL ROUNDTABLE AND INDUSTRY-SCIENCE-GOVERNMENT DIALOGUE, PART III REPORT FROM SCIENTIFIC WORKSHOPS 1, 2 AND 3  
CLOSING REMARKS

#### DETAILED PROGRAM

##### SUNDAY, 19TH NOVEMBER 2017

**DURING THE DAY** - ARRIVAL OF DELEGATIONS AND PARTICIPANTS

**19:00** - Welcome reception and Dinner

##### Monday 20th November 2017

**8:30-9:00** - REGISTRATION



**9:00-9:45 - WELCOME REMARKS: SETTING THE STAGE**

**Gilberto Kassab**, Minister of Science, Technology, Innovations and Communications, Brazil

**João Raimundo Colombo**, Governor of the State of Santa Catarina, Brazil

**Manuel Heitor**, Minister of Science, Technology and Higher Education, Portugal

**9:45-10:30 - MINISTERIAL ROUNDTABLE AND INDUSTRY-SCIENCE-GOVERNMENT DIALOGUE, PART I**

Chair: **Juan Maria Vásquez**, Secretary General, Science and Innovation, Spain

Implementing the AIR Centre - Main conclusions of the two high level groups created in Azores in April 2017

Brief Presentation: **Paulo Ferrão**, Portuguese Foundation for S&T (FCT), Portugal

Ministerial Roundtable and Dialogue: informal discussion around the table

**10:30-12:30 - LAUNCHING AND IMPLEMENTING THE AIR CENTRE RESEARCH AGENDA** Brief presentations (5 min):

**Ricardo Galvão**, National Space Research Institute, Brazil

**Patrick Plante**, thales Europa, France

**Alvaro Prata**, Secretariat for Technological Development and Innovation, Brazil

**Antonio Sarmento**, WavEC, Portugal

**Alte Marcos Almeida**, Diretoria-Geral de Desenvolvimento Nuclear e Tecnológico da Marinha, Brazil

**Joaquín Hernández Brito**, Oceanic platform of the Canary Islands (PLOCAN), Spain

MINISTERIAL ROUNDTABLE AND DIALOGUE:

INFORMAL DISCUSSION AROUND THE TABLE CLOSING SUMMARY:

**Lino Barañao**, Minister Science, Techn. and Productive Innovation, Argentina (TBC)

**Vinny Pillay**, Minister Counselor: South Africa Mission to the European Union,  
Department of Science and Technology, South Africa

**Aquilino Varela**, director of Science, Technology and Innovation Cabinet, Cape Verde

**12:30 - FAMILY PHOTO**

**13:00-14:00 - LUNCH**

**14:00-16:30 - MINISTERIAL ROUNDTABLE AND INDUSTRY-SCIENCE-GOVERNMENT DIALOGUE, PART II**

Chair: **Maria do Rosário sambo**, Minister of Higher Education, Science, Technology and Innovation, Angola

LAUNCHING AND IMPLEMENTING THE AIR CENTRE RESEARCH AGENDA (CONT.) Brief Presentations:

**Jailson Bittencourt de Andrade**, Secretary for R&D Policies, Brazil

**Juan Maria Vázquez Rojas**, General Secretary for S&I, Spain

**Gui Menezes**, Azores Regional Secretary for Sea, Science and Technology, Portugal

**José Raimundo Braga Coelho**, Brazilian Space Agency, Brazil

**Tiago Rebelo**, Center for Innovation and Creative Engineering (CEiiA), Portugal

**Osvaldina Silva**, National Institute for the Fishing Development, Cape Verde (TBC)

**Seidu Mohammed**, National Space Research and Development Agency (NASRDA), Nigeria

MINISTERIAL ROUNDTABLE AND DIALOGUE: INFORMAL DISCUSSION AROUND THE TABLE Closing Remarks for the first day:

**Myriam Aldabalde**, Representative of Minister for Education and Culture, Uruguay

**Maritza rosabal Peña**, Minister for Education, Cape Verde (TBC)

**Manuel Heitor**, Minister for Science, Technology and Higher Education, Portugal

**Gilberto Kassab**, Minister of Science, Technology, Innovations and Communications, Brazil

**17:00-18:00** - OFFICIAL CEREMONY: SIGNING OF THE FLORIANÓPOLIS DECLARATION  
FOR IMPLEMENTING THE AIR CENTRE

**19:30** - COCKTAIL + CULTURAL EVENT

**20:30** - DINNER

Keynote speaker: Rebecca Greenspan, Secretary General, Ibero American Conference (SEGIB)  
Tuesday 21st November 2017

**9:00-12:30** - PARALLEL WORKSHOPS ON "AIR CENTRE'S RESEARCH AGENDA"

**Workshop 1:** Earth observation, climate, energy and ecosystem variability

**Workshop 2:** From deep sea to space, from space to deep sea

**Workshop 3:** Data analytics and artificial intelligence for interdisciplinary research  
(see detailed programme below)

**13:00-14:00** - LUNCH BREAK

**14:00-15:30** - MINISTERIAL ROUNDTABLE AND INDUSTRY-SCIENCE-GOVERNMENT DIALOGUE, PART III

Chair: **Gilberto Kassab**, Minister of Science, Technology, Innovation and Communications, Brazil

REPORT FROM SCIENTIFIC WORKSHOPS 1, 2 AND 3:

WORK GROUP'S CHAIRS REPORT FOR 15 MIN EACH CLOSING REMARKS

**Paulo Ferrão**, Portuguese Foundation for Science and Technology (FCT), Portugal

**Jailson Bittencourt de Andrade**, Secretary for R&D Policies, Brazil

PARALLEL WORKSHOPS ON "AIR CENTRE RESEARCH AGENDA", NOVEMBER 21ST

WORKSHOP 1: EARTH OBSERVATION, CLIMATE, ENERGY AND ECOSYSTEM VARIABILITY

Chair: **António Sarmento**, WavEC, Portugal

Rapporteur: **Ricardo Galvão**, National Institute for Space Policies (INPE), Brazil

**Vladimiro Miranda**, INESC P&D-Brazil - Energy (TBD)

**Seidu Mohammed**, National Space Research and Development Agency (NASRDA),

Nigeria - Contributions of NASRDA to the Atlantic Interactions Agenda

**Francisco Cunha**, TEKEVER, Portugal - Infante project and applications

**Rui Semide**, Lusospace, Portugal - Atlantic Optical Network

**Nuno Catarino**, DEIMOS, Portugal - Towards an Atlantic Earth Observation System of Systems:

the AIR contribution to GEOSS

**Joaquín Hernández Brito**, Oceanic Platform of the Canary Islands (PLOCAN), Spain - Use of Research I  
nfrastructures for earth observation

**Eduardo Barlguerías**, Spanish Oceanographic Institute (IEO), Spain - Relationship of ocean-atmosphere  
and sustainable fisheries

**João António Lorenzetti**, National Institute for Space Research (INPE), Brazil (TBC)

- Earth and Ocean systems observation

**José Luis Muñoz**, Spanish Node of Climate Knowledge Innovation Community (KIC), Spain - EIT Climate KIC &  
Cross-KIC Spain - The Knowledge and Innovation Communities of European Institute of Innovation and Technology - EIT

**WORKSHOP 2: FROM DEEP SEA TO SPACE, FROM SPACE TO DEEP SEA**

Chair: **Ricardo Mendes**, Tekever, Portugal

Rapporteur: **Andrei Polejack**, Ministry of Science, Technology, Innovation and Communications (MC-TIC), Brazil

**Guillermo Franz**, Universidade Federal do Paraná, Brazil - Modelling to strengthen the link between Maritime Regions

**Francisco Arias**, Instituto de Investigaciones Marinas y Costeras (INVEMAR), Colombia (TBC) - Deep Sea observation,  
monitoring and sampling - importance and difficulties

**Ramiro Neves**, Instituto Superior Técnico, Lisbon University, Portugal - Earth System Modelling Framework for Understanding Regional Climate Change Impacts

**Alberto de Pedro Crespo**, GMV Portugal, Portugal - Next Steps towards services and applications

**Orestes Estevam Alarcon**, Federal University of Santa Catarina, Brazil - Marine scientific platform in Brazil in support of the AIR Centre

**Eduardo Pereira**, ISISE/IB-S, University of Minho, Portugal - IB-S and Next Sea project: multidisciplinary approach to current ocean challenges and other harsh environments

**Wilsa Atella**, AMBIDADOS, Brazil - Technological development for ocean research

**Telmo Morato**, DOP, University of Azores, Portugal (TBC) - Ocean

**Juan Carlos Cortés**, Space Technologies of the Spanish Agency for Innovation, Spain - Identification of gaps and opportunities for the involvement of technological companies in this topic

**Elsa Alexandrino**, DEIMOS, Portugal - Federating capacity: a common ground segment for Atlantic EO Missions

**Carlos Fernández**, DEIMOS Imaging, Spain (TBC) - TBD

### WORKSHOP 3: DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE FOR INTERDISCIPLINARY RESEARCH

Chair: **Ulisses Mello**, IBM Research-Brazil, Brazil

Rapporteur: **António Cunha**, University of Minho, Portugal

**Igor Oliveira**, IBM Research-Brazil, Brazil - The Weather Company: Large Scale Weather Forecast

**Lucas Villa Real**, IBM Research-Brazil, Brazil - Water Management with Sensors

**Rui Oliveira**, University of Minho and INESC TEC, Portugal - Unlocking the potential of Big Data with AI and the frontiers of Quantum Computing

**Josep Martorell**, Barcelona Supercomputing Center, Spain - HPC for interdisciplinary research

**João Barbosa**, University of Texas at Austin, United States of America - E-Science for data management at AIR

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Professor University of Minho

**Elsa Alexandrino**

Business Development Manager  
Elecnor Deimos

**Francisco Cunha**

Senior Adviser  
TEKEVER



**Gui Menezes**

Regional Secretary Azores Regional Secretary for the Sea,  
Science and Technology

**Ivo Vieira**

CEO  
Lusospace

**Jorge Cabral**

Ambassador  
Portuguese Embassy in Brazil

**Magda Coco**

Partner  
Vieira Almeida & Associados - Sociedade de Advogados

**Manuel Heitor**

Minister  
Ministry for Science, Technology and Higher Education (MCTES)

**Margarida Saragoça**

Director of Practice and Clients  
Vieira Almeida & Associados - Sociedade de Advogados

**Marta Graça**

Head of New Frontier Business  
Vieira Almeida & Associados - Sociedade de Advogados

**Nuno Catarino**

Senior Project Manager  
DEIMOS

**Paulo Ferrão**

President Foundation for Science and Technology (FCT)

**Ramiro Neves**

Director  
Marine, Environment & Technology Center (MARETEC), IST, University of Lisbon

**Ricardo Mendes**

CEO  
Tekever

**Rui Oliveira**

Professor  
University of Minho

**Rui Semide**

Chief Marketing Officer  
Lusospace

**Telmo Morato**

Research Associate Marine and Environmental Sciences Centre (MARE), Universidade dos Açores

**Teresa Tavares**

Adviser  
Ministry for Science, Technology and Higher Education (MCTES)

**Tiago Rebelo**

Aerospace Engineer  
Centre for Innovation and Creative Engineering (CEiiA)

## SOUTH AFRICA

**Patrick Plante**

R&T Director  
Thales Group

**Vinny Pillay**

Minister-Counselor  
Department of Science and Technology at the South African Mission to the EU

## SPAIN

**Benjamín Sánchez Gimeno**

Deputy Director General for the Internationalization of Science and Innovation  
General Secretary of Science and Innovation

**Eduardo Balguerías Guerra**

Director  
Spanish Institute of Oceanography

**José Joaquín Hernández Brito**

Manager of Science, Technology and Innovation Oceanic Platform of the Canary Islands (PLOCAN)

**José Luiz Muñoz**

Director  
Spanish Node of Climate Knowledge Innovation Community (KIC)

**Josep Martorell**

Associate Director  
Barcelona Supercomputing Centre (BSC)

**Juan Carlos Cortés**

Director  
Space Technologies of the Spanish Agency for Innovation

**Juan María Vázquez Rojas**

Head of Delegation  
General Secretary of Science and Innovation

**Octavio Llinas**

Director  
Oceanic Platform of the Canary Islands (PLOCAN)

## UNITED KINGDOM

**Rui Lopes**

Deputy Director  
Science and Innovation Network in Brazil

## URUGUAY

**Myriam Aldabalde**

Advisor to the Directorate of Science and Technology  
Ministry of Education and Culture

## UNITED STATES OF AMERICA

### **Augustus Vogel**

U.S. Office of Naval Research Global (São Paulo office)

### **Jerry Miller**

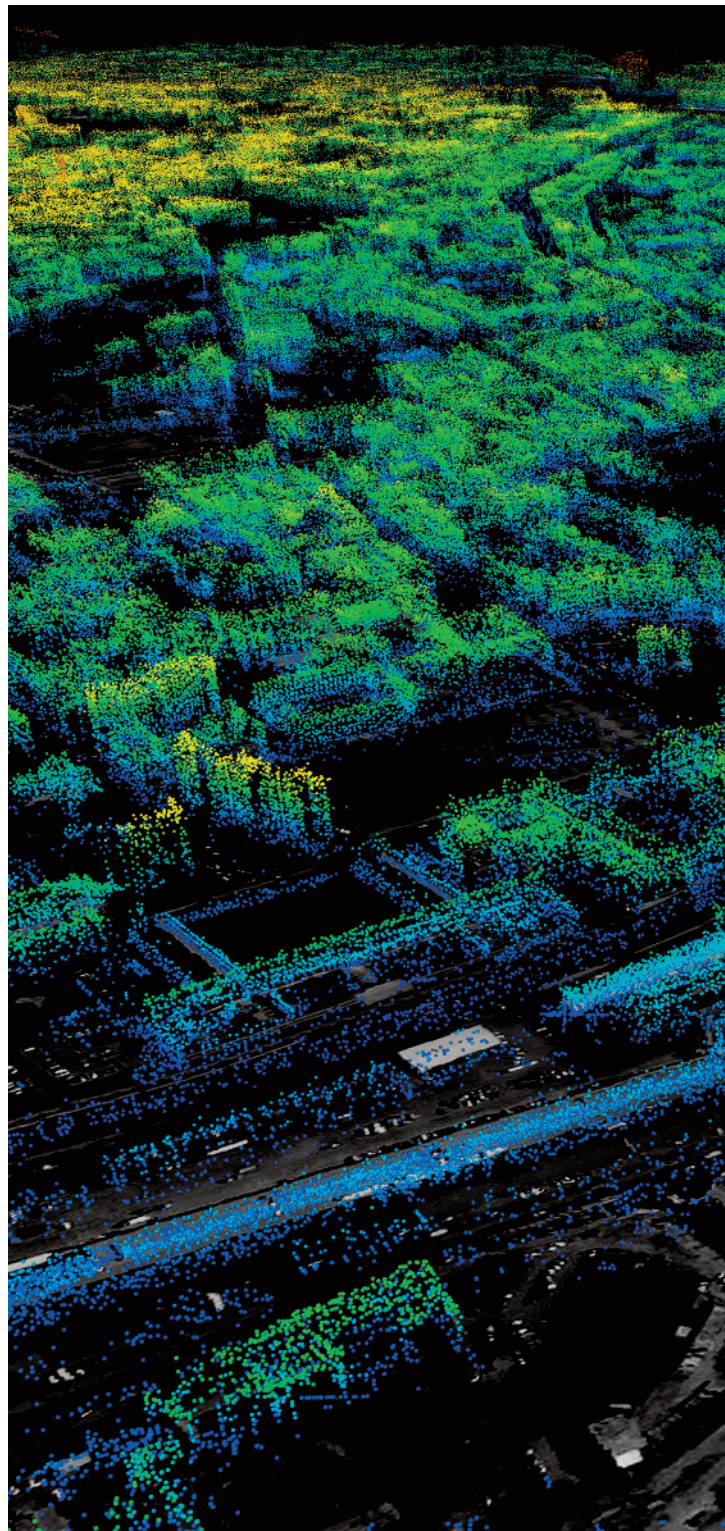
Director for Science Technology for Sustainability  
The National Academy of Sciences, Engineering and Medicine

