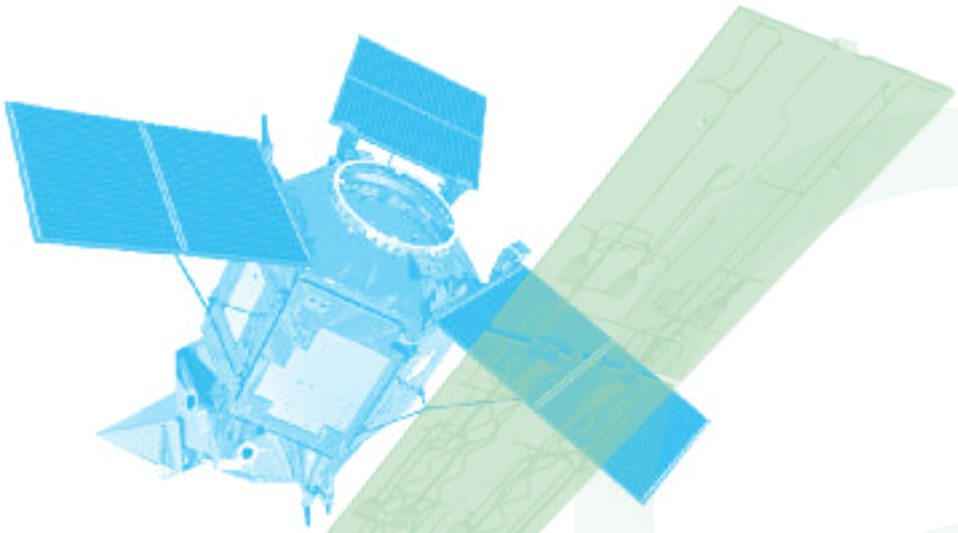
ATLANTIC INTERACTIONS 3.0

Atlantic Interactions:
TERCEIRA ISLAND, AZORES, PORTUGAL, APRIL 2017
FLORIANÓPOLIS, BRAZIL , NOVEMBER 2017
PRAIA, CAPE VERDE, MAY 2018
LAS PALMAS, CANARY ISLANDS, SPAIN, NOVEMBER 2018

MAY 2018 - NOVEMBER 2018

Delivering the
Atlantic International Research Centre (AIR Centre)



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A PROCESS OF SCIENTIFIC DIPLOMACY:

MAY 2018 – NOVEMBER 2018

Delivering the AIR Centre

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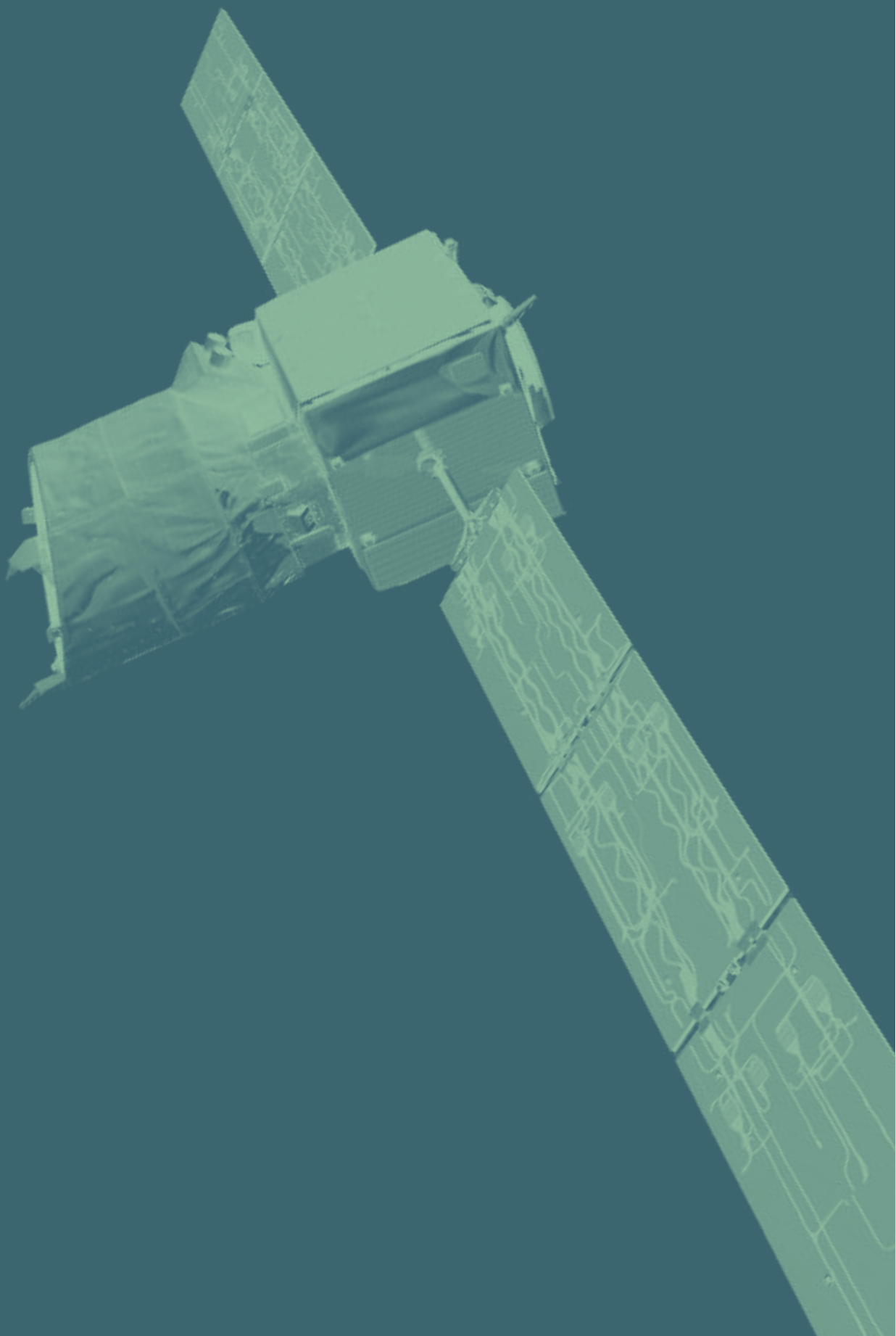
Atlantic International Research Centre



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PREFACE

Pedro Duque
Minister for Science, Innovation and Universities, Spain

It is my pleasure to welcome you to the 4th High Level Industry-Science-Government Dialogue on 'Atlantic Interactions'. I thank the Portuguese Minister Manuel Heitor, government leaders and representatives from the regional and local governments and participants for their presence and contribution to fostering Atlantic Interactions.

Our fruitful past meetings made real the establishment of the AIR Centre – Atlantic International Research Centre, as an internationally distributed scientific organization across Atlantic countries. I would also like to remember that the "Third High-level industry-science-Government dialogue on Atlantic interactions", in Praia, Cape Verde, allowed all of us to reach consensus in the definition of a preliminary Scientific Program and the preliminary identification of the first technical initiatives of the AIR Centre.

It is now the time to show that the Atlantic Interactions Programme (AIP) is a reality in the Atlantic Ocean domain, with scientific and research organizations worldwide that has now taken a step forward towards full institutional and scientific autonomy.

In Gran Canaria, we have the opportunity to continue our mission on addressing the need to further study and conduct research in Atlantic regions in terms of related natural resources, ecosystems dynamics and the interdependences with human activities towards achieving the 2030 United Nations goals for sustainable development, together with the potential exploration of new avenues for knowledge-based economies in south and north Atlantic. Thus, it will be our pleasure to show the current state of AIR Centre developments, synergies and breakthrough with current existing international initiatives producing wide range outcomes, benefiting wide communities across the Atlantic basin. Thus we have designed a unique program showing how we are delivering the AIR Centre by showing:

- Implementation status and illustrative projects
- The road to the next future
- The challenges of Atlantic trans-regional access to infrastructures
- Projects addressing UN SDGs
- Accelerating innovation and entrepreneurship
- Current Status and Societal Benefit Areas

The AIR Centre is already a reality, by triggering better and enhanced international R&D collaborations between regions and disciplines; we are creating and supporting opportunities to collaborate with UN, and regional bodies in America and Africa in key scientific and technological areas. Moreover, we are proud of concrete national actions that helped to advance the establishment of the Air Centre, the development and adhesion to the AIR Centre and the creation of the AIR Centre Spanish Node which is coordinated by the Ministry of Science, Innovation

and Universities. This national node, which could be used as an example to our peers, comprises our national research institutions, know-how and multipurpose technical-scientific facilities, but also research and innovation funding agencies and other national RDI agents that cover the geographic scope and main pillars of this international initiative.

Thus Spain continues its commitment to the AIR Centre by participating and articulating efforts focused on Atlantic research and innovation programs; the sustainable and effective use of Research Infrastructures (RI) across the Atlantic area; by accelerating technology transfer, innovation and entrepreneurship across and along the Atlantic area and by establishing a clear strategic plan and time line objectives which will help in integrating global and local perspectives, and open ecosystems where stakeholders from public and private institutions establish an international dialogue and work together in the Atlantic region.

SCIENTIFIC DIPLOMACY TO FOSTER ATLANTIC INTERACTIONS: THE ATLANTIC INTERNATIONAL RESEARCH CENTRE - AIR CENTRE

Manuel Heitor

Minister for Science, Technology and Higher Education, Portugal

The installation of the AIR Centre has made significant progress over the last thirty months in terms of our initial 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) and through South-North/North-South cooperation.

We all should be proud of the global process we have all shared to foster a sound and scientifically relevant R&D agenda on "Atlantic Interactions" through the first steps in establishing a Basic 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 Cross-cutting Work Plan of initiatives to be approved in the Canary Islands in November 2018 are aligned with the Belem Statement (July 2017) signed between the European Commission, Brazil and South Africa and the associated concerted and support action. 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 critical 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 education and knowledge aimed to promote education 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, economically and scientific relevant process, to be inclusive for all countries and regions involved.

Now is time to continue this global effort and to guarantee a stepwise process for the full autonomous operation of the AIR Centre in the coming years, with adequate institutional, legal and financial structure, together with fully scientific work force as a multisite research organization.

Our common commitment is to help building the future with a truly inclusive orientation towards sustainable job creation and knowledge based societies in Atlantic regions, through South-North/North-South cooperation.

SPACE-BASED INTEGRATED APPLICATIONS AND THE SUSTAINABLE DEVELOPMENT GOALS

Simonetta di Pippo
Director, UNOOSA (United Nations Office for Outer Space Affairs)

In September 2015, the United Nations, through a deliberative process involving its 193 Member States, adopted a new set of goals to be achieved over the following 15 years to end poverty, protect the planet, and ensure prosperity for all, as part of a new sustainable development agenda: the 2030 Agenda for Sustainable Development which came into effect on 1 January 2016. This Agenda has defined 17 Sustainable Development Goals (SDGs) with 169 associated targets which demonstrate the scale and ambition of the Agenda. The SDGs are integrated, indivisible and balance the three dimensions of sustainable development: social, economic and environmental. To maximize its practical gains, the implementation of the Agenda is supported by a data-driven framework which defines a set of indicators and precise methodologies to monitor the progress, inform policy and ensure accountability of all stakeholders. Governments have the primary responsibility for follow-up and review, at the national, regional and global levels, in relation to the progress made in implementing the Goals and targets over the 15-year period.

From the very inception of the SDGs, space technologies have been viewed as integral for their achievement. Space technology is one of several technologies essential for successfully implementing the 2030 Agenda. It provides data, information and services that directly or indirectly con-tribute to achieving the Sustainable Development Goals (SDGs) or to assessing and monitoring progress towards achieving the Goals. The resolution 70/1 of the United Nations General Assembly: "Transforming our world: the 2030 Agenda for Sustainable Development." specifically mentions space technologies by calling to “promote transparent and accountable scaling-up of appropriate public-private cooperation to exploit the contribution to be made by a wide range of data, including Earth observation and geospatial information”.

One of the distinctive characteristics of space measurements is their capacity to take non-invasive repeatable objective measurements, which enables a more equitable and fair decision-making process. For the 2030 Agenda for Sustainable Development to be successful, the use of space technologies shall become the norm. A global partnership is needed to ensure that countries are fully aware of the potential of space to implement and monitor the SDGs and to ensure that the needs of all countries are taken into account, reducing existing gaps when designing and operating new space-based infrastructure as the capabilities of using the resulting data and applications are uneven.

The Office for Outer Space Affairs has as vision to bring the benefits of space to humankind and the mission of promoting international cooperation in the peaceful uses of outer space and the utilization of space for sustainable development, through various programmes, initiatives and pro-jects. In particular, the United Nations Office for Outer Space Affairs (OOSA) assists Member States in building capacity in the use of space science, space technology and space applications. The Office’s emphasis has been on the development and transfer of knowledge and skills to developing countries and countries with economies in transition. OOSA is promoting the use of space for monitoring and achieving the SDGs. One of the results of these activities has been the publication of a report entitled “European Global Navigation Satellite System and Copernicus: Supporting the Sustainable Development Goals. Building Blocks towards the 2030 Agenda", elaborated by the Office for Outer Space Affairs together with the European Global Navigation Satellite Systems Agency. This report describes how the two European space flagship programmes, Copernicus and European Global Navigation Satellite System contribute to the SDGs. Only these two programmes can con-tribute to the achievement of almost 40% of the targets associated with the SDGs.

The work of the Office for Outer Space Affairs goes beyond that, for instance, the platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), man-aged by the Office, supports Member States in the full disaster management cycle, providing assistance in the form of best practices, capacity-building efforts and technical advisory

missions, making use of all available space technologies. In fact, the trend is not to use single technologies like Earth observation alone, but the integration of technologies, data and applications to provide comprehensive services, as the integration of Earth observation and global navigation satellite systems for precision farming, or the integration of global navigation satellite systems with satellite tele-communications to provide additional information to search and rescue teams.

There is no reason to consider only the integration of space technologies exclusively but also with other technologies. The use of Artificial Intelligence (AI) and associated applications through ma-chine learning are well established as tools for more effective policymaking. AI needs vast amounts of data to train algorithms and extract features and the amount of data captured by Earth observation satellites alone is in the order of hundreds of gigabytes per day, not to mention the data generated by other space-based technologies. The synergies between space-based data and AI could give unprecedented views on the status of our planet, giving policymakers around the world additional tools to understand impacts at global scale. We are only starting to explore the tip of an ice-berg of possibilities, where space plays a fundamental role and creates unique benefits to modern society. In fact, SDG 17 stresses the need for partnerships to reach all the SDGs, stressing out that demanding goals set out by the 2030 Agenda for Sustainable Development cannot be reached without a concerted effort on the part of all stakeholders and will require the use of all the technologies that can rightly contribute.

Even if unnoticed, today, the use of space technology and the availability of space-based services is widespread. Space assets and technologies can be used to support most, if not all, the SDGs and it is the role of the Office for Outer Space Affairs to bring the benefits of space to the whole human-kind

#1 INTRODUCTORY NOTES

SCIENTIFIC DIPLOMACY TO FOSTER ATLANTIC INTERACTIONS: THE ATLANTIC INTERNATIONAL RESEARCH CENTRE - AIR CENTRE

1. BACKGROUND INFORMATION

This note presents the progress associated with the establishment of the AIR Centre 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).

The AIR Centre´s Basic Scientific Program 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 Deep Ocean to Near Space:** development, integration and use of sensors, devices and systems making use of integrated Earth Observation and ocean technologies 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.

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 and aligned with the Belem Statement (July 2017) signed between the European Commission, Brazil and South Africa and the associated concerted and support actions. They can include, among others:

e) Developing coordinated actions to implement common standards for data sharing, using existing supranational e-infrastructures to test them.

f) Defining Transatlantic alliances of clusters, coastal cities, infrastructures, and research centres to provide solutions for coastal regions and cities of the South Atlantic Ocean in mitigating carbon emissions, adapting to the challenges of climate change, creating jobs, and promoting blue economy

g) Sharing infrastructures and defining mobility and training programs

h) Aligning scientific policies to enhance ocean innovation or identifying and developing academia-industry knowledge transfer and encouraging collective capacity building measures.

2. THE LAST TWO YEARS OF SCIENTIFIC DIPLOMACY TO INSTALL THE AIR CENTRE

The "Fourth high-level Industry-Science-Government Dialogue on Atlantic Interactions", to be held in the Canary Islands, Spain, 25-27 November 2018, follows three previous major events and a wide set of workshops in the last years, as initiated in June 2016 to facilitate and foster an effective process of scientific diplomacy on Atlantic Interactions, which has resulted in a global process for establishing the Atlantic International Research Centre - AIR Centre.

Recently, the **"Third High-level Industry-Science-Government Dialogue on Atlantic Interactions"**, held in Praia, **Cabo Verde, 7-8 May 2018**, has confirmed the progress achieved in establishing the AIR Centre, namely the contributions to a R&D agenda on "Atlantic Interactions", including the outline of the Basic Scientific Program and the preliminary identification of the first technical initiatives of the AIR Centre. It has also confirmed the process of setting up 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.

Before that, the commitment reached in the **"Second High-level Industry-Science-Government Dialogue on Atlantic Interactions"**, held in **Florianópolis, Brasil 20-21 November 2017**, was very important to establishing the AIR 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**, determined the establishment of an innovative R&D agenda on "Atlantic Interactions" in a way to promote an 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 series of "High Level Industry-Science-Government Dialogues on Atlantic Interactions" mentioned above was made possible after the organization of more than 30 thematic workshops organized throughout the world in the last years, as initiated in June 10, 2016 in New York City, at the Institute of International education, IIE.

The conclusion of the installation plan of the AIR Centre is to be approved in the **4th High-level Industry-Science-Government Dialogue on Atlantic Interactions**", to be held in **Canary islands, in 25-27 November 2018**, addressing the AIR Centre latest achievements in expanding the network, consolidating key partnerships and delivering scientific, technological and societal programmes.

COMPLETING THE IMPLEMENTATION PHASE OF THE AIR CENTRE

António Sarmento
Chair of the Steering Committeel

The Steering Committee and Executive Committee (ExCo) mandates, as specified by the Florianopolis Declaration signed in November 2017, were to set-up the AIR Centre until November 2018 as a private non-for-profit organization under the Portuguese law and to make it evolve to an international scientific network organization in a later phase. Accordingly, the activity of the two committees is being focused in i) Clarifying the vision for the AIR Centre as a new organization; ii) Advancing the scientific, innovation, capacity building and economic development agendas for the AIR Centre; iii) Setting up the private non-for-profit organization under the Portuguese law; iv) Setting up a Implementation Team to assist the two committees in their work; v) Starting the selection process for the AIR Centre CEO; vi) Attracting new countries to the AIR Centre; vii) Expanding the network of partner organizations; viii) Starting a partnership with funding agencies; ix) Identifying, proposing and running the first set of projects.

These different activities and their major outcomes will be now briefly presented.

Positioning the AIR Centre in the international context

The AIR Centre needs to position itself as a new international organization **that adds value on what exists**, namely programs, initiatives and cooperation frameworks. This is particularly critical in the ocean space. To do so, the AIR Centre should build on:

1. Being a long-term multilateral platform for cooperation that lasts beyond the framework of projects and so with a very high potential to exploit their legacy and to sustain (and expand) partnerships that otherwise would be lost (or inexistent);

2. Having an inclusive perspective to science, innovation, capacity building and economic development;

3. Focusing in the interaction between ocean, climate change impacts and sustainable energy and the impact of new space and in situ technologies for ocean observation and data science in those fields;

4. Effective co-design and co-operation of the AIR Centre by the different country members and affiliated partners;

5. Establishing a sound strategic plan well accepted by the main stakeholders, namely the funding agencies and International Financial Institutions (IFIs), leading to a significant financial support to its projects and initiatives.

AIR Centre scientific agenda

The Praia High-Level Dialogue requested the AIR Centre agenda to be well aligned with the UN Sustainable Development Goals (SDGs). As a result, three major challenges were subsequently identified that should to guide the AIR Centre agenda and work plan:

1. Understanding, predicting and adapting to Climate Change;
2. Understanding the Atlantic Ocean for a Healthy & Productive Ocean and
3. Clean, Affordable and Secure Energy for All,

These three challenges are well in accordance with the Basic Scientific Program composed of the 6 Societal Benefit Areas (SBAs) and 3 Cross-Cutting Initiatives (CCIs) approved in Praia.

To further develop the Basic Scientific Agenda, 9 working groups were formed. These should present in the Canary Islands High-Level Dialogue a first vision on the activities the AIR Centre shall focus to add value on what exist and avoid duplication. Only activities that clearly show an added-value shall be developed by the AIR Centre.

The establishment of a mature scientific agenda takes time and will be done through a process that balances a strategic approach, as the one that the several working groups are undertaking, with two somehow opportunistic approaches: i) the attraction of partners that will show who is available to cooperate with the AIR Centre and how, and ii) the development of the first projects taking into account the funding opportunities that are available. These three complementary streams will lead in the future to a workplan that we expect to be consistent and realistic.

Creation of the non-for-profit organization under the Portuguese law

As already made public in the Praia High-Level Dialogue, the private non-for-profit Association for the Development of the AIR Centre (AD AIR Centre) was created in April under the Portuguese Law, with the Portuguese Foundation for Science and Technology and the Azores Regional Fund of Science and Technology as members. Spain has meanwhile requested the admission of PLOCAN as the Spanish representative to the AD AIR Centre, a request that was recently approved by the AD AIR Centre General Assembly. The Association has got 5.4 million euros secured by the Portuguese Government until 2023, based on which the General Assembly has approved an exemption of initial and annual quotas for new members until 2020.

Implementation team

An Implementation Team composed of 4 members has been formed to support the Steering Committee and Executive Committee of the AIR Centre. This Team is funded by AD AIR Centre and shall assure a smooth transition with the permanent staff to be hired in 2019.

Permanent staff

An international call was opened in October to fill the position of the Executive Director/CEO of the AIR Centre. Around 50 submissions were received and by November 17 a very short-list of candidates was established for further analysis. It is expected that the selection process will be completed in December and the contract to be signed in February. The hiring of the remaining permanent staff will take place in 2019, once the new CEO is in full operation.

Attraction of new country members, partners and partnerships

A significant number of workshops have been undertaken (Nigeria, Rio de Janeiro, Fortaleza, Washington, London, Cape Town, Saint John's Newfoundland, Accra and Oslo) to engage new country members and partner institutions. This is an ongoing process that will hopefully attract new countries to the AIR Centre, reinforce existing links and identify the first AIR Centre projects.

As a direct result of these workshops and many other meetings of different type, many Memorandum of Understandings have been signed with relevant international organizations and three Letters of Intention will be signed to start three relevant cooperation processes: i) between funding agencies and IFIs to jointly finance AIR Centre projects and initiatives; ii) between innovation agents to jointly promote innovation and capacity building projects in the AIR Centre context and iii) between research and observation infrastructures to facilitate the access of researchers and the exchange of best practices.

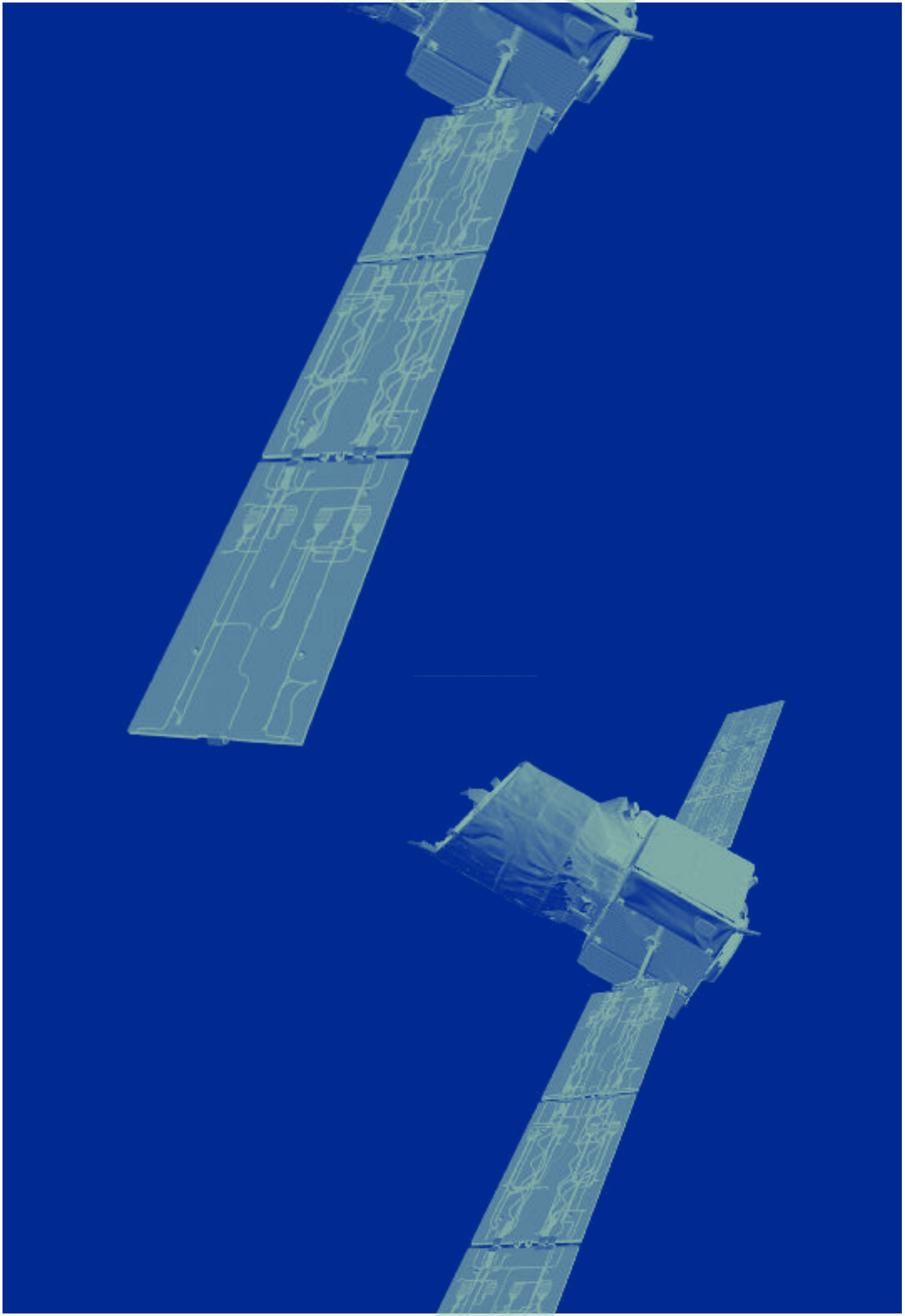
First projects

As well as the attraction of new partners is important to gain visibility and credibility, the identification (and development) of the first set of projects is critical to show that we are able to mobilize stakeholders and to deliver. These initial projects have been identified in an opportunistic way, but with some requirements as they need to: i) be aligned with the US SDGs, ii) integrate two or more topics, iii) be replicable and/or scalable and iv) create value for the AIR Centre. More than 10 projects have been identified, some of which already submitted to calls and one already under development. Some integrate oceans, space and data science, others ocean and IT, others climate change and public policies, others space and data science or climate change and energy.