### **João Barbosa**

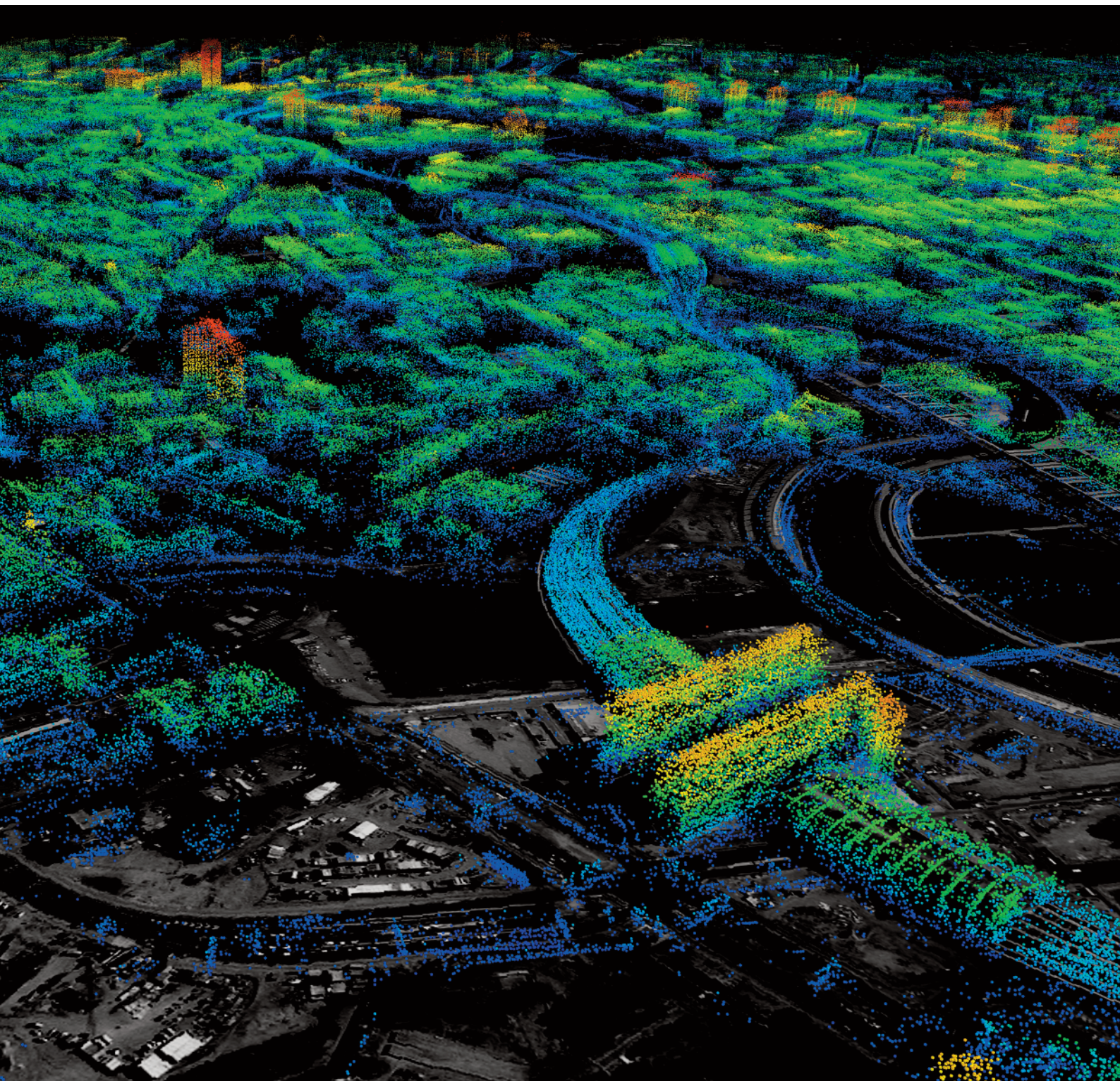
Research Associate, Scalable Visualization Group  
University of Texas at Austin (UT Austin)

### **Marco Bravo**

Project Director at the IC2 Institute  
University of Texas at Austin (UT Austin)









# THE FLORIANOPOLIS DECLARATION

## Establishing the ATLANTIC INTERNATIONAL RESEARCH CENTER (AIR CENTER)

Florianopolis, Brazil, 20-21 November 2017

Following the conclusions of the "First High-Level Industry-Science-Government Dialogue on Atlantic Interactions", held in Terceira island, Azores-Portugal, 20-21 April 2017, the signatories met during the "Second High-Level Industry-Science-Government Dialogue on Atlantic Interactions", in Florianopolis, Brazil, 20-21 November 2017, and agree on establishing the **Atlantic International Research Center (AIR Center)**, making use of the terms and common understanding described below:

- The AIR Center should promote a holistic, integrative and systemic approach to knowledge on space, atmosphere, oceans climate-energy, and data sciences in the Atlantic, while fostering an inclusive perspective to science, technology and economic development;
- The AIR Center major goal is to become a knowledge and data driven network organization, enabling innovative work through bottom-up initiatives that will face new and greater challenges and R&D gaps;
- At this launching phase, the initial AIR Center Research Agenda is that adopted in the document "Atlantic Interactions - Towards an integrative approach to the Atlantic: Climate Change and Energy Systems, Space and Ocean Sciences, Data Sciences through North-South/South North cooperation" (August 2017);
- The establishment of the AIR Center, with its Headquarters in the Azores, should take benefit of the strategic positioning of Atlantic islands and set up a network of existing or new research sites and infrastructures in the Atlantic islands of Azores, Madeira, Canary Islands, Cape Verde, Fernando de Noronha and S. Pedro-S. Paulo, among others, together with mainland research sites in India, Nigeria, Angola, South Africa, as in Europe and in the Americas, as well as others to follow, in order to optimize the appropriate use and sharing of research infrastructures and data, in order to increase their operational efficiency and output;



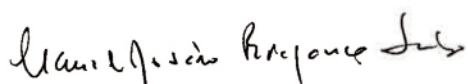
- The AIR Center should be conceived as open to the world through the establishment of different forms of scientific and technological collaboration with public and private entities across the Globe, thus providing a truly international shared environment. In this way, it shall benefit from the development of comparative studies and projects over our entire and unique ocean, including the interactions between Atlantic, Indian, Arctic, Southern Pacific and Mediterranean regions, promoting a sustainable management of common resources;
- The expected impact of the creation of the AIR Center includes the development of a new scientific and innovation platform at the best international level, offering a global-scale network of research sites, capable of attracting scientists and technology-based companies from around the world, as well as stimulating different forms of collaboration among European, North, Central and South American, Caribbean, African and Asian public or private entities within a wide range of areas including: Atmospheric Science and Climate Change, Energy Systems, Ocean Science and Technology, Data Science and Space Science and Technology, associated with research, education and technology-based businesses;
- The AIR Center governance should be implemented under the following guidelines:
  - Establish an international distributed scientific network organization, with an own and independent legal status, comprising an international network of science, technology and innovation organizations across Atlantic countries in association with other scientific and research organizations worldwide;
  - Consider a stepwise process with the following time-bound targets:
    - 2018, 1<sup>st</sup> semester: Setting-up an initial financial and investment plan for the AIR Center, as a network of research sites and infrastructures. The plan should include a forecast of expected investment for jobs and for expenditures and potential funding sources. A clear draft business plan is to be prepared and submitted to approval by founding partners;
    - 2018, 2<sup>nd</sup> semester: Conclude the launching phase, by establishing a non-profit Association, registered in Portugal, to lead the network of research sites and infrastructures in the initial phase of the AIR Center through a consortia of

founding members (public and private institutions), aimed to deepen the governance model and to launch, anon, activities within the basic scientific program in targeted research areas;

- 2019-2020: Foster a development phase, with the completion of national processes regarding the acquisition of "Air Center" international legal status, at the same time as the multisite research and infrastructures in different countries is strengthened;
- 2020-2022: Guarantee full institutional autonomy, with adequate institutional, legal and financial structure, together with fully scientific autonomy as a multisite research organization;
- Form a Steering Committee (SC) that will prepare the establishment of the AIR Center – Atlantic International Research Center, as described above, and will define an implementation and financial plan which at least should consider the following items:
  - A flexible international governance model, addressing staff, financial contributions, definition of the scientific program, headquarter agreement and extension to Member States;
  - A Basic Program, to be subscribed by all founding partners, together with Specific Target and Thematic Programs to accomplish specific goals considered in the AIR Center Research agenda;
  - The implementation plan for the AIR Center should consider a voluntary funding raising strategy and the identification of main sources of funding for a period of 5 to 20 years for the Basic Program and the Specific Target and Thematic Programs;
  - The Steering Committee meets every 3 months, and comprises an Executive Committee that meets twice a month. The meetings can be held through video conferencing and other electronic means.
- The countries interested in the launching of the AIR Center agree on designating their representative (s) to the Steering Committee no later than January 2018.
- The next High-Level Meetings will be in Cape Verde, in May 2018, and in the Canary Islands, in November 2018.

The signatories, in Florianopolis

**Governments**



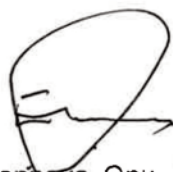
Maria do Rosário Sambo, Minister for Higher Education, Science, Technology and Innovation, Angola



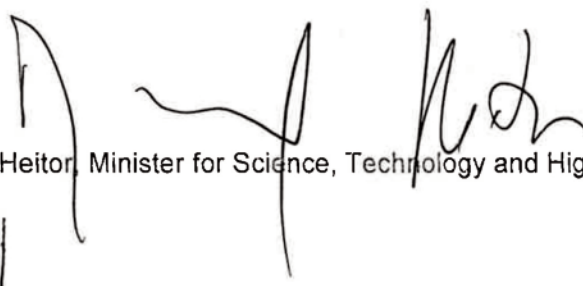
Gilberto Kassab, Minister for Science, Technology, Innovations and Communications, Brazil



Maritza Rosabal, Minister of Education, Cape Verde, represented by Aquilino Varela



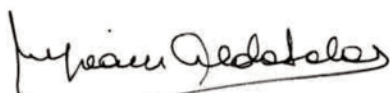
Ogbornaya Onu, Minister of Science and Technology, Nigeria, represented by Ekanem J. Udoh



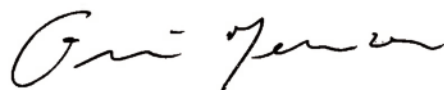
Manuel Heitor, Minister for Science, Technology and Higher Education, Portugal



Juan Maria Vázquez Rojas, General Secretary for Science and Innovation, Spain



María Julia Muñoz Minister for Education and Culture, Uruguay, represented by  
Myriam Aldabalde



Gui Menezes, Azores Regional Secretary for Sea, Science and Technology,  
Regional Government of Azores



**Initial Associated Research and Technology Organizations, RTOs:**




Associação RAEGE, Azores, Gui Menezes, representative of the major shareholder



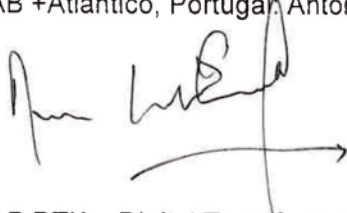
Barcelona Super Computing Center (BSC-CNS), Spain: Josep M. Martorell Rodon, Associate Director



CEIIA Engineering and Innovation Center, Portugal: José Rui Felizardo, CEO



CoLAB +Atlântico, Portugal: António Sarmento

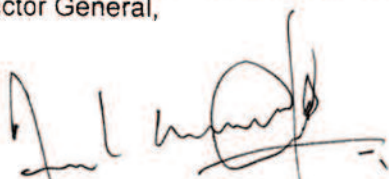


CoLAB DTX – Digital Transformation, Portugal: António Cunha

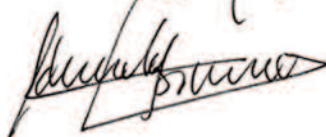




EIT Climate-KIC Spain (Knowledge Innovation Community on Climate of the European Institute of Innovation and Technology), Spain José Luis Muñoz, Director General,



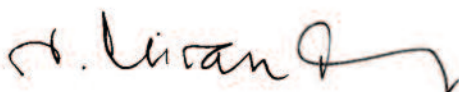
IB-S - Institute for Bio Sustainability, Portugal: António Cunha



IEO - Instituto Español de Oceanografía, Spain: Eduardo Balguerías, Director



INESC TEC, Portugal: Rui Oliveira, Member of the Board



INESC P&D Brasil: Vladimiro Miranda, President Director



PLOCAN, Spain: José Joaquín Hernández Brito, Chief Operating Officer



WavEc, Portugal, António Sarmento

**Initial list of Industry**



Deimos, Elecnor Group, Elsa Alexandrino, Business Developer


Lusospace Ivo Vieira, CEO



Tekever: Ricardo Mendes, CEO



Thales: Patrick Plante, R&D Technical Director

For Thales Portugal 

G.M.V. , Alberto de Lencastre, Director ~~and~~ Portugal



## Signatories of the Florianopolis Declaration

### Governments

Olinto Daio, Minister for Education, Culture and Science, São Tomé and Príncipe



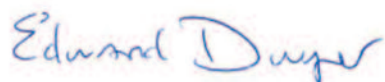
### Associated Research and Technology Organizations, RTOs

Ciência Viva Agency, Portugal: Rosalia Vargas, President

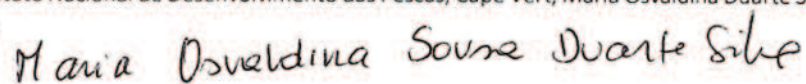
CODI - Centro para o Desarrollo Tecnológico Industrial: Spain, Francisco Marin, President

CSIC – Consejo Superior de Investigaciones Científicas, Spain, José Ramón Urquijo, Vice-president  
de Organización e Relaciones Institucionales

EUROcean: Ned Dywer, Executive Director



INDP/Instituto Nacional de Desenvolvimento das Pescas, Cape Vert, Maria Osvaldina Duarte Silva,  
President





Universidade de Cabo Verde, Cabo Verde: Judite Medina do Nascimento, Rector



University of Texas at Austin, USA: Daniel Jaffe, Vice President for Research

#### Industry

EDP Inovação: António Vidigal, Presidente e Luís António, Executive Diretor

**Annexes:**

1. Initial list of research institutions, sites and infrastructures considered "**Poles of the AIR Center**", in the launching phase
2. Members of the **Steering Committee** of the AIR Center



## Annex 1

### Initial list of research institutions, sites and infrastructures considered "**Poles of the AIR Center**", in the launching phase

1. Cape Verde Ocean Observatory, in collaboration with GEOMAR - Helmholtz Center for Ocean Research Kiel and the National Institute for the Development of Fisheries ill (Contact: tbd)
2. Cape Verde Atmospheric Observatory Humberto Duarte Fonseca, CVAO, (Contact: tbd)
3. CoLab +Atlântico, Portugal (contact: António Sarmento, Member of the board)
4. INPE – National Institute for Space Policies, S José dos Campos, Brazil (contact: Ricardo Galvão, Director)
5. Nigerian National Institute of Oceanography, Lagos, Nigeria (contact: tbd)
6. PLOCAN, Canary Islands, Spain (contact: Octavio Llínas, Director)
7. Santa Maria satellite tracking unit (Contact: tbd)
8. South Africa National Center for Ocean Resercah, tbd (Contact: tbd)
9. Texas Advanced Computing Center, TAAC, University of Texas at Austin, USA
10. RAEGE (Rede Atlântica de Estações Geodinâmicas e Espaciais/Atlantic Network of Geodynamic and Spacial Stations), Spain and Azores (contacts: Pablo de Vicente, Director / Luís R. Santos, Assistant Director)