Conclusion

The forthcoming year will also be critical for the success of this initiative, namely in the following aspects: i) setting up the permanent staff and office; ii) attraction of new countries and international partners; iii) development of the first projects; iv) alignment with the European Commission and major European and international initiatives; v) consolidation of the workplan, governance structure and national nodes; vi) alignment with the funding agencies and IFIs.

The implementation of the AIR Centre already gave important steps in this first year, but such an ambitious and complex project requires much more time and, as well, intelligence, patience and commitment. We count on you to contribute to this effort!



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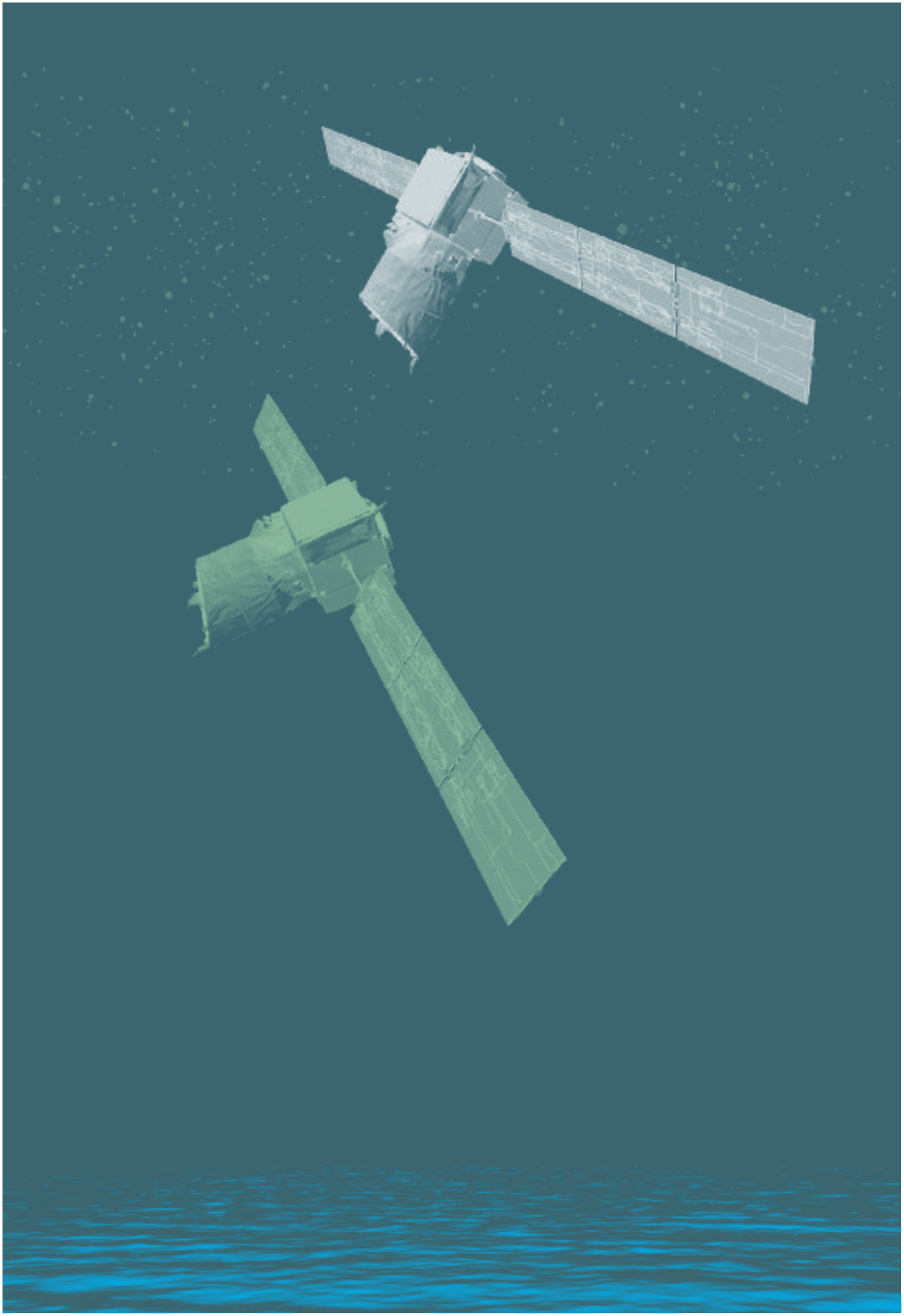
THE CHALLENGES



2.1.

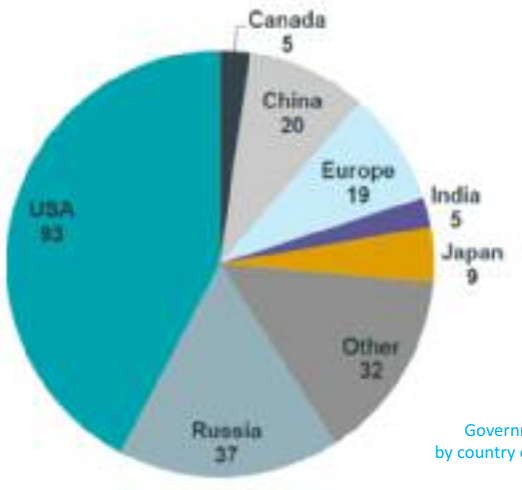
SPACE TECHNOLOGIES AND DATA SCIENCE IN SUPPORT OF THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS ON OCEANS, CLIMATE CHANGE, AND ENERGY

Prof. Dava Newman, Rebecca Browder, Jeremy Stroming, and Max Vilgalys
MIT Portugal Program

Space technologies can be used to support virtually all of the UN Sustainable Development Goals (SDGs) and the efficacy of these technologies can be maximized through the engagement of data science. Seven SDGs were targeted by the Atlantic Interactions, of specific note are: the oceans, climate change and energy. We provide an initial framework for determining some space technologies and data science techniques that can be used to support SDGs, which may be extended to other SDGs in the future.

Evolution of the New Space Industry

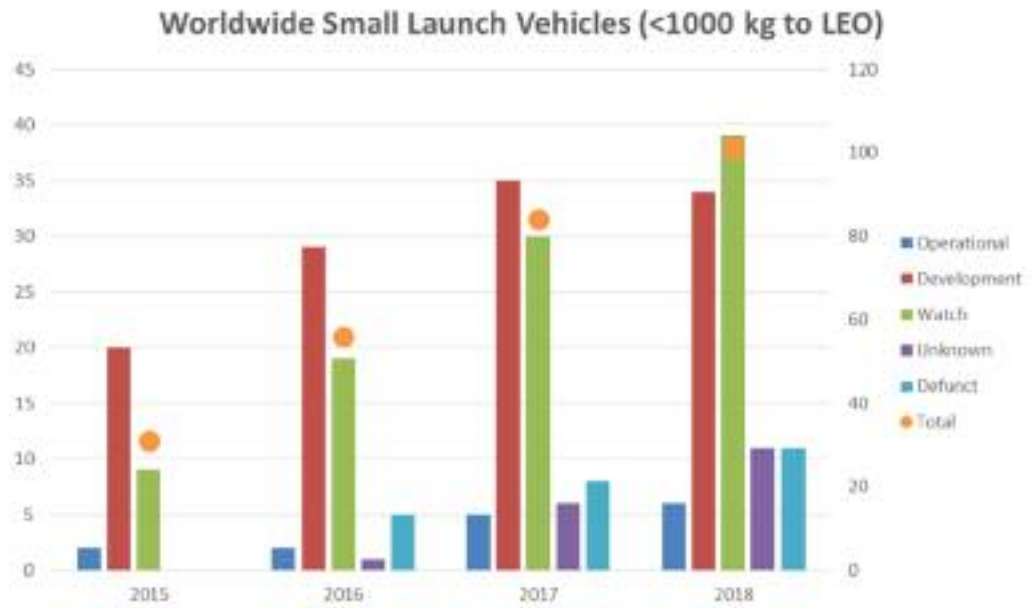
The 21st century has seen a rapid increase in the democratization of access to space. Commercial interest in space exploration has developed new market sectors in space transportation and access, spacecraft development and manufacturing, ground sites, on orbit servicing, telecommunications services, navigational and positioning systems, remote sensing, resource extraction, and spin-off industries. The advent of small satellites has drastically reduced the cost of access to space, inviting a wider range of international collaborators. Meanwhile, an internationally competitive market of launch vehicles to service smaller payloads is also developing. The US has dominated this market, with US companies representing 90% of commercial smallsat launches from 2012-2017, but private companies across the world are beginning to make their mark (Niederstrasser, 2018). In the small launch vehicle industry, 46% of current competitors are based outside of the US (Bryce Space and Technology, 2018). Both smallsat and small launch vehicle markets have seen steady growth and consistent private investment on the order of billions of dollars per year for each of the past five years. The New Space industry will continue to be a great opportunity for international collaboration.



Government smallsats launched by country of operator (2012-2017).

Governments around the world can use space technology for weather forecasting, disaster response, agricultural and water resource management, precise positioning and navigation services, improved connectivity and communication services, microgravity research, technology transfer, and inspiration drawn from research and education to support sustainability goals. These technologies can be pursued through partnerships with commercial companies as well as other governments in order to promote international collaboration while maximizing the use of existing infrastructure.

While satellites technology is already used in numerous applications to pursue sustainability around the globe, the amount of data produced by satellites is enormous. Thus, the employment of data science methods in analyzing satellite data can maximize the efficacy of space technology in pursuing SDGs.



Growth of the small launch vehicle market.

Utilizing Data Science to Maximize Efficacy of Space Technologies

The expansion of space exploration has led to unprecedented amounts of information on the state of the planet. Earth-observing satellites collect terabytes of information on temperature, currents, water mass, atmospheric composition, and additional metrics every day. This flood of data introduces opportunities and challenges as scientists translate the unparalleled scope of observations into a sophisticated understanding of Earth systems.

Earth-observing data are already widely used for weather prediction and monitoring but asking more complicated questions of the data requires using advanced data science approaches. By using deep learning algorithms on satellite data, Stanford researchers were able to assess infrastructure quality in Africa (Oshri et al., 2018). The World Bank group analyzes satellite data to estimate economic well-being (Engstrom et al., 2017). Analyses such as these can measure and explain complex global trends, enabling policy makers to measure progress on sustainable development goals.

There is still a need to expand the data science capabilities of policymakers to learn as much as possible from these data. Many tasks are restricted to analysis of past trends, which, while providing large-scale and empirical observations, are not living up to their full potential. As Eastwood (2017) describes, major global institutions don't use the predictive power of machine learning and data science techniques. Using data science to not only analyze but predict the consequences of climate change on our energy, water, and food systems will enable policymakers to plan for a more resilient future.

Countries and institutions can utilize data science techniques in the pursuit of SDGs through partnerships with groups that have had success in this area or by leveraging experts in the field of data science to apply their skills in support of the SDGs.

Supporting the SDGs Targeted by Atlantic Interactions

Space technologies can be used to "support most, if not all, the SDGs [Sustainable Development Goals]" (United Nations Office for Outer Space Affairs). Therefore, it is up to the organization to first determine which goals they aim to support and then seek out the space assets and technologies that can be used to support those goals. The UN Sustainable Development Goals that focus directly on oceans, climate change and energy are: 7) Affordable and Clean Energy,

13) Climate Action, and 14) Life Below Water. However, the inherent connectivity between the goals leads to the expansion of the "oceans, climate change and energy" focus to include goals such as 17) Partnerships for the Goals and 11) Sustainable Cities and Communities. For example, the Atlantic Interactions group can engage partners in their pursuit of goals 7, 13 and 14, and thus also work toward goal 17. In addition, the pursuit of goal 11 will help to achieve goals 7, 13 and 14 through the implementation of green energy solutions and an emphasis on making the human-ocean relationship more symbiotic and sustainable. Previously, the Atlantic Interactions and AIR Centre targeted Sustainable Development Goals 1, 2, 7, 11, 13 and 14:

Sustainable Development Goals

"The AIR Centre's Basic 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." (Atlantic Interactions)

Based on this focus, we can determine which space assets and technologies to use to achieve the SDGs. The UNOOSA's report in collaboration with ESA provides an excellent framework for analyzing space assets and technologies in relation to their ability to support the SDGs (United Nations Office for Outer Space Affairs). Drawing from and augmenting this analysis, Table 1 provides an initial list of space technologies and example applications to achieve the SDGs targeted by the Atlantic Interactions. This table is not exhaustive, but instead provides examples of relevant space technologies and applications that can begin the Atlantic Interactions' development of a space sector that supports the Sustainable Development Goals. Keeping in mind that "a key element of pursuing the SDGs is for nations to work with the UN to develop methods to measure progress toward the Targets on each indicator" (Wood), Atlantic Interactions could partner with organizations that are able to supply relevant space technologies and needed applications.

UN Sustainable Development Goal, SDG	Relevant Space Technologies	Examples of Applications
	Satellite Earth observation Satellite positioning	• Natural disaster forecast • Crop productivity optimization
	Satellite Earth observation Satellite positioning Technology transfer	• Crop productivity optimization • Livestock management optimization • Reduction of food shortages and waste (Gilchrist)
	Satellite Earth observation Satellite positioning	• Infrastructure monitoring • Power grid synchronization • Seismic surveying • Solar and wind energy production forecasting
	Satellite Earth observation Satellite positioning Satellite communication	• Urban planning • Infrastructure monitoring • Improvement of city services • Air quality monitoring • Disaster management • Search and rescue operations
	Satellite Earth observation Satellite positioning Satellite communication	• Climate change monitoring • Disaster management • Search and rescue operations
	Satellite Earth observation Satellite positioning Satellite communication	• Mapping and monitoring of natural and protected areas • Communication with vessels at sea • Remote monitoring of fishing activities

References

Atlantic Interactions | Air Centre. (n.d.). Retrieved November 9, 2018, from http://www.atlanticinteractions.org/air-centre/

Bryce Space and Technology, "Smallsats by the Numbers 2018", 2018.

Eastwood, Brent M. “IMF and World Bank in Need of More Modern Forecasting Methods.” Atlantic Council, 24 Apr. 2017, www.atlanticcouncil.org/blogs/futuresource/imf-and-world- bank-in-need-of-more-modern-forecasting-methods.

Engstrom, Ryan; Hersh, Jonathan Samuel; Newhouse, David Locke. 2017. Poverty from space : using high-resolution satellite imagery for estimating economic well-being (English). Policy Research working paper; no. WPS 8284; Paper is funded by the Strategic Research Program (SRP). Washington, D.C. : World Bank Group.

Gilchrist, K. (2018). Technology used by NASA in food tests may save trillions, stop hunger. Retrieved November 10, 2018, from https://www.cnbc.com/2018/09/19/nasa-technology-in- food-tests-may-save-trillions-and-stop-hunger.html

Niederstrasser, Carlos. "Small Launch Vehicles – A 2018 State of the Industry Survey."

Conference on Small Satellites, 2018.

Oshri, et al. “Infrastructure Quality Assessment in Africa Using Satellite Imagery and Deep Learning.” [Astro-Ph/0005112] A Determination of the Hubble Constant from Cepheid Distances and a Model of the Local Peculiar Velocity Field, American Physical Society, 3 June 2018, arxiv.org/abs/1806.00894.

Wood, D. (n.d.). New models for democratic engagement in the application of space technology for sustainable development. Retrieved from https://techandsocialchange2017.wordpress.brownbag.me/wp- content/uploads/sites/26/2018/11/20181029_Wood_Democratic-engagement-Space-for-Dev-v2- 1.pdf

United Nations Office for Outer Space Affairs. (n.d.). European Global Navigation Satellite System and Copernicus: Supporting the Sustainable Development Goals: Building Blocks Towards the 2030 Agenda. Retrieved from http://www.unoosa.org/res/oosadoc/data/documents/2018/stspace/stspace71_0_html/st_space_71 E.pdf

2.2.

HOW TO BRING ADDED VALUE ON EXISTING INFRASTRUCTURES AND INITIATIVES ?

J.Joaquín Hernández-Brito,
Chief Operating Officer, PLOCAN (Oceanic Platform of the Canary Islands)

Scientific and technological Research Infrastructures (RIs) are unique facilities, resources and services used by the scientific community to address global scientific challenges. They are designed to solve highly relevant scientific questions in a wide field of knowledge, from the observation of the Higgs Boson to the exploration of the Universe. They provide cutting-age and unprecedently large-scale, usually costly, complex or specially located instrumentation, associated with computing resources and advanced equipment and services powered by international collaboration. They can involve larger scientific facilities, resources such as collections, archives or scientific data, e-infrastructures such as data and computing systems or communication networks. They are serving a scientific community of excellence committed to solve a scientific challenger or enable critical technologies to overcome a socio-economic major challenge of concern at international level (e.g. climatic change, space exploration or the quest for new sources of energy).

The RIs can play a major role strengthen national and international collaboration in science and technology, providing world-class facilities where a new generation of researchers and engineers can meet together around critical shared targets, gathering the required critical mass of talent and resources necessary. They have a large community of stakeholders and a value change distributed internationally, but mainly concentrated around highly consolidated scientific groups of excellence, outstandingly developed technological regions and well-developed countries.

The AC can play a significant role by collaborating with RIs to enlarge communities of users and stakeholders across the Atlantic area, increasing awareness, diffusion and dissemination of their potential to foster excellence science and innovation. AC can contribute to involving new researchers and companies, extending and promoting a broader benefit of RIs in new fields and locations. It can provide a significant contribution to the development of the transatlantic research area, extending the use and profit of those facilities, providing access to outstanding research conditions and also envisaging innovative applications and perspectives. Many research centres or technology-based companies can potentially benefit from collaboration with RIs, by fostering new ideas, innovative services or disruptive products, either directly or by collaboration with entitles already involved.

Besides, RIs are usually privilege meeting and vantage points to look at critical scientific challenges and future technologies, but also crossroad where cross-fertilization is recombining ideas, technologies, networking, disciplines leading to innovation or excellent science. RIs creates new opportunities to connect researcher from all over the work and focus them around new targets and often opening new technologies and business models based on disruptive technologies.

The AC can create a high-valuable relational capital by connecting RIs with new users, funding bodies, companies and other stakeholders o RIs in other fields, creating cross-fertilization links among sector and scientific disciplines. AC can increase the impact of RIs in Atlantic regions, creating new synergies among research centres. AC can gather valuable information on the multidisciplinary needs of an Atlantic basin engaged in tapping the beneficial potential of the blue economy by increasing cooperation and applying new technologies and scientific knowledge.

Some preliminary examples of AC´s potential initiatives for developing new synergies with RIs are listed below:

● Generation of new collaboration spaces (physical or virtual) to connect RIs potential users. Many research groups are not aware of how to access RIs or benefit from their services, many times distributed in nodes or virtual services, especially on environmental, data, food or energy-related infrastructures.

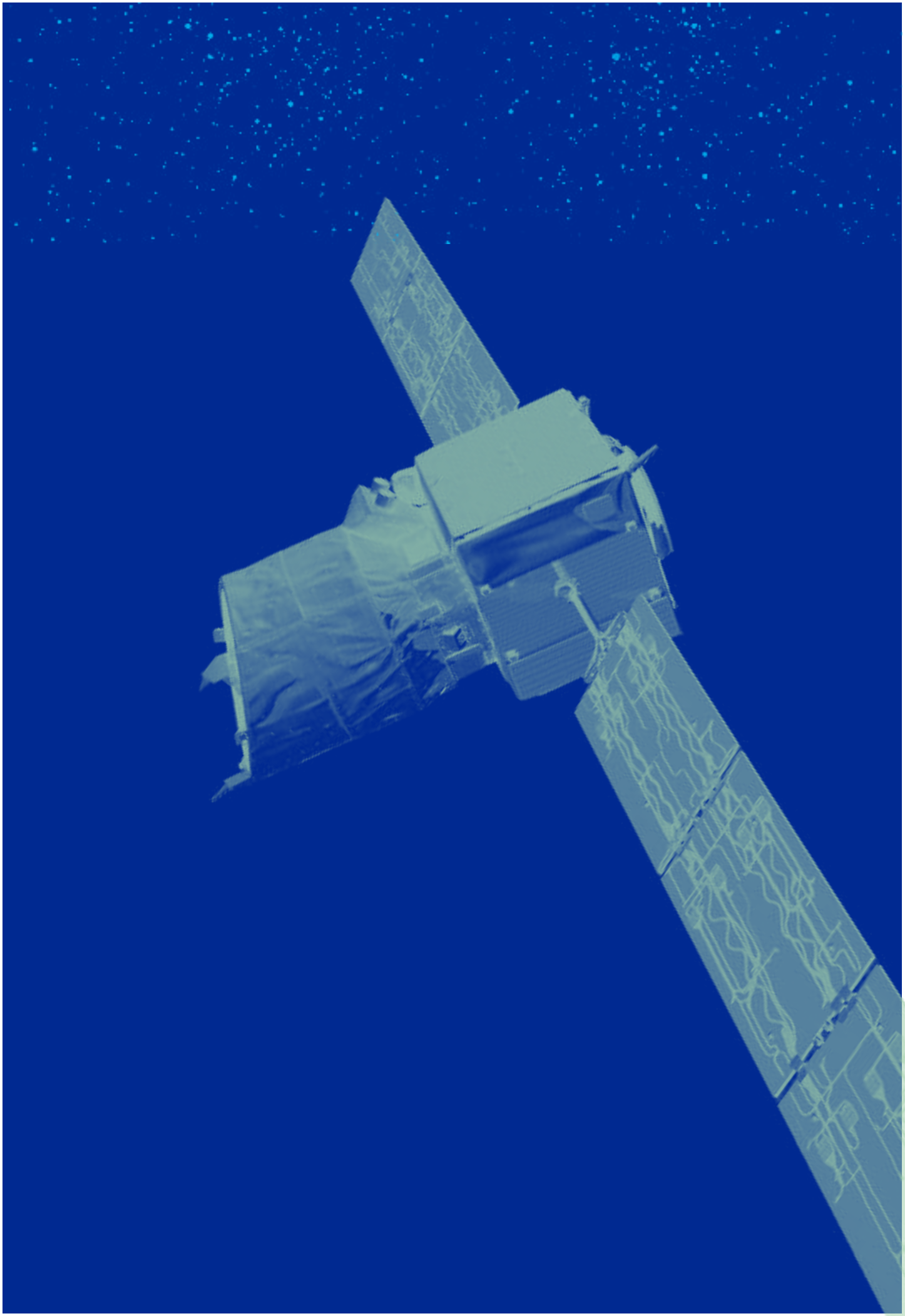
● Dissemination of information, results or knowledge transfer at national and international infrastructures of the Atlantic Area facilitating the diffusion of the services of services.

● Transnational access and mobility of researchers. Transnational access is relevant for infrastructures, although organization and financing usually present opportunities for improvement, both in the organization, financing, or the mobility of researchers among others. Therefore, there is a space for collaboration of the AC, seeking models

● Interdisciplinary and multisectoral collaboration. The fields of science increasingly generate a growing amount of highly specialized knowledge, which in turn requires researchers and infrastructure to focus more. The opportunity for AC arises from the need to create synergies between different scientific infrastructures, sometimes not at first evident.

● Preparation of joint projects or collaborative initiatives to provide new access models more extended to involve research communities across the Atlantic area.

● Generation of new services or preparation of new potential infrastructures especially relevant for the Atlantic area.



Atlantic Interactions:

Climate Change and Energy,

Space and Oceans

#3

THIRD HIGH-LEVEL INDUSTRY - SCIENCE - GOVERNMENT DIALOGUE ON ATLANTIC INTERACTIONS

Praia, Santiago Island,

Cabo Verde,

May 7th- 8th 2018

3.1.

SUMMARY

The purpose of the 3rd High Level Industry-Science-Government Dialogue was to present and discuss the progress of the implementation of the AIR Centre, along with an updated exchange of information regarding scientific and technical developments, as well as the 'institutional ecosystem' of the AIR Centre. The meeting concluded the first phase of preparation and marked the transition to the operational phase of the AIR Centre, counting with more than 120 participants coming from 13 different countries and representing around 30 organizations.

The program included a first day of plenary sessions and a second day with 4 workshop sessions covering a wide range of scientific topics related to space, ocean, climate, energy and data science. Through the signature of the Praia Declaration, the progress achieved in establishing the AIR Centre was confirmed, namely the setting up of a non-profit association to develop the AIR Centre, the preliminary definition of the R&D priorities and the identification of the initial set of S&T initiatives in a way to provide, promote and foster the basis of a truly international organization.

3.2.