## Annex 2

### Members of the **Steering Committee** of the AIR Center

1. Angola: tbd
2. **Andrei Polejack**, Deputy Secretary for Policies and Programs, Brazil
3. **Aquilino Varela**, Director of Science, Technology and Innovation, Cabo Verde
4. **M.A. Atmanand**, Former Director National Institute of Ocean Technology , Chennai, India
5. **Ekanem Udoh**, Director of Science and Technology Promotion, Nigeria
6. **António Sarmiento**, CoLab +Atlântico, Portugal (**Chair**)
7. São Tomé and Príncipe: tbd
8. **Stewart Bernard**, Council of Scientific and Industrial Research, South Africa
9. **José Joaquín Hernández Brito**, PLOCAN, Spain
10. **David González**, Director of Science and Technology, Uruguay
11. **Marco Bravo**, University of Texas at Austin, USA
12. **Carolina Rêgo Costa**, Portuguese Science and Technology Foundation, Portugal (Executive Legal Officer)
13. **Rui Oliveira**, INESC TEC - Universidade do Minho, Portugal
14. **Tony Lewis**, Emeritus Beaufort Professor & Co-PI MaREI Centre Environmental Research Institute
15. **Francisco Wallenstein Macedo**, Azores Mission Structure for Space, Azores
16. **Bruno Pacheco**, Regional Director of Science and Technology, Azores
17. **Claire Durkin**, Head of Global Science and Innovation in BEIS- Department for Business, Energy and Industrial Strategy, United Kingdom (Observer)

### Executive Board of the Steering Committee of the AIR Center

1. **António Sarmiento**, CoLab +Atlântico, Portugal (**Chair**)
2. **Andrei Polejack**, Deputy Secretary for Policies and Programs, Brazil
3. **Stewart Bernard**, Council of Scientific and Industrial Research, South Africa
4. **José Joaquín Hernández Brito**, Chief Operating Officer, PLOCAN, Spain
5. **Carolina Rêgo Costa**, Portuguese Science and Technology Foundation, FCT, Portugal (Executive Legal Officer)
6. **Bruno Pacheco**, Regional Director of Science and Technology, Azores



Atlantic Interactions:  
Climate Change and Energy, Space and Oceans

# 4

# WORKING MEETINGS AND RESEARCH WORKSHOPS

Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 1

Abuja, Nigeria

**Venues:** National Space Research and Development Agency (NASRDA),  
National Biotechnology Development Agency (NABDA), Raw Material Research and Development Council (RMRDC),  
National Board for Technology Incubation (NBTI), Energy Commission of Nigeria (ECN)

December 4<sup>th</sup> – 5<sup>th</sup> 2017



December 4th – 5th 2017

Venues: National Space Research and Development Agency (NASRDA), National Biotechnology Development Agency (NABDA), Raw Material Research and Development Council (RMRDC), National Board for Technology Incubation (NBTI), Energy Commission of Nigeria (ECN)

## WORKSHOP 1 • PROGRAM

### OVERALL PROGRAM

#### MONDAY 4TH DECEMBER 2017

**09:00-12:00:** REGISTRATION AND WELCOME

**12:00-14:00:** PARALLEL TECHNICAL SESSIONS START

**14:00-15:00:** LUNCH BREAK

**15:00-17:00:** PARALLEL TECHNICAL SESSIONS CONTINUE

**18:00-20:00:** WELCOME DINNER FOR PORTUGUESE AND NIGERIAN PARTICIPANTS

#### TUESDAY 5TH DECEMBER 2017

**09:00-12:45:** DISCUSS REPORTS FROM TECHNICAL SESSIONS

**12:45-13:45:** LUNCH BREAK

**14:45-18:00:** PRESENTATION OF COMMUNIQUÉ/CLOSING CEREMONY  
& TOUR OF ABUJA BY PORTUGUESE DELEGATES

### DETAILED PROGRAM

#### MONDAY 4TH DECEMBER 2017 – OPENING CEREMONY / TECHNICAL SESSIONS

**09:00-10:00:** ARRIVAL AT NASRDA

**10:00-11:00:** OPENING CEREMONY

**10:00-10:05:** OPENING PRAYERS (SECOND STANZA OF THE NIGERIAN NATIONAL ANTHEM)

**10:05-10:10:** NIGERIAN NATIONAL ANTHEM/PORTUGUESE NATIONAL ANTHEM

**10:10-10:15:** INTRODUCTION OF THE NIGERIAN/PORTUGUESE SCIENTISTS' CONFERENCE BY THE DIRECTOR,  
SCIENCE AND TECHNOLOGY PROMOTION, FEDERAL MINISTRY OF SCIENCE AND TECHNOLOGY,  
EKANEM UDOH

**10:15-10:20:** WELCOME ADDRESS BY THE HONOURABLE MINISTER, FEDERAL CAPITAL TERRITORY,  
ALHAJI MUHAMMADU BELLO

**10:20-10:40:** GOODWILL MESSAGES BY:

- i. Chairman Senate Committee on Science and Technology, Sen. (Prof.) Robert Boroffice;
- ii. Chairman House Committee on Science and Technology, Hon. Beni Lar;
- iii. Ambassador, Portuguese Embassy in Nigeria;
- iv. Honourable Minister of Education.

**10:40-10:45:** REMARKS/PRESENTATION ON ATLANTIC INTERNATIONAL RESEARCH (AIR) CENTRE BY THE MINISTER OF SCIENCE, TECHNOLOGY AND HIGHER EDUCATION, PROF. MANUEL HEITOR

**10:45-10:50:** KEYNOTE ADDRESS BY THE HONOURABLE MINISTER OF SCIENCE AND TECHNOLOGY, DR. OGBONNAYA ONU

**10:50-10:55:** VOTE OF THANKS, BY THE PERMANENT SECRETARY, FEDERAL MINISTRY OF SCIENCE AND TECHNOLOGY, DR.(MRS.) AMINA M.B. SHAMAKI, MNI

**10:55-11:00:** NATIONAL ANTHEMS – NIGERIAN/PORTUGUESE

**11:00:** COMMISSIONING OF NIGERIAN POLE OF THE AIR CENTRE BY PROF. MANUEL HEITOR, MINISTER OF SCIENCE, TECHNOLOGY AND HIGHER EDUCATION, PORTUGAL

**11:00-12:00:** GROUP PHOTOGRAPH & TEA BREAK/INSPECTION OF EXHIBITION  
/DEPARTURE TO SUB-THEMES VENUES

**12:00-14:00:** PARALLEL TECHNICAL SESSIONS

### **1. Space, Science and Technologies for Sustainable Socio-economic Development – The AIR Centre Initiative (Venue: NARSDA)**

**Moderators:** Dr. Francis D. Chizea / Nuno Borge Carvalho

- a)** Prof. Manuel Heitor, Minister of Science, Technology and Higher Education, Portugal – Presentation on AIR Centre
- b)** Dr. Ogbonnaya Onu, Honourable Minister of Science and Technology, Nigeria – Remarks on the AIR Centre
- c)** Mário Rui Rilho de Pinho, University of Azores, Marine Science – Fisheries Stock Assessment
- d)** Dr. Adekunle Oresgun, Research activities at the Nigerian Institute of Oceanography and Marine Research
- e)** Prof. S.O. Mohammed, DG/CEO NASRDA – Micro satellite for the monitoring of the Gulf of Guinea
- f)** Dr. Olusegun Sholiji, Coordinator: Aero-space Engines Laboratory Oka, Ondo State – Prospect of Launch Vehicles and Launch Site Development in Nigeria
- g)** Francisco Vilhena da Cunha, Senior Adviser Tekever – Aerospace
- h)** Mahmoud Umar Mohammed, Centre for Geodesy and Geodynamics Toro, Bauchi – Monitoring Land Subsidence Audits Consequence in Lagos
- i)** Nuno Borges Carvalho, Full Professor and Senior Researcher, Instituto de Telecomunicações, Universidade de Aveiro – Electrical and Telecommunications Engineering
- j)** Prof. Babatunde Rabi, Centre for Atmospheric Research, Anyigba, Kogi State – An Assessment of the Socio-economic Impact of Space Weather in Africa: Peculiarities, Activities and Observations
- k)** Nuno Simões, UAVision CEO – R&D Area: Unmanned Air Vehicles (Robotics)
- l)** Ana Morgado, Senior Researcher and Vice Dean for R&I Office, University of Lisbon – Geometric Engineering/Space Applications Innovations and Entrepreneurship

### **2. Biotechnology and Natural Products for Health, Marine and Industrialization (Venue: NABDA)**

**Moderators:** PROF. ERNEST AKPA/MARIA MANUEL GIL

- a)** Amílcar Antonio, Associate Professor, Polytechnic Institute of Bragança, Portugal-Mountain Research Centre – Food Chemistry
- b)** Prof. Egwim C. Evans, Federal University of Technology Minna – Molecular-scale Biomimicry: A Systematic and Scientific Approach to Support Low Cost Evaluation and Product Discovery
- c)** Maria Manuel Gil, Head of Research Center MARE-IP Leiria, Polytechnic Institute of Leiria – Scientific area: Food Science-Seafood
- d)** Prof. Benjamin Ewa Ubi, Ebonyi State University – Exploring Nigerian Biodiversity

for Optimization of Bioactive Resources: from drugs to food product

**e)** Dr. Adekunle Oresgun, Nigerian Institute for Oceanography and Marine Research – Exploring Marine Biodiversity for Product Development: implication of biotechnology

**f)** Taofiq Ayodele Oludemi, Polytechnic Institute of Bragança, Portugal-Mountain Research Centre – Biotechnology and Chemistry of Natural Product

### **3. Process and Manufacturing Technology/Skills Development (Venue:RMRDC)**

**Moderator:** Prof. A.S.Ahmed

**a)** Taofiq Ayodele Oludemi, Polytechnic Institute of Bragança, Portugal-Mountain Research Centre – Biotechnology and Chemistry of Natural Products

**b)** Dr. Neeka Jacob Biragbara, Petroleum Technology Development Fund – Skill Development as Panacea for Economic Diversification

**c)** Mr. Uche Nwakama, PZ Industries – The Imperative of Innovation in Product Competitiveness

**d)** Dr. U.B.Bindir, Secretary Adamawa State Government – Sustainable Development Through Technology Acquisition and Adaptation

**e)** Dr. D.B. Ayo, University of Lagos – Capacity Development in the Design and Fabrication of Process Equipment and Plants for Small and Medium Enterprises

**f)** Amilcar Antonio, Associate Professor, Polytechnic Institute of Bragança, Portugal-Mountain Research Centre – Food Chemistry

### **4. Research and Development / Industry Linkages (Venue: NBTI)**

**Moderators:** Mr Inye Kemabonta / Mr. Chinedu E. Onyekauru

**a)** Ana Morgado, Senior Researcher and Vice Dean for R&I Office,

University of Lisbon – Geometric Engineering /Space Applications, Innovations and Entrepreneurship

**b)** Dr. Peter Ogbobe, National Board for Technology Incubation – Research and Development: General Overview

**c)** Dr. Abdulmalik Ndagi, National Board for Technology Incubation – Research and Development: Industry, Linkages, Trends and Challenges

**d)** Mario Rui Rilho de Pinho, University of Azores – Marine Science: Fisheries Stock Assessment

### **5. Science and Society (Venue: NASRDA)**

**Moderators:** Ana Noronha/Prof. Okechukwu Ukwuoma

**a)** Ana Noronha, Director Ciencia Viva Agency – Scientific Culture and Education

**b)** Alhaji Shuaibu Umaru, Federal Ministry of Science and Technology, Abuja, Nigeria – National Science, Technology and Innovation Roadmap 2030

**c)** Mr. R.O. Ukpog, Federal Ministry of Science and Technology, Abuja, Nigeria – The 774 Young Nigerian Scientists Presidential Award

**d)** Dr. Osuji Out, United Nations Educational, Scientific and Cultural Organization, Multi Sectorial Regional Office, Abuja, Nigeria – Science and Society

**e)** Dr. V.O. Fadipe, Federal Ministry of Science and Technology, Abuja, Nigeria – Science and Technology Exposition Fair

**f)** Mrs. Bernadette Ogwuche, Federal Ministry of Science and Technology, Abuja, Nigeria – National Science and Technology Museum

**g)** Mr. O.M. Okpe, Federal Ministry of Science and Technology, Abuja, Nigeria – Talented Young Scientists of Nigeria

## **6. Renewable Energy/Energy Efficiency (Venue: ECN)**

**Moderator:** Prof. A.S. Sambo

- a) I.J. Dioha, Energy Commission of Nigeria – Renewable Energy Resources Development and Opportunities in Nigeria
- b) Mr. Suleman Yusuf, Blue Camel Energy – Constraints of Deploying Renewable Energy Technologies in Nigeria
- c) Etiosa Uyigue, Community Research and Development Centre – Energy Efficiency and Conservation in Nigeria

**14:00-15:00:** LUNCH BREAK (LUNCH AT TECHNICAL SESSIONS' VENUES)

**15:00-17:00:** PARALLEL TECHNICAL SESSIONS CONTD.

**18:00-20:00:** WELCOME DINNER FOR PARTICIPANTS FROM NIGERIA AND PORTUGAL @ NARSDA

## **TUESDAY 5TH DECEMBER 2017 – DISCUSSIONS ON REPORTS FROM TECHNICAL SESSIONS**

**9:00-10:30:** MODERATOR: PROF. ANA NORONHA

**9:00-9:45:** SPACE SCIENCE AND TECHNOLOGIES FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT: THE AIR CENTRE INITIATIVE BY DR. FRANCIS D. CHIZEA / NUNO BORGE CARVALHO

**9:45-10:30:** BIOTECHNOLOGY AND NATURAL PRODUCTS FOR HEALTH, MARINE AND INDUSTRIALIZATION BY PROF. ERNEST AKPA / MARIA MANUEL GIL

**10:30-11:15:** TEA BREAK

**11:15-12:45:** MODERATOR: PROF. OKECHUKWU UKWUOMA

**11:15-11:45:** PROCESS AND MANUFACTURING TECHNOLOGY/SKILLS DEVELOPMENT BY PROF. A.S. AHMED

**11:45-12:15:** RESEARCH AND DEVELOPMENT / INDUSTRY LINKAGES BY MR INYE KEMABONTA / MR. CHINEDU E. ONYEKAURU

**12:15-12:45:** SCIENCE AND SOCIETY BY ANA NORONHA / PROF. OKECHUKWU UKWUOMA

**12:45-13:45:** LUNCH BREAK /NETWORKING

**13:45-15:00:** MODERATOR: PROF. DIOHA I. JOSEPH

**13:45-14:15:** RENEWABLE ENERGY/ENERGY EFFICIENCY BY PROF. A.S. SAMBO

**14:15-15:00:** PRESENTATION OF COMMUNIQUÉ BY DIRECTOR SCIENCE AND TECHNOLOGY PROMOTION, EKANEM UDOH. CLOSING

**15:00-18:00:** TOUR OF ABUJA BY PORTUGUESE DELEGATES



## LIST OF PARTICIPANTS IN THE WORKSHOP 1

NAME	ORGANIZATION
Egwim C. Evans	Federal University of Technology Minna
Benjamin Ewa Ubi	Ebonyi State University
James Ogbonna	Nigerian Institute for Oceanography and Marine Research
Neeka Jacob	Biragbara, Petroleum Technology Development Fund
Uche Nwakama	PZ Industries
U.B. Bindir	Secretary Adamawa State Government
D.B.Ayo	University of Lagos
Peter Ogbobe	National Board for Technology Incubation
Abdulmalik Ndagi	National Board for Technology Incubation
Alhaji Shuaibu Umaru	Federal Ministry of Science and Technology, Abuja, Nigeria
R.O. Ukpong	Federal Ministry of Science and Technology, Abuja, Nigeria
V.O. Fadipe	Federal Ministry of Science and Technology, Abuja, Nigeria
Bernadette Ogwuche	Federal Ministry of Science and Technology, Abuja, Nigeria
O.M. Okpe	Federal Ministry of Science and Technology, Abuja, Nigeria
Osuji Otu	United Nations Educational, Scientific and Cultural Organization, Multi Sectorial Regional Office, Abuja, Nigeria
I.J. Dioha	Energy Commission of Nigeria
Suleman Yusuf	Blue Camel Energy
Etiosa Uyigue	Community Research and Development Center









Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 2

Barcelona, Spain

**Venues:** Barcelona Supercomputing Center (BSC)

January 12<sup>th</sup>, 2018



## WORKSHOP 2 • PROGRAM

### PROGRAM

**10:30: Carmen Vela & Manuel Heitor**, Secretary of State for Research, Development & Innovation of Spain and Minister of Science, Technology and Higher Education of Portugal - Welcome & Presentation of the agenda and the attendees

**10:45: Mateo Valero & Josep Maria Martorell**, BSC Director and Associate Director - BSC presentation

**11:30: EXPOSITION ON THE SCOPE OF THE COLLABORATION AGREEMENT**  
AND DISCUSSION OF FUTURE ACTIONS:

**António Cunha**, Rector Universidade do Minho - Creation of Minho Advanced Computing Center

**António Sarmento**, Chair, Executive Steering Committee of the AIR Centre - AIR\_DataNet project

**Sergi Girona**, BSC Operations Director - Spanish Supercomputing Network

**13:00: SIGNATURE OF THE COLLABORATION AGREEMENT AND VISIT TO THE MN4**

### LIST OF PARTICIPANTS IN THE

## WORKSHOP

NAME • TITLE	ORGANIZATION
<b>Antonio Cunha</b> Rector	University of Minho
<b>Antonio Sarmento</b> Chair of Executive Steering Committee	AIR Centre
<b>Carmen Vela</b> Secretary of State	Secretary of State for Research, Development & Innovation, Spain
<b>João Nuno Ferreira</b> Director	Foundation for National Scientific Computing (FCCN), Portugal
<b>José M. Cela</b> Computer Applications in Science & Engineering Director	Barcelona Supercomputing Center (BSC)
<b>Josep M. Martorell</b> Associate Director	Barcelona Supercomputing Center (BSC)
<b>Manuel Heitor</b> Minister	Ministry of Science, Technology and Higher Education, Portugal
<b>Mateo Valero</b> Director	Barcelona Supercomputing Center (BSC)
<b>Sergi Girona</b> Operations Director	Barcelona Supercomputing Center (BSC)









Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 3

## GoPortugal

Matosinhos - Guimarães, Portugal

Venues: CEiiA, UpTec, Minho University

15th February - 16th February 2018

## PROGRAM

**Main event - Thursday 15th February 2018**

**Venue: CEiiA, Matosinhos**

Public presentation and signature of cooperation agreements between Portugal and the Massachusetts Institute of Technology (MIT), the University of Carnegie Mellon (CMU), the University of Texas at Austin (UT Austin), the Fraunhofer-Gesellschaft (FhG), Global Space Ventures (GSV), Fundação La Caixa, Aga Khan Development Network (AKDN), the Finnish Association of Polytechnics (ARENE) and the Frysian Design Factory of the Netherlands

**15:00: Part 1 - GoPortugal: Promoting Innovation through International Partnerships**

Opening: **António Costa**, Prime Minister

International Partnerships: Brief interventions (5 min):

Moderators:

**Paulo Ferrão**, President, FCT

**Fernando Freire**, CCDR Norte

**Initial intervention – Why we need Global Science and Technology Partnerships?**

**Rodrigo Costa**, CEO, REN

**Farnam Jahanian**, Carnegie Mellon University (CMU), President

**Bruce Tidor**, Massachusetts Institute of Technology (MIT), Deputy Provost for Intl. Affairs

**John Ekerdt**, University of Texas at Austin, Associate Dean of Engineering

**Georg Rosenfeld**, Fraunhofer-Gesellschaft, Member of the Board

**Angel Font Vidal**, Fundação La Caixa, Director for Science and Technology

**Ritta Rissanen**, Finnish Association of Polytechnics (ARENE), Executive Director

**Ville Kairamo**, DEMOLA, CEO

**Klaas-Wybo van der Hoek**, Frysian Design Factory, Netherlands

**António Guetter**, COPER (Companhia Paranaense de Energia, BRasil), President

*Signature of cooperation agreements and presentation of “Industrial affiliates”*

**Aga Khan Portugal Development Network (AKDN) - Government of Portugal Collaborative Research Network in Portuguese speaking countries in Africa**

**Nazim Ahmad**, Diplomatic Representative of the Ismaili Imamat to Portugal

**Paul Dhalla**, AKDN, Director of Research

**Iberian Initiative on Biomedical Research and Innovation, i4b (*Iniciativa Ibérica de Investigação e Inovação Biomédica, i4b; FCT - Fundação La Caixa*)**

**Artur Santos Silva**, Fundação La Caixa

**Isidro Fainé**, President Fundação La Caixa

*Signature of cooperation agreement between FCT and Fundação La Caixa*

Closing address: **Manuel Heitor**, Minister for Science, Technology and Higher Education



**17:00:** BREAK AND COFFEE

**17:20:** PART 2 - GOPTUGAL: COLLABORATIVE LABORATORIES, ATLANTIC INTERACTIONS AND AIR CENTRE:  
Brief Initial Intervention:

**Paulo Ferrão**, President, FCT

Collaborative Laboratories:

**José Luis Encarnação**, Chair, International Review Panel at FCT

Atlantic Interactions and the AIR Centre

**Gui Menezes**, Azores Regional Secretary for the Oceans, Science and Technology

**António Sarmiento**, WavEC; AIR Centre Installation Committee

**Jean Jacques Dordain**, (ESA former DG)

**Dava Newman**, MIT

**José Moura**, Carnegie Mellon University

**Burke Fort**, University of Texas Center for Space Research (CSR)

**Ricardo Mendes**, INEST Tec; U Minho and MACC (Minho Advanced Computing Centre)

**18h30:** Closing Remarks: **Manuel Heitor**, Minister for Science, Technology and Higher Education









## SPECIALIZED WORKSHOPS AND THEMATIC SESSIONS - FRIDAY 16TH FEBRUARY 2018

### MIT

Venue: University of Minho, Guimarães

MIT and Portugal in the Challenges for the Planet and the Society

**9:15-9:20:** Welcome Address

**Rui Vieira de Castro**, Rector of the University of Minho

**9:20-9:40:** Opening Session: A path towards a new partnership

**António Cunha**, MIT Portugal Program – Program Governing Board

**9:40-11:10:** Round Table I – Space, Sea, Climate & Data Science: a contribution to Atlantic International Centre (co-organized by the AIR Centre)

Keynote: An Earth Operating Manual, **Dava Newman**, MIT AeroAstro

Moderator: **José Moutinho**, AIR Centre

**Marcos Martins**, Uminho

**Frederico Ferreira**, IST – U Lisboa

**João Crespo**, U Nova Lisboa

**Eugénio Ferreira**, Uminho

**Name tbd**, TEKEVER

**Name tbd**, EDISOFT

**11:10-1130** – Coffee break

**11:30-13:00** – Round Table II – Smart Industry: from new industrial concepts to the digital transformation (co-organizes by DTx: Digital Transformation CoLab)

Keynote: Interacting with Personal Fabrication Machines, Stefanie Mueller, MIT CSAIL/HCI

Moderator: Ricardo Machado, Uminho/DTx: Digital Transformation CoLab

Paulo Cruz, Uminho

Jorge Belinha, IP Porto

Elsa Henriques, IST – U Lisboa

Paulo Flores, Uminho

Américo Azevedo, U Porto

Francisco Duarte, Bosch Car Multimedia

Name tbd, EFACEC

**13:00-14:30** – Lunch

**14:30-16:00** – Round Table III – Cities as Sustainable Systems

Keynote: Cities and Sustainability: the Atlantic Ocean-City Interface, **John Fernandez**, MIT

Moderator: **Richard Neufville**, MIT

**Daniel Aelenei**, U Nova Lisboa

**Carla Rodrigues**, U Coimbra

**Anabela Ribeiro**, U Coimbra

**António Couto**, U Porto



**Manuel Martins**, U Coimbra

**Jorge Pinho de Sousa**, U Porto

**Luís Picado dos Santos**, IST – U Lisboa

**José Teixeira**, DST

**Pedro Grilo**, Lisboa City Council

**16:00-16:30** – Wrap up and Final Remarks

**Pedro Arezes**, MIT Portugal Program

**16:30-17:00** – Closing Session

**Manuel Heitor**, Minister of Science, Technology and Higher Education (MCTES)

**Paulo Ferrão**, President of Portuguese Foundation for Science and Technology (FCT)

**UT@AUSTIN - UT Austin and Portugal - Building the Future**

**Venue: UPTEC - University of Porto, Porto**

**10:30:** Welcome words

**Rui Oliveira**, INESC TEC

**Marco Bravo**, UTA

**11:00:** Harnessing advanced computing in Science and Business

Keynote: How TACC enables domain specific research, **Dan Stanzione**, TACC

Discussants from different scientific domains: Physics, Biology, Polymers, Atmospheric Modelling and Astrophysics

**Albano Beja-Pereira**, UP

**Alfredo Rocha**, UA

**Anabela Oliveira**, LNECC

**Carlos Andrade**, GALP

**João Miguel Nóbrega**, UM

**Lino Santos**, FCCN

**Luís Oliveira Silva**, IST

**Paulo Silva**, UC

**13:00:** Light Lunch Talk – Foster commercialization of Nano Materials to global markets, Brian Korgel, UTA

**14:00:** Space and Earth Observation Research

**Keynote: Atlantic Spaceport Centre feasibility study, Burke Fort, UTA-CSR**

Discussants from different scientific domains: Climate and Earth system modelling, Astronomy,

Ocean Robotics, Aeronautics, and Space Software Systems

**André Guerra**, CEiiA

**Aníbal Bastos**, UP

**Luísa Bastos**, UP

**Patrick Heimbach**, UTA

**Pedro Camanho**, UP

**Nuno Silvas**, Deimos

**16:00:** Closing remarks

**John Ekerdt** (UTA)

**CMU - Data Science - Carnegie Mellon and Portugal at the crossroads of the new**

**Venue: UPTEC, University of Porto**

**Workshops and Plenary Session**

**9:30-13:00:** Workshops

**WORKSHOP 1: CLOUD COMPUTING AND BIG DATA**

**Justine Sherry** (CMU)

**Paolo Romano** (IST-UL/INESC ID)

**WORKSHOP 2: Deployable Robotics**

**Pedro U.Lima** (IST-UL)

**Rodrigo Ventura** (IST-UL)

**WORKSHOP 3: HUMAN CENTERED DESIGN**

**Geoff Kaufman** (CMU)

**Valentina Nisi** (University of Madeira/CMU)

**WORKSHOP 4: MACHINE LEARNING AND NATURAL LANGUAGE PROCESSING**

**Francisco S. Melo** (IST-UL)

**Isabel Trancoso** (INESC ID)

**Manuela M. Veloso** (CMU)

**WORKSHOP 5: PUBLIC POLICY**

**Joana Mendonça** (IST-UL)

**M. Granger Morgan** (CMU)

**WORKSHOP 6: SOFTWARE ENGINEERING**

**Bruno Miguel Brás Cabral** (University of Coimbra)

**Manuel “Mel” Rosso-Llopart** (CMU)

**14:00-16:00:** Plenary Session

**José Fonseca de Moura** (CMU)

**Rodrigo Rodrigues** (IST-UL/INESC ID)

**Nuno Nunes** (LARSyS)

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Foundation La Caixa

**Ville Kairamo**  
DEMOLA















Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 4

Rio de Janeiro, Brazil

**Venues:** Auditorium of Technological Park of UFRJ

February 20<sup>th</sup>–21<sup>st</sup> 2018

## WORKSHOP 4 • PROGRAM

### PROGRAM

#### TUESDAY 20TH FEBRUARY 2018

**09:30-10:00:** REGISTRATION

**10:00-12:30:** OPENING CEREMONY

**Keynote speaker: Manuel Frederico Tojal de Valsassina Heitor,**  
Minister of Science, Technology and Higher Education of Portugal

**12:30-14:00:** LUNCH BREAK

**14:00-15:30:** SESSION 1 – DEVELOPMENT AND INTEGRATION OF SPACE AND OCEAN TECHNOLOGIES

**Coordinators: Luiz Landau, Coppe, and António José Nunes de Almeida Sarmiento,** Instituto Superior Técnico (IST) and AIR Centre

**Keynote speaker: Segen Farid Estefen,** Coppe/INPOH

**Luiz Paulo de Freitas Assad,** IGEO/UFRJ and LAMCE/COPPE

**Leticia Cotrim,** Faculty of Oceanography/UERJ

**Mauricio Fragoso da Rocha,** PROOCEANO

**Luiz Alexandre de Guerra,** CENPES/PETROBRAS

**Ayoze Castro,** PLOCAN

**Carlos Castaño Climent,** CDTI

**15:30-16:00:** COFFEE BREAK

**16:00-17:30:** SESSION 2 – DATA SCIENCE AND CREATION OF AIR CENTRE DATA INTELLIGENT NETWORK

**Coordinators: Arthur Ziviani,** LNCC and **Rui Carlos Oliveira,** University of Minho

**Keynote speaker: Josep Maria Martorell,** Barcelona Supercomputing Centre (BSC)

**Fábio Porto,** LNCC

**Guilherme Travassos,** NACAD/COPPE/UFRJ

**Ana Oliveira,** DELL/EMC

**Izabel Jeck,** Marinha do Brasil

**19:00-21:00:** COCKTAIL IN THE GENERAL CONSULATE OF PORTUGAL

#### WEDNESDAY 21ST FEBRUARY 2018

**09:00-10:30:** SESSION 3 – NEW KNOWLEDGE-INTENSIVE BUSINESS STRATEGIES  
IN THE CONTEXT OF ATLANTIC INTERACTIONS

**Coordinators: Ricardo Galvão,** INPE, and **José Luiz Moutinho,** Instituto Superior Técnico (IST) and AIR Centre

**Keynote speaker: Nick Veck,** Satellite Applications Catapult, UK

**José Alberto Sampaio Aranha,** ANPROTEC

**Alex Jacobs,** ANPROTEC

**Fernanda Achete,** VORTEXMUNDUS

**Ayoze Castro,** PLOCAN

**10:30-11:00:** COFFEE BREAK

**11:00-12:30: SESSION 4 – PUBLIC POLICIES IN RD&I AND EU-BR COOPERATION**

IN THE CONTEXT OF THE ATLANTIC INTERACTIONS

**Coordinators:** Andrei Polejack, MCTIC, and António Augusto Magalhães Cunha, University of Minho**Keynote speaker:** Paulo Ferrão, Foundation for Science and Technology (FCT), Portugal**Ricardo Vieiralses**, FAPERJ**Alice Souto Maior**, CAPES**Josep Maria Martorell**, Barcelona Supercomputing Center (BSC)**Márcio Ellery Girão Barroso**, FINEP**12:30-13:30: LUNCH BREAK****13:30-15:00: CLOSING SESSION****15:00-17:00: TECHNICAL VISIT TO PARQUE TECNOLÓGICO OF UFRJ – OCEAN TECHNOLOGY LABORATORY OF COPPE****LIST OF PARTICIPANTS IN THE****WORKSHOP**