AGENDA

Venue: National Library, Praia, Santiago Island, Cape Verde

OVERALL AGENDA

SUNDAY, 6TH MAY 2018

During the day	Arrival of delegations and participants
20:00 – 22:00	Welcome Reception Cocktail at Hotel Oasis Praiamar

MONDAY, 7TH MAY 2018

8:30 – 9:00	Registration
9:00 – 9:20	Welcome Remarks from Local Authorities
9:20 – 9:40	Brief Remarks by Government Leaders and Representatives
9:40 – 11:00	Implementing the AIR Centre: Initiatives - 1
11:00 – 11:30	Coffee Break
11:30 – 13:00	Implementing the AIR Centre: Initiatives - 2
13:00 – 14:00	Lunch
14:00 – 15:30	Implementing the AIR Centre: Initiatives: Developing the network
15:30 – 16:00	Coffee Break
16:00 – 17:30	Implementing the AIR Centre: Developing knowledge-based economic and social ecosystems
17:30 – 18:00	Closing Remarks

18:00	Signing of Conclusions & Family Photo
20:00	Dinner

TUESDAY, 8TH MAY 2018

8:45 – 9:00	Registration
9:00 – 11:00	Parallel Workshops: challenges for the AIR Centre's Scientific Program
	Workshop 1: Clean, healthy and sustainable oceans
	Workshop 2: Data Science and systems for ocean, atmosphere and climate issues
11:00 – 11:30	Lunch
11:30 – 13:00	Parallel Workshops: challenges for the AIR Centre's Scientific Program
	Workshop 3: Sustainable Marine Resources and Biodiversity
	Workshop 4: Earth observation in the Atlantic Ocean and coasts: from deep sea to outer space
13:00 – 14:00	Lunch
14:00 – 15:30	Industry-Science-Government relationships and challenges for the AIR Centre's Scientific Program
15:30 – 16:00	Coffee Break
16:00 – 16:45	Knowledge for all for the AIR Centre: Promoting science culture and education
16:45 – 17:00	Closing Remarks
17:00 – 19:00	AIR Centre Steering Committee Meeting

DETAILED PROGRAM

SUNDAY, 6TH MAY 2018

During the day — Arrival of delegations and participants

20:00 – 22:00 — Welcome Reception Cocktail at Hotel Oasis Praiamar

MONDAY, 7TH MAY 2018

8:30 – 9:00 — Registration

9:00 – 9:20 — Welcome Remarks from Local Authorities

Maritza Rosabal Peña, Minister of Education, Family and Social Inclusion, Cape Verde

Jorge Carlos Fonseca, President of the Republic of Cape Verde

9:20 – 9:40 — Brief Remarks by Government Leaders and Representatives

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

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

Domingos Neto, Secretary of State for Science and Technology, Angola

Cecil Masoka, Director, Multilateral Cooperation, Department of Science and Technology, South Africa

Juan Marîa Vázquez, Secretary General for Science and Innovation, Spain

9:40 – 11:00 — Implementing the AIR Centre: Initiatives – 1

Chair: **Gilberto Kassab**, Ministry of Science, Technology, Innovations and Communications, Brazil

Brief introduction: **António Sarmento**, Chair of the AIR Centre Installation Committee
- AIR Centre implementation (10 min)

Invited Discussants:

Josep Martorell, BSC, Spain – Barcelona Supercomputing Center;

Ricardo Galvão, INPE, Brazil – Earth Observation;

Ramiro Neves, MARETEC/IST, Portugal – Ocean modelling;

Alexander Turra, USP, Brazil – Clean and Healthy Oceans;

Jorge Del Rio Vera, UNOOSA – Space Supporting the Sustainable Development Goals;

Rosalia Vargas, Ciencia Viva, Portugal – Democratization of Science.

Debate among Ministers and scientific and business leaders

11:00 – 11:30 Coffee Break

11:30 – 13:00 Implementing the AIR Centre: Initiatives – 2

Co-Chairs: **Juan María Vázquez**, Secretary General, Science & Innovation, Spain & Cecil Masoka, Director, Multilateral Cooperation, Department of Science and Technology South Africa

Brief introduction: **Doug Hart, MIT**, USA - Monitoring the World's Oceans

Brief invited speeches:

Susan Barr, IASC - International Arctic Science Committee - The IASC and T-MOSAiC);

Gregory Jenkins, Penn State, USA – Emerging Trends in West Africa and Cape Verde).

Eduardo Silva, Portugal – TEC4SEA: Technological Challenges in Ocean Observation, Exploration and Exploitation;

José Fortes, University of Florida, USA - CENTRA: A Possible Partnership Framework for AIR Transnational Research;

Augusto Gadelha, LNCC, Brazil - The National Laboratory of Scientific Computing;

Fernando Lobo Pereira, FEUP, Portugal, on behalf of João Borges de Sousa,

FEUP, EUMR PI - EU Marine Robotics.

Debate among Ministers and scientific and business leaders

13:00 – 14:00 Lunch

14:00 – 15:30 Implementing the AIR Centre: Initiatives: Developing the network

Chair: **Carlos Ferreira Santos**, Ocean Science Centre Mindelo, Cabo Verde;

Brief introduction: **Marco Borra**, EMBRC-ERIC, Italy – EMBRC-ERIC: A Global Reach Research Infrastructure

Brief presentation: **Gui Menezes**, Azores Regional Government

Invited speakers:

Andrei Polejack, MCTIC, Brazil – Developing the AIR Centre Network: Proposal by Brazil

José Joaquín Hernández Brito, Plocan, Spain - Implementing the AIR Centre: Developing the Network;

Carlos Ferreira Santos, Ocean Science Centre Mindelo, Cabo Verde – Ocean Science Centre Mindelo: A joint initiative of and operated by GEOMAR and INDP;

Cecil Masoka, Director, Multilateral Cooperation, Department of Science and Technology, South Africa, on behalf of Nicole du Plessis, SAEON – South African Environmental Observation Network, South Africa – Building Academic Networks in South Africa and Abroad.

Debate among Ministers and scientific and business leaders

15:30 – 16:00 Coffee Break

16:00 – 17:30 Implementing the AIR Centre: Developing knowledge-based economic and social ecosystems

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

Brief introduction:

Nick Veck, Catapult Satellite Applications, UK - Implementing the AIR Centre:
Developing Business Ecosystems

Invited speakers:

Samy Djavidnia, GEO Blue Planet, Italy – Earth Observation in support of coastal and ocean services;

Ned Dwyer, EurOcean, Ireland – From Science to Innovation – A Sea Change is needed for improved marine Knowledge Transfer;

Michael Lawrence, DEIMOS UK – Atlantic GEOSS, EO for development;

Juan Carlos Cortez, CDTI, Spain – Spanish space assets relevant to the Air Center;

Wilsa Atella, Ambidados, Brazil – Implementing the AIR Centre:
Developing knowledge-based economic and social ecosystems;

Ana Noronha, Ciencia Viva, Portugal – Science culture and education.

Debate among Ministers and scientific and business leaders

17:30 – 18:00 Closing Remarks

Glória da Graça Vaz do Rosário, General Directorate of Higher Education and Science,
Sao Tome and Principe

Juan Marîa Vázquez, Secretary General for Science and Innovation, Spain

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

Domingos Neto, Secretary of State for Science and Technology, Angola

Cecil Masoka, Director, Multilateral Cooperation, Department of Science and Technology, South Africa

Gilberto Kassab, Ministry of Science, Technology, Innovations and Communications, Brazil

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

José Gonçalves, Ministry of Maritime Economy, Cape Verde

18:00 Signing of Conclusions & Family Photo

20:00 Dinner

TUESDAY, 8TH MAY 2018

8:45 – 9:00	Registration
9:00 – 11:00	Parallel Workshops: challenges for the AIR Centre's Scientific Program
	Workshop 1: Clean, healthy and sustainable oceans
	Workshop 2: Data Science and systems for ocean, atmosphere and climate issues
	(see detailed program and report below)
11:00 – 11:30	Lunch
11:30 – 13:00	Parallel Workshops: challenges for the AIR Centre's Scientific Program
	Workshop 3: Sustainable Marine Resources and Biodiversity
	Workshop 4: Earth observation in the Atlantic Ocean and coasts: from deep sea to outer space
	(see detailed program and report below)
13:00 – 14:00	Lunch
14:00 – 15:30	Industry-Science-Government relationships and challenges for the AIR Centre's Scientific Program
	Co-Chairs:
	Paulo Ferrão, Portuguese Foundation for Science and Technology, Portugal
	Juan María Vázquez, Secretary General for Science and Innovation, Spain
	Cecil Masoka, Director, Multilateral Cooperation, Department of Science and Technology, South Africa
	Reports from workshops: Workshop rapporteurs
15:30 – 16:00	Coffee Break
16:00 – 16:45	Knowledge for all for the AIR Centre: Promoting science culture and education
	Co-Chairs:
	Rosalia Vargas, Ciência Viva, Portugal
	Jerry Miller, Science for Decision, USA
	Andrei Polejack, MCTIC, Brazil
	Reports from workshops: Workshop rapporteur
16:45 – 17:00	Closing Remarks
	Amadeu Cruz, Secretary of State for Education, Cape Verde
	Ulisses Correia e Silva, Prime Minister, Cape Verde
17:00 – 19:00	AIR Centre Steering Committee Meeting

3.3.

PARALLEL WORKSHOPS: CHALLENGES FOR THE AIR CENTRE'S SCIENTIFIC PROGRAM

Workshop 1:

OBSERVING, MODELLING AND MONITORING, OCEANS AND COASTAL ZONES

Coordinator and Rapporteur:
Ramiro Neves, MARETEC/IST, Portugal

Presenters:
Luiz Paulo Assad, LAMCE / COPPE RJ, Brazil - Numerical Modelling and Data Assimilation applied to the South Atlantic Ocean;
Paula Sobral, MARE, Portugal – Microplastics;
Josep Pellegrí, CSIC, Spain - Some examples of Spanish monitoring initiatives.

Highlights:

Most of the existing models follow the downscale perspective, from global to local models. An innovative approach would be to use data from local and regional studies carried at national/regional level to improve the global models, products and services (upscaling), such as CMEMS (Copernicus Marine Environment and Monitoring System), which in turn can be subsequently used to improve local/regional solutions. This approach would have three major benefits: a) development of an improved global solution for the Atlantic Ocean; b) development of a common data platform; and c) development of products and services better tailored for local needs. The AIR Centre should explore the possibility of using Atlantic islands as test beds for new services and products.

The health of the world's oceans is a matter of concern. Amongst others, a major problem derives from the exponential increase in the amount of plastics produced worldwide, part of which ends up in the oceans constituting a global problem, as they a) have been detected in all levels of the marine environment causing diverse harm to marine life (ingestion, entanglement, etc); b) may transport nonindigenous marine species, which threaten marine biodiversity and the food chain; and c) can accumulate toxic substances or act as a vector of toxic pollutants in the food chain, with potentially severe health implications. The study of the generation, distribution and fate of the microplastic in the ocean will not only contribute to the better understanding of the problem and help with the solution, but it can also improve other models such for oil spills and eutrophication. The AIR Centre must build upon other projects in the same domain and add value to all of the Atlantic Ocean, avoid overlapping and duplication of efforts.

Conclusions:

A joint initiative, Clean and Healthy Oceans Mission, which will focus on observing, modelling and monitoring plastics pollution in the Atlantic Ocean, was considered a priority within the context of the AIR Centre. This initiative is a long-term, transnational and multidisciplinary effort that will integrate several activities and provide tools that could be adapted to other scientific domains. This initiative builds upon the integration of global and local processes (upscale modelling) and the provision of a comprehensive visualization tool that will allow experts and non-experts to experiment, simulate and support informed decision making.

Workshop 2:

DATA SCIENCE AND SYSTEMS FOR OCEAN, ATMOSPHERE AND CLIMATE ISSUES:

Matching data producers and user needs: developing the AIR_DataNet

Coordinator:
Rui Oliveira, MACC / INESC TEC, Portugal

Presenters:
Josep Martorell, BSC, Spain – Some thoughts on the AIR Data Net implementation;
Ivo Vieira, Lusospace, Portugal – AtON Project;
Jose Fortes, iDigBio, USA – iDigBio: data management systems and opportunities for collaboration;
Luiz Landau, LAMCE / COPPE RJ, Brazil – HPC4E Project;
Anabela Oliveira, LNEC), Portugal – The OpenCoasts Service: On-demand Operational Coastal Circulation Forecast Services

Rapporteur:
Nick Veck Catapult Satellite Applications, UK

Highlights:

Earth observation infrastructures, products and services must switch from a technology driven approach to a demand (user) driven approach where the needs and requirements of the users are adequately identified, analysed and understood before implementation. But intermediate and final users, on the other hand, must be capable to proactively articulate requirements, to locally appropriate Earth observation tools and to develop new layers of services and products. Therefore, capacity building in all domains related to Earth Observation was considered a critical factor of success since quantitative and qualitative data for monitoring the Atlantic Ocean and coastal areas is complex, needing specific competences for acquiring, transforming, analysing and interpreting the respective information.

Technological platforms are the key component of effective Earth observation and they must be actively promoted, but the resulting services and products must be evaluated in terms of its social benefits and response to global challenges. For the AIR Centre to have a measurable, positive impact in the life and work of people along and across the Atlantic Ocean, there must be a clear added value in relation to other national / regional projects and initiatives.

Conclusions:

The AIR Centre must develop a pragmatic, concrete and measurable Earth observation working plan to move from ideas to implementation, which will be presented in the meeting in the Canary Islands. This working plan should be aligned with the UN 2030 Agenda for Sustainable Development and focus on the user needs and impacts on society.

Workshop 3:

SUSTAINABLE MARINE RESOURCES AND BIODIVERSITY

Fisheries, offshore aquaculture and renewable energies, ecosystem valorization

Coordinator and Rapporteur:
Jose Joaquín Hernandez Brito, PLOCAN, Spain

Presenters:
Pedro Afonso Santos, University of Azores, Portugal – Open-ocean and Deep-sea research priorities;
Pablo Abaunza, IEO, Spain –Sustainable Marine Resources and Biodiversity;

Antonio Sarmento, AIR Centre, Portugal – Global Energy Interconnections;
Rui Patricio Freitas, University of Cape Verde, Cape Verde – Challenges of Coastal Oceanography in Cape Verde.

Highlights:

The AIR Centre should stimulate the constant, integrated monitoring of the biodiversity of the South Atlantic, finding hot spots in deep waters, proposing new technologies for mapping these hot spots and assess the completeness of information already available with the aim of identifying the gaps, collecting new data and eventually integrating the data in global networks. The same approach would also apply to fisheries and aquaculture, without overlapping with other national / international organizations and taking into account local needs.

Ultra-high capacity, long-distance energy grids will be ubiquitous around the globe. The AIR Centre could be a test bed for these technologies, especially with respect to their feasibility and potential contribution to a substantial increase in marine renewable energy conversion in the Atlantic. The example of Cape Verde, using very simple, but very effective, methods of sampling must be an example. The AIR Centre must establish parameters for collecting the same type data with the same frequency that could be also integrated in other European data sets.

(no generic conclusions were stated in this workshop, due to time pressure and a large bandwidth of topics)

Workshop 4:

EARTH OBSERVATION IN THE ATLANTIC OCEAN AND COASTS: FROM DEEP SEA TO OUTER SPACE

Developing tools for informed policy making, business development and citizen participation

Coordinator:
João Lorenzetti, INPE, Brazil

Presenters:
Nuno Catarino, Deimos, Portugal – Atlantic GEOSS
Francisco Vilhena, Tekever, Portugal - Building the AIR Centre from the Industry
Julio Pimenta Lima, INMG, Cape Verde
Eduardo Pereira & Tiago Miranda, IB-S, Portugal – IB-S initiatives in Oceanic Systems and Adaptation to Global Changes

Rapporteur:
Samy Djadvinia, Geo Blue Planet, Italy

Highlights:

The AIR_DataNET will act as the AIR Centre data foundry, enabling the fulfilment 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 Area. 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 and 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. The AIR_DataNET will host other initiatives such as Atlantic Data Cube, which will provide analysisready multidimensional data sets for user-oriented ocean / land services and applications that will transform the use of satellite data and in-situ observations. The Atlantic Data Cube will be the first one with ingestion of ocean data, increasing complexity significantly since 3D data will be indexed to multitemporal series.

Three other data-intensive projects were also discussed. 1) The Atlantic GEOSS will be part of the Global Earth Observation System of Systems (GEOSS). It will bring together all of the Earth observation resources available in Atlantic region so that they can be used more effectively and become the main data gateway for the Atlantic Ocean and coastal areas, with strong focus on the Sustainable Development Goals. 2) It was suggested that the AIR Centre could build an on-demand circulation forecast system for user-selected sections of the Atlantic coast and maintaining them running operationally for the timeframe defined by the user. This daily service generates forecasts of several indicators, such as water levels, 2D velocities and wave parameters over the spatial region of interest for periods of 72 hours, based on numerical simulations of all relevant physical processes. 3) Another interesting proposal is the federation of biodiversity collections data of the Atlantic Ocean region, such as SpeciesLink from Brazil and iDigBio from the University of Florida and provide a portal access to biodiversity data in a cloud computing environment addressing key environmental and economic challenges.

Conclusions:

Validation and calibration of the data sets are considered a possible (very important) role for the AIR Centre that should promote the integrations, or at least the interoperability, of existing data sets. There is a pressing need to develop use cases that would show how can these data infrastructures for the benefits of society.

Comments and Final Conclusions from Co-Chairs

Co-chairs:

- Paulo Ferrão, Portuguese Foundation for Science and Technology, Portugal
- Juan María Vázquez, Secretary General for Science and Innovation, Spain
- Cecil Masoka, Director, Multilateral Cooperation, Department of Science and Technology, South Africa

Conclusions:

The Sustainable Development Goals must be taken seriously, otherwise the AIR Centre would do better making explicit that the SDG are not included focus.

Two very important Quick Wins were identified and should be immediately implemented:

1. Workgroup on Capacity Building – and a programme for funding mobility of researchers in the Atlantic area. The work group on capacity building should present an immediate working plan that would encompass all societal benefit areas identified.

2. Research Mobility Programme – provide the necessary conditions, including funding, for international mobility of researchers starting new partnerships or extending existing partnerships for the development of projects and initiatives related to the AIR Centre scientific agenda.

When discussing user needs, it must be clear if we are discussing intermediate or end user, since their needs do not necessarily coincide.

All of the AIR Centre stakeholders need to work together to develop effective scientific networks that bring clear benefits for the society.

3.4.

LIST OF PARTICIPANTS

ANGOLA

António Alcochete - Ministry of Science and Technology (MINCT)

Domingos da Silva Neto - Ministry of Science and Technology (MINCT)

BRAZIL

Alexander Turra - University of São Paulo

Andrei Polejack - Ministry of Science, Technology, Innovation and Communication (MCTIC)

Augusto Gadelha - National Laboratory of Scientific Computing (LNCC)

Bruno Miranda Zetula - Embassy of Brazil in Praia

Carlos Matsumoto - Ministry of Science, Technology, Innovation and Communication (MCTIC)

Felipe Fortuna - Ministry of Science, Technology, Innovation and Communication (MCTIC)

Gilberto Kassab - Ministry of Science, Technology, Innovation and Communication (MCTIC)

João Carlos de Araújo Leitão - Embassy of Brazil in Praia

João Lorenzetti - National Institute of Space Research (INPE)

Julio Pellegrini - ProOceano

Luis Fernando Machado - Ministry of Foreign Affairs

Luiz de Freitas Assad - LAMCE/COPPE/RJ

Luiz Landau - COPPE/RJ

Marcos Sinval - Ministry of Science, Technology, Innovation and Communication (MCTIC)

Maurício Martins do Carmo - Embassy of Brazil in Praia

Ricardo Galvão - National Institute of Space Research (INPE)

Samuel Façanha – State University of Ceará (UECE)

Wilsa Atella - AMBIDADOS

CAPE VERDE

Amadeu Cruz - Ministry of Education

Aquilino Varela - Ministry of Education

Carina Fernandes

Carlos Ferreira Santos - Mindelo Oceanographic Center (OSCM) / GEOMAR

Corrine Almeida – University of Cape Verde (UNICV)

Ester Brito - National Institute of Meteorology and Geophysics

Ineida Baptista - National Institute of Land Management

José Gonçalves - Ministry of Maritime Economy

José Pimenta Lima - National Institute of Meteorology and Geophysics

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Olinto Daio – Ministry of Education, Culture, Science and Communication

André Ferdinand Ngueho - Ministry of Education, Culture, Science and Communications (MECC)

SENEGAL

Loubna Bourkane – African Development Bank (AfDB)

SOUTH AFRICA

Cecil Masoka – Multicultural Cooperation at the Department of Science and Technology (DST), National Government of South Africa

Nicole du Plessis – National Research Foundation (NRF) - South Africa (SAMREF
- South African Marine Research and Exploration Forum)

SPAIN

Alberto de Pedro Crespo – GMV Portugal

Antonio Palazuelos – United Nations

Benjamin Sanchez Gimeno – Ministry of Economy, Industry and Competitiveness (MINECO)

Carlos Castaño - Center for the Development of Industrial Technology (CDTI)

Jorge del Rio Vera – United Nations Office for Outer Space Affairs (UNOOSA)

Jose Joaquin Hernandez-Brito - Oceanic Platform of the Canary Islands (PLOCAN)

Josep Pelegri – Institute of Marine Sciences, Spanish National Research Council (CSIC)

Josep Martorell – Barcelona Supercomputing Center (BSC)

Juan Carlos Cortez – Center for the Development of Industrial Technology (CDTI)

Juan Maria Vazquez Rojas – Secretary General of Science and Innovation

Pablo Abaunza Martínez - Spanish Institute of Oceanography (IEO)

Pedro Joaquin Belchí - Spanish Institute of Oceanography (IEO)

UNITED KINGDOM

Michael Lawrence – Deimos Space UK

Nicholas Veck – Catapult

Susan Barr – International Arctic Science Committee

UNITED STATES OF AMERICA

Amelia Runuyon – U.S. Embassy - Praia

Carla Brigham - U.S. Embassy – Praia

Douglas Hart – MIT

Gregory Jenkins – Pennsylvania State University

Jerry Miller – Science for Decisions

José Fortes – University of Florida

3.5.


ATLANTIC
INTERACTIONS
CABO
VERDE


ATLANTIC
INTERACTIONS
GOVERNO DE
CABO
VERDE
3rd High Level Industry-Science
Dialogue


ATLANTIC
INTERACTIONS


What are forecast services?
Roadmap for setting-up a forecast system

3.5.

AIR CENTRE

ATLANTIC INTERNATIONAL RESEARCH CENTRE

PRAIA DECLARATION

Establishing the
ATLANTIC INTERNATIONAL RESEARCH CENTRE
(AIR CENTRE)

Praia, Cabo Verde,

7 - 8 May 2018

The signatories met at the "Third High-level Industry-Science-Government Dialogue on Atlantic Interactions", held in Praia, Cabo Verde, 7-8 May 2018, and, making use of the terms and common understanding described below,

Following 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" aiming to promote an 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,

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Confirming the commitment reached in the "Second High-level Industry-Science-Government Dialogue on Atlantic Interactions", held in in Florianopolis, Brazil, 20-21 November 2017, regarding the establishment of the AIR Centre - Atlantic International Research Centre, as an internationally distributed scientific organization across Atlantic countries, in association with scientific and research organizations worldwide, to be established in a stepwise process,

Hereby,

1. Note, with appreciation, all the progress achieved in establishing the AIR Centre, namely the contributions to a R&D agenda on *"Atlantic Interactions"*, including an outline of the Scientific Program and the preliminary identification of the first technical initiatives of the AIR Centre.

2. Congratulate the establishment of the non-profit association to promote the *AIR Centre* (Associação para o Desenvolvimento do AIR Centre – AD AIR Centre), registered in Portugal, to develop the initial activities and provide, promote and foster the basis of a truly international scientific agenda, organization and workforce throughout the Atlantic and across the Globe.

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3. Recognize the need, and appreciate the initial work that has been done, to launch a *Scientific Program* of the AIR Centre promoting an integrative approach to space, climate change and energy, earth and ocean science in the Atlantic, fostered by emerging methods of data science.

4. Recommend the continuation of the efforts to establish the *Scientific Program* in close cooperation with all appropriate parts.

5. Recognize the relevance of the following topics for their potential inclusion in the Scientific Program, without prejudicing their re-formulation or the inclusion of other pertinent topics to be identified:
   a) Marine Resources and Biodiversity: Promote Sustainable Fisheries, aquaculture and ecosystem valorization;
   b) Healthy and Clean Ocean: Protection of related marine and coastal ecosystems to avoid significant adverse impacts;
   c) Systems integration from outer space to Deep Ocean. Observing, modelling and monitoring oceans and coastal areas for a better management of the Atlantic resources, plus the development, integration, transfer technologies 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, were applicable;
   e) Sustainable Energy Systems: including but not limited to marine renewable energy technologies development, global energy interconnections and the use of renewable energy sources;

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f) Data science, artificial intelligence and learning systems for ocean, atmosphere dynamics and climate issues: matching data producers and user needs.

6. Recognize the need to launch a *Cross-cutting Work Plan* of initiatives to support the development of the *Scientific Program* of the AIR Centre and actions to strength the scientific culture and awareness with the relevant partners in the areas of space, ocean and sustainability, appreciate the initial work that has been undertaken with this purpose and recommend its further development in close cooperation with all relevant parts, to be approved in the 4th High-Level Meeting in the Canary Islands in November 2018, and aligned with the United Nations' Sustainable Development Goals (SDGs) the Belem Statement, among others. They can include:

   a. Developing coordinated actions to implement common standards for data sharing, using existing supranational e-infrastructures to test them;

   b. Defining Transatlantic alliances of clusters, coastal cities, infrastructures, and research centres to provide solutions for coastal regions and cities of the South Atlantic Ocean in mitigating carbon emissions, adapting to the challenges of climate change, creating jobs, and promoting blue economy;

   c. Sharing 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;

   e. Promoting citizen's awareness and ocean literacy by fostering education and knowledge aimed to promote "Knowledge for Space" and its integration with ocean, earth and climate education in a holistic approach.

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7. Acknowledge the importance of women in Science and Technology, namely their increasing role in scientific leadership and recommend that the execution of the Scientific Program of the AIR Centre can also consider equal opportunities for women.

8. Agree to join efforts in identifying and setting-up a coherent effort of national and international Science &Technology (S&T) funding agencies to jointly open calls to fund projects within the scope of the *Scientific Program* and *Cross-cutting Work Plan*, to be presented and discussed in November 2018.

9. Acknowledge that mobility of human resources is a privileged mechanism to foster common projects within the scope of AIR Centre's *Scientific Program* and therefore it should be included in its *Cross-cutting Work Plan* to facilitate mobility of researchers and students to enhance networking and achieve a high level of undertaking.

10. Acknowledge and support that the AIR Centre should be installed in the form of an international distributed scientific organization, comprising an international network of science, technology and innovation across the Atlantic, in association with other scientific and research organizations worldwide, to be further developed in coming years;

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11. Give note that the next High-Level Meeting will be held in the Las Palmas, Canary Islands, in 26-27 November 2018.

Praia, May 7, 2018,

The signatories, '

Domingos da Silva Neto, Secretary of State for Higher Education, Science, Technology and Innovation, Angola

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

Maritza Rosabal Peña, Minister of Education, Family and Social Inclusion, Cape Verde

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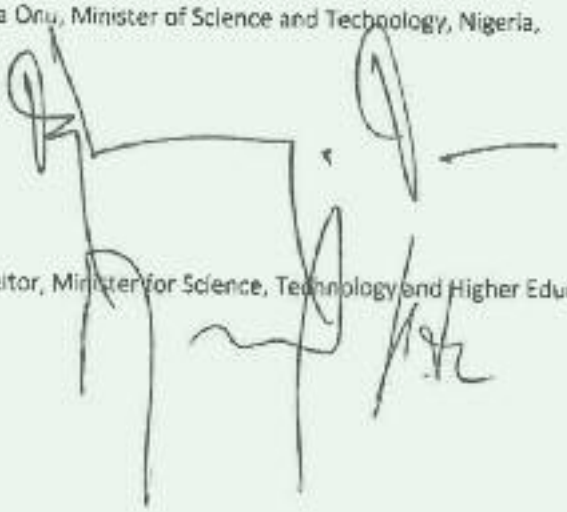
Ogbonnaya Onu, Minister of Science and Technology, Nigeria,



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

Olinto Daio, Minister for Education, Culture and Science and Communications, São Tomé and Principe, represented by Gloria do Rosário, General Director of Higher Education

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

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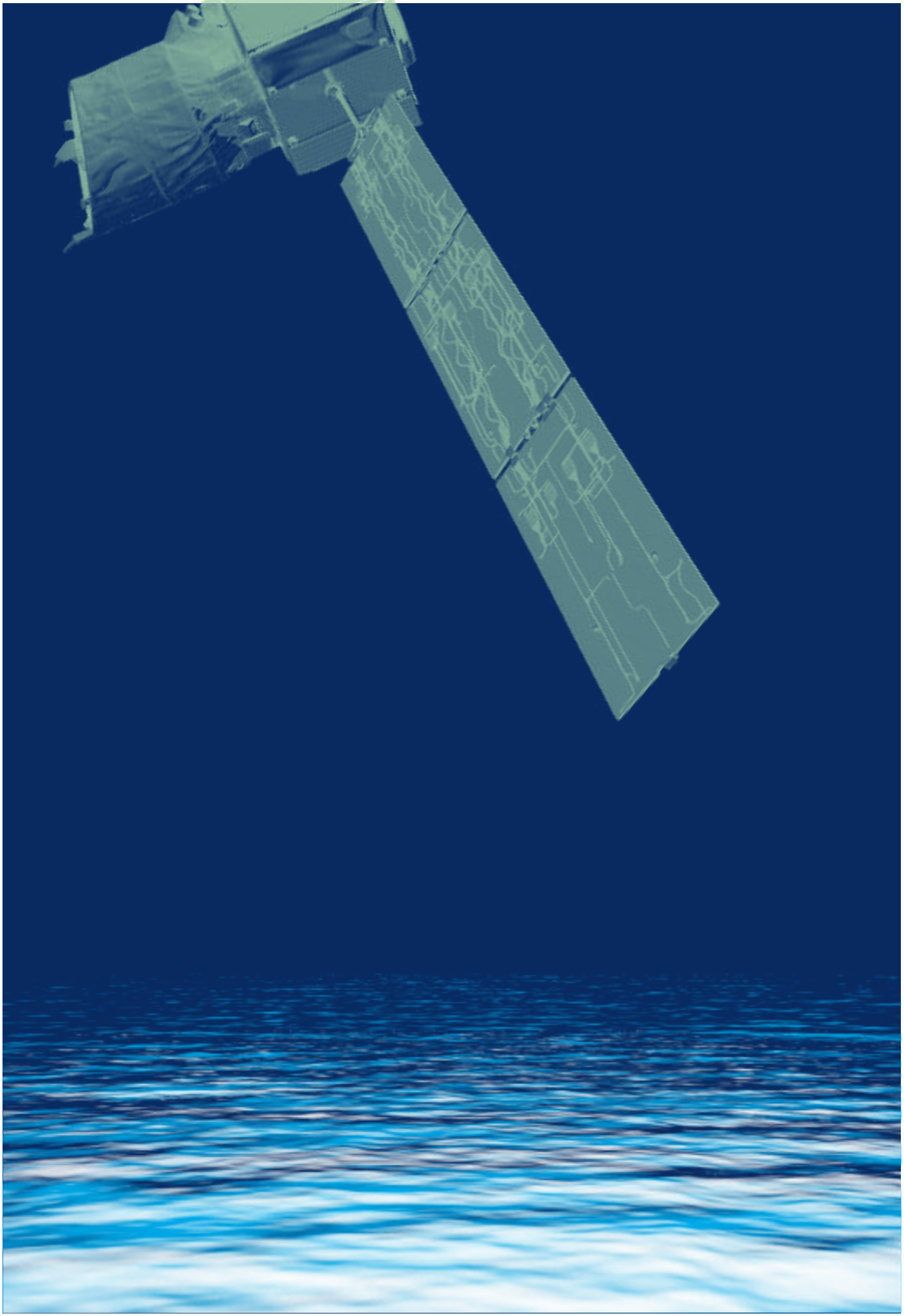
Gui Menezes, Azores Regional Secretary for Sea, Science and Technology, Regional Government of Azores

With the endorsement of South Africa, represented by

Cecil Masoka, Department of Science and Technology of South Africa



#4

EVOLUTION OF AIR CENTRE'S SCIENTIFIC & TECHNOLOGICAL AGENDA

STATUS UPDATE OF THE WORKING GROUPS AND VISION PAPERS

Frank Neumann
AIR Centre

The basis for the Scientific Agenda of AIR Centre had been created by the elaboration of the White Paper of the Atlantic Interactions: "A Science and Technology Agenda for an integrative approach to the Atlantic: Integrating Space, Climate, Oceans and Data Sciences through North-South / South-North Cooperation. Towards the Atlantic International Research Center (AIR Center)".

With the signature of the Praia Declaration in May 2018, it was decided to re-formulate the process for the scientific program of the AIR Centre to a more evolutive and hands-on process, identifying six initial focus areas called 'Societal Benefit Areas (SBA)', for which expert work groups are formed. Each work group elaborates initial Vision Papers, which are then discussed in a wider audience and updated on a regular basis. As a consequence, the White Paper is archived – after a final revision including comments until April 2018 – and serves as generic foundation for the scientific program hereafter.

The establishment of the initial work groups for the vision papers, the status of work and first findings to be discussed and extended in Las Palmas are presented in the following.

Visions on integrating Space, Ocean, Climate Change, Energy and Data Science

• The AIR Centre Implementation Team, the AIR Centre Executive Committee and several partners have common baseline for AIR Centre activities, where the following features were identified as essential:

• Alignment with / contributing to UN Sustainable Development Goals (SDGs)

• Integration of different thematic areas

• Replicable (in particular over a wide geographic range)

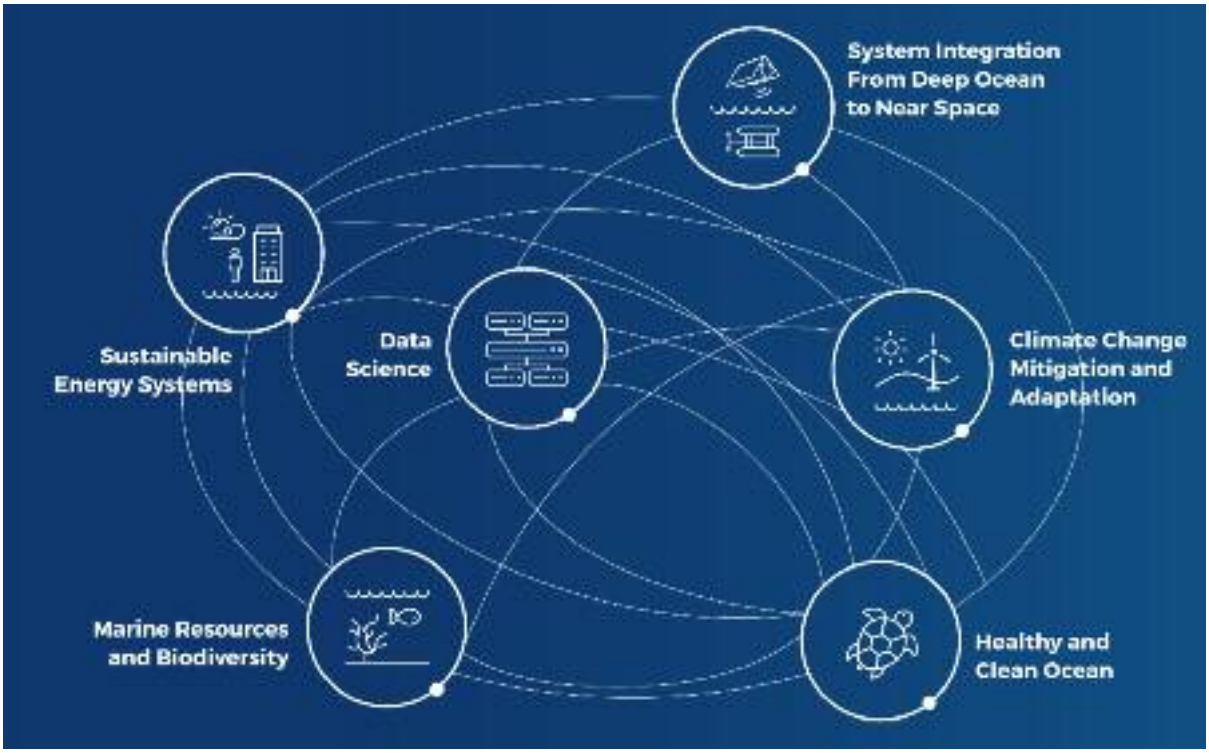
• Scalable (to create economic value in the region)

• Creating value for the AIR Centre

The over-arching ambition of AIR Centre is to work for the benefit of the people of the Atlantic by addressing challenges that are common to different regions or countries.

The work groups correspond initially to the 6 Societal Benefit Areas (SBAs) contained in the Praia Declaration, and for the first draft of Vision Papers a limited number of international experts, including one work group coordinator, were requested to identify topics with potential high value added by the AIR Centre. In the setup phase, each coordinator is supported by one member of the AIR Centre Implementation Team serving as moderator, ensuring the articulation with AIR Centre and as group secretary.

In addition to the 6 thematic work groups, there were invited two initial work groups for the cross-cutting issues **Atlantic Research & Observation Infrastructures** and **Knowledge for All**. Following the discussions in Las Palmas, it will be decided to integrate these topics horizontally into the thematic areas, or to maintain dedicated work groups.



The 6 Societal Benefit Areas (SBAs) for initial work stream focus of AIR Centre, as defined by the Praia Declaration. In addition, focus is on the cross-cutting work streams Atlantic Research & Observation Infrastructures and Knowledge for All.

In the following, a status outline for each of the 8 presently existing work groups is presented. Draft Vision Papers are elaborated for presentation and discussion at the Las Palmas meeting. Once the first version of the Vision Papers has undergone this step, and the full set of reviewed versions is elaborated, it will be published as starting point for AIR Centre taking up its full operation in 2019.

The exact name and content of the work groups for the SBAs and the cross-cutting areas presented in the following may change in the initial Vision Papers, to be published after the Las Palmas meeting.

Marine Resources & Biodiversity

Work group core members:
Nicole du Plessis (SAEON, South Africa), Coordinator
Frank Neumann (AIR Centre), moderator/group secretary;
Arne Fredheim (Sintef Ocean, Norway)
Isabel Sousa Pinto (Ciimar, Portugal)
Mauro Pavão (Federal University of Rio de Janeiro UFRJ, Brazil)
Jesús Miguel Santamaría Ulecia (LifeWatch ERIC, International Organisation)

Common agreement has been that the focus of this SBA will be to identify projects and programmes for the ethical use of living and non-living marine resources with a focus on new applications and innovations for the sustainable economic development of countries of the Atlantic Ocean Region.

Within the field of **Biodiversity**, AIR Centre can make a difference by mapping/ identifying the genetic resources of the Atlantic Ocean, focus on Ecologically or Biologically Significant Marine Areas (EBSAs), Ecosystem Services, functions and their valuation. Articulation with the two other SBAs “Clean & Healthy Oceans” and “Mitigation and Adaptation to Climate change” is required, in particular for aspects like benthic organisms as bio-indicators of anthropogenic impacts, understanding dispersion vectors in the marine systems, and surveillance and early warning systems for invasive/ exotic marine species.

For the field of **Sustainable/ Responsible** fisheries, the need for an expert was identified. Despite common agreement of the relevance of this field, only superficial work streams, e.g. best practice, technology and skills transfer, as well as business development were identified. The latter could e.g. focus on tools for fisheries: ocean observing systems, modelling, apps for small scale fisheries.

Expansion in **Aquaculture** production capacity was identified as highly relevant, especially the aspect of increasing offshore activities, bringing along opportunities and challenges, including technology and operational practices for open ocean farming, development of commercial-scale less labour-intensive farming operations for non-fed aquaculture (e.g. shellfish, seaweed), new low-impact omega 3 rich feed resources for fin fish farming, Integrated Multi-Trophic Aquaculture (IMTA) practices, and development of international legal framework for ocean and marine activities.

In the field of **'Blue Biotechnology'**, significant economic potential is expected in the near future, as this is a relatively recent area. In particular the discovery of natural molecules with potential biological interest and marine organisms is a large unexploited source of potential pharmaceuticals (Marine Biomedicine). Multidisciplinary and multi-institutional partnerships for clinical and non-clinical studies, joint-purpose cultivation of low-trophic species, and marine biofuels, including their potential for carbon capture and storage appear interesting.

For the rising topic of **Deep Sea Mineral Resources,** AIR Centre may be well placed to establish industry platforms to collect non-commercial marine data and a more holistic approach to business-academic collaboration.

Healthy & Clean Ocean

Work group core members:
Ramiro Neves (MARETEC, Portugal); Coordinator
José Luiz Moutinho (AIR Centre), moderator/group secretary;
Victor Martinez-Vicente (Plymouth Marine Laboratory, United Kingdom)
Christopher Pham (Azores University UAc, Portugal)

Oceans' Health is a matter of concern. Among other known threats, 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. Plastic pollution exhibits a global distribution and microplastics, particles of plastic smaller than 5 mm, have been detected in all levels of the marine ecosystems and food chains. Microplastics may also transport non-indigenous marine species, negatively impacting marine biodiversity and act as a vector of toxic pollutants in the food chain, with potentially severe health implications.

A mission-oriented approach to plastic pollution in the oceans is a good example of how the AIR Centre works (mission-oriented refers to the logic of setting EU-level research and innovation missions with very ambitious but concrete goals). It is proactively engaging researchers to produce a comprehensive mapping of the sources, distribution and fate of plastics in the Atlantic Ocean, building consensus around methodologies for collection and identification, combining satellite imagery and aerial, in-situ and ex-situ observations, and integrating data using advanced numerical models to assess, monitor, predict and inform about the circulation patterns, deposition cycles and impacts of plastics in marine and coastal environments. Among the different lines of action will be Science, Technology and Engineering, Public Policies and Outreach.

Ocean Health is not limited to Plastic pollution, however in the initial phase the "Healthy & Clean Ocean Mission" is priority, and a first draft is presented and discussed in the Las Palmas event, as part of the Vision Paper publications to be release as a result. This SBA comprises topics that are also highlighted in the "Marine Resources" SBA (e.g. dispersion vectors of pollutants), and relevant to "Mitigation and Adaptation to Climate change" (e.g. ocean acidification and its consequences), which is why articulation is required to enable adequate interfaces between the working groups.

From Space to Deep Ocean: Technology for observation and data integration

Work group core members:
Samy Djavidnia (GEO Blue Planet, International Organisation), Coordinator
José Luiz Moutinho (AIR Centre), moderator/group secretary;
Stewart Bernard (Council for Scientific and Industrial Research CSIR, South Africa)
João Tasso (Porto University Engineering Faculty FEUP, Portugal)

The Atlantic Ocean countries need to be ready to take complete advantage of the prolific amount of Earth observation data that is available from multiple satellite missions as well as other observational platforms, and convert them efficiently into services that can support decision-making for end users, such as policy makers, industry, researchers, and citizens. Within this context, how can Earth Observation (EO) support sustainable development in the Atlantic region…and what is the role of the AIR Centre?

Recognising that Earth observations are a means to an end, the AIR Centre acknowledges that there are many **existing long lasting national and international organisations and programmes** aimed at developing Earth observation capacity. The AIR Centre is set to work with and along all of these initiatives and will not replace nor duplicate the existing efforts.

In fact, the AIR Centre is ideally positioned to enable a process whereby the needs in terms of data, information and services of the Atlantic Ocean countries are identified and deployed. These requirements can be of local, national or regional scales and can stretch between many different sectors of society encompassing global challenges and national priorities. The AIR Centre therefore aims to set-up a collaborative framework to identify, consolidate, sustain, stimulate, promote and build capacity for:

- Existing EO based services of use for Atlantic Ocean countries;
- New EO based services which can be implemented from existing EO data;
- Future EO based services to be developed with novel EO datasets and platforms;
- When implementing the EO based services, the AIR Centre will adhere to the following set of guiding principles:
    - o Design with the user and understand the ecosystem;
    - o Design for scale, build for sustainability;
    - o Be data driven, and adopt open data, standards and innovation solutions;
    - o Reuse and improve, be collaborative.

The AIR Centre's comprehensive approach to Earth observation will therefore include:

- Partnering with global/regional actors and participating in networks;
- Understanding user needs;
- Supporting the integration of satellite imagery, in-situ and ex-situ observation data through assimilative, predictive numerical models;
- Stimulating new sensing technologies and methods;
- Fostering cutting-edge data science: artificial intelligence, deep learning;
- Deploying new satellite constellations;
- Promoting capacity and institution building;
- Deploying new services and products;
- Disseminating useful information.

Mitigation & Adaptation Climate Change & Natural Hazards

Work group core members:
Gregory Jenkins (PennState/AESEDA, USA), Coordinator;
Frank Neumann (AIR Centre), moderator/group secretary;
Joana Portugal Pereira (IPCC / Imperial College, United Kingdom)
José Luís Muñoz (KIC Climate Change, Spain)
Ester Brito (Instituto Hidrografico, Cape Verde)

It has been agreed that AIR Centre may play an important role in lessening negative impacts of anthropogenic climate change through the sharing of knowledge, promoting innovation and building capacity especially in low-income countries. In addition, AIR Centre may be well positioned to work – in coordination with other international organisations – towards large-scale mitigation measures of climate change.

Making increased use of **Earth Observations and low-cost in situ measurements** for monitoring Anthropogenic Climate Change effects on short and longer timescales is a priority for good decision-making and policy strategies, with a particular need in West Africa and small island states, where also capacity building should be a focus. Flexible and open-source **Risk Management and Assessment tools** can play an important role for the helping decision-makers limiting potential damage from increasing natural hazards in coastal cities and towns.

The **vulnerability of Small Island States (SIS)** to natural hazards is also expected to increase further, with respect to rising sea level and reduced biodiversity from acidification and warming temperatures. Limited freshwater resources in many SIS and

significant reductions in fish catch over the next few decades in the tropical zone are further near-future challenges. AIR Centre can play a role in facilitating monitoring natural hazards, rising sea level, off shore energy resources, smart agricultural practices, desalination, innovative food security measures Innovation through Aquaculture, Aquaponics, and diversifying economic opportunities. Some of these actions have an interface to the SBAs "Marine Resources" and "Sustainable Energy", which calls for articulation between the work groups. Improved Earth Observations, prediction and coastal warning systems also provide small and commercial fishermen and ship transport in this context a means of being safe while avoiding economic losses through proper planning. AIR Centre can help foster innovation through entrepreneurial training, models for financing, capacity building and sustainable fishing practices.

Several other areas of intervention relevant to this SBA have been brought up but not yet discussed in detail, and are included as further sub-topics in the initial structure proposed for the work group themes:

(i) **Sustainable Urban Development** (main focus in Water & energy resources and buildings), transforming urban environments into decarbonised and climate-resilient cities;

(ii) **Industrial Ecology** – Circular economy (main focus in waste, resource consumption, raw materials and new climate-friendly products), transforming cities & territories into carbon-neutral economies;

(iii) **Sustainable Rural Development** (main focus in agriculture, food, water, forestry and land use);

(iv) **Sustainable Marine & Ocean Development** (main focus in fishery resources, maritime transport, climate risks).

While the above discussion focuses on Climate Change Adaptation in low-income regions, a medium-long term challenge to be addressed in the context of AIR Centre is also to halt and revert the steady increase of CO2 in the atmosphere. The most obvious measures include 'active' **Carbon Dioxide Removal (CDRs)** measures, for which a range of land-based solutions have gained increasing attention, including direct air capture. Of particular relevance for AIR Centre could be the concept of 'seaforestation', a concept similar to A/reforestation on land, which envisages the plantation of large Kelp forests or Mangroves/aquatic plants. This has a strong link to the recommendations in the "Marine Resource" SBA. Other measures like ocean fertilisation and ocean-based solar radiation management could be interesting future options but require further research.

Sustainable Energy Systems & Global Energy Interconnections

Work group core members:
Ana Brito e Melo (OES-IA, International Organisation), Coordinator
Frank Neumann (AIR Centre), moderator/group secretary;
Thembakazi Mali (SANEDI, SA)
João Peças Lopes (INESC TEC, PT)
Antoni Martinez Iberia (KIC InnoEnergy, Iberia, EU)

The significance of a global transition towards a new, sustainable energy system has been widely discussed, and gains particular relevance in connection to greenhouse gas reduction and climate change mitigation (see SBA "Climate Change"). The main challenges to achieve such a transition in the Atlantic area are (i) Technology development, (ii) Transmission and storage infrastructure, (iii) Access to sustainable energy in low-income countries.

The latter is a challenge of particular relevance to AIR Centre due to its potential to enable a wide implementation of renewable energy in low-income regions and Small Island States (SIS), which is vital for a global shift towards prioritizing renewable energy. In addition to the need of further reduction of technology costs, a key is **Microgrids design**, implementation and management in islands and isolated areas, including energy storage. A favourable factor for this development is the high conventional energy cost in SIS/remote areas as a result from the use of conventional (fossil) generation to feed the local electricity consumption. Key is the learning process to develop innovative and efficient solutions, the achievement of real knowledge transfer, and their speed of deployment in different regions, including desalination (energy and water, storage), electricity and heat storage, communication and control architectures for system control and specific grid codes with technical requirements for the new generation facilities. Business models, in particular for isolated areas, community involvement and remuneration schemes for renewable generation and specific ancillary services are horizontal measures to enable innovation.

To increase substantially the share of **Marine Renewable Energy** in the large-scale generation system is an obvious priority in the scope of the Atlantic countries. While for **Ocean Energy** (e.g. wave & tidal), there are still mainly technological and economic obstacles for a wider implementation, the establishment of Offshore Wind has reached a significant level. For a further growth into deeper waters and a wider geographic distribution, the path to full commercialization of **Floating Offshore Wind** has to be addressed. In particular large islands are suitable for the development of floating offshore wind, being the

main challenge the interconnection with the local grid; how to manage the balance between the load and the generation with high penetration of variable renewable generation. In addition to Norway and Portugal, also Brazil and Spain (Canary Islands) have given clear indications of their offshore wind ambitions, which is why wind and ocean measurements, specialized education/capacity building, institutional relationship, and study of interconnections will be important contributions to the development in the short term.

The most cost-intensive and structural challenge to a fully renewable energy powered society are the **transmission grid infrastructure and storage issues**, due to the fluctuation of the resources and limited ability to control online generation capacity. While a number of technical improvements in the fields of storage and network control are part of the solution, a radical change in the large-scale transmission system is required, which has shown in various visions over the last decades about a marine "Supergrid" as backbone for Marine Renewable development. The recent Chinese initiative towards connecting the world through Ultra-High Voltage DC Power Grid (UHVDC) aims at smoothing 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 technology for onshore UHVDC lines is mature with several lines already in operation in China, being the longest more than 3000km. Though very ambitious and rather a long-term target for implementation, such connections could substantially change the energy paradigma in the Atlantic, which is why initial research on topics like the following appears indicated: impact on future energy systems and societies, possible routing, synergies with underwater mining, marine renewable energy production, electrical shipping, deep water energy storage and ocean observation, additional technology needs to enable synergies, need for offshore electrical infrastructures and grid configurations, connection to local AC grids and ancillary services, required functionalities for management and communication.

An activity that has not yet been discussed in detail but could have relevance for the acceleration of Marine Renewables implementation and other innovative energy concepts in the Atlantic is the lifetime extension of existing platforms for multi-purpose space use. The sheer number of existing platforms being at or near their end of service life has large potential for synergies, including the vision for P2G (power to gas) in connection to offshore renewable generation and storage, refinery and distribution.

Data Science for the Atlantic ocean, coasts, biodiversity and societies

Work group core members:
Rui Oliveira (INESC-TEC, Portugal), Coordinator
José Luiz Moutinho (AIR Centre), moderator/group secretary;
Josep Martorell (Barcelona Super Computer Centre BSC-CNS, Spain)
Luiz Landau (LAMCE, UFRJ, Brazil)

Data Science (DS) has a growing importance in the world and is critical to many areas of human activity today. On one hand, the huge amounts of collected data and the ubiquity of devices with sensors and/or processing power offer opportunities and challenges to scientists and engineers. On the other hand, rising demand of complex models for objective decision support is spreading in industry, energy, health, science, media, agriculture, e-government and e-learning, reinforcing the need for different approaches to model and understand data.

The overall objective of DS is to take advantage of the present data flood, data diversification, advanced algorithms such as deep learning, and innovative visualisation interfaces in order to develop research lines that will shorten the gap between collected and useful data, as well as offering easy-to-use modelling solutions to users, allowing them to extract crucial knowledge from such data. The most important consideration in the development of DS within the context of the AIR Centre is, arguably, to ensure that it benefits humanity, which includes being both "human-friendly" and "Earth-friendly", focusing on tackling key global challenges and national priorities through All- Atlantic joint actions. Some examples of how Data Science is expected to support the activities of the other 5 SBAs are:

Marine Resources and Biodiversity: e.g. monitoring and prevention of overfishing; thresholds for fish catching and feedback to fishermen concerning ecosystems; optimisation of food value chains and origin tracking; water quality and supply; adaptive aquaculture management with the ability to simulate the growth of species; precise monitoring and analysis of ecosystems and habitat loss; species migration patterns and monitoring of important changes, e.g. marine dead zones.

Clean and Healthy Oceans: e.g. the ability to track and predict the dispersal of pollutants, in particular marine litter and microplastics; real-time monitoring and management of water supplies and the understanding of current, the recognition of patterns concerning transports, and the overall monitoring of ocean pollution levels.

System integration - From space to deep ocean: e.g. increased availability of low-cost sensor devices and satellite systems, enabling the monitoring and control of large remote areas; micro and nanodevices adapted to extreme environments delivering potentially vast amounts of data.

Mitigation and adaptation to Climate Change: e.g. accurate weather & climate modelling systems (focus on extreme events); high-resolution route planning for air and sea transport; early detection of changes in ocean acidity and pollution levels, and backtracking to causes (requiring data collection and processing on ocean scale); predictive and analytic models for exogenous and/or invasive species.

Sustainable Energy: e.g. data-driven condition monitoring (e.g. alarm processing, health index) and self-learning and distributed algorithms for predictive maintenance; large amounts of data from weather and swell for operational monitoring; fine-tuned prediction models including grid behaviour; self-learning and distributed algorithms and decision-aid methodologies.