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<b>Adolfo Simões</b> Project Manager	National Laboratory of Scientific Computing (LNCC), Brazil
<b>Afonso Paiva</b> Researcher	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Alex Jacobs</b> Director of Innovation Environments	National Association of Entities Promoting Innovative Enterprises (ANPROTEC)
<b>Alex Queiroz de Souza</b> Member	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Alexandre de Macedo Fernandes</b> Professor	State University of Rio de Janeiro (UERJ)
<b>Alfredo Laufer</b> Consultant	Federal University of Rio de Janeiro (UFRJ)
<b>Ana Beatriz Ramadas da Cruz</b>	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Ana Claudia Moura</b> Computer Science Coordination Technician	National Laboratory of Scientific Computing (LNCC), Brazil
<b>Andrei Polejack</b> General Coordinator for SEPED	Ministry of Science, Technology, Innovation and Communications (MCTIC)
<b>Angela Uller</b> General Coordinator	Brazilian Company of Research and Industrial Innovation (EMBRAPPII/ UFRJ)
<b>Antonio Cunha</b> Rector	University of Minho
<b>Antonio Sarmiento</b> President of the Executive Committee	Air Centre
<b>Arthur Ziviani</b> Senior Researcher	National Laboratory of Scientific Computing (LNCC), Brazil
<b>Augusto da Cunha Raupp</b> President	Secretary of State for Science, Technology, Innovation and Social Development of Rio de Janeiro
<b>Ayoze Castro</b> Head of Innovation Unit	Oceanic Platform of the Canary Islands (PLOCAN)
<b>Bruno Primo</b>	Vortex
<b>Carlos Augusto</b> Executive Director	CAF - Facilities Management
<b>Carlos Castaño Climent</b> Spanish Delegation to ESA	Centre for the Development of Industrial Technology (CDTI), Spain
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<b>Dyellen Soares Queiroz</b>	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Edson H Watanabe</b> Professor	Queiroz Galvão Exploração e Produção
<b>Eliete Bouskela</b> Director of Technology	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Enrico Pedroso</b>	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Fabia Hoch Leitner</b>	National Agency of Petroleum, Natural Gas and Biofuels (ANP)
<b>Fabiano Gallindo</b> Member	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Fábio Nascimento</b>	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Fabio Porto</b> Technologist	Embrapii-COPPE
<b>Fernanda Achete</b>	National Laboratory of Scientific Computing (LNCC), Brazil
<b>Filipe Vaz</b> Pro Rector	Vortex
<b>Flavio Toledo</b> Manager	University of Minho
<b>Frank Neumann</b> Installing Commission	National Laboratory of Scientific Computing (LNCC), Brazil
<b>Frederico Garcia Magalhães</b>	AIR Centre
<b>Gelson Alves Santos</b> Member	USSV
<b>Gisele Lobo Hajdu</b> Researcher	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Guilherme Franz</b> Researcher	State University of Rio de Janeiro (UERJ) Federal University of Paraná (UFPR)
<b>Guilherme Travassos</b> Professor	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ), NACAD
<b>Gustavo Brandão Monteiro Leite</b>	Queiroz Galvão Exploration and Production
<b>Itamar Santos</b> Business Development Analyst	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Izabel Jeck</b>	Brazilian Navy
<b>Janice Romaguera Trotte Duhá</b> Adviser on Ocean Affairs	Brazilian Navy
<b>João Luiz Ribeiro</b> Journalist	Financier of Studies and Projects (FINEP)
<b>José Alberto Sampaio Aranha</b> President	National Association of Entities Promoting Innovative Enterprises (ANPROTEC)
<b>José Luiz Moutinho</b> Installing Commission	AIR Centre
<b>José Manoel Carvalho de Mello</b> Technical Advisor	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Josep Martorell</b> Associate Director	Barcelona Supercomputing Centre (BSC)
<b>Julio Pellegrini</b> Director	PROOCEANO
<b>Karine Fragoso</b> Operational Manager	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Leonardo Maciel</b> Innovation Manager	OceanPact
<b>Leticia Cotrim</b> Researcher	Faculty of Oceanography/UERJ



<b>Lídia Vaz Aguiar</b> Environmental Analyst	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Lindália Junqueira Reis</b> <b>Lorenzo Souza</b>	Chamber of Commerce of Brazil USSV
<b>Lucimar Dantas</b> Operational Manager	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Luiz Alexandre de Guerra</b> Ocean Engineering Technology	CENPES/PETROBRAS
<b>Luiz Landau</b> Professor	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Luiz Paulo de Freitas Assad</b> Technical Coordinator	IGEAO/UFRJ and LAMCE/COPPE/UFRJ
<b>Manuel Heitor</b> Minister	Ministry of Science, Technology and Higher Education (MCTES), Portugal
<b>Marcelo Albuquerque</b> Representative	Nucleus of Technological Innovation (NIT) Celso Suckow da Fonseca Federal Centre for Technological Education (CEFET/RJ)
<b>Marcelo de Alencar</b> <b>Marcelo Mendes</b>	National Laboratory of Scientific Computing (LNCC), Brazil Federation of Industries of the State of Rio de Janeiro (FIRJAN)
Member of Scientific Board	
<b>Marcio Costa</b> Technical Specialist	Financier of Studies and Projects (FINEP)
<b>Marcio Ellery Girão Barroso</b> Director	State University of Rio de Janeiro (UERJ)
<b>Marcos Bastos</b> Professor	Nucleus of Technological Innovation (NIT) – Rio
<b>Mariana Botino</b> Marketing and Trading	Federal University of Rio de Janeiro (UFRJ)
<b>Mauricio Guedes</b> Assessor	IGEO - Federal University of Rio de Janeiro (UFRJ)
<b>Mauro Cirano</b> Coordinator	IbqM - Federal University of Rio de Janeiro (UFRJ)
<b>Mauro Pavão</b> Professor	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Monica Heilbron</b> <b>Nick Veck</b>	Satellite Applications Catapult Scientific Research National Centre, América Latina (CNRS)
CEO	
<b>Olivier Fudym</b> Director	INMETRO
<b>Orlando Bandeira</b> Director of Innovation and Technology	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Paulo Buarque Guimarães</b> Advisor to the President	Federal University of Rio de Janeiro (UFRJ)
<b>Paulo de Tarso</b> Executive Director	Foundation for Science and Technology (FCT)
<b>Paulo Ferrão</b> President	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Paulo Volpato</b> <b>Pedro Domingues</b>	Federation of Industries of the State of Rio de Janeiro (FIRJAN) WavEC - Offshore Renewables
Regional Manager	
<b>Pedro Pires</b> Business Developer	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Priscilla Haddock</b> International Relations Assessor	IST – University of Lisbon
<b>Ramiro Neves</b> Associate Professor	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Regina Faria</b> Coordinator	Federal University of Rio de Janeiro (UFRJ)

<b>Renata La Rovere</b> Professor	National Institute of Space Research (INPE)
<b>Ricardo Galvão</b> Director	Federal Fluminense University (UFF)
<b>Ricardo Leal</b> Director of AGIR	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Ricardo Vieiralves de Castro</b> President	Financier of Studies and Projects (FINEP)
<b>Rodrigo Acioli</b> Professor	ADDLABS/UFF
<b>Romildo Dias Toledo Filho</b> Professor	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Ronald Cintra Shellard</b> Director	Brazilian Centre for Physical Research (CBPF)
<b>Rui Carlos Oliveira</b>	University of Minho
<b>Segen Farid Estefen</b>	Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE/UFRJ)
<b>Sergio Fontes</b>	ON
<b>Sergio Kuriyama</b> Member	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Sergio Yates</b> Advisor	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Shirley Coutinho</b> Executive Manager	Pontifical Catholic University of Rio de Janeiro (PUC-Rio)
<b>Thiago Renault</b> Professor	Foundation for Research Support of the State of Rio de Janeiro (FAPERJ)
<b>Valéria Caramuru</b> Specialist in technology services business	Federation of Industries of the State of Rio de Janeiro (FIRJAN)
<b>Wilsa Atella</b> Director	Oceanpact
<b>Wladimir Lenie Oliveira</b>	Financier of Studies and Projects (FINEP)

## CONCLUSIONS

The ultimate goal of the workshop was fully achieved, with a strong mobilization of the C, T&I of Rio de Janeiro and the presence of 102 participants of 41 institutions and companies highly representative. Among the foreign participants, we had representatives of companies and institutions of research in Portugal, Spain and the United Kingdom, in addition to the presence of the Minister of Science, Technology and Higher Education of Portugal, Manuel Heitor.

As for the most significant results achieved, we highlight the signing of a cooperation agreement between the FAPERJ and the Foundation of Science and Technology (FCT) of Portugal and the set of recommendations prepared by the coordinators of the four sessions of the workshop, which were presented and discussed at the closing session.

Finally, we would like to highlight the manifestation expressed during the workshop, both by UFRJ and FAPERJ, as to their firm willingness to ensure that Rio de Janeiro becomes a pole of the AIR Centre, with a prominent role in the actions of the AIR Centre in Brazil, including, if appropriate, hosting some of its operations in the UFRJ Technology Park.















Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 5

Fortaleza, Brazil

**Venues:** Superior Council Room of State University of Ceará (UECE)

February 23<sup>rd</sup>, 2018

# WORKSHOP 5 • PROGRAM

## PROGRAM

**Convergence of Space, Ocean, Energy and Climate Sciences in the Equatorial Atlantic**

**FRIDAY 23RD FEBRUARY 2018**

**09:00-9:30: REGISTRATION**

**9:30-10:00: OPENING CEREMONY**

Rector of UECE – **José Jackson Coelho Sampaio**

President of FCT – **Paulo Ferrão**

President of FUNCAP – **Tarciso Pequeno**

**10:00-11:00: Keynote speaker – António Sarmento**, President of the Executive Committee and Coordinator of the Installing Committee of the AIR Centre

**11:00-11:30: DEBATES**

**11:30-12:30: SPACE AND ENVIRONMENTAL SCIENCE AND TECHNOLOGY**

**Coordinator – José Luiz Moutinho**

**Vicente de Paula Silva Filho** (INPE) – Panoramic Vision on Research, Development and Innovation Activities in Instituto Nacional de Pesquisas Espaciais (INPE), Related to the Goals of the AIR Centre

**João César Mota** (G-TEL – UFC), Prof. Dr. Felix Antreich and Prof. Dr. Jarbas Silveira – Nanosatellites and Big Data Recent Results and New Challenges at the UFC Technology Centre, the case of SACODE

**Antônio Wendell de Oliveira Rodrigues** (IFCE) – Research and Results of IFCE in Energy and Data Science regarding Embrapii

**Donizeti de Andrade** (ITA) – Options for Investments in Science & Technology & Education, Research & Development & Innovation, and Industrial Interfaces Ceará and Portugal

**12:30-13:30: LUNCH BREAK**

**13:30-14:30: DEEPENING THE KNOWLEDGE OF THE EQUATORIAL ATLANTIC – I**

**Coordinator: Maria Ozilea Bezerra Menezes** (Director of Labomar – Instituto de Ciências do Mar, Federal University of Ceará UFC)

**Marcelo Oliveira** – Ecosystems of the Atlantic Ocean: Analyzing the impacts in environmental services in the Arctic and Antarctic

**Carlos Teixeira** – The Role of Oceanic Circulation in the Atlantic Ecological Connectivity

**Geraldo Ferreira** – Geophysical Products Generated from Satellite Data and its Applications in Meteo-Oceanography

**Edmo Campos** – Potential changes in Climatological Patterns in Coastal Regions of the Northeast Brazil in Response to Changes in Large-scale Oceanic Circulation in the Atlantic South

**14:30-15:15: DEEPENING THE KNOWLEDGE OF THE EQUATORIAL ATLANTIC – II**

**Coordinator: André Luiz Carneiro de Araújo** (IFCE)

**Aristides Pavani Filho** (CTI/ITIC) – Internet of the Seas, a Project of IoT and Monitoring of the Atlantic

**Meiry Sakamoto** (FUNCEME) – Potential Scientific Collaboration in the Areas of Oceanography, Meteorology and Remote Sensing and its Applications in the Sectors of Water Resources and Agriculture



**Jacques Servain** (FUNCEME) – The Role of Climate Variability over the Tropical Atlantic, the PIRATA Project

**15:15-15:30: COFFEE BREAK**

**15:30-16:30: DEEPENING THE KNOWLEDGE OF THE EQUATORIAL ATLANTIC – III**

**Coordinator: Francisco Sales Ávila Cavalcante** (UECE)

**Mona Lisa Moura de Oliveira** (UECE) – Efficient and Sustainable Use of Biomass Energy

**Lutero Carmo de Lima** (UECE) – Production of Ammonia for Fertilizers from Solar Energy

**Augusto César Barros Barbosa** (UECE) – Monitoring and forecasting of meteorological events to quantify individual/joint contribution to the rainfall rate of major regions of the globe, especially water availability and its impacts on food and energy security in the arid and semi-arid regions

**Marcial Porto Fernandez** (UECE) – Data Science System combining processing in an IoT device and in Cloud Computing that obtains accurate answers in a short period of time with IoT devices with low processing capacity

**16:30-17:00: PRESENTATION AND DISCUSSION OF THE MANAGEMENT MODEL OF THE AIR CENTRE POLE – CE**

**Hermano José Batista de Carvalho** (PPGA/IDESCO)

**17:00-17:30: SIGNATURE AND PRESENTATION OF THE FORTALEZA LETTER**

**17:30-18:00: CLOSING SESSION**

**Inácio Arruda** – State Secretary for Science, Technology and Higher Education

**18:00-19:30: COCKTAIL**

## LIST OF PARTICIPANTS IN THE

# WORKSHOP

NAME • TITLE	ORGANIZATION
<b>André Luiz Carneiro De Araújo</b> Innovation Department Chief	Federal Institute of Education, Science and Technology of Ceará (IFCE)
<b>Antônio Sarmiento</b>	AIR Centre
<b>Antônio Wendell de Oliveira Rodrigues</b> Head of Research Department	Federal Institute of Education, Science and Technology of Ceará (IFCE)
<b>Antônio Gomes De Souza Filho</b> Pro-Rector of PP	Federal University of Ceará (UFC)
<b>Aristides Pavani Filho</b> CTI	Institute of Information and Communication Technology (ITIC)
<b>Augusto César Barros Barbosa</b>	State University of Ceará (UECE)
<b>Carlos Artur Sobreira Rocha</b> Superintendent Director	Institute of Information and Communication Technology (ITIC)
<b>Carlos Filipe Moreira e Silva</b>	Federal University of Ceará (UFC)
<b>Carlos Teixeira</b>	LABOMAR – Institute of Marine Sciences
<b>Cláudio Ricardo</b> President	Citinova
<b>Claudio Henrique Pereira D'alencar</b>	Companhia das Docas do Ceará
<b>Donizeti De Andrade</b>	Technological Institute of Aeronautics (ITA)
<b>Edmo Campos</b>	LABOMAR – Institute of Marine Sciences
<b>Felix Antreich</b>	Federal University of Ceará (UFC)
<b>Francisco Carvalho</b> Deputy Secretary	Secretary of Science, Technology and Higher Education of Ceará (SECITECE)
<b>Francisco Das Chagas Magalhães</b> President	Ceará Industrial Technology Nucleus Foundation (NUTEC)