The availability of open-source platforms, with the objective of providing the necessary data to obtain useful information from oceans and out-space, is of great interest to benefit decision-makers, researchers, companies and the society in general.

AIR Centre's flagship initiative related to this SBA is the AIR_DataNet (Air Centre Data Intelligence Network), which was formally established by a Collaboration Agreement for Supercomputing Alliance to service the AIR Centre's activities. The AIR_DataNet is described in more detail in the Projects section.

Atlantic Research & Observation Infrastructures (cross-cutting area that will support the activities in the SBAs)

Work group core members:
Joaquin Brito (PLOCAN, ES), Coordinator;
Marta Casas (AIR Centre), moderator/group secretary;
Juan Miguel González Aranda (LifeWatch ERIC, EU)
Marco Chamon (National Institute for Space Research INPE, BR)
Geilson Loureiro (National Institute for Space Research INPE, BR)
Carlos Ferreira Santos (Ocean Science Center Mindelo OSCM, CV)

Research infrastructures (RIs) provide cutting-age and unprecedently large-scale, costly, complex or specially located instrumentation, serving a scientific community of excellence committed to solve a scientific challenger or enable critical technologies to overcome a socio-economic major challenge of concern at international level (e.g. climatic change, space exploration or the quest for new sources of energy).

The RIs play a major role strengthen national and international collaboration in science and technology, and AIR Centre's success will also depend on its ability to involve and articulate RIs to support the work streams in the SBAs. Particularly relevant aspects are: generation of new collaboration spaces (physical or virtual) to connect RIs with users especially on environmental, food or energy-related infrastructures; dissemination of information (knowledge transfer with focus on Atlantic Area); transnational access and mobility of researchers; interdisciplinary and multisectoral collaboration; creation of synergies between different scientific infrastructures; joint projects or collaborative initiatives to provide new access models; generation of new services or preparation of new potential infrastructures especially relevant for the Atlantic area.

Knowledge for all (cross-cutting area to be implemented across all SBAs)

Work group core members:
Jose Luís Muñoz (EIT Change KIC Spain, ES), Coordinator;
Marta Casas (AIR Centre), moderator/group secretary;
Ana Noronha (Ciência Viva, PT)
Octavio Llinás (PLOCAN, ES)
Ekanem Udoh (Federal Ministry of Science and Technology, NG)
Gameli Magnus Kwaku Adzaho (Global Lab Network/Next Einstein Forum, GH)

Connecting science and citizens through knowledge and expertise is instrumental for addressing AIR Centre's global challenges. Research initiatives are transformed into new products and services, in order to meet opportunities for society, economy and employment in the Atlantic improving the lives of people. Focus of this work stream is to promote:

(i) Cooperation and communication between science, academia, business, public bodies and citizenship - NGOs, in a multilevel perspective in the Atlantic; explore synergies and opportunities with existing national/international strategic initiatives.

(ii) Capacity building of researchers, graduates, professionals and executives with the skills, to empower them for contributing to solving the 'AIR Centre challenges'.

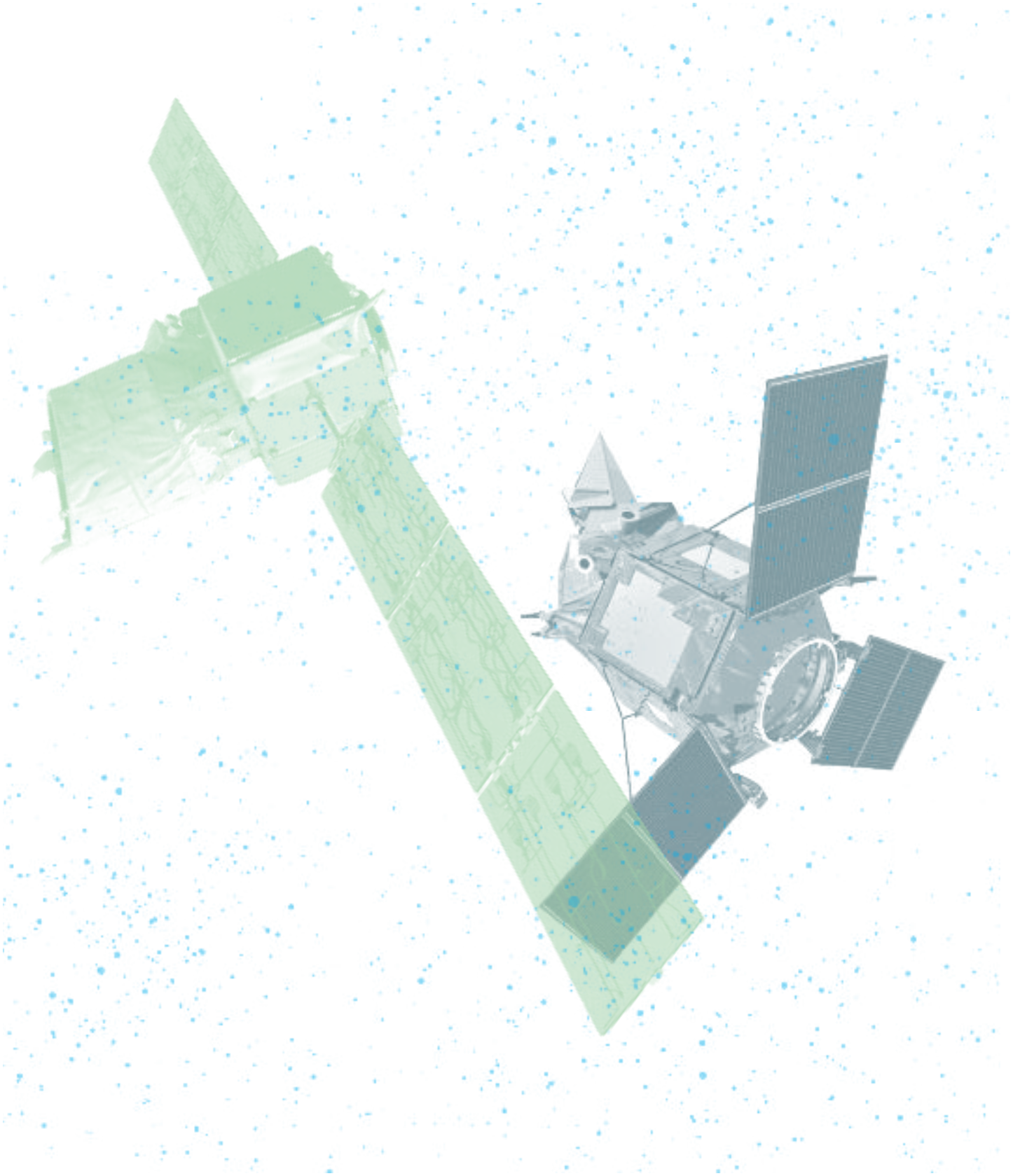
(iii) Entrepreneurship and Business incubation to make profitable research groups and develop sustainable products & services that can create new areas of employment (promotion of innovative ideas/entrepreneurship from research, start-up business and early-stage pilot innovation projects).

(iv) Open innovation and technology transfer. Through Atlantic Pilot projects to accelerate learning and foster collective action in networks of experts and stakeholders.

Four main areas to focus initial efforts have already been identified, namely **research** (research centers, technological institutes and platforms), **education** (from high-schools to graduate students - learning-by-doing concept, competencies like innovation, entrepreneurship, mindset change, …), **professionals** (private and public sector – knowledge transfer, networking, mobility programs to support "out-of-the-box" vision), and **citizens & NGOs** (participative methodologies, innovative workshops - bottom-up approach towards behavior / mindset change).

#5

AIR CENTRE IMPLEMENTATION ACTIVITY AND PROJECTS



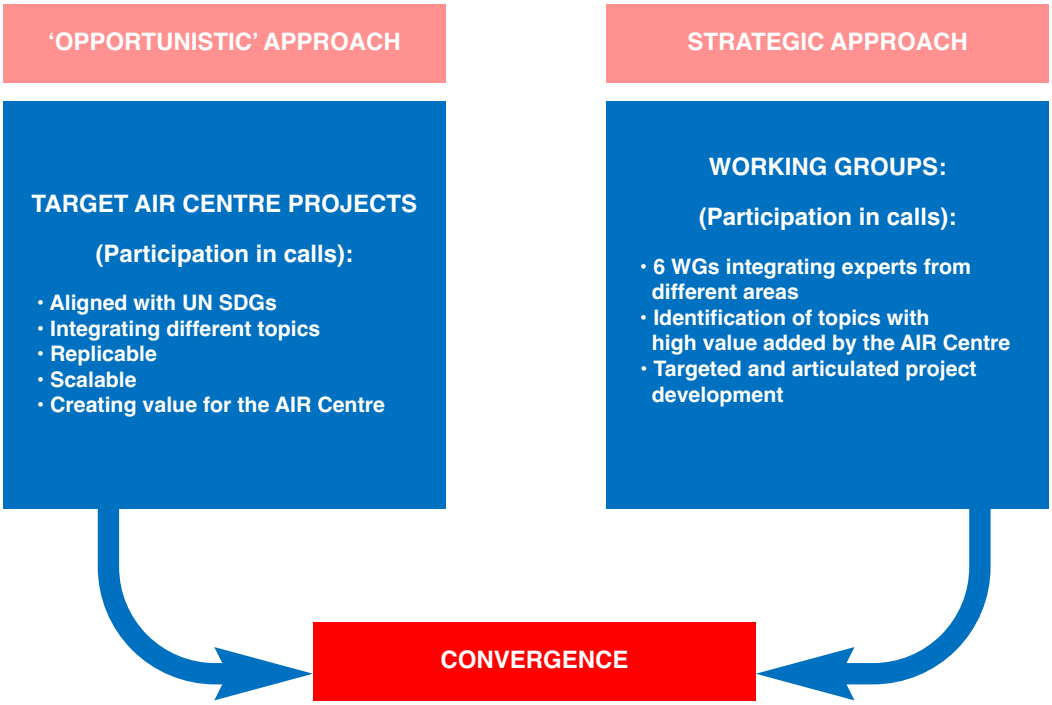
While the first implementation phase until May focused on identifying ‘anchor projects’, mainly ongoing activities with high relevance to the AIR Centre Scientific Agenda, the recent 6-month period focused on the development of dedicated AIR Centre initiatives. Being initially a Portuguese initiative, most of the ‘anchor projects’ originated from dedicated calls of existing transatlantic partnership programs, like e.g. CMU Portugal, UT Austin Portugal, MIT Portugal, as well as other project calls with involvement of FCT. At the same time, other third-party funded R&D projects with leading participation of institutions active in the AIR Centre installation were identified, as a basis for AIR Centre participation in the exploitation of results and position for follow-up activities. This exercise helped establishing first operational connections with relevant players and identifying work streams of interest for AIR Centre in the short term.

In addition, several ideas, proposals and concepts under discussion were presented, also following the debates in the context of the White Paper and former Atlantic Interactions High Level Dialogues. Some of these project leads have evolved into a more concrete shape and are included in the example project descriptions in the following sections. Others have not further developed since then, due to limited resources of the Implementation Team and no sufficient lead from the network partners.

Of the latter, some have not further been followed up, but others remain candidates for near-future efforts, when appropriate consortia and funding sources are identified. Examples for these are the Ocean Accounts concept (following Accounting the Atlantic Ocean and Coastal Ecosystems Services, Development of an integrative framework to be built upon the SEEA Land Account and Ecosystem Accounts) and the MARCHANGE project proposal (Marine Protected Areas and Ecosystem Services in a Changing Atlantic Ocean / Monitoring of Marine and Coastal Protected Areas).

A project instrumental for the positioning of the AIR Centre is the Atlantic Data Cube, which was one of the first project ideas discussed and presented in the former phase. Although it has not yet evolved towards a concrete activity plan, significant advance has been made on how to approach this initiative. For the Atlantic Ocean counties to take the full advantage of the current flood of Earth Observation (EO) data, the AIR Centre identified the urgent need to provide analysis-ready multidimensional data sets, services and products for policy makers, industry, researchers and citizens. As pointed out by Peter Baumann et al. (in “Earth Observation Open Science and Innovation”, Mathieu et al., ISBN 978-3-319-65633-5), EO users want to "'ask any question, any time, on any size', thereby enabling them to 'build their own product on the go'". The AIR Centre is currently gathering the needs of ocean and coastal information to stimulate the development of a Macaronesia+ Data Cube (plus Sao Tome and Principe, and probably other islands in the near future), which would be first step to develop a comprehensive Atlantic Data Cube.

In the present phase, since the Praia event and the existence of the six Societal Benefit Areas (SBAs) defined as the strategic priorities for AIR Centre projects, the approach to project development is dual; on one hand the ‘opportunistic approach’ aiming at involving AIR Centre and its network directly in new collaborative proposals, and on the other hand the ‘strategic approach’ with the gradual development of critical mass for Atlantic-scale AIR Centre flagship projects.



In the strategic approach, six work groups for identifying priority work streams in the thematic SBAs have started elaborating Vision Papers (see chapter 4). These work groups integrate experts from different background within the SBA and will be updated on a regular basis. The expected outcome is to identify promising projects of Atlantic scale, their consortia and realistic funding options.

Within the opportunistic approach, project development integrated in solid consortia for existing calls and/or tenders will play a key role to establish AIR Centre as operational player in the topics of interest. There is a number of projects being discussed or in preparation, including participation in an EC Blue Growth call, as well as preparative consortia-building activities for future calls. Increased focus on setting up new projects with strong involvement of the institutions in the AIR Centre network will be operational priority for the next 1-2 years.

In the following, a choice of projects that originated from this dual approach and have reached a grade of implementation, are presented on an exemplary basis.

5.1.

THE AIR CENTRE DATA INTELLIGENCE NETWORK – AIR_DATANET

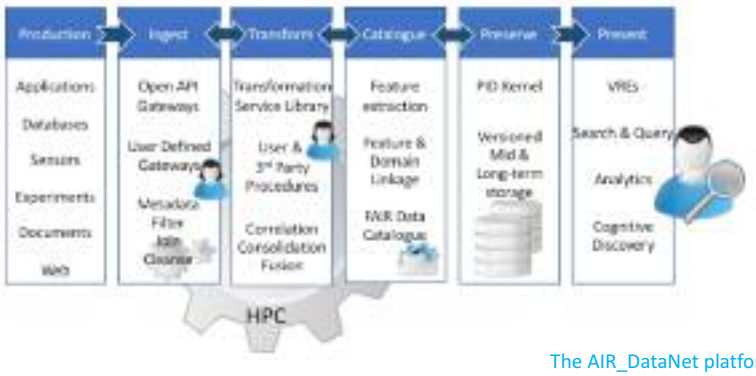
Contact person: **Rui Oliveira,**
Institute for Systems and Computer Engineering, Technology and Science, rui.c.oliveira@inesctec.pt

Objective: The AIR_DataNet will act as the AIR Centre data foundry. It is being designed to manage all sorts of data relevant to the AIR Centre projects (e.g. datasets, source code, publications) duly curated and catalogued. Researchers will be able to in situ query, process, analyse and render presentations enabling the fulfillment of AIR Centre's research mission. These 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:

(1) 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;
(2) to provide a one-stop shop Open Data management facility for storage, processing and retrieval;
(3) to provide state-of-the-art presentation and visualization data services and tools.

Methodology: The implementation of the AIR_DataNet leverages a highly scalable Open Science Cloud node federating storage and processing resources from the MACC (Minho Advanced Computing Centre), BSC (Barcelona Supercomputing Centre) and TACC (Texas Advanced Computing Center). The node will start by creating a FAIR (Accessible, Findable Interoperable and Reusable) Data & Metadata Catalogue of the AIR Centre projects.

Outcomes: The AIR_DataNet will progressively offer a comprehensive state-of-the-art platform to systematize the ingestion, transformation, cataloguing, preservation and presentation of data (Figure 1).



The AIR_DataNet platform.

Consortium: AIR Centre and involving institutions from the respective partner countries. The founding institutions are MACC, Portugal, BSC, Spain and TACC, USA. Other current partners include COPPE (Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia), LNCC (Laboratório Nacional de Computação Científica) and INPE (National Institute for Space Research) from Brazil and CHPC (Centre for High Performance Computing) from South Africa.

Estimated Budget (€): Approximately 28M€ and a running cost of around 1.75M€/year.

Funding program/agency: Potential funding sources are being sought.

5.2.

Pennsylvania State University (PSU) Alliance for Education, Science, Engineering, and Design in Africa (AESEDA) and the Atlantic International Research (AIR) Centre Partnership for Resilience in Coastal West Africa and Atlantic Tropical Small Island States (RESPONSE)

Contact person: **Gregory S. Jenkins,**
AESEDA Director, Penn State University, gsj1@psu.edu

Objective: RESPONSE seeks to investigate and improve knowledge of natural hazards and extreme events and their impacts on coastal resilience within three themes that incorporate the UN sustainable development goals (SDGs) and AIR objectives. The three themes are:

(1) Earth Observations;
(2) Blue-Green Innovation;
(3) Coastal Resilience.

These themes address SDGs and AIR Centre Objectives and support current government and non-governmental activities in Coastal West Africa and Atlantic SIS. The RESPONSE program aims to engage government, academic and private/public institutions in addressing the themes. RESPONSE is expected to use innovation to promote entrepreneurial activities on the ground with the goal of creating new opportunities especially for youth.

Methodology: We take a multi-layered approach with conferences, workshops, summer institutes, research pilot projects using high level science and technology and low cost technology which can be reproduced at the local levels. In Theme 1, we address limited observations, which does not allow us to quantify rates of change in natural systems or their interactions with human drivers. In particular we use Earth Observations to quantify and better understand natural hazards in Coastal zones. In the area of Blue-Green Innovation, we deploy Makerspace innovation labs. Makerspaces are open labs and community workshops for digital design and fabrication that foster peer-to-peer learning-by-doing, skills training and co-creation of technology. We use Makerspace Innovation labs to help address challenges addressing food security and energy solutions. In the area of Earth Observation, we deploy Makerspace Innovation Labs to develop low cost in situ instruments that can be used to improve knowledge, evaluate model prediction and satellite observations, while monitoring extreme events and long-term changes associated with Anthropogenic climate change. In the area of Coastal resilience, we work to develop risk management tools to improve decision-making and have community engagement activities in relationship to consumption-waste, air quality and health outcomes.

Outcomes: The primary outcome of this work is 1) Increased human capacity and Earth Observations to address natural hazards and anthropogenic climate change; 2) the use of innovation to address needs in the areas of food security and renewable energy and the deployment of Makerspace Innovation Labs in Coastal West Africa; 3) Increased community awareness and improved decision-making tools for risk management;

Consortium: Penn State University, AIR Centre, National governments, University partners in Coastal West Africa, Cape Verde and Sao tome, NGO organizations, local stakeholders (consortium not closed)

Estimated Budget (€): 2 500 000 over a 5-year period

Funding program/agency: Potential funding sources are being sought.

5.3.

ATLANTIC MARGINS – FROM LOCAL TO GLOBAL ATLANTIC SCALE

Contact person: **Ramiro Neves,**
Instituto Superor Técnico (IST), Portugal – Marine Environment & Technology Center (MARETEC), ramiro.neves@tecnico.ulisboa.pt

Objective: Project Atlantic Margins aims to use data from local and regional studies carried out at a national/regional level to improve the Global Atlantic solution, which in turn can be subsequently used to improve local/regional solutions.

Project Atlantic Margins addresses UN SDGs:

Methodology: The project will use local/regional data to improve the Copernicus (CMES – Copernicus Marine Environment and Monitoring System, http://marine.copernicus.eu/) Atlantic forecasts and will make the improved solution available to the whole Atlantic basin countries, giving value and visibility to local/regional studies and creating an effective collaborative network. The methodology is to enable three major work packages: (1) Development of an improved Global Atlantic Ocean solution (data assimilation tools, assessment of global atmospheric circulation models and of river discharges); (2)Development of a Data System (to manage data for improved Atlantic Global solution and local/regional model solutions); (3) Development of an Information Platform (disseminate results and data; perform simulations).

Outcomes: Creation of a platform with the several functionalities including: 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).

Consortium: The project's consortium is currently constituted by: Instituto Superior Técnico, IST (Portugal), UFRJ (Brazil), UERJ (Brazil), UFPR (Brazil), UFPA (Brazil) and Puertos del Estado (Spain). Futhermore, other partners are under the process of formalizing their participation

Estimated Budget (€): The estimated budget is 1.5 M€ over a 4-year period.

Funding program/agency: The potential funding sources are National Science Foundations, H2020/FP9 and end users.

5.4.

ATLANTICGEOSS – COOPERATION FOR A BETTER UNDERSTANDING OF THE ATLANTIC

Contact person: **Nuno Catarino,**
DEIMOS Engenharia, nuno.catarino@deimos.com.pt

Objective: AtlanticGEOSS' goals are to develop an integrated EO framework that promotes collaboration and growth within the Atlantic countries, and to engage with communities to identify and potentiate opportunities for EO information and services, serving the region's societal needs. Context is the increasing demand for cooperation between countries in order to work towards the 2030 Sustainable Development Goals (SDGs), which were defined as new set of strategies to promote a sustainable development for the next 15 years in the United Nation Summit 2015.

By creating a collaborative ecosystem, AtlanticGEOSS aims to facilitate the creation of value-added services, based on the needs of each Atlantic country, supporting the decision-making processes. Such services will be focused on Marine, Maritime and Coastal application areas, such as monitoring marine biodiversity and protected areas, fishing and aquaculture, and marine spatial planning.

Methodology: The implementation of the AtlanticGEOSS will focus on the users' needs, federating the demand for EO services across Atlantic countries, and then matching the services with appropriate funding from international, regional and national funding institutions, as well as with technology providers from Atlantic countries. At the core of the AtlanticGEOSS will also be the capacity building and dissemination initiatives around the services provided.

Outcomes: More than a data and services framework, AtlanticGEOSS aims to establish an Atlantic community and ecosystem for Earth Observation services for the Atlantic. The AtlanticGEOSS will be proposed as an official GEO Initiative in 2019.

Consortium: AtlanticGEOSS consortium is open to partners who can contribute to the project's development

Estimated Budget (€): 17M€ (Estimates of main activities and a Rough Order of Magnitude (ROM) for the required budget for the implementation of AtlanticGEOSS for the triennium 2019-21)

Funding program/agency: the potential funding institutions identified to support the AtlanticGEOSS initiatives are the following: AIR Centre, including in kind support of human resources for promoting international cooperation | African Development Bank (AfDB) | World Development Bank (WDB) | European Investment Bank (EIB) | European Bank for Development and Reconstruction (EBRD) | West African Development Bank (BOAD) | Food and Agriculture Organization of the United Nations (FAO) | United Nations Office for Outer Space Affairs (UNOOSA) | European Space Agency (ESA), including: Atlantic Initiative **(5-6 M€)** | European funding through H2020 actions: Coordination and Support Actions (CSA), e.g. SC5-16-2019 CSA **(1M€)**, Research and Innovation Actions (RIA) , e.g. DT-SPACE-06-EO-2019 (2M€), Innovation Actions (IA), e.g. SC5-16-2019 CSA **(3M€)** | National/Regional Budgets | Private Investment **(>3M€)**

5.5.

TUNA BAIT-BOAT FORECAST (TB4). AN EXAMPLE OF PROPOSAL FOR ECOSYTEM APPROACH TO FISHERIES MANAGEMENT.

Contact person: **Pablo Abaunza,**
Spanish Institute of Oceanography (Instituto Español de Oceanografía – IEO), pablo.abaunza@ieo.es

Objective: Tuna fisheries play a key role and are of great importance for many countries worldwide, therefore they are central from a food security perspective. Tropical tunas' distribution is constrained by the physiological tolerance of the species and, within their suitable habitat, it is influenced by its environmental preferences and forage availability. The overarching objective of this pilot project is to determine the relationship between baitboat, as an example case, catch rates and oceanographic features through the joint analysis of fishery and oceanographic data. This project could also set the foundations to improve the sustainability of the fisheries at the ecosystem level (e.g., by avoiding the catch of those species which are beyond the optimum level of exploitation).

Methodology: The development of the pilot project could then take place in three stages: (i) collection of fishery and oceanographic data, (ii) modeling and (iii) development of a platform providing the forecast of tuna distribution. In a future phase, and based on the outcome of the current action, the project could be easily scaled to cover other areas/fisheries/management objectives based on the same procedures. Fisheries data would be made available from the research institutes of the coastal states monitoring the fishing activity, and oceanographic data would be obtained from different operational oceanography platforms currently available, notably the Copernicus Marine Environment Service and other proposals within the AIR.

Outcomes: The completion of the main objective, i.e. the understanding of the environmental drivers affecting tuna catchability, would allow for the development of a fishery forecast system. This tool would help improve the profitability of artisanal fleets, the quality of the products and the reduction of the fuel consumption. Moreover, the results of this work could result in synergies with other ongoing activities, like improving the development of abundance indices or the testing of management measures based on the knowledge of the environmental drivers of species distribution (e.g., study the feasibility of dynamic closures for the purse seine fisheries aimed at minimizing the catch of juvenile bigeye tuna). It must also be stressed that the deliverables of the project could be easily extrapolated to other fisheries/fishing areas/objectives that focus on the habitat preferences of marine species.

Consortium: The consortium, still to be developed, could involve stakeholders and scientists from the main coastal states with baitboat fisheries, namely Brazil, Portugal, Ghana, Spain, South Africa and Senegal.

Estimated Budget (€): 194,000 €

Funding program/agency: Potential sources of funding: EU development and research funds, in-kind contributions from research institutes, etc.

5.6.

HAPS – HIGH ALTITUDE PLATFORM STATION

Contact person:
Juan Carlos Cortez,
CDTI (Spanish Center for the Development of Industrial Technology), jccp@cdti.es;
Luis Serina,
FCT/ANI (Portuguese National Science Foundation/ National Innovation Agency), luis.serina@fct.pt

HAPS (High-Altitude Pseudo-Satellites) are a novel concept that is being developed to provide several types of services that can complement and enhance satellite-based services. HAPS are aircraft which operate in the high atmosphere in order to provide with high availability and proximity services such as Earth observation and telecommunications. They can take the form of airplanes, balloons, or similar platforms and even though there are several developments ongoing, there is no system that is offered commercially at the moment.

These services are already provided by satellites on a global basis, but a single satellite often cannot provide the service to a specific location on a continuous basis, or must do it from a geosynchronous orbit, which is costly and has resolution and latency constraints. A HAPS system, by flying over and/or near a particular location or region, can provide this service on a continuous basis, and in addition has the additional advantages of requiring less sophisticated technology to provide the service (since the environment is milder than the space environment) and being maintainable and upgradeable periodically. Thus, they are a perfect complement to satellite-based services for specific areas (cities, archipelagos, etc.). In addition, they can also be used to provide services in areas where due to a natural catastrophe the telecommunication infrastructure is not available.

Spain and Portugal have agreed to initiate studies to analyse the feasibility of developing in collaboration a HAPS system. The first studies will be funded by Portugal and Spain via ESA GSTP activities, which have funding already secured. The studies will be oriented to map the technical competences in both countries, in order to identify the capabilities that could allow the development of a HAPS system. As part of this study, an analysis of the market opportunities will be included, considering the needs identified in the potential user community. This analysis will consider the needs of the Atlantic states, which can be gathered in articulation with the AIR Centre initiative. By using the network of the AIR Centre, a set of user needs, both multinational and interdisciplinary, will be available for the analyses. This will ensure that the future developments can provide services that are useful to the nations in the Atlantic basin.

The studies will be carried out during 2019-2020, and depending on their outputs, follow-on activities will be funded. The AIR Centre target community is encouraged to contribute to this activity, which aims at performing several tasks: (a) collecting the applicable user needs and constraints in Portugal, Spain and additional Atlantic countries, which could contribute to the development of the HAPS system (b) identify technological capabilities, which could be made available in contributing countries (c) survey and describe the possible system concepts and business models to realize the objectives of the HAPS activity.

Consortium: CDTI, FCT. Other Atlantic partners will join in the near future.
Funding program/agency: CDTI / FCT

5.7.

E5DES - RESEARCH & INNOVATION TOWARDS EXCELLENCE IN TECHNOLOGICAL EFFICIENCY, USE OF RENEWABLE ENERGIES, EMERGING TECHNOLOGIES AND CIRCULAR ECONOMY IN DESALINATION

Contact person:
Baltasar Suárez,
ITC (Technological Institute of the Canary Islands), baltasarp@itccanarias.org

Objective: This activity proposes to investigate in Macaronesia the technical, economic and environmental feasibility of the use of wind, photovoltaic and marine energy, mainly in desalination. There is a period of transition from the desalination plants in self-consumption until the isolated network systems are profitable

Methodology: The E5DES project builds up on the existing DESAL+ Living Lab, an ongoing INTERREG-MAC project (https://www.desalinationlab.com/es/) led by ITC to establish an internationally leading desalination lab. In the context of the strategic R&D plan for desalination of Macaronesia, this project focuses on the exclusive use of renewable energies (RE) for desalination, which requires advancing engineering designs, simulations of operations and demonstrations at various scales. Up to 12 studies are proposed at different scales and combinations, practical and theoretical, which have as a guiding principle to feed desalination plants in isolation or in self-consumption with EERR. Each study presents its own methodology according to its scope, data needs and participating partners.

Outcomes:

- To provide technically and economically viable solutions aimed at reducing the dependence on fossil fuels in desalination. In particular for making exclusive use of wind energy, solar photovoltaic and wave energy, as well as hybrid energy systems for powering desalination systems.
- Advance scientific knowledge about the use of renewable solutions for the operation of desalination plants.
- Methodologies to analyse optimal combinations of RES for desalination at different scales, contexts and geographical conditions.
- Analysis of scenarios, impact studies exploitation models of hybrid generation plants connected to the transport/distribution networks associated with the aggregated energy demand of several desalination plants in an island system.

Consortium: (proposal submitted) Instituto Tecnologico de Canarias ITC, Universidad de Las Palmas de Gran Canaria ULPGC, Universidad de La Laguna ULL, Consorcio para el Diseño, Construcción, Equipamiento y Explotación de la Plataforma Oceánica de Canarias PLOCAN, Agencia Canaria de Investigación, Innovación y Sociedad de la Información ACIISI (Spain); Atlantic International Research Centre AIR Centre, Agência Regional da Energia e Ambiente da Região Autónoma da Madeira AREAM (Portugal), Universidad Assane Seck de Ziguinchor UASZ (Senegal), Universidad de Nouakchott Al-Aasriya UMA (Mauritania), Universidade Publica de Cabo Verde UNICV (Cape Verde)

Proposed Budget (€): 2 822 400 (85% FEDER, if approved)
Funding program/agency: INTERREG-MAC 2014-2020 (proposal submitted)

5.8.

MACARATLAN – INSTITUTIONAL COOPERATION NETWORK FOR THE IMPROVEMENT OF THE GOVERNANCE AND PROMOTION OF BLUE ECONOMY IN THE EUROPEAN REGIONS OF MACARONESIA AND THE CARIBBEAN

Contact person:
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Regional Directorate for Science and Technology, Azores Government, Portugal, Bruno.MC.Pacheco@azores.gov.pt;
Octavio Llinás
PLOCAN, octavio.llinas@plocan.eu

Objective: MACARATLAN seeks to promote the meeting of the Macaronesia region with the counterpart space of the Caribbean by promoting the effective participation of these regions in European strategies and plans for the Atlantic. This meeting will be facilitated through the articulation of a Network of Institutional Cooperation in Blue Economy of the Mid-Atlantic (RECIAM) with a joint strategy and action plan to extend collaboration and maximize the results of the most competitive groups and projects in Blue Growth.

Methodology: Based on an exhaustive review of existing policies, programs and projects, MACARATLAN will determine the technical areas of collaboration with the greatest potential in the Blue Economy and will set up specialized Action Groups involving the most competitive entities and organizations from Macaronesia and Caribbean regions. It aims the engagement with public authorities, institutions, citizens, policy makers and key stakeholders in relation to activities, programs and projects in the context of the Blue Economy in Macaronesia and its analogy within the Caribbean area. This will allow the development of success cases during the life of the project and the provision of the necessary experience and recommendations to build a network with an effective strategy and actions that maximize investment and innovative results in the blue economy, between both regions, and facilitate the medium- to long-term sustainability of the network.

Outcomes: Determination of the investment priorities in the Blue Economy in the Atlantic. Creation of the Thematic Action Groups. Formalization and proposal of the Constitution Agreement for the European Network of Institutional Cooperation in the Blue Economy of the Middle Atlantic from Macaronesia to the Caribbean, including the elaboration of an agreed Joint Strategy and the first Action Plan that contributes to give content to the projection European in the Middle Atlantic.

Consortium: The MACARATLAN consortium is constituted by Fundo Regional para a Ciência e Tecnologia (FRCT), Azores, PT; Plataforma Oceánica de Canarias (PLOCAN), SP; Agencia Regional para o Desenvolvimento da Investigaçao, Tecnologia e Inovaçao, Madeira, PT; Núcleo Operacional de Sociedade para Informaçao, Entidade Pública Empresarial, Cape Verde and AIR Centre. The activity will be developed by expert partners in the 3 ERDF (European Region Development Fund) regions (Canary Islands, Madeira and Azores) and, in Cape Verde, as Third Country member of the Interreg MAC program. In addition, part of the activity of identification and description of the Atlantic policies will be carried out in collaboration with organizations in institutions of the Caribbean European regions (Martinique, Guadeloupe, French Guiana and San Martin).

Budget (€): Expected total cost of the project 942.932€

Funding program/agency: An application to the Interreg MAC 2014-2020 program (European Region Development Fund program) was submitted on October 2018.

5.9.

PRATA – PHOTONICS FOR RESILIENCE AGAINST TSUNAMIS IN THE ATLANTIC

Contact person:
Yasser Omar,
IST, University of Lisbon & Instituto de Telecomunicações, yasser.omar@tecnico.ulisboa.pt

Objective: Project PRATA – Photonics for Resilience Against Tsunamis in the Atlantic aims at exploiting optical submarine telecommunication cables as novel sensors for seismological signals, and develop the necessary technology to use them for coastal resilience, namely for new and more efficient early-warning systems for tsunamis.

Project PRATA addresses directly UN SDG 11, reducing the vulnerability to disasters and improving the resilience of cities and communities in coastal areas.

Furthermore, by crosslinking big data from submarine sensors with big data from satellite sensors, project PRATA contributes to the AIR Centre S&T Agenda and Cross-Cutting Initiatives, namely as an integrated approach to oceanic monitoring from deep sea to near space, as well as to use the AIR Centre Data Network.

Methodology: Project PRATA brings together a very interdisciplinary team of scientists and engineers (from optical communications, geophysics, data science, etc.) and key stakeholders (telecom companies, local authorities, etc.), to tackle these challenges in the Atlantic Ocean with a very original and comprehensive approach, including the use of both classical and quantum communication technologies for enhanced precision, the use of complementary satellite geophysical data, and the transfer and processing of big data.

It will involve numerical simulations of the cables and of the laser signals, the development of prototype interferometry stations, their deployment and testing in cable terminals, the corresponding data acquisition, the cross-comparison with satellite data, the analysis of big data, the development of predictive models for new and more efficient early-warning systems for tsunamis, and the engagement with civil protection authorities and the population for the exploitation and use of such early-warning systems.

Outcomes: The outcomes of project PRATA will include the development of devices for completely novel sensing capabilities at the bottom of the ocean, as well as their application to the early-warning tsunamis, including the corresponding decision support tools and systems, contributing to reducing the vulnerability to disasters and improving the resilience of cities and communities in coastal areas.

Consortium: The PRATA consortium is currently constituted by: Instituto de Telecomunicações (Portugal), National Physics Laboratory (UK), Instituto Nazionale de Ricerca Metrologica (Italy), Instituto Português do Mar e da Atmosfera (Portugal), University of Lisbon (Portugal), University of Malta, Altice Portugal. Furthermore, the following partners are currently formalizing their participation: Instituto Nacional de Estatística (Cape Verde), Angola Cables, Governo Regional dos Açores (Portugal). The PRATA consortium is open to additional partners who can contribute to the project's deployment in the Atlantic Ocean.

Estimated Budget (€):
Stage I (2019-2021), covering a 1000 km link between Lisbon and Madeira (Portugal),
as well as short inter-island links in the Atlantic (e.g. Cape Verde), the estimated budget is 3 million Euro.
Stage II (2022-2024) will investigate longer distance links along the African coast (e.g. Angola),
and has an estimated budget of 5 million Euro.
Stage III (2025-2027) will investigate cross-Atlantic links,
namely Africa-Brazil and Europe-Brazil, and has an estimated budget of 8 million Euro.

Funding program/agency: Currently, an application is being prepared to the European Comission's programme in Future and Emerging Technologies (FET), namely to the FET Open call, to fund part of PRATA - Stage I (2019-2021).

5.10.

OCEAN AND COASTAL INFORMATION IN SUPPORT OF MARINE RESOURCES AND BIODIVERSITY IN THE MACARONESIA, SAO TOME AND PRINCIPE REGION

Contact person:
Emily Smail
GEO Blue Planet / NOAA Affiliate, emily.smail@noaa.gov

Introduction: The AIR Centre is working to define scientific and technological initiatives to undertake in the Macaronesia and Sao Tome and Principe region. In coordination with the GEO Blue Planet Initiative, Future Earth Coasts and the Marine Biodiversity Network (MBON), it is co-organizing a workshop in Mindelo, Cape Verde, scheduled for February 2019, to identify initiatives to pursue in the region that are aligned with the Praia Declaration topic "Marine Resources and Biodiversity: Promote Sustainable Fisheries, aquaculture and ecosystem valorization".

Workshop objectives:

- Inform local and regional stakeholders about the technology and methods for deriving ocean and coastal information for use in sustainable fisheries management, aquaculture site selection and management and biodiversity monitoring;
- Support local and regional decision makers on the use on ocean and coastal information to assess marine and coastal spatial planning options;
- Identify potential marine resources and biodiversity initiatives for the AIR Centre and relevant partners to pursue in the region;
- Map capacities needed in the region for deriving ocean and coastal information, identify gaps and promote capacity building initiatives in the region.

Methodology: This workshop will build upon three preliminary cross-sectoral and cross-disciplinary meetings to better understand the information needs of local and regional governments, businesses, researchers and civil society to enhance local and regional capacity for job creation and innovation in the blue economy and to foster the sustainable use of marine resources as a main component of local and regional economies. The two preliminary meeting were held in Faial, Azores on October 29th, 2018, and Las Palmas, Canary Islands on October 15th, 2018 in. The third preliminary meeting will take place in Sao Tome and Principe on January 2019.

Outcomes: This workshop will produce a report on coastal and information needs to be shared and discussed with data and service providers such as NASA, NOAA, ESA and Copernicus. The workshop is seen as a first stepping stone into a series of Atlantic regional workshops aimed at the development of innovative user-oriented Earth observation services and products as well as the identification of new initiatives for the AIR Centre to pursue, such as workshops covering other topical and regional areas (as the Southern-West and Southern East Atlantic).

Consortium: AIR Centre, GEO Blue Planet Initiative, Future Earth Coasts, The Marine Biodiversity Observation Network (MBON), European Space Agency (ESA), United Nations Outer of Space Agency (UNOOSA), Ocean Science Center Mindelo (OSCM), Regional Government of Azores, Azores Regional Foundation for Science and Technology (FRCT), Oceanic Platform of the Canary Islands (PLOCAN), Ministry of Maritime Economy of Cape Verde, and Ministry of Education, Culture and Science of Sao Tome and Principe.

Estimated Budget (€): 75.000 Euros

Funding program/agency: In kind contributions from consortium partners

5.11.

PROGRAM ATLANTIC PIONEERS

Contact person:
José Luis Muñoz,
EIT Climate KIC Spain, jose-luis.munyoz@climate-kic.org;
Marta Casas,
AIR Centre, marta.casas@aircentre.org

Pioneers is a successful professional mobility program of EIT Climate KIC to be implemented in cooperation with the AIR Centre in 10 Countries of the ATLANTIC during 2019. This program looks for the next generation of climate innovators: professionals who wants to shape the world's next economy, intra-entrepreneurs to create new products and services, and always ready to step outside their comfort zone.

Atlantic Pioneers aspire to involve 10 pioneers and 10 potential hosting organizations through the Atlantic region to joint this program. The Atlantic Pioneers will run from May through to November and consists of a program of learning activities bespoke transitions thinking & systems innovation mentoring delivered through a structured workshop program and online training, and a 4-6-week practice placement (international).

EIT Climate KIC Spain and AIR Centre, along with referential institutions, will work together in the definition and provision of the common core content of the Scientific and Education Component aligned with the UN Sustainable Development Goals (SDGs).

Applicants
Pioneers: As part of the application process to become pioneers, candidates will be asked for the project experience, fields of interest and CV.

Host: As a part of the application process to become host, the organization will be asked for the fields of interest and type of placement projects offered. Host entities will provide challenge or a project in which Pioneers will work and a workstation.

Proposal for each participant Country will afford a fee per pioneer as coordination expenses, will give a grant to their pioneers for travel and subsistence expenses, and will provide at least one host placement for a pioneer in his country. Pioneers will have to co-finance the travel and subsistence expenses, pending the support of its country.

Estimated budget: 200k€ -250k€.
Funding program/agency: Potential funding sources are being sought.

5.12.

PROGRAM ATLANTIC CLIMATHON

Contact person:
José Luis Muñoz,
EIT Climate KIC Spain, jose-luis.munyoz@climate-kic.org;
Marta Casas,
AIR Centre, marta.casas@aircentre.org

CLIMATHON is the world's largest climate action movement of its kind. Organized by EIT Climate KIC, it brings together the challenges of the world's cities with the people who have the passion and ability to solve them.

By connecting cities with their citizens, Climathon empowers entrepreneurs, innovators and big-thinkers to come together to work on new, creative solutions to their local climate change challenges. Now in its fourth year of operation, the Climathon movement has grown tremendously, encouraging more cities and innovators across the globe to drive climate action. Climathon has grown from 19 cities in its first year, to 113 in 2018 with more than 5,000 participants. Social networks are also a key element of this event, where the interconnectivity of the cities and citizens is one of the empowering components of the initiative.

ATLANTIC Climathon proposal is to run the Climathon in at least 10 Cities in the ATLANTIC during 2019 connecting different realities though the Atlantic regions, generating and sharing innovation in the field of the UM Sustainable Development Goals in multidisciplinary teams to local-based solutions that can build scalable models of application across the globe.

EIT Climate-KIC Spain, AIR Centre and key stakeholders will provide organization, framework and experience in the development of the program offering support for the event: agenda, challenge, contents for the media, city brand presence in the media, training or suggestion of coaches, local and global EIT Climate-KIC networking contacts with other Climathon cities, design, support and participation in the global web page, support during and after the 24h. event.

Each participant City will:

- Define the thematic area of the challenge and identify the specific challenge together with EIT Climate-KIC Spain and AIR Centre.
- Provide information regarding the state-of-the-art, policies, background and initiatives related to the challenge.
- Provide with the right venue to host the event fulfilling the Climathon requirements (working space, catering, wifi connectivity, audiovisual equipment, stationery, …).
- Communicate & disseminate in media and through networks and targeted stakeholders to recruit high level participants and to communicate the result of the event.
- Provide coaches/facilitators who commit to follow the training to ensure the quality standard of the event.
- Invite a jury to evaluate the ideas and establish a prize for the winner.
- Provide and disclose a final feedback with a report template.

Estimated budget: 200k€ -250k€.
Funding program/agency: Potential funding sources are being sought

#6

IMPLEMENTING THE AIR CENTRE: STRUCTURE AND INITIATIVES

IMPLEMENTATION TEAM ACTIVITY AND PERMANENT STAFF

The AIR Centre implementation team established in early 2018 reached its first two Milestones with the formal constitution of the AD AIR Centre (Association for the Development of AIR Centre) in April 2018, and the successful organisation of the 3rd High-Level Dialogue in Praia, Cape Verde in May 2018 (see chapter 3). Following that event, the first Executive Committee meeting at the head office in Terceira Island, Azores, Portugal was held in June, and general lines of actuation were decided for the period leading to the delivery of the AIR Centre by the end of 2018. In addition to focusing the 'road show' of presenting the AIR Centre vision and status in identified key countries (see below), efforts to formally attract the existing partner countries as members into AD AIR Centre and the development of collaborative projects within the AIR Centre network have been the priority.

The composition of the AIR Centre team remained during the period, gaining one additional member in August: António Sarmento (Executive Director), José Luiz Moutinho, Frank Neumann, Marta Casas, Maria Apolónia and Tânia Li Chen. During the time span of 6.5 months between the two events, the total dedication of the Implementation Team amounted to approximately 25 person-months FTE.

Within this effort, the organisation of diverse international working meetings and events (see below and following sections) were held, a number of multidisciplinary projects prepared and/or initiated, and the day-today business for making the AIR Centre a reality. As a first step towards establishing the permanent team, an international call for the new CEO position was conducted, and over 50 valid applications received. By end of November 2018, the final decision upon the new CEO of AIR Centre is expected, so that its plain operation can continue with a permanent team from early 2019 onwards. In addition to the CEO, two senior leadership positions are foreseen (Operations and/or Scientific and/or Business Development profiles, depending on the profile of the CEO to be selected), as well as a technical project team and a secretariat.

The extension towards an international organisation has started with the formal admission of Spain to the AD AIR Centre, to be formalized in the Las Palmas event. In addition, significant progress towards the adhesion of other countries as members have been made, and the process for a number of Memorandums of Understanding (MoUs) with institutions of high relevance for AIR Centre have been initiated. The following MoUs or Letter of Intents (LoIs) have reached a stage at which it is expected to have them signed by the end of 2018, but a number of other MoUs and/or LoIs are in a less developed stage but with good prospects to be signed:

- AIR_DataNet (BSC, MACC, AIR Centre, FCT, FNCC);
- GEO Blue Planet;
- European Space Agency (ESA);
- UNITED NATIONS Office for Outer Space Affairs (UNOOSA);
- GEO Marine Biodiversity Observation Network (MBON);
- Pennsylvania State University (PSU) Alliance for Education, Science, Engineering, and Design in Africa (AESEDA);
- E-Science European Infrastructure for Biodiversity and Ecosystem Research - LifeWatch ERIC;
- Instituto Nacional de Pesquisas Espaciais - National Institute for Space Research (INPE);
- Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia, da Universidade Federal do Rio de Janeiro - Federal University of Rio de Janeiro (COPPE, UFRJ).

Several of dedicated meetings with relevant entities mainly in Europe, Africa, North and South Americas were organized during this period, with the main objective of either clarify the AIR Centre vision and implementation status in order to attract new partners, or in relation to the mutual agreements and/or development of projects. In addition to the events organized by the AIR Centre (see following sections), several networking activities by the AIR Centre implementation team included:

AIR CENTRE PRESENTATIONS / ACTIVE PARTICIPATION

07|05|2018
Salamanca (Spain): Spanish-Portuguese Workshop on Research and Education Networks and E-Science

29|05 - 01|06|2018
Goa (India): 12th World Congress of the RSAI

17|06|2018
Davos (Switzerland): IASC (International Arctic Science Council) meeting

20-21|06|2018
Brasília (Brazil): CPLP Institutional Meeting; AIR Centre dissemination

23-24|07|2018
Salvador (Brazil): Belém All Atlantic Research Forum

01-03|08|2018
Bangkok (Thailand): UN ESCAP workshop on Ocean Accounts

06-09|08|2018
Sao José dos Campos (Brazil): AmeriGEOSS Week

17-19|09|2018
Graz (Austria): United Nations/Austria Symposium on Space for the Sustainable Development Goals

04|10|2018
Cork (Ireland): Co-ReSyf kickoff meeting

AIR CENTRE REPRESENTATIVES WERE ALSO PRESENT AT THE FOLLOWING EVENTS:

22-24|05|2018
Stavanger (Norway): Spaceport Norway Conference & Exhibition Stavanger Forum

16|06|2018
Davos (Switzerland): IASC marine working group annual meeting

11-12|06|2018
Geneva (Switzerland): Earth Observations for Impact - GEO Symposium 2018

18-19|06|2018
Vienna (Austria): UNISPACE+50 Symposium

05-06|07|2018
Porto (Portugal): In the Black - Deep Sea Mining Challenges (INESC-TEC)

04-06|07|2018
Toulouse (France): 4th GEO Blue Planet Symposium

12-14|09|2018
Vienna (Austria): ICRI 2018 (Intern. Conf. Research Infrastructures)

24-29|09|2018
Ponta Delgada (Portugal): 25 years of Progress in Radar Altimetry and [SOCLIMPACT] Meeting LWG-Azores (27.09.)

01|10|2018
Lisbon (Portugal): MIT Annual Conference 2018

02|10|2018
Brussels (Belgium): Copernicus Workshop Fisheries and Aquaculture

06-09|11|2018
Porto (Portugal): 2018 IEEE OES Autonomous Underwater Vehicle Symposium


OUTER
SPACE FOR

ATLANTIC INTERACTIONS

WORKSHOP

1

AIR Centre Presentation at *Outer Space for Development: Policy, Business and Regulatory Summit,* Portugal

Venues: Vieira de Almeida (VdA), Sociedade de Advogados, Lisbon, Portugal

May 21ST, 2018

SUMMARY

The Summit aimed to illustrate the exciting developments taking place in the Portuguese space sector, by seeking to highlight the usefulness of space in a national, European and global contexts to ensure space becomes a valuable tool for development. Particular attention was given to industrial development, national space strategy and the development of a national space law. Prof. Dr. Manuel Heitor gave a presentation with the title "The AIR Centre and Portugal Space 2030" in a session dedicated to Space Policies

AGENDA

SESSION: SPACE POLICIES

9:50 – 10:10 **Outer Space and the UN Sustainable Development Goals**
Mr. Niklas Hedman, Chief of UNOOSA's Committee, Policy and Legal Affairs Section

10:10 – 10:30 **The EU approach to space**
Mr. Paul Flament, Head of Unit J1, Galileo el EGNOS – Programme Management, DG GROW

10:30 – 10:50 **The role of ESA in using and exploring outer space**
Mr. Piero Messina, MS Relations & Partnerships Office, Strategy Department, ESA

10:50 – 11:10 **The AIR Centre and Portugal Space 2030**
Prof. Dr. Manuel Heitor, Minister of Science, Technology and Higher Education

Coffee break

11:30 – 12:10 Round Table: United space in Europe

Moderator: **Dr. Marco Ferrazzani,** Legal counsel to ESA and Head of Legal Services Department
Mr. Paulo Ferrão, President, Portuguese Foundation for Science and Technology (FCT)
Major General Henrique Macedo, President, idD – Platform of National Defence Industries
Mr. Rodrigo da Costa, Galileo Services Programme Manager, GSA
Mr. Alain Ratier, General Director, Eumetsat
Dr. Stefano Zatti, Head, Security Office ESA


United space in Europe


smartVR
studio
EXPERIENCE
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THALES

ATLANTIC INTERACTIONS

WORKSHOP

2

AIR Centre Presentation at *NewSpace Atlantic Summit,* Portugal

Venue: Pavilhão do Conhecimento, Lisbon, Portugal

May 28th-29th, 2018

SUMMARY

The event aimed at discussing processes and products that promote the analysis of data through spatial services and applications as well as the development of infrastructures and services that generate spatial data in the Atlantic region. A special focus was given to small satellites and space constellations as well as to infrastructures for space and Earth observation, with a presentation about the implementation of the AIR Centre.


Escola
Ciência
Viva
NewSpace
Atlantic
Summit
2018


MONTH OF
PORTUGAL

ATLANTIC INTERACTIONS

WORKSHOP

3

Washington Symposium, USA

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

Venue – Embassy of Portugal in Washington DC, 2012 Massachusetts Ave NW, USA

May 28th-29th, 2018

SUMMARY

The Washington Symposium, on June 14, was aimed at discussing the progress associated with the establishment of the AIR Centre in terms of its goals to promote an integrative approach to space, climate change, energy, and earth and ocean science in the Atlantic, fostered by emerging methods of data science, being continuously promoted in close alignment with the United Nations' Sustainable Development Goals (SDGs)..

AGENDA

9:00 – 10:00 **Session 1: Welcome and Introduction**

Welcome Remarks

Frederico Nascimento, Deputy Chief of Mission, Embassy of Portugal in Washington D.C.

Introductory remarks

Jared Banks, Department of State, Office of Science and Technology Cooperation

Antonio Sarmento, Chair of the AIR Centre Installation Committee

Debate

10:00 – 11:00 **Session 2: Implementing the AIR Centre – on the progress achieved**

Chair

Bruno Pacheco, President, Regional Fund for Science and Technology

Invited Discussants

John Leonard, Director of MIT's Marine Robotics Lab, MIT

Burke Fort, Center for Space Research, The University of Texas at Austin

Peter Kristensen, WACA – West Africa Coastal Adaptation Project, World Bank

Vitor Mulas, Agenda on Innovation and Entrepreneurship in Cities at the World Bank Group's Trade & Competitiveness Global.