<b>Francisco Sales Ávila Cavalcante</b>	State University of Ceará (UECE)
<b>Geraldo Ferreira</b>	LABOMAR – Institute of Marine Sciences
<b>Inácio Arruda</b> Secretary	Secretary of Science, Technology and Higher Education of Ceará (SECITECE)
<b>Jacques Servain</b>	Cearense Foundation of Meteorology and Water Resources (FUNCEME)
<b>Jarbas Silveira</b>	Federal University of Ceará (UFC)
<b>João César Mota</b>	Federal University of Ceará (UFC)
<b>João José Vasco Peixoto Furtado</b> R&I Director	University of Fortaleza
<b>Jorge Barbosa Soares</b> Director of Innovation	Cearense Foundation for Scientific and Technological Development Support (FUNCAP)
<b>José Jackson Coelho Sampaio</b> Rector	State University of Ceará (UECE)
<b>José Moutinho</b> Installing Commission	AIR Centre
<b>José Soares De Andrade Júnior</b> Professor	Federal University of Ceará (UFC)
<b>Laila Blythman de Figueiredo</b> Master's student	Technological Institute of Aeronautics (ITA)
<b>Lidriane De Souza Pinheiro</b>	LABOMAR – Institute of Marine Sciences
<b>Luiz Drude De Lacerda</b> Vice coordinator	Cearense Foundation for Scientific and Technological Development Support (FUNCAP)
<b>Lutero Carmo De Lima</b>	State University of Ceará (UECE)
<b>Marcelo Oliveira</b>	LABOMAR – Institute of Marine Sciences
<b>Marcial Porto Fernandez</b>	State University of Ceará (UECE)
<b>Maria Ozilea Bezerra Menezes</b> Director	LABOMAR – Institute of Marine Sciences
<b>Meiry Sakamoto</b> Researcher	Cearense Foundation of Meteorology and Water Resources (FUNCEME)
<b>Mona Lisa Moura De Oliveira</b> Professor	State University of Ceará (UECE)
<b>Paula Lenz</b> Administrative-Financial Director	Cearense Foundation for Scientific and Technological Development Support (FUNCAP)
<b>Paulo Ferrão</b> President	Foundation for Science and Technology (FCT), Portugal
<b>Rodrigo Cavalcanti</b> Technological Innovation Coordinator	Federal University of Ceará (UFC)
<b>Sampaio Filho</b> President	Federations of Industry of the State of Ceará (FIEC)
<b>Sérgio Ricardo Freitas Oliveira</b> Master's student	Technological Institute of Aeronautics (ITA)
<b>Tarcísio Haroldo Cavalcante Pequeno</b> President	Cearense Foundation for Scientific and Technological Development Support (FUNCAP)
<b>Teresa Lenice Nogueira Da Gama Mota</b>	Luciano Feijão
<b>Vicente De Paula Silva Filho</b>	National Institute of Space Research (INPE)









Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 6

Mindelo, Cape Verde

**Venues:** Ocean Science Centre Mindelo

March 5<sup>th</sup>, 2018

## WORKSHOP 6 • PROGRAM

### PROGRAM

Discussion of the Air Centre setting-up and the implementation of the Atlantic Interactions Agenda.  
Debate among participants.

### LIST OF PARTICIPANTS IN THE WORKSHOP

NAME • TITLE	ORGANIZATION
<b>António Sarmento</b> President of the Installing Commission	AIR Centre
<b>Aquilino Varela</b> General Director of Higher Education	Office of Science and Technology
<b>Carina Fernandes</b> Professor   Researcher	University of Cape Verde (UNICV)
<b>Erik Augusto Sequeira</b> Professor   Researcher	School of Agricultural and Environmental Sciences (ECAA-UNICV)
<b>Inácio Pereira</b> Executive Administrator	National Agency of Water and Sanitation (ANAS), Cape Verde
<b>Inesca Baptista</b> Technician	National Institute of Land Management (INGT), Cape Verde
<b>Iniza Araujo</b> Professor   Researcher	University of Cape Verde (UNICV)
<b>Isaurinda Batista Costa</b> Professor   Researcher	School of Agricultural and Environmental Sciences (ECAA-UNICV)
<b>José Luís Moutinho</b> Business Developer	AIR Centre
<b>José Manuel da Veiga Pereira</b> Executive Assistant   Associate Professor and Researcher at UNICV	Laboratory of Civil Engineering of Cape Verde
<b>José Manuel Moreno</b> President	National Institute of Meteorology and Geophysics (INMG)
<b>Judite Nascimento</b> Rector	University of Cape Verde (UNICV)
<b>Manuel Lopes Roberto</b>	Office of Science, Technology and Innovation (GCTI) - AT
<b>Mara Abu-Raya</b> Professor   Researcher	University of Cape Verde (UNICV)
<b>Oswaldo Teixeira</b> Coordinator	Office of Science, Technology and Innovation (GCTI)
<b>Paula Carvalho</b> Technician	Directorate General for Higher Education and Science (DGES), Cape Verde
<b>Samuel Gomes</b> Head of Department of Environmental Sciences	National Institute of Agrarian R&D (INIDA)
<b>Susana Catita</b> Adviser	Ministry of Science, Technology and Higher Education (MCTES)
<b>Tiago Saborida</b> Head of International Cooperation Division	Foundation for Science and Technology (FCT)
<b>Vera Alfama</b> Professor   Researcher	University of Cape Verde (UNICV)







Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 7

Praia, Cape Verde

**Venues:** Centro Cultural Português

March 6th, 2018

## WORKSHOP 7 • PROGRAM

### PROGRAM

Discussion of the Air Centre setting-up and the implementation of the Atlantic Interactions Agenda.

Debate among participants.

### LIST OF PARTICIPANTS IN THE

## WORKSHOP

NAME • TITLE	ORGANIZATION
<b>Albertino Martins</b> Director of Research and Fisheries	National Fisheries Development Institute (INDP)
<b>António Sarmento</b> President of the Installing Commission	AIR Centre
<b>Aquilino Varela</b> General Director of Higher Education	Office of Science and Technology
<b>Araci Rocha</b> Technician	National Directorate of Maritime Economy (DNEM)
<b>Carlos Santos</b> Honorary consul	Oceanographic Centre of Mindelo (OSCM)   GEOMAR
<b>Corrine Almeida</b> Professor   Researcher	University of Cape Verde - UNICV
<b>Delvis Fortes</b> Technician	National Directorate of Maritime Economy (DNEM)
<b>José Carlos de Luz</b> City Councilor	Town Hall of S. Vicente
<b>José Luís Moutinho</b> Business Developer	AIR Centre
<b>Maria Osvaldina Sousa Duarte Silva</b> President	National Fisheries Development Institute (INDP)
<b>Rui Freitas</b> Professor   Researcher	University of Cape Verde - UNICV
<b>Susana Catita</b> Adviser	Ministry of Science, Technology and Higher Education (MCTES)
<b>Tiago Saborida</b> Head of International Cooperation Division	Foundation for Science and Technology (FCT)
<b>Vito Ramos</b> Scientific Coordinator	National Fisheries Development Institute (INDP)   Oceanographic Centre of Mindelo (OSCM)







Atlantic Interactions: Climate Change and Energy, Space and Oceans

# WORKSHOP

# 8

London, United Kingdom

**Venues:** Universities UK (Woburn House), BEIS, Imperial College

April 23<sup>rd</sup>- 24<sup>rd</sup>, 2018

## WORKSHOP 8 • PROGRAM

### PROGRAM

#### MONDAY 23RD APRIL 2018

**09:30** Meeting with Vivienne Stern, Director of Universities UK International

*Local: Universities UK, Woburn House, Tavistock Square, WC1H 9HQ*

**10:55-13:00** Visit to Imperial College

*Local: Main Entrance of the College on Exhibition Road, London SW7*

**13:30** Meeting with Minister Sam Gyimah, Minister of State for Universities, Science, Research and Innovation

*Local: BEIS – Department for Business, Energy and Industrial Strategy - 1, Victoria Street, London SW1H 0ET*

**14:15** Meeting with Sir Mark Walport, CEO, UK Research and Innovation

*Local: BEIS – Department for Business, Energy and Industrial Strategy - 1, Victoria Street, London SW1H 0ET*

**14:45** Meeting with David Golding, Head of EU and Global Engagement, Innovate UK

*Local: BEIS – Department for Business, Energy and Industrial Strategy - 1, Victoria Street, London SW1H 0ET*

**15:30-16:30** Meeting with Graham Turnock, CEO, UK Space Agency

*Local: BEIS – Department for Business, Energy and Industrial Strategy - 1, Victoria Street, London SW1H 0ET*

**20:00** Dinner at the official Residence of Ambassador Manuel Lobo Antunes

#### TUESDAY 24TH APRIL 2018

**08:30-10:30** Meeting with Adam Webb, Director International and R&D Programme Manager, Digital Catapult

*Local: Digital Catapult Centre, 101 Euston Road, NW1 2RA*

**PORTUGUESE DELEGATION:****Manuel Heitor,**

Minister for Science, Technology and Higher Education

**Paulo Ferrão,**

Presidente, FCT

**João Sà água,**

Reitor, Universidade Nova de Lisboa

**Arlindo Oliveira,**

Presidente, Instituto Superior Técnico

**José Manuel Mendonça,**

President, INESC TEC

**António Cunha,**

Universidade do Minho

**António Sarmiento,**

Chair, Steering Committee of the AIR Centre

**Alexandra Marques ,**

I3Bs - Research Institute on Biomaterials, Biodegradables  
and Biomimetics, Universidade do Minho

**Teresa Tavares,**

Aviser MCTES

**IMPERIAL COLLEGE DELEGATION****Alice P. Gast,**

President of Imperial College London

**Maggie Dallman,**

Vice-President (International), Associate Provost (Academic Partnerships)

**Nick Jennings,**

Vice Provost (Research and Enterprise)

**David Gann,**

Vice President (Innovation)

**Francisco Veloso,**

Dean of Imperial College Business School

**Tim Green,**

Director of the Energy Futures Laboratory (EFL)

**Yannis Karpadakis,**

Department of Civil & Environmental Engineering

**Yike Guo,**

Professor of Computing Science

**Sanjeev Gupta,**

Professor of Earth Science

**Marisa Miraldo,**

Associate Professor in Health Economics, Department of Economics

**Ana Luisa Neves,**

Research Associate in the Centre for Health Policy  
at the Institute for Global Health and Innovation

**Silvestre Pinho,**

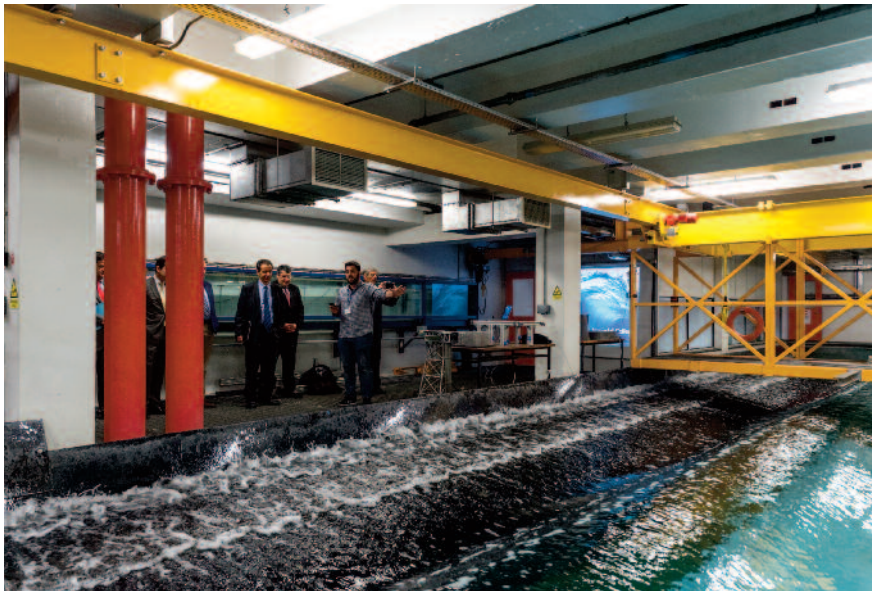
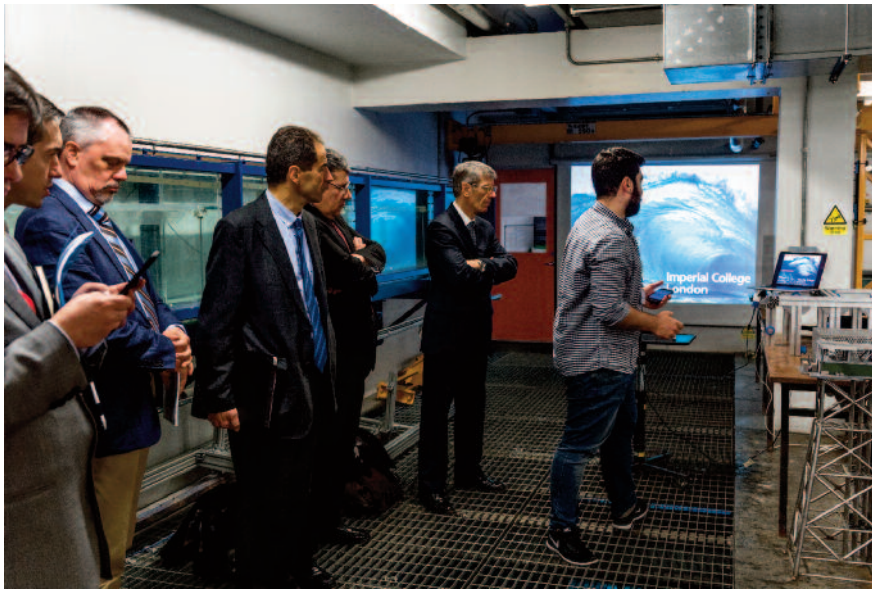
Professor in the Mechanics of Composites, Department of Aeronautics

**Amanda Wolthuizen,**

Director of Public Affairs

**Michael McTernan,**

Senior International Relations Officer







Atlantic Interactions:  
Climate Change and Energy, Space and Oceans

# 5

## AIR CENTRE INITIAL ACTIVITY AND PROJECTS





AIR CENTRE

ATLANTIC INTERNATIONAL RESEARCH CENTRE

## AIR CENTRE INITIAL ACTIVITY AND PROJECTS

### Status Update of the AIR Centre Implementation Team

Soon after the Florianopolis meeting in November 2017, an implementation team was established by the Portuguese Ministry for Science, Technology and Higher Education, MCTES. The team started with 2 elements in December, growing to 3 in January and 4 in March, corresponding to a total of 3 FTE (full-time equivalent), in addition to the Chair of the Executive Committee, António Sarmento. Legal and administrative support have been provided by MCTES and FCT (Portuguese Science Foundation), as well as FRCT (The Azores' Regional Science and Technology Foundation), who provides the headquarters and local support. The main task of the team is to assist the Steering Committee and Executive Committee in their mission, as well as gradually taking over the responsibility for ensuring the progress of the day-to-day business for making the AIR Centre a reality. By November 2018, it is planned to hand over the AIR Centre in plain operation to a permanent team.

Since the creation of the AIR Centre Steering Committee and Executive Committee (ExCo) in November 2017, 4 ExCo meetings were held per phone conference (14.02., 03.04., 17.04. and 03.05.2018), and a physical meeting in the Azores headquarters is planned for June 6th, 2018.

A Steering Committee phone meeting was held on 02.02.2018, with the main purpose to inform about the progress so far and to prepare for the physical Steering Committee meeting at the upcoming High-Level event in Praia, Cape Verde, on May 8th, 2018.

Among the milestones for the implementation team has been to coordinate the **constitution of the AD Air Centre (Association for the Development of AIR Centre)**, which was formalized on 16<sup>th</sup> April, 2018, in the Azores headquarters in Praia de Victória (Terceira Island). The Statutes' original version in Portuguese have been translated into certified English and Spanish versions for reference, but are subject to changes according to the entry of new partners. Spain has officially expressed its intention to enter formally into AD AIR Centre still during 2018, Brazil is analyzing the process, and other governments have been approached to comment on the path forward.