Lorenzo Carrera, Disaster Risk Management Specialist at The World Bank

Debate

11:00 – 11:30 **Coffee Break**

11:30 – 12:30 **Session 3: Implementing the AIR Centre – engaging the US**

Chair and brief presentation:

Jerry L. Miller, President, Science for Decisions.

Invited Discussants:

Kim Nitschke, Los Alamos National Laboratory

Sally MacFarlane, US Dept of Energy, ARM Program Manager

Eduardo Brito Azevedo, University of Azores, ARM Project Manager

Paul DiGiacomo, Division Chief, Satellite Oceanography & Climatology Division, NOAA

Gregory Jenkins, Penn State, USA

Debate

12:30 Closing Lunch

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

LIST OF PARTICIPANTS

Alan Leonardi - National Oceanic and Atmospheric Administration (NOAA)

Alyssa Hildt - The Ocean Foundation

Ana Margarida Ferreira - IDB

Ann K. - U.S. Department of Commerce

António Moreira - University of Maryland, Baltimore County

António Nascimento - Embassy Cape Verde

António Sarmento - AIR Centre Installation Committee

Bruno Pacheco - Regional Fund for Science and Technology

Burke Fort - University of Texas

Derek Parks - National Oceanic and Atmospheric Administration (NOAA)

Domingos Sarmento Alves - Embassy of East Timor

Don Rice - National Science Foundation

Eduardo Brito Azevedo - University of Azores

Gabriel Montague - Massachusetts Institute of Technology (MIT)

Gambo Y. Manza - Embassy of Nigeria

Gerardo Díaz Bartolomé - Embassy of Argentina

Gregory Jenkins - Penn State

Jared Banks - State Department

Jerry Miller - Science for Decisions

John Leonard - Massachusetts Institute of Technology (MIT)

Jon White - Consortium Ocean Leadership

Jordann Krouse - Senator John Thune

Jorn Poldermans - Embassy the Netherlands

José Luiz Moutinho - AIR Centre

Kim Nitschke - Los Alamos National Laboratory

Leigh Zimmerman - Consortium Ocean Leadership

Lorenzo Carrera - World Bank

Luciana Mancini - Embassy of Brazil

Luduk Moravec - Embassy Czech Republic

Luís Encarnação - Ibdi Consulting

Manuel Heitor - Ministry of Science, Technology and Higher Education, Portugal

Margarida Gaspar - Embassy of Angola

Melissa Anderson Garcia - National Oceanic and Atmospheric Administration (NOAA)

Michael Guterres - The MITRE Corporation

Nicolas Desramaut - World Bank

Paul DiGiacomo - National Oceanic and Atmospheric Administration (NOAA)

Pedro Vaz Teixeira - Massachusetts Institute of Technology (MIT)

Sally MacFarlane - U.S. Department Energy

Sandra Pires - Camoes Institute

Sonia Ortega - National Science Foundation

Stefano Lami - Embassy of Italy

Sunny Petzinger - National Oceanic and Atmospheric Administration (NOAA)

Terry Schaefer - National Oceanic and Atmospheric Administration (NOAA)

Timothy Walters - US Department of Energy

Vitor Mulas - World Bank


MONTHOFPORTUGAL
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'18

ATLANTIC INTERACTIONS

WORKSHOP

4

AIR Centre Sessions at *Encontro Ciência '18*, PORTUGAL

Venue – Lisbon Congress Center, Lisbon, Portugal

July 2nd-4th, 2018

SUMMARY

Encontro Ciência (National Science Summit) is a Portuguese annual meeting. It aims at promoting a broad debate on the main topics and challenges of science beyond the world of research. Hence, it stimulates the participation and the interaction among researchers, the business sector and the public.

Based on the 17 Sustainable Development Objectives (ODS), Ciência 2018's programme was organized around sessions to stimulate the debate on the design of the future 9th European Framework Program for Research and Innovation, 2021-2028.

The AIR Centre was present in two sessions. One session was fully dedicated to the AIR Centre, and the other was organized by the AIR Centre and dedicated to the Belém Statement.

AGENDA

MONDAY, 2ND JULY 2018

11:30 Implementing the Atlantic International Research Centre: on the progress achieved

Moderation: **Susana Catita**, MCTES
Initial Intervention: **Rafael Silva**, Gil Eanes Secondary School, Lagos
Introduction: **Jose Luiz Moutinho**, AIR Centre Implementation Team

Panel:

Rui Oliveira, INESC TEC - AIR_DataNET
Joaquín Hernandez Brito, PLOCAN – In-situ Observations
Ramiro Neves, MARETEC / IST – Modelling World's Oceans
Samuel Djadvinia, GEO Blue Planet – Earth Observation for monitoring the SDGs
Ricardo Mendes, TEKEVER – NewSpace Industry
Cristina Marta-Pedroso, IST – Ecosystems Services and Functions

Debate

14:00 **The Belém Statement - Scientific Diplomacy in the Atlantic**

Moderation: **Paulo Ferrão**, FCT
Introduction: **Gonçalo Zagalo**, FCT - The Belem Statement,
The Implementation Meeting in Salvador de Bahía (July 2018) and upcoming collaboration project plans

Panel:

Vinny Pillay, Deputy HLG Senior Science and Technology Representative to the European Union, Department of Science and Technology South Africa in Brussels
Jonas Guimarães Ferreira, Counselor, Sector of Economic Matters - Representation from the Embassy of Brazil in Lisbon
Joaquín Hernandez Brito, PLOCAN- Plataforma Oceánica de Canarias, Spain
- A choice of projects and collaborations in the South Atlantic
João Miguel Janeiro, CIMA - Universidade do Algarve - AtlantOS Societal Benefit Pilot Actions
Frank Neumann, AIR Centre Implementation Team,
The AIR Centre as potential tool for the implementation of the Belém Statement

Debate

ATLANTIC INTERACTIONS

WORKSHOP

5

Pennsylvania State University Meeting, USA

Venue – Pennsylvania State University, State College, Pennsylvania, USA

July 9th, 2018

AGENDA

14:00 – 14:10 **Opening Remarks**
Michael Adewumi, Vice Provost for Global Programs

14:10 – 14:30 **AIR Core Team Presentation**
Jenni Evans, Director of Institute for CyberScience
Jose Pinto Duarte, Director of the Stuckeman Center for Design Computing
Greg Jenkins, Professor of Meteorology
Sven Bilén, Head of the School of Engineering Design,
Technology and Professional Programs

14:30 – 15:10 **Institute Presentations:**
14:30 – 14:40 **Michael Hickner**, Associate Director of Materials Research Institute
14:40 – 14:50 **Tom Richard**, Director of Institutes for Energy and the Environment
14:50 – 15:00 **Jim Marden,** Associate Director of Huck Institutes of the Life Science
15:00 – 15:10 **Jenni Evans**, Director of Institute for CyberScience

15:10 – 15:20 **Environment Center Related Presentations**
Erica Smithwick, Director of Center for Landscape Dynamics

15:20 – 15:35 **Office of Global Programs Presentation**
Robert Crane, Associate Vice Provost for Global Programs

15:35 – 15:45 **Innovation Park Presentation**
Dan Leri, Director of Industrial Partnerships Innovation Park Office

15:45 – 16:30 **Discussions including other attendees:**
Armen Kemanian, Professor of Plant Sciences
Klaus Keller, Professor of Meteorology
Chris Forest, Associate Director for Network for Sustainable Climate Risk Management
Shadi Nazarian, Associate Professor at the Stuckeman School of Architecture
and Landscape Architecture

LIST OF PARTICIPANTS

Shadi Nazarian

Chris Forest

Klaus Keller

Armen Kemanian

Dan Leri

Robert Crane

Erica Smithwick

Jenni Evans

Jim Marden

Tom Richard

Michael Hickner

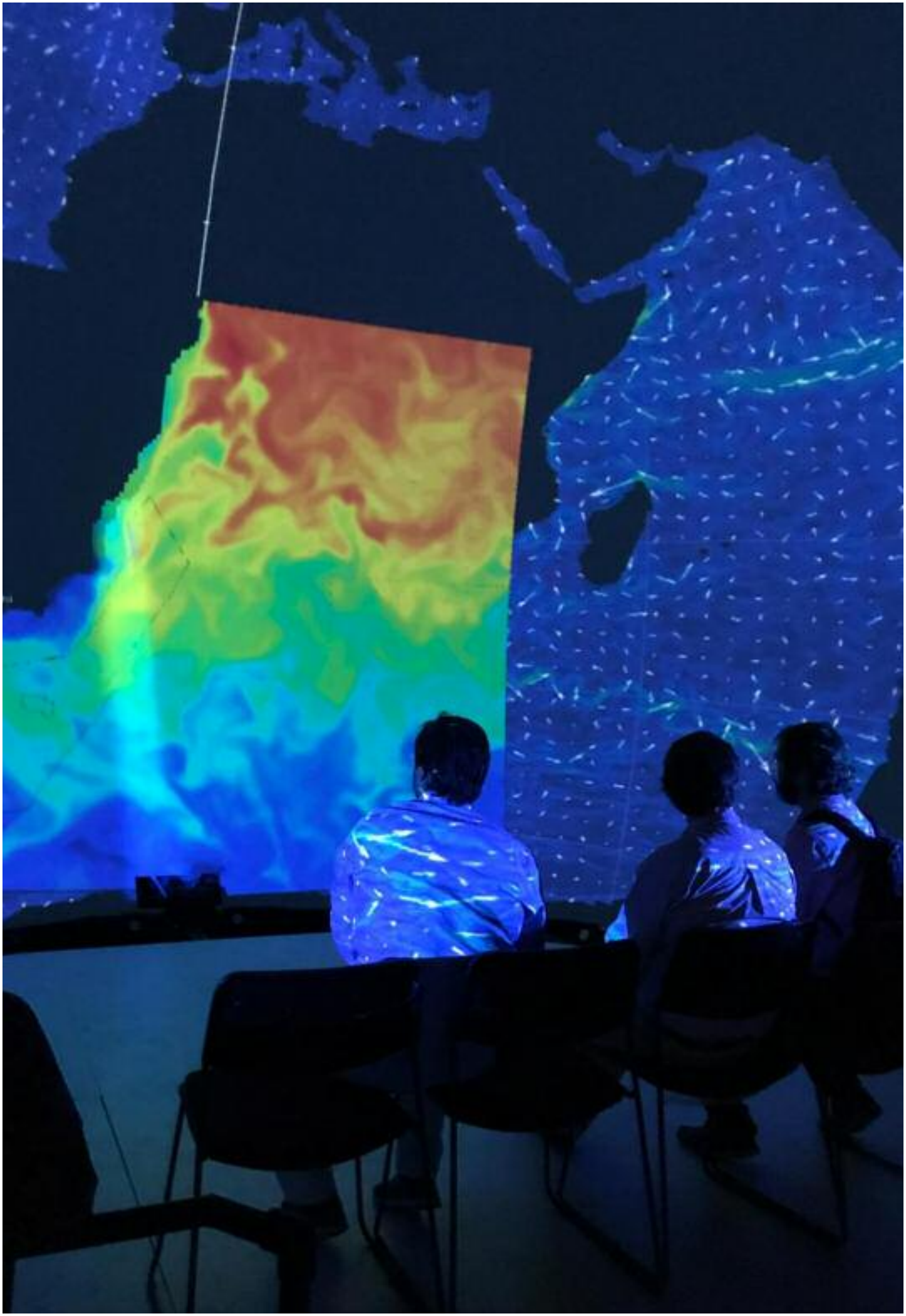
Sven Bilén

Greg Jenkins

Jose Pinto Duarte

Jenni Evans

Michael Adewumi



ATLANTIC INTERACTIONS

WORKSHOP

6

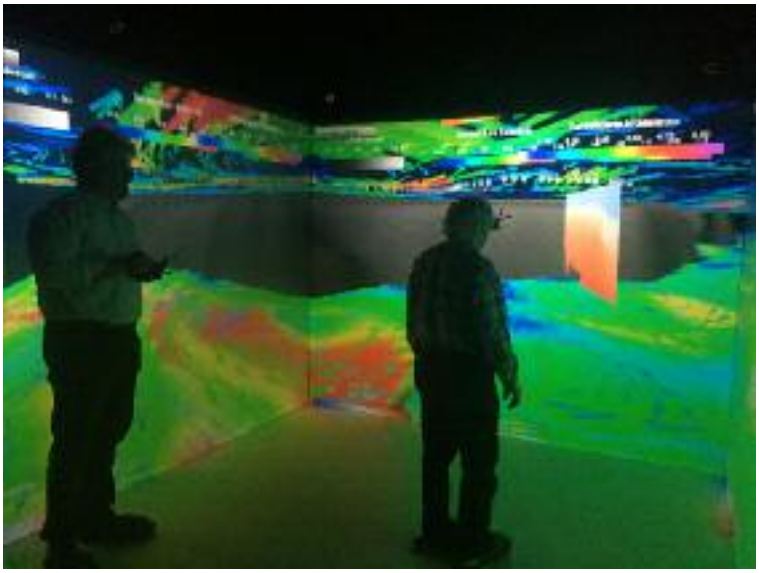
Meeting Lamce COPPE / AIR Centre, Brazil

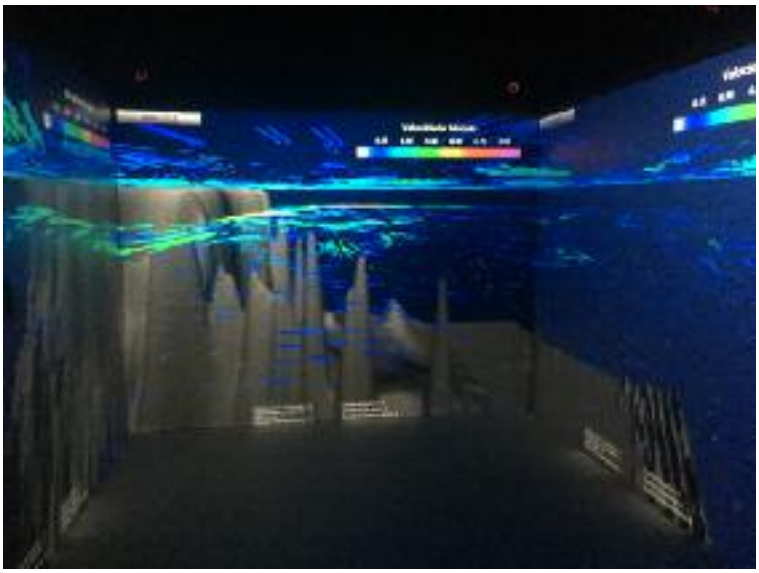
Venue – Technology Park, Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil

August 14th, 2018

SUMMARY

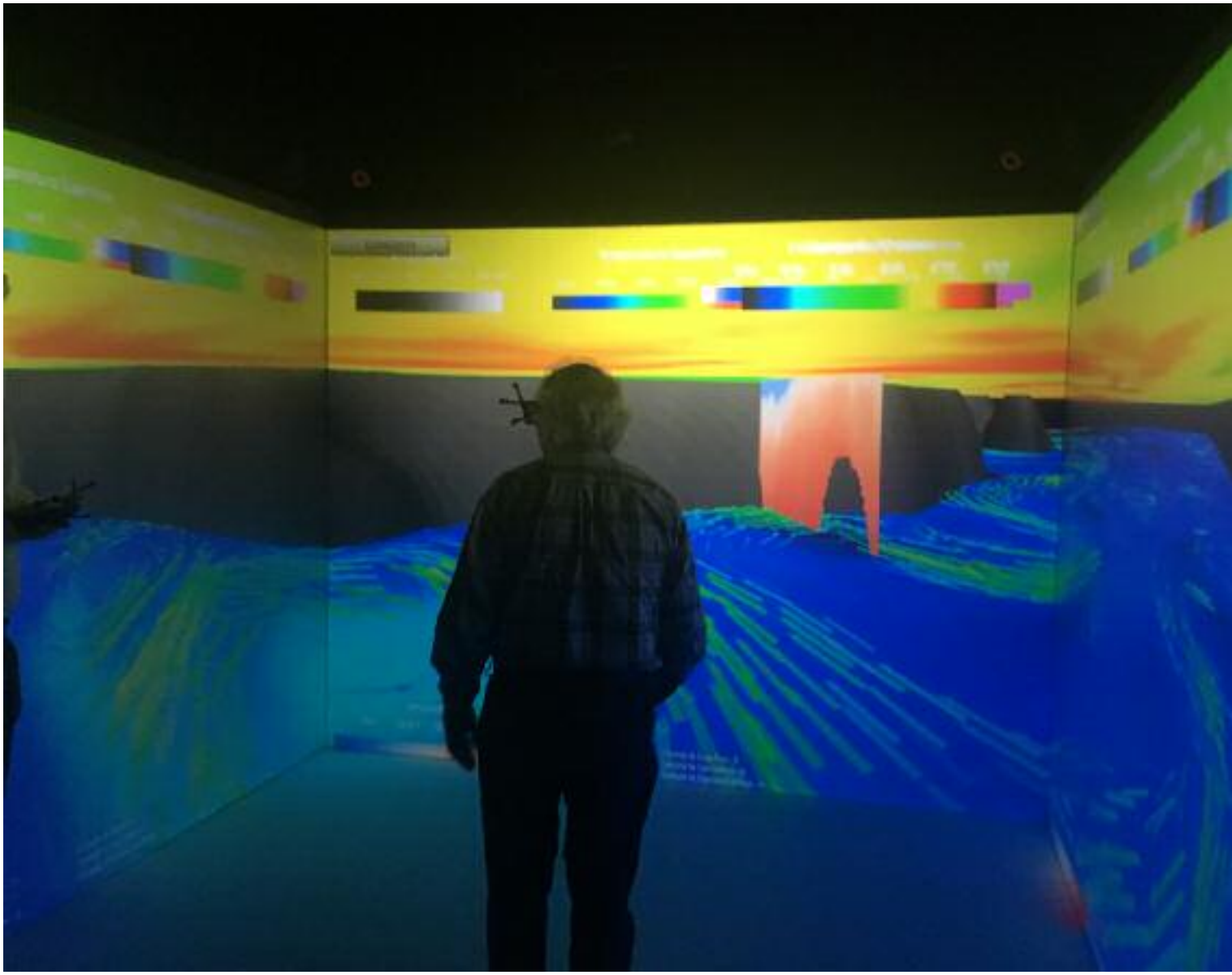
The meeting between Laboratory of Computational Methods in Engineering (LAMCE) and the AIR Centre began with a presentation of the laboratory structure, located in the Technology Park of the UFRJ. The technical visit was followed by an interesting demonstration of the Integrated System between High Performance Computing and scientific visualization and a presentation of 3D hydrodynamic modeling results of the Brazilian / South Atlantic ZEE in the Basement and the Domo. The meeting concluded with a proposal of MoU signing for the establishment of the Air Center's UFRJ Node, through the Technological Park and COPPE





LIST OF PARTICIPANTS

Fabio Hochleitner, Lamce/ COPPE/UFRJ
Gerson Gomes Cunha, Lamce/ COPPE/UFRJ
José Luiz Moutinho, AIR Centre
José Manoel de Mello, Faperj
Leonardo Melo, Technology Park UFRJ
Leonardo Peçanha, Lamce/ COPPE/UFRJ
Luiz Landau, Lamce/ COPPE/UFRJ
Luiz Paulo Assad, Lamce/ COPPE/UFRJ
Marco José, Lamce/ COPPE/UFRJ
Maria Celia Lopes, Lamce/ COPPE/UFRJ
Roberto Pitombo, Lamce/ COPPE/UFRJ




MARINE LITTER: microplastics
First preliminary results on microplasticos collected in the stomach contents of some pelagic and demersal species

ATLANTIC INTERACTIONS

WORKSHOP

7

AIR Centre Two-Day Consultative Workshop, South Africa

Venue – Council for Scientific and Industrial Research (CSIR),
Cape Town Satellite Campus, Cape Town, South Africa

September 13th-14th, 2018

SUMMARY

This workshop established collaborative priorities for the AIR Centre activities from a regional Southern African and Brazilian perspective, under the guidance of the South-South Framework. The workshop covered AIR Centre Societal Benefit Areas (SBAs) such as mitigation and adaptation to climate change, marine resources and biodiversity, data science and sustainable energy systems. The outcomes will be used to guide the development of the vision for the AIR Centre scientific agenda, South African national engagement and potential H2020 calls around the Belem Agreement.

AGENDA

THURSDAY, SEPTEMBER 13TH, 2018

9:00 – 9:30 **Session 1: Registration**

9:30 – 10:15 **Session 2: Opening Remarks – Welcome and Keynote Address**
Facilitator: **Dr. Steward Bernard**
Mr. Daan Du Toit, Deputy Director-General: Department of Science and Technology (DST)
Dr. Antonio Sarmento, AIR Centre Ambition and Implementation Status

10:15 – 10:45 **Session 3: Setting the Scene**
Dr. Steward Bernard, Earth Systems Earth Obervation CSIR – NRE Centre for High Performance Computing

10:45 – 11:30 **Session 4: EO: System integration from outer space to deep ocean**
Duncan Stanton, CEO: Space Advisory Company (SAC)
Milton Kampel, INPE, National Institute of Spatial Research, Brazil
Presentation via videoconference
Colin Schwegmann, CSIR Meraka, The Oceans and Coastal Information Management Service (OCIMS)

11:30 – 12:00 **Session 5: AIR Centre main areas of interest, potential joint projects and funding opportunities**
Dr. Domingos da Silva Neto, Ministry of Higher Education, Sciencie, Technology and Innovation, Angola
Mr. Michel Nxumalo, National Research Foundation, SA
"Overview of South Africa's joint funded research with Namibia and Angola"

12:00 – 13:30 **Lunch**

13:30 – 15:00 **Session 6: Marine Resources and Biodiversity**
Dr. Gilbert Siko, Director Marine and Polar Research, Paleosciences, Department of Science and Technology (DST)
Nicole du Plessis, Southern African Earth Observation Network (SAEON)
Joaquin Brito, PLOCAN, Spain
Presentation via videoconference

14:00 – 16:00 **Session 7: Health and Clean Ocean (Discussion)**
Luiz Paulo Assad, LAMCE COPPE, Brazil
José Luiz Moutinho, AIR Centre

16:00 **Summary of Outcomes of Day 1**

Closing Tea Break

FRIDAY, SEPTEMBER 14TH, 2018

9:00 – 9:30 **Session 1: Recap of Outcomes Day 1**

9:30 – 11:00 **Session 2: Mitigation and Adaptation to Climate Change and Natural Hazards**
Gregory Jenkins, Penn State, USA, Mitigation and Adaptation to Climate Change, Resilience of Coastal Areas Presentation via videoconference
Dr. Christo Rautenbach, Chief Marine Scientist, SA Weather Service: High resolution ocean modelling
Dr. Samuel Mafwila, University of Namibia
Dr. Marcello Vichi, Oceanography, UCT, Adapting to complexity: benefits of international collaboration in ocean science education

11:00 – 12:00 **Session 3: Sustainable Energy Systems (Discussion)**
Dr. Antonio Sarmento, AIR Centre

12:00 – 13:00 **Lunch**

13:00 – 14:30 **Session 4: Data Science**
Dr. Werner Janse van Rensberg, CPHC/CSIR
"Background and Collaboration opportunities with the CHPC"
Mr. Josep Martorell, Barcelona, Spain
Presentation via videoconference

14:30 – 15:00 **Session 5: Summary of the two days & Conclusion**

LIST OF PARTICIPANTS

António Sarmento, Chair of the Executive Committee AIR Centre

Ashley Johnson, Department of Environmental Affairs (DEA), South Africa

Cecil Masoka, Department of Science and Technology (DST), South Africa

Christo Rautenbach, South African Weather Service (SAWS)

Colin Schwegmann, CSIR Meraka

Daan Du Toit, Department of Science and Technology (DST), South Africa

Deirdre A. Byrne, Oceans and Coasts, Departmentof Environmental Affairs, South Africa

Domingos da Silva Neto, Ministry of Higher Education, Science, Technology and Innovation, Angola

Duncan Stanton, Space Advisory Company

Frank Neumann, AIR Centre

Gilbert Siko, Department of Science and Technology, South Africa

Gregory Jenkins, Penn State University

Hilka Ndjaula, University of Namibia

José Arsénio, Consul General of Portugal

José Luiz Moutinho, AIR Centre

Josep Martorell, Barcelona Supercomputing Centre (BSC)

Juliet Hermes, South African Environmental Observation Network (SAEON)

Karabo Mphogo, Department of Science and Technology (DST)

Luiz Landau, Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE)

Luiz Paulo Assad, Alberto Luiz Coimbra Institute for Graduate Studies and Engineering Research (COPPE)

Marcello Vicchi, University of Cape Town (UCT)

Michael Nxumalo, National Research Foundation (NRF)

Milton Kampel, National Institute for Space Research (INPE), Brazil

Nicole du Plesis, South African Environmental Observation Network (SAEON)

Palesa Motsoeneng, Department of Science and Technology (DST)

Paulo Coelho, Ministry of Fisheries, Angola

Samuel Mafwila, University of Namibia

Selby Modiba, Department of Science and Technology (DST)

Steward Bernard, Council for Scientific and Industrial Research (CSIR)

Tracy Klarenbeek, National Research Foundation (NRF)

Werner Janse van Rensburg, Centre for High Performance Computing (CHPC)

ATLANTIC INTERACTIONS

WORKSHOP

AIR Centre Policy & Research Workshop, United Kingdom

Venue – Residence of the Ambassador of Portugal, London, UK

October 3rd, 2018

SUMMARY

This AIR Centre policy research workshop aimed at exploring synergies for future collaboration within the AIR Centre among an audience of participants representing 14 research institutes, 11 government agencies and 4 companies. The AIR Centre ambition, implementation status and initial thoughts on funding and governance were presented and discussed and as well as the potential interest of industrial representatives.

OPENING SPEECH

by MANUEL LOBO ANTUNES,
AMBASSADOR OF PORTUGAL IN THE UK

Ladies and Gentlemen,
I'm delighted to welcome you all to the Embassy this morning to discuss a topic of such importance to Portugal. I'm very happy to host such a variety of institutions represented here today, including Government departments, universities, research institutes and companies. As I understand it, the AIR Centre is precisely about that: bringing together different actors from different countries around the common purpose of furthering research on space, climate change and energy, earth and ocean science in the Atlantic.

The Portuguese Prime Minister António Costa had the chance to speak to Mrs. May about the AIR Centre project when they met in Dowining Street in April this year. Both leaders agreed to step up cooperation in the field of science and innovation in the future, particularly in the context of Brexit.

Soon after, and taking this common desire forward, the Portuguese Minister of Science, Technology and Higher Education, Manuel Heitor, met with this counterpart Sam Gyimah. Their respective teams set up a working work and have been working together on taking forward a number of initiatives to strengthen collaboration in the future.

Therefore, I hope today's workshop will be fruitful and contribute to a better understanding by our British and other partners, at a more technical level, on what the AIR Centre is all about.

I now give the floor to the experts. Professor António Sarmento, Chair of the AIR Centre Executive Committee, the floor is yours.

AGENDA

WEDNESDAY, OCTOBER 3RD, 2018

09:00 – 09:30 **Registration**

09:30 – 10:00 **Welcome Remarks: establishing the AIR Centre to address global challenges – ambition, implementation status, funding and governance**
Manuel Lobo Antunes, Portuguese Ambassador to the United Kingdom
António Sarmento, Chair of the AIR Centre Executive Committee
Moderator: **António Sarmento**, Chair of the AIR Centre Executive Committee

10:00 – 10:30 **Round Table #1: Governance and Operation of the AIR Centre – How the AIR Centre works in practice; Funding structure; How the AIR Centre aims to create synergies; Access to infrastructure**

10:30 – 11:00 **Coffee Break**

11:00 – 11:45 **Round table #2: Promoting multilateral research and innovation through the AIR Centre**
Joaquin Brito, PLOCAN, Spain / Member of the AIR Centre Executive Committee
Vinny Pillay, Minister Counsellor (Science and Technology), South African Embassy to The United Kingdom of Belgium, The Grand Duchy of Luxembourg and Mission to the European Union

11:45 – 12:30 **Round Table #3: Addressing global challenges through the AIR Centre – Mitigation and Adaptation to Climate Change; Systems Integration from Deep Sea to Outer Space; Marine Resources and Biodiversity; Clean and Healthy Oceans; Renewables Energy Systems; and Data Science**
Nicholas Veck, Satellite Applications Catapult

12:30 – 12:45 **Closing Remarks**
António Sarmento, Chair of the AIR Centre Executive Committee

12:45 – 14:00 **Networking Lunch**

LIST OF PARTICIPANTS

Alan Lowdon - Offshore Renewables Energy Catapult

Allaine Cerwonka - Alan Turing Institute

António Sarmento - AIR Centre Implementation Team

Cathrine Armour - United Kingdom Hydrographic Office (UKHO)

Cecil Masoka - Department of Science and Technology, Ministry of Science and Technology, South Africa

Dan Maxwell - GO-Science

David Brown - Sonardyne

Devika Botschinsky - Department of Business, Energy & Industrial Strategy (BEIS), UK

Edward Lewis-Smith - Department of Business, Energy & Industrial Strategy (BEIS), UK

Eleanor Webster - Department of Business, Energy & Industrial Strategy (BEIS), UK

Frank Neumann - AIR Centre Implementation Team

Frederico Lyra - British Embassy Lisbon

Gaia Stucky de Quay - Imperial College

Giulia Manzetti - European Space Agency (ESA)

Helene Margue - Royal Society

Hugh Kelliher - Space ConneXions

João Mota - Heriot-Watt University

Jon Downes - University of Southampton

Jose Joaquin Hernandez-Brito - Oceanic Platform of the Canary Islands (PLOCAN)

José Luiz Moutinho - AIR Centre Implementation Team

Kristopher Ford - Department of Business, Energy & Industrial Strategy (BEIS), UK

Luís Miguel Lacerda - Portuguese Association of Researcher and Students in the UK (PARSUK)

Mariana Servini - Foreign & Commonwealth Office (FCO)

Michael Lawrence - Telespazio

Michel McTernan - Imperial College

Mike Meredith - British Antarctic Survey (BAS)

Naomi White - Department of Business, Energy & Industrial Strategy (BEIS), UK

Nick Veck - Satellite Applications Catapult

Robert Gunn - National Physical Laboratory (NPL)

Ross Jolliffe - Centre for Environment, Fisheries and Aquaculture Science (Cefas)

Russell Wynn - National Oceanography Centre (NOC)

Samantha Montanari – Foreign & Commonwealth Office (FCO)

Samuel Gilchrest - United Kingdom Hydrographic Office (UKHO)

Sarah Callaghan - RAL Space, STFC

Tom Greig - Telespazio

Victor Martinez-Vicente - UK rep under the Healthy and Clean Oceans WG (Plymouth Marine Laboratory)

Vinny Pillay - South African Embassy to the Kingdom of Belgium

Yves Plancheral - Imperial College

ATLANTIC INTERACTIONS

WORKSHOP

9

AIR Centre Session at Ocean Frontier Institute Conference, Canada

Introducing the AIR Centre: a new organization for international research cooperation across the Atlantic

Venue – Delta Hotels St. John's Conference Centre, St. john's, Newfoundland, Canada

October 10th, 2018

SUMMARY

This session took place within the OFI Conference – a conference on North Atlantic opportunities – with the aim of introducing the AIR Centre to the Canadian R&D Community of the relevant areas as a new organization for international research cooperation along and across the Atlantic and counted with presentations from two guest speakers. The session also included an introduction done by Jerry Miller focused on the outcomes of the AIR Centre workshop that took place in Washington in July 2018.

AGENDA

WEDNESDAY, OCTOBER 10TH, 2018

18:00 **Jerry Miller**, Science for Decisions
Introduction: AIR Centre and North America

18:05 **António Sarmento**, AIR Centre Implementation Team
The Atlantic International Research Centre: Introduction and Implementation Status

18:30 **Suzan Lozie**r, Duke University
OSNAP: Overturning in the Subpolar North Atlantic Program

18:40 **Richard Dewey**, University of VictoriaOcean networks Canada
advancing ocean observation and smart oceans systems

18:50 **Debate**

LIST OF PARTICIPANTS

Akash Rastogi

António Sarmento - AIR Centre

Benoît Pirenne - Ocean Networks Canada

Bjorn Erik Axelsen - Institute of Marine Research, Norway

Britt Dupuis - Fisheries and Oceans Canada / Government of Canada

Dave Murrin - National Research Council of Canada/ Ocean, Coastal and River Engineering

Emma Shouldice - Memorial University of Newfoundland - Dept. Physics & Physical Oceanography

Fiona Grant - International Programmes, Marine Institute

Francesca Kerton - Memorial University of Newfoundland - Department of Chemistry

Frank Neumann - AIR Centre

Frederik Whoriskey - Dalhousie University

Gaurav Madan - Memorial University of Newfoundland

Glenn Blackwood - Fisheries and Marine Institute of Memorial University of Newfoundland

Gordon Slade - Shorefast Foundation – Fogo Island

Jerry Miller - Science for Decisions

Justin Moores - Synapse Inc

Kelley Santos - Office of Research & Development / Fisheries and Memorial University of Newfoundland

Kes Morton - Pisces Research Project Management INC.

Kim Thomson - Ocean Frontier Institute (OFI)

Lawrence P. Hildebrand - World Maritime University

Mark Murphy - National Research Council of Canada/ Ocean, Coastal and River Engineering

Michel Dumoulin - National Research Council

Neus Campanyá i Llovet - Ocean Sciences Centre / Memorial University of Newfoundland

Obreahny O'Brien - Lenox Group

Paul Snelgrove - Ocean Frontier Institute (OFI)

Richard Dewey - Ocean Networks Canada/University of Victoria

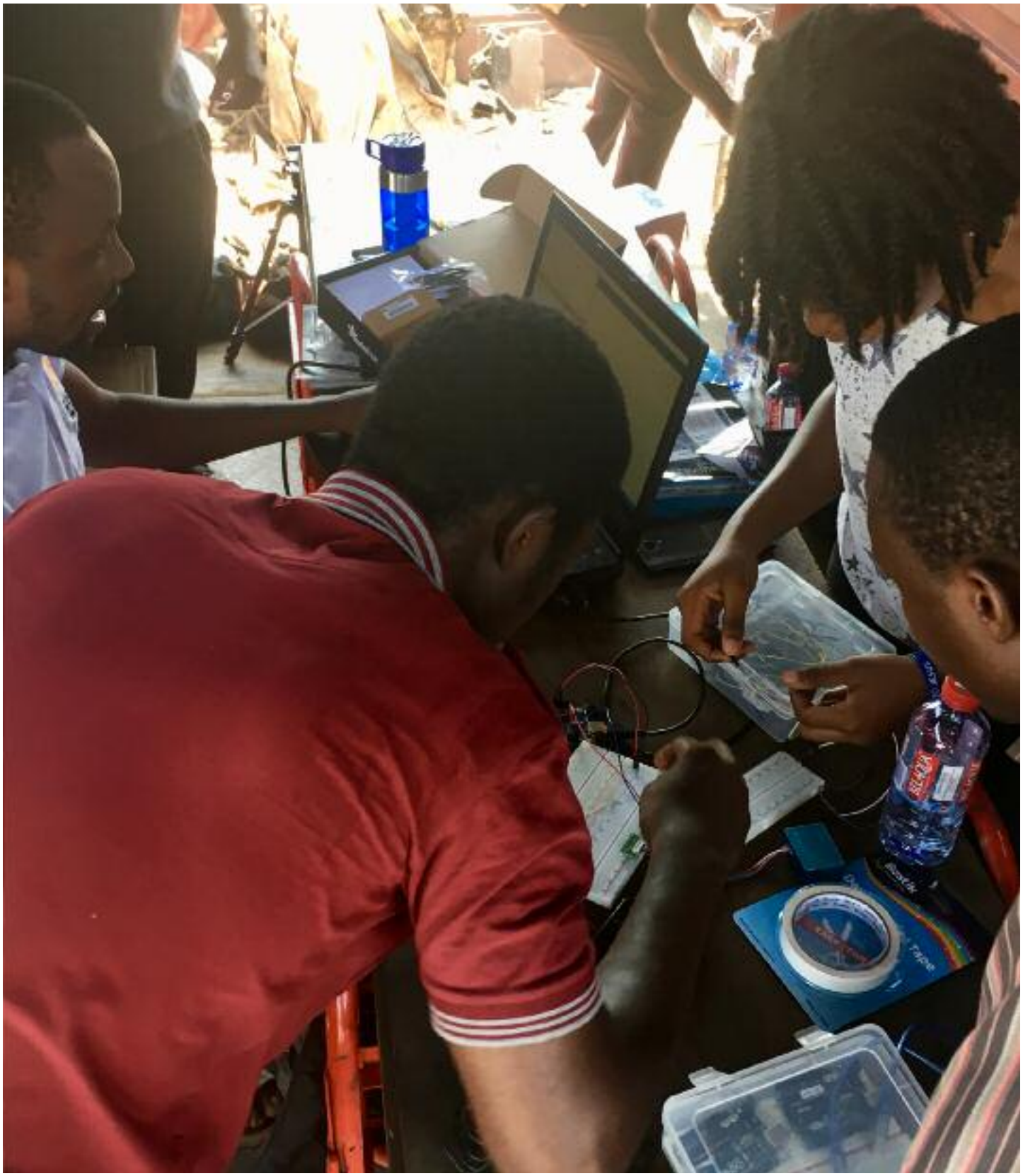
Stefan Leslie - Marine Environmental Observation, Prediction and Response Network (MEOPAR)

Subhadeep Rakshit - Department of Oceanography, Dalhousie University

Toby Balch - Centre for Marine Applied Research

Wendy Watson-Wright - Ocean Frontier Institute (OFI)

Yi Liu - Fisheries and Marine Institute - Memorial University of Newfoundland



ATLANTIC INTERACTIONS

WORKSHOP

10

AIR Centre Two-Day Maker Workshop: Design Innovation for Coastal Resilience, Ghana

Venue – Ashesi University, Berekuso & AMP Spacecraft, Accra, Ghana

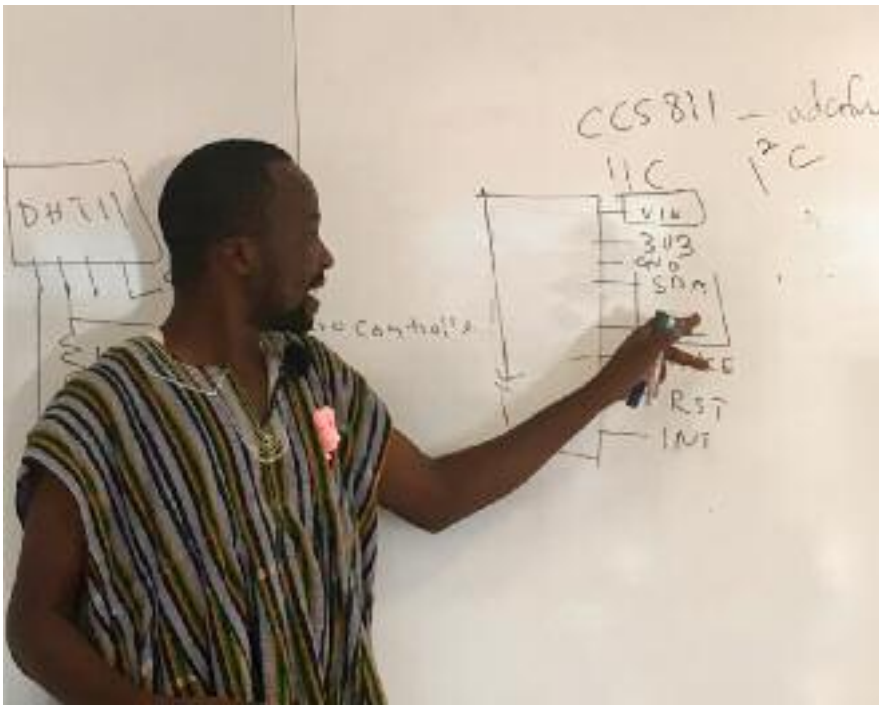
October 19th - 20th, 2018

SUMMARY

This workshop brought together key stakeholders active in Ghana's entrepreneurship, innovation, technology and scientific research communities to explore opportunities to leverage indigenous forms and networks of R&D to drive expanded models of resilience in Coastal West Africa. Insights gained from this workshop are to be compiled and incorporated into ongoing development of an international framework for transatlantic design-led coastal resilience. The main objective of the workshop was to test the feasibility of building low-cost sensors for implementing Citizen's Science projects. With a total of 32 participants, the workshop demonstrated that low-cost sensors could be built by undergraduate students and used to collect reliable environmental data.

LIST OF PARTICIPANTS

Alberta Danso - Ashesi University
Alexander Denkyi - Ashesi University
Anita Antwiwaa - Space Systems Technology Lab / All Nations University College
Benjamin Bonsu - Space Systems Technology Lab / All Nations University College
Bryan Achiampong - Ashesi University
Christopher Anamalia - Ashesi University
D. K. Osseo-Asare - Penn State
Danyuo Yiporo - Ashesi University
Ernest Opoku-Kwarteng - Centre for Remote Sensing and Geographic Information Services (CERSGIS)
Ernest Teye Matey - Space Systems Technology Lab / All Nations University College
Faka Nsadisa - South African Development Community – Climate Services Centre (SADC-CSC)
Foster Mensah - Centre for Remote Sensing and Geographic Information Services (CERSGIS)
Francis Smita - Namibia Institute of Space Technology (NIST) / Namibia University of Science and Technology (NUST)
G. Ayorkor Korsah - Head of Department of Computer Science / Ashesi University
Gameli Magnus Kwaku Adzaho - Next Einstein Forum
George Senyo Owusu - Centre for Remote Sensing and Geographic Information Services (CERSGIS)
Gordon Adomdza - Ashesi University/D:Lab
Gregory Jenkins - Penn State
Hannah Lormenyo - Ashesi University
Ivana Ayorkor Barley - Ashesi University
Joseph Neenyi Quansah - Space Systems Technology Lab / All Nations University College
Kenobi Morris - Ashesi University
Kristen Agyeman-Prempeh - Ashesi University
Kwame Adu Agyekum - ECOWAS MESA (Monitoring for Environment and Security in Africa)
Melissa Bui - EWB Fellowship Program
Nathan Amanguah - Dean Engineering Department / Ashesi University
Nicholas Korblah Tali - Ashesi University /D:Lab
Nkosinathi Mzembe - Ashesi University
Nutifafa Cudjoe Amedior - Ashesi University
Rasheeda Mohammed Alhassan - Ashesi University
Selorm Kosi Lodonu - Ashesi University
Stella Ofori-Ampofo - Centre for Remote Sensing and Geographic Information Services (CERSGIS)
Victor Owusu - ECOWAS MESA
William Akuffo - Ashesi University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ATLANTIC INTERACTIONS

WORKSHOP

11

Preliminary Meeting of Workshop on "Ocean and Coastal Information in Support of Marine Resources and Biodiversity in the Macaronesia, São Tomé and Príncipe Region", Faial, Azores

Venue – Museu Fábrica da Baleia, Horta, Faial, Azores, Portugal

October 29th, 2018

SUMMARY

In coordination with the GEO Blue Planet Initiative, Future Earth Coasts and the Marine Biodiversity Network (MBON), the AIR Centre is co-organizing a workshop in Mindelo, Cape Verde, scheduled for February 2019, to identify initiatives under the topic of Marine Resources and Biodiversity. This workshop builds upon two preliminary cross-sectoral and cross-disciplinary meetings, which took place in Faial (October 29th, 2018) and in Las Palmas (November 15th, 2018), to better understand local and regional information needs to enhance job creation and innovation in the blue economy and to foster the sustainable use of marine resources as a main economic component.

The main challenges discussed during the first meeting were the low resolution of existing satellite data and the lack of qualified personnel to retrieve and convert the required data into interpretable information. As an outcome, the main user needs for an virtual/artificial user need 'Azores' was formulated as 'I want to see the distribution of biodiversity in the water column of 0-20m deep; to enable identification of biodiversity changes, support coastal resource and risk management, harmful algal bloom detection, ocean litter monitoring, etc'.

Organizing committee: Emily Smail, NOAA/GEO Blue Planet | Francisco Wallenstein, Regional Government of the Azores | Frank Muller-Karger, GEO MBON | Gabrielle Canonico, NOAA/GEO MBON | Isabel Chavez, UNESCO | Joaquin Brito, PLOCAN | Jorge del Rio Vera, UNOOSA | José Moutinho, AIR Centre | Martin Le Tissier, Future Earth Coasts | Paul DiGiacomo, NOAA/GEO Blue Planet | Piero Messina, ESA | Samuel Djavidnia, GEO Blue Planet | Shubha Sathyendranath, Plymouth Marine Laboratory | Sophie Seeyave, POGO/GEO Blue Planet

AGENDA

9:00 – 9:30	**Registration**
9:30 – 9:45	**Welcome**
9:45 – 10:15	**Workshop methodology /Presentation and participants expectations**
10:15 – 11:00	**Development of User Stories**
11:00 – 11:30	**Coffee Break**
11:30 – 12:30	**Working Groups – Information Needs** 1. Fisheries 2. Aquaculture 3. Biodiversity 4. Marine Spatial Planning 5. Cetaceans Observation
12:30 – 13:00	**Presentation of information preliminary needs**
13:00 – 14:00	**Lunch**
14:00 – 15:00	**WG discussion and production of supporting documentation**
15:00 – 15:30	**Identification of gaps and main challenges for the Azores region**
15:30 – 16:00	**Coffee Break**
16:00 – 16:45	**Presentation and discussion of WG results**
16:45 – 17:00	**Summary with key results**
17:00 – 17:30	**Wrap up and next steps**

LIST OF PARTICIPANTS

Alexandra Guerreiro

Ana Martins - University of Azores / OKEANOS

Ana Neto - University of Azores / CE3C

Artur Oliveira - SeaExperts

Carla Dâmaso / Maria Joana Cruz - Sea Observatory of the Azores (OMA)

Carla Melo - SIMBIENTE

Christopher Pham - University of Azores / Department of Oceanography and Fisheries

Erica Cruz - WavEC Offshore Renewables

Ester Pereira - City Council of Horta, Azores

Frederic Vandeperre - University of Azores / Department of Oceanography and Fisheries

Frederico Pessanha - Endemic-Açores

Hugo Pacheco - The Azorean Sailing Association (ARVA)

Jorge Fontes - University of Azores / Department of Oceanography and Fisheries

Norberto Serpa - Norberto Diver

Workshop organization team - Regional Fund for Science and Technology (FRCT):
Bruno Pacheco, Emmanuel Mendonça, Francisco Pinto, Francisco Wallenstein,
Luís R. Santos, Maria Dutra, Maria Silveira, Maria Vale

ATLANTIC INTERACTIONS

WORKSHOP

12

AIR Centre Information Meeting, Norway

Venue - Auditorium of the Norwegian Research Council Norway (RCN), Oslo, Norway

November 6th, 2018

SUMMARY

The purpose of this workshop, supported by the Portuguese Embassy in Oslo, was to introduce the AIR Centre to the Norwegian R&D Community of the relevant areas, to outline the AIR Centre implementation status and to identify potential collaborations.

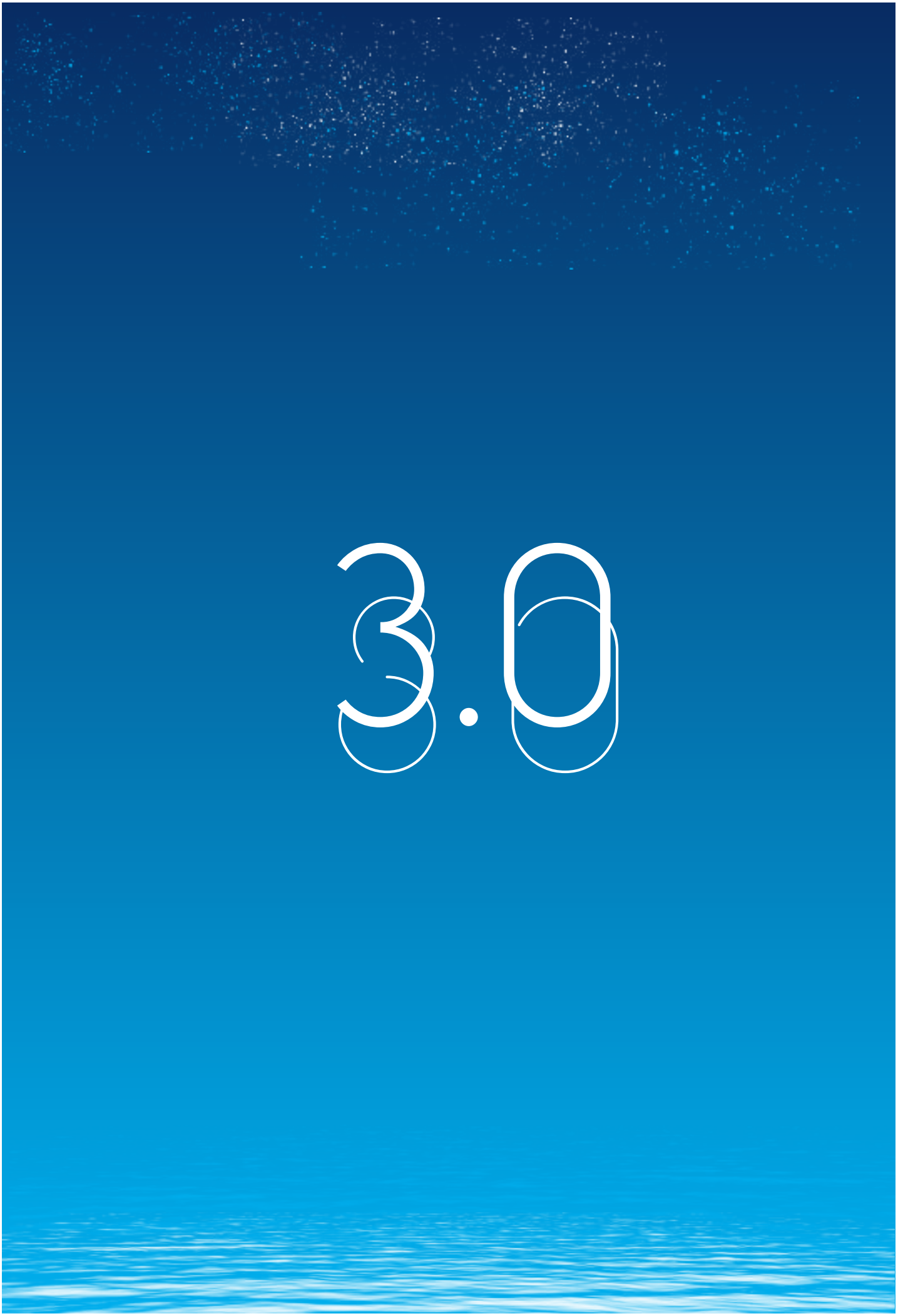
AGENDA

TUESDAY, NOVEMBER 6TH, 2018

9:30 – 10:00	**Welcome and registration** **Frank Neumann**, AIR Centre Implementation Team
10:00 – 10:40	**Welcome note from Ambassador of Portugal in Oslo, António Quinteiro** **AIR Centre introduction + Q&A - António Sarmento, Executive Director AIR Centre**
10:40 – 11:00	**Norwegian Expert notes – exemples for relevance of AIR Centre vision** **Cristina Guerreiro**, NILU **Arne Fredheim**, Sintef Ocean
11:00 – 11:30	**Coffee Break**
11:30 – 12:00	**Norwegian Expert notes – views on relevance of AIR Centre vision Brief interventions according to availability; Veterinærinstituttet, NTNU, UiB/Marine Cluster, UiB/Bjerknes, IMR, Aquaplan NIVA, Revocean, Framsenteret**
12:00 – 12:30	**Final Discussion**

LIST OF PARTICIPANTS

Aleksandra Haugstad, Research Council of Norway (RCN)
Alexandra Neyts, NTNU, Norwegian University of Science and Technology
Alice Newton, Norwegian Institute for Air Research (NILU)
Arne Fredheim, Sintef Ocean
Beatriz Balino, UiB / Norwegian Marine University Consortium
Carlos das Neves, Veterinærinstituttet (VI)
Cristina Guerreiro, Norwegian Institute for Air Research (NILU)
Edgar Brun, Veterinærinstituttet (VI)
Evert Bouman, Norwegian Institute for Air Research (NILU)
Frank Neumann, AIR Centre
Frode Kjersem, Framsenteret
Gry Ulverud, Revocean
Herman Farbrot, Research Council of Norway (RCN)
Kathryin A. Donnelly, Framsenteret
Kristin Thorud, Research Council of Norway (RCN)
Pål Buhl-Mortensen, Institute for Marine Research (IMR)
Thor Magne Jonassen, Aquaplan Niva
Trude Vrålstad, Veterinærinstituttet (VI)
Øyvind Paasche, Bjerknes Centre (UiB)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