Major efforts have been dedicated to rising awareness of the AIR Centre and its objectives among potential partners internationally, in order to attract institutions in countries not yet formally involved in the AIR Centre to promote joint initiatives, such as from the USA, UK and Norway, as well as relevant international organizations such as GEO Blue Planet, UNOOSA and World Bank.

The target is to establish an External Ecosystem to attract joint initiatives, in addition to the Internal AIR Centre Ecosystem involving countries and relevant international organizations. First tangible outputs of these outreach activities have materialized through collaboration agreements and Memorandum of Understandings (MoUs), which are summarized in the following:

- Collaboration agreement for AIR\_DataNet (January 12th, 2018)  
Creation of the Minho Advanced Computing Center (MACC), Portugal, and development of a collaborative framework leading to the AIR Centre Data Intelligence Network (AIR DataNet); as partners, Foundation for Science and Technology (FCT), Portugal; Foundation for National Scientific Computing (FCCN), Portugal; Barcelona Supercomputing Center (BCN-CNS), Spain; University of Minho (UMinho), Portugal; AIR Centre

- Memorandum of Understanding (MoU) for the installation of the AIR Centre in the State of Ceará, 23<sup>rd</sup> February 2018

Signatories: Secretary of Science, Technology and Higher Education of Ceará (SECITECE), Brazil; Foundation for Science and Technology (FCT), Portugal. 10 Organizations involved

- Memorandum of Understanding (MoU) with GEO Blue Planet (20<sup>th</sup> March 2018)

Mutual recognition, strategic alliance and intention to establish sustainable collaboration projects between participants in both networks; signed between Portuguese Foundation for Science and Technology, Portugal; AIR Centre and GEO Blue Planet Initiative

Further noteworthy networking activities by the AIR Centre implementation team include the following meetings:

- Visit and AIR Centre discussion with Satellite Applications Catapult (Harwell, United Kingdom);
- AIR Centre implementation team working visit of Azores University and Regional representatives;
- Visit and AIR Centre discussion with Offshore Renewable Energy (ORE) Catapult (Glasgow, United Kingdom);
- Meeting with Barbara Ryan and Douglas Cripe (GEO) in Geneva, Switzerland
- Conversations with Jorge de Rio Vera (UNOOSA) and planned meeting with Simonetta Di Pippo (UNOOSA);
- Meeting with Jacqueline Kay Wood (Head of JPI Oceans Secretariat) and introduction to other JPI Oceans representatives via FCT;
- Participation in the G7 Plastics workshop in Brussels (23.03.2018)
- AIR Centre presentation in the Lisbon meeting of the partnership of Marrakesh and the Talanoa Dialogue and the Ocean-Climate interface (28.03.2018)
- Participation in workshop in Porto “Modelling Ocean Plastic Litter in a Changing Climate: Challenges and Mitigations” (26-27.04.2018);
- Participation in the “3<sup>rd</sup> GEO Data Providers Workshop”; Frascati, Italy (02.-04.05.2018)

With respect to specific projects within the scope of the AIR Centre, the understanding that initial projects should focus on mobility of researchers to strengthen the network and prepare better projects to be developed in 2019 appears to be widely agreed. Apart from this, some project calls have already been opened as AIR Centre projects in Portugal by FCT in collaboration with international institutions as GoPortugal (Massachusetts Institute of Technology, University of Texas at Austin and Carnegie Mellon University), and Aga Khan Foundation (Aga Khan Development Network), potentially serving as a pilot for future funding calls.

Projects approved under these calls are listed in the following pages as Pilot projects, tentatively divided into projects under the Scientific Program and Cross-cutting activities supporting this program. Projects funded independently of AIR Centre, but with a high relevance and linked to AIR Centre activities and a confirmed mutual interest in collaboration are referred to as Anchor projects. Finally, a number of project ideas and concepts/proposals has been collected and summarized, largely originating from the Florianopolis meeting, the Rio de Janeiro and Fortaleza meeting and the various technical discussions during and following up the workshops and meetings. Identifying details about these projects, in particular potential coordinators, partners and funding mechanisms, will be among the priority of the next phase of the AIR Centre establishment.

Further, the next steps for the implementation team include a thematic roadmap proposal for the starting phase, including projects’ specifications for 2019, the elaboration of a business model for discussion within ExCo and Steering Committee, and the proposal of AIR Centre Statutes to be discussed in the same committees.

Permanent AIR Centre Staff for the phase from November onwards will be sourced (partly by international tender), in order to ensure the process for transition to a Scientific Network Organization of international right.



## INITIAL LIST OF R&D PROJECTS TO SUPPORT THE IMPLEMENTATION OF THE SCIENTIFIC PROGRAM OF THE AIR CENTRE

The initial list of R&D projects to support the implementation of the Basic Scientific Program of the AIR centre is presented in two parts, as follows:

- “Pilot / Anchor Projects” with specific external funding after a competitive and international peer-review process;
- “Idea proposals and concepts” originated through AIR Centre activities;

### A) R&D PILOT / ANCHOR PROJECTS INITIATED AND FUNDED SINCE 2016/17

**Main Topic:** Marine Resources and Biodiversity: Promote Sustainable Fisheries, offshore aquaculture and ecosystem valorization

Project title:

**Luanda Bay Ecological Assessment: a waterfront-based approach to reduce environmental risks and increase quality of life**

**PI:** Maria Alexandra Teodósio (CCMAR/Algarve University - UAlg, PT)

**Partners:** CIMA, UAlg (Portugal); ANU, INIP (Angola)

**Period:** 2018-2021 **Support:** Aga Khan AKDN /FCT (Budget [€]: 297,081)

Project title:

**COBIO-NET - Coastal biodiversity and food security in peri-urban Sub-Saharan Africa: assessment, capacity building and regional networking in contrasting Indian and Atlantic Oceans**

**PI:** José Paula (Lisbon University - UL, PT)

**Partners:** Faculty of Science and ‘Museu Nacional de História Natural e da Ciência’ (FC+muhnac/UL, Portugal); Museu de História Natural, Universidade Eduardo Mondlane (Mozambique); Reserva da Biosfera Ilha do Príncipe, Príncipe Trust (São Tomé e Príncipe); WIOMSA (Zanzibar/Tanzania)

**Period:** 2018-2021 **Support:** Aga Khan AKDN /FCT (Budget [€]: 298,696)

**Main Topic:** Healthy and Clean Ocean: Observing, modelling and monitoring oceans and coastal areas

Project title:

**+ATLANTIC: Science and Technology Policy and Innovation Analysis to Maximize the Economic, Environmental and Social Benefits of Deep Sea Exploration and Oil and Gas Development in the South Atlantic Region**

**PIs:** Scott Matthews -CMU; CEE, Michael Griffin - CMU; EPP (USA), Ramiro Neves - IST-UL (PT)

**Partners:** ARDITI, M-ITI, CEIIA, EMAM, ISQ, ONIP, Action Modulers, TECHNIP, PETROGAL/Galp-E, WAVEC (Portugal); R-Tech (DE)

**Period:** 2016-2018 **Support:** CMU Portugal / FCT (Budget [€]: 520 752)

Project title:

**FERRO-CLEAN - Ferrofluidic Extensional Rheological Response for Ocean CLEAN-up**

**PI:** Francisco José Galindo Rosales (Faculdade de Engenharia, Universidade do Porto - FEUP, PT)

**Partners:** n/a (exploratory project)

**Period:** 2018-2019 **Support:** MIT-Portugal / FCT (Budget [€]: 83 106)

**Main Topic:** Systems integration from outer space to deep ocean - Occupy the Ocean

Project title:

**iFADO - Innovation in the Framework of the Atlantic Deep Ocean**

(Anchor project, funded independently of AIR Centre)

**PI:** Ramiro Neves (Instituto Superior Técnico, PT)

**Partners:** Marine Institute, DHPCLG (Ireland); NERC, DEFRA (United Kingdom);, PLOCAN, MAGRAMA (Spain); FCUL, Uma, IPMA, FRCT, DRAM, DROTA, DGRM (Portugal); NOVELTIS, PMBA, AFB (France)  
**Period:** 2017-2021 **Support:** EU Interreg Atlantic Area (Budget [€]: 3 632 635)

Project title:

***HABAIR - Innovative High Altitude Balloon for Atlantic Observation: Fostering the Development of a Collaborative Platform for Integrated Aerial and Oceanic Research***

**PI:** José Raul Carreira Azinheira (IDMEC, Instituto Superior Técnico - IST, PT)

**Partners:** Instituto de Soldadura e Qualidade – ISQ, TEKEVER Autonomous Systems – TEKAS, Instituto de Investigação em Vulcanologia e Avaliação de Riscos – IVAR (Portugal)

**Period:** 2018-2019 **Support:** MIT-Portugal / FCT (Budget [€]: 81 050)

Project title:

***Atmosphere - Ocean - Solid Earth Coupling: Seismic Tools to Explore and Monitor the Oceans***

**PI:** Susana Inês da Silva Custódio (Faculdade de Ciências - FCUL, PT)

**Partners:** University of Texas at Austin (USA); IDL, IPMA UAc (Portugal)

**Period:** 2018-2019 **Support:** UT Austin Portugal / FCT (Budget [€]: 99 984)

Project title:

***2DEEPSCAPE - Towards Deep-Sea Soundscaping***

**PI:** Marcos Silva Martins (Universidade do Minho, PT)

**Partners:** CINTAL, Marsensing (Portugal)

**Period:** 2018-2019 **Support:** MIT-Portugal / FCT (Budget [€]: 87 487)

Project title:

***MUSAS - Mapping of underwater soil of the Azores using Sdr based In-SAS***

**PI:** Sérgio Reis Cunha (Faculdade de Engenharia, Universidade do Porto - FEUP, PT)

**Partners:** University of Texas at Austin (USA); IPMA, TEKEVER (Portugal)

**Period:** 2018-2019 **Support:** UT Austin Portugal / FCT (Budget [€]: 94 440)

**Main Topic:** Mitigation and Adaptation to Climate Change: Resilience of cities and coastal areas, disaster risk reduction and local policy planning

Project title:

***HazRunoff - Integration of sensing and modelling technologies for early detection and follow-up of hazmat and flood hazards in Transitional and coastal waters***

*(Anchor project, funded independently of AIR Centre)*

**PI:** Ramiro Neves (Instituto Superior Técnico - IST, PT)

**Partners:** Action Modulers, Câmara Municipal de Loures (Portugal); Centro Tecnológico del Mar - CETMAR (Spain); EOMAP (Germany); CEDRE (France); Public Health England- PHE (United Kingdom)

**Period:** 2018-2020 **Support:** EU DG-ECHO (Budget [€]: 643 770)

Project title:

***SUpporinG GEoSciences To develop Africa***

**PI:** Rui Fernandes (University Beira Interior – UBI, PT)

**Partners:** CENACARTA, INAMI, INAM, Univ. Eduardo Mondlane (Mozambique), INMG, IGCA (Angola), OSGoF (Nigeria) **Period:** 2018-2021 **Support:** AgaKhan AKDN, FCT (Budget [€]: 299 278) – t.b.c

Project title:

***ISY-AIR: An integrated system for urban scale air quality assessment and forecast***

**PI:** Oxana Anatolievna Tchepel (Universidade de Coimbra - UC/UP, PT)

**Partners:** n/a (exploratory project)

**Period:** 2018-2019 **Support:** MIT-Portugal / FCT (Budget [€]: 91 537) – t.b.c

**Main Topic:** Sustainable Energy Systems and Global Energy Interconnections: Increase share of renewable energy and improve energy efficiency.

Project title:

***New low-cost approach for solar-cells based on magnetoplasmonic nanostructures***

**PI:** Navas Otero, Faculdade de Ciências, Universidade do Porto (FCUP/UP)

**Partners:** MIT (USA); INESC-MN (Portugal), UPV/EHU (Spain)

Area e) Sustainable Energy Systems and Global Energy Interconnections

**Period:** 2018-2019 **Support:** MIT-Portugal / FCT (Budget [€]: 99 725) – t.b.c

Project title:

***Nanostructured transition Metal Phosphides for Electrochemical Energy Storage***

**PI:** Lifeng Liu (International Iberian Nanotechnology Laboratory - INL, PT)

**Partners:** University of Texas at Austin (USA); University of Aveiro – UA (Portugal)

Area e) Sustainable Energy Systems and Global Energy Interconnections

**Period:** 2018-2019 **Support:** UT Austin Portugal / FCT (Budget [€]: 99 865) – t.b.c

Project title:

***Unconventional Thermoelectrics Based on Self-Organized Binary Nanocrystal Superlattices***

**PI:** Yury Kolen'ko (International Iberian Nanotechnology Laboratory - INL, PT)

**Partners:** University of Texas at Austin (USA); Universidade do Minho – UM (Portugal)

Area e) Sustainable Energy Systems and Global Energy Interconnections

**Period:** 2018-2019 **Support:** UT Austin Portugal / FCT (Budget [€]: 98 881) – t.b.c

**Main Topic:** Data science, artificial intelligence and learning systems for climate issues and atmosphere dynamics: Matching data producers and user needs.

Project title:

***Deep-Data: Data Science in the Azores deep***

**PI:** Maria Inês Camarate de Campos Lynce de Faria (INESC ID/INESC/IST/ULisboa, PT)

**Partners:** Carnegie Mellon – CMU (USA); IMAR/MARE Azores (Portugal)

Area f) Data science, artificial intelligence and learning systems for climate issues and atmosphere dynamics

**Period:** 2018-2019 **Support:** CMU Portugal / FCT (Budget [€]: 96 000) – t.b.c.

## B) IDEAS, PROPOSALS AND CONCEPTS UNDER DISCUSSION

**Main Topic:** Marine Resources and Biodiversity: Promote Sustainable Fisheries, offshore aquaculture and ecosystem valorization

Project title:

***Accounting the Atlantic Ocean and Coastal Ecosystems Services, Development of an integrative framework to be built upon the SEEA Land Account and Ecosystem Accounts;***

**Potential Partners:** UN ESCAP, GEO Blue Planet

Project lead from webinar follow-up – AIR Centre to apply for Atlantic to be included in testing regions

**Contact:** José Luiz Moutinho (AIR Centre)

Project title:

***Integrating data on phytoplankton and oceanographic variables in the Accounting of the Atlantic Ocean and Coastal Ecosystems Services;***

**Potential partners:** INPE, GEO Blue Planet.

Project lead from the discussions with GEO Blue Planet

**Contact:** José Luiz Moutinho (AIR Centre)

Project title:

**MARCHANGE - Marine Protected Areas and Ecosystem Services in a Changing Atlantic Ocean (Monitoring of Marine and Coastal Protected Areas);**

Project proposal originating in Fortaleza meeting,

**PI:** Marcelo de Oliveira Soares (Universidade Federal do Ceará (UFC)

**Partners:** ITIC, CTI, UECE (Ceará); others t.b.d.

Area a) Marine Resources and Biodiversity

**Main Topic:** Healthy and Clean Ocean: Observing, modelling and monitoring oceans and coastal areas

Challenge:

**Mapping the generation and distribution of microplastics in the Atlantic Ocean**, building consensus around methodologies for collection and identification, combining satellite monitoring, aerial and in-situ observations, coupled with specific sampling and analysis, and data science with advanced numerical models to assess the quantity of microplastics in the Atlantic Ocean and to predict its correlation with floating and immersed plastics, degradation, deposition cycles and circulation patterns;

Goals:

- Reduce in 2/3, until 2030, the actual amount of plastic residues in the Atlantic Ocean, by improved technologies for collecting, recycling and elimination of those materials and other wastes;
- Reduce in 90%, until 2030, the disposal of non-biodegradable plastics to the Atlantic Ocean, by proposing concerted legal, behaviour and technological actions in the Atlantic countries.

Process:

This challenge will consider the development of new standardized technologies and methodologies for sampling, quantifying, monitoring and identifying microplastics in the ocean and coastal areas. These actions will certainly help society to address the challenge of preventing, reducing and mitigating plastic pollution, through an integrated approach, from space to deep sea, across the south and north Atlantic, with emphasis in the most threatened coastal areas. An open data cube will be available to support the development of local, regional and national policies to create a sustainable framework for pollution reduction and to actively mobilize all interested stakeholders.

Potential ideas for future projects:

- Project title: Integrating Global and Local models of the Atlantic;  
Concept by IST-MARETEC originating in Florianopolis meeting and follow-up; is presently expanding partnership within AIR Centre network (potential synergies with project leads “Enhancement of large-scale marine circulation models in the South Atlantic” and “Dispersion modelling of micro plastics and oil in the sea” from Rio de Janeiro meeting), as well as “Surveying, Mapping and modelling of the generation and distribution of marine litter in the Atlantic Ocean” (UM)  
Contact: Ramiro Neves (IST-MARETEC)  
Area b) Healthy and Clean Ocean
- Project title: Ocean and Coastal Information in Support of Monitoring and Implementation of the UN 2030 Agenda for Sustainable Development in the Macaronesia and Sao Tome and Principe region;  
PI: (AIR Centre) Partners: GEO Blue Planet, with the possible support of NASA, NOAA and UNOOSA, project originating from AIR Centre – GEO Blue Planet MoU  
Contact: José Luiz Moutinho (AIR Centre)
- Project title: Surveying, Mapping and modelling of the generation and distribution of marine litter in the Atlantic Ocean  
Contact: António Cunha (Universidade do Minho - UM)  
Area b) Healthy and Clean Ocean
- Project title: Dispersion modelling of micro plastics and oil in the sea;  
Concept presented in Rio de Janeiro meeting, potential synergies with project “Integrating Global and Local models of the Atlantic” (IST-MARETEC)



Contact: AIR Centre to be contacted for intentions to coordinate/participate Area b) Healthy and Clean Ocean

- Project title: Changes in ocean dynamics in the South Atlantic basin in the face of climate change scenarios

Project concept presented in Rio de Janeiro meeting

Contact: AIR Centre to be contacted for intentions to coordinate/participate Area b) Healthy and Clean Ocean

- Project title: Enhancement of large-scale marine circulation models in the South Atlantic; concept presented in Rio de Janeiro meeting, potential synergies with project “Integrating Global and Local models of the Atlantic” (IST-MARETEC)

Area b) Healthy and Clean Ocean

#### **Main Topic:** Systems integration from outer space to deep ocean - Occupy the Ocean

- Project title: AtON Satellite LASER communication – Laser communication between satellites and earth; Project proposal by LusoSpace, from Florianopolis meeting Area c) Systems integration from outer space to deep ocean

- Project title: Smart Gulf – Concentration of ocean observation resources in the Gulf of Guinea;

Project lead from Florianopolis meeting, various options for follow-up

Contact: AIR Centre to be contacted for intentions to coordinate/participate

Area c) Systems integration from outer space to deep ocean

- Project title: Regular lines of oceanographic observation of the South Atlantic

Project concept presented in Rio de Janeiro meeting

Contact: AIR Centre to be contacted for intentions to coordinate/participate

Area c) Systems integration from outer space to deep ocean

- Project title: Implantation of autonomous sensors in voluntary observing ships (VOS- Voluntary Observing Ships); Project concept presented in Rio de Janeiro meeting; synergy with project “LORA-based IOT communication sensing solution [...]”, proposed by UECE;

Contact: AIR Centre to be contacted for intentions to coordinate/participate

Area c) Systems integration from outer space to deep ocean

- Project title: Fusion of Reverse Modeling and Gravimetric Satellite Data applied to Remote Oil Exploration;

Project lead originating in Rio de Janeiro meeting, various options for follow-up

Contact: AIR Centre to be contacted for intentions to coordinate/participate

Area c) Systems integration from outer space to deep ocean

- Project title: LORA-based IOT communication sensing solution for capturing information in remote areas of the ocean, using sea lanes from ships to read information;

Project lead originating in Fortaleza meeting; synergy with project “Implantation of autonomous sensors in voluntary observing ships [...]” from Rio de Janeiro meeting

Potential partners: UECE (PI); UECE, IFCE, UFC (Ceará); others tbd

Contact: AIR Centre to be contacted for intentions to coordinate/participate

Area c) Systems integration from outer space to deep ocean

#### **Main Topic:** Mitigation and Adaptation to Climate Change: Resilience of cities and coastal areas, disaster risk reduction and local policy planning

- Project title: Resilient Cities – “AIR Center and Resilience Potential of Equatorial Atlantic Coastal Cities; Project lead originating in Fortaleza meeting;

Potential partners UECE, IFCE; UFC; ITIC; CTI; INPE; FUNCEME (Ceará); AIR Centre to seek integration/link with ongoing initiatives like e.g. “Tanzanian Urban Resilience Program – TURP” (World Bank)

Contact: José Luiz Moutinho (AIR Centre)

Area d) Mitigation and Adaptation to Climate Change

- Project title: IASAHS - Influence of dynamic circulation variability of the Atlantic on food and water security in semi-arid regions;  
Project proposal originating in Fortaleza meeting;  
PI: Vicente de Paula Silva Filho (INPE – Instituto de Pesquisas Espaciais - Ministério de Ciência, Tecnologia, Inovações e Comunicações - MCTIC);  
Partners: CTI-NE, FUNCEME, IFCE, UECE, UNILAB; others tbd  
Area d) Mitigation and Adaptation to Climate Change

**Main Topic:** Sustainable Energy Systems and Global Energy Interconnections: Increase share of renewable energy and improve energy efficiency.

- Project title: Alternative energy from the management of urban sewage sludge for the sustainable development of cities;  
Project lead originating in Fortaleza meeting;  
Contact: AIR Centre to be contacted for intentions to coordinate/participate  
Area e) Sustainable Energy Systems and Global Energy Interconnections

**Main Topic:** Data science, artificial intelligence and learning systems for climate issues and atmosphere dynamics: Matching data producers and user needs.

- Project title: 2Recognition of satellite image patterns using P, D & I and Artificial Intelligence techniques for: leaks in oceans, schools, climate change;  
Project concept originating in Fortaleza meeting; potential partners ECE, IFCE, UFC (Ceará);  
Contact: AIR Centre to be contacted for intentions to coordinate/participate  
Area f) Data science, artificial intelligence and learning systems for climate issues and atmosphere dynamics:

## Initial list of activities to support the implementation of the Cross-Cutting Work Plan initiated by the AIR centre

### A) AIR CENTRE DATA INTELLIGENCE NETWORK (AIR\_DATANET)

AIR\_DataNET comprises the development of an Atlantic network involving computing power, data storage and data science expertise for the identification, promotion and development of Big Data projects in the context of the AIR Centre. It will provide data validation and accessibility to attract and facilitate data not public at present – crowd-data processes – to all those stakeholders involved through its facilities and expertise.

The AIR\_DataNet will act as the AIR Centre data foundry, enabling the fulfillment of its research objectives. It will include a Data Catalogue to maximize the impact of AIR Centre research outputs, aligning with the Open Science agenda in the Pan-European Research. Accordingly, the objectives of the AIR\_DataNet are:

- To enable and support a very large capacity federated data infrastructure providing ready-to-use data focused on the scientific domains of the AIR Centre;
- To provide a one-stop shop data management facility for Open Data storage, processing and retrieval facility, a FAIR Data & Metadata Catalogue, Persistent IDs and versioned mid & long-term storage;
- To provide state-of-the-art presentation and visualization big data services and tools.

**PI:** Rui Oliveira (University of Minho, UM)

**Partners:** MACC (Portugal), BSC (Spain), TACC (USA), COPPE, INPE (Brazil, t.b.c.);

**Period:** Starting 2018 **Support:** FCT, outros t.b.c.

### B) ATLANTIC DATA CUBE AND GEOSS

These initiatives are the first actions within the MoU signed between AIR Centre, FCT and GEO Blue Planet, signed on March 20th, 2018, aiming at mutual recognition, strategic alliance and intention to establish sustainable collaboration projects.

The Group of Earth Observations (GEO) is an intergovernmental organization focusing on facilitating access to Earth Observation (EO) data for nine priority areas, among them natural and human-induced disasters, environmental sources of health hazards, energy management or climate change and its impacts. GEO Blue Planet is a GEO Initiative created to ensure the sustained development and use of ocean and coastal observations for the benefit of society in line with SDG 14 (United Nations Sustainable Development Goals). The main path of implementation is to provision data applications and services with local engagement and valorisation.

#### *Atlantic Open Data Cube*

Delivery of innovative ready-to-use data applications that offer significant potential to impact important environmental, economic and social challenges in the Atlantic Ocean and Coastal Areas, including at the local, regional and global scales. The Atlantic Open Data Cube will have the potential to streamline data distribution and management for providers, while simultaneously lowering the technical barriers for users to exploit the data to its final users, such as policy makers, local enterprises and the general public. The Atlantic Data Cube is an innovative initiative as up to now since existing Data Cubes work with terrestrial data. The Atlantic Data Cube will be the first not only with ocean data but also integrating ocean and land data.

**Contact:** José Luiz Moutinho (AIR Centre)

**Partners:** AIR\_DataNet

**Period:** Starting 2018 **Support:** FCT (Portugal), others t.b.d.

#### *Atlantic GEOSS*

The Atlantic GEOSS is a collaborative hub aiming at enhancing the role of Earth Observation (EO) information and services serving the Atlantic Region societal needs, with strong focus on the Sustainable Development Goals. It will promote collaboration and growth, and mobilize and coordinate complementary resources of Atlantic countries, being a bridge between GEO regional initiatives (Europe, America, Africa). Atlantic GEOSS will create a sustainable data platform for the Atlantic region, supporting the use of Earth Observation information in decision-making processes, via access to a wide range of geospatial data sources, powerful distributed processing

architecture, EO imagery pre- and post-processing toolkits, expert services, development and integration support, and advanced visualization and data analytics.

**Contact:** José Luiz Moutinho (AIR Centre)

**Partners:** AIR\_DataNet; Deimos Elecnor Group (Portugal, t.b.c.); others t.b.c.

**Period:** Starting 2018 **Support:** t.b.c.

### C) ATLANTIC RESEARCH INFRASTRUCTURES

Reinforcing a collaborative use of Atlantic R&D&I infrastructures, by creating a network integrating multidisciplinary resources is one of the basic objectives of the AIR Centre. Existing research facilities, expertise and data shall be valorized and optimized through an Atlantic integrative approach in order to increase their operational efficiency and output. This will promote transversal projects such as the mobilization of researchers and the implementation of effective knowledge transfer processes between the infrastructures in the network. This includes the infrastructures that are part of the AIR Centre network, as well as other existing ones that can be ascribed to this network, or new infrastructures created in the future in the Atlantic islands of Azores, Madeira, Canary Islands, Cape Verde, Fernando de Noronha and S. Pedro-S. Paulo, among others, together with mainland research sites in India, Nigeria, Angola, South Africa, as in Europe and in the Americas, as well as others.

As a first initiative, the launch of the program “Researchers Mobility - Infrastructures & Working areas” promoted by Portuguese and Spanish institutions for the mobilization of researchers in upcoming work areas is planned. In the Fortaleza meeting, researcher exchange programs and mutual access to infrastructures were generally identified as preferable means to implement network cohesion in a cost-effective manner.

The existing infrastructures available within the AIR Centre network are listed in the Annex of the White Paper (AIR Centre Research Agenda), which is being updated.

In addition, initial contacts towards establishing working relationships with the following highly relevant, recently initiated projects have been established:

#### ***Anchor projects related to Atlantic Research Infrastructure Access***

##### ***EUMarineRobots (The Marine Robotics Research Infrastructure Network)***

**PI:** João Borges de Sousa (Universidade do Porto, PT)

**Partners:** UNI BREMEN (Germany); IST-ID (Portugal); UNIGE, DLTM (Italy); UNIZG-FER (Croatia); UdG, PLOCAN (Spain); ULIM, MI (Ireland); NATO STO (Belgium); HWU, NERC (United Kingdom); NTNU (Norway); IFREMER (France)

Area c) Systems integration from outer space to deep ocean

**Period:** 2018-2021 **Support:** EC Horizon 2020 (Budget [€]: 4 998 736)

##### ***T-Mosaic - Terrestrial - Multidisciplinary Distributed Observatories for the Study of Arctic Climate***

**Contact:** João Canário (Instituto Superior Técnico - IST, PT)

**Partners:** Universidade de Lisboa -UL (Portugal); University Laval, University of Calgary, University of British Columbia (Canada); NOAA, University of Alaska/Fairbanks (USA); Alfred Wegener Institute (Germany); University of Iceland; KOPRI (South Korea); University of Sterling (United Kingdom); Tomsk State University (Russia); INTERACT (Sweden); University South Bohemia Czech Republic)

Area c) Systems integration from outer space to deep ocean

**Period:** 2018-2022 **Support:** (Research funding from multiple partner projects)

#### ***Ideas, proposals and concepts under discussion***

- Satellites’ sharing and Microsatellite cluster;

Project leads by Deimos and Tekever (respectively) from Florianopolis meeting

Contact: AIR Centre to be contacted for intentions to coordinate/participate

- ARION micro launcher (providing launching capacity for microsats);

Project by Payload Aerospace, Spain



- Internet of the oceans - scientific platform for monitoring the oceans by sensors; Project concept originating in Fortaleza meeting  
PI: (UFC-LABOMAR)  
Partners: ITIC, CTI, UECE (Ceará), others t.b.d. (AIR Centre to help adding 'Atlantic dimension')  
Contact: AIR Centre to be contacted for intentions to coordinate/participate
- Implementation of strategically located physical containers for cloud computing for storage and processing solutions with high-speed communications between them;  
Potential partners UECE, IFCE, UFC (Ceará), others t.b.d. (AIR Centre to help adding 'Atlantic dimension')  
Contact: AIR Centre to be contacted for intentions to coordinate/participate
- Atlantic Photovoltaic Certification Laboratory  
Project concept originating in Fortaleza meeting  
PI: Carlos Artur Sobreira Rocha (ITIC);  
Partners: CTI-NE, CTI, NUTEC, UFC, UECE, PI Berlin, others t.b.d. (AIR Centre to help adding 'Atlantic dimension')  
Contact: AIR Centre to be contacted for intentions to coordinate/participate
- Establishment and commissioning of an air tunnel for strengthening the wind energy supply chain in Brasil  
Project concept originating in Fortaleza meeting  
Potential Partners: t.b.d. (AIR Centre to help adding 'Atlantic dimension')  
Contact: AIR Centre to be contacted for intentions to coordinate/participate

#### D) KNOWLEDGE FOR ALL

The program includes activities fostering science citizenship, together with education and knowledge aimed to promote "Knowledge for Space" and its integration with ocean, earth and climate education in a holistic approach. It is aimed to expand traditional education and science awareness programs to consider new horizons of space technologies in order to foster the access to education for all. This will be achieved by involving telecom operators, broadcast services and space providers in a "Space for Knowledge" network.

- The Ciência Viva agency, which is associated to the AIR Centre, will initiate the activities supported by its significant European and international network, in particular through the anchor program ESERO Portugal (European Space Education Resource Office, a collaboration between ESA & national partners). Activities will be coordinated within the AIR Centre network through National agents with the objectives of (i) support of experimental science education in basic and secondary school levels, (ii) scientific dissemination campaigns targeted at the general public.  
The actions will be discussed and implemented in an integrated form with the technical programs in the next phase of AIR Centre set-up. Foreseen activities include VOS (voluntary observatory ships), sensor conception and distribution for citizen data collection and survey/monitoring programs, interactive workshops and field campaigns, as well as competitions, like e.g. the existing CanSat microsatellite building student competition.

## **CRÉDITOS FOTOGRÁFICOS**

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LUÍSA FERREIRA

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