# The Atlantic International Research Centre: a framework for collaboration along and across the Atlantic Ocean

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The Atlantic International Research Centre (AIR Centre) results from a 2-year process of scientific diplomacy that started in a workshop in the UN premises in New York in November 2016 and continued over 30 scientific and policy workshops around the world. It is well aligned with the Galway Statement, signed in 2013 by the European Commission, the US and Canada, for the North Atlantic; the Belem Statement, signed in 2018 by the European Commission, Brazil and South Africa, for the South Atlantic; and the South-to-South Framework for Scientific and Technical Cooperation signed by Brazil and South Africa, also in 2018.

As a result of this process, four countries are leading the implementation of the AIR Centre through their participation in the Executive Committee: Portugal, Spain, Brazil and South Africa. Five other countries are associated with the AIR Centre (Uruguay, Angola, Nigeria, Sao Tome and Principe and Cape Verde) and three are observers (UK, Argentina and India).

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

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

The AIR Centre aims at working for the benefit of people living on the islands and margins of the Atlantic by addressing challenges that are common to different regions or countries and by promoting projects that require the transregional and/or transnational dimension that the AIR Centre can provide. A good example is the presence of plastics in the ocean, its impact on human life and the identification of mitigation measures. This requires the observation and numerical simulation of the entire Atlantic Ocean. The implementation of the required mitigation measures implies, among others, new legislation and a change in the behavior of

the population on the two sides and two hemispheres of the Atlantic. The AIR Centre is a unique facilitator not only to develop the science required to address the problem, but also to effectively disseminate the results among the governments and population.

Another relevant ambition for the AIR Centre is to work together with funding bodies, so that the identification of projects is aligned also with the priorities of S&T national and regional funding agencies, the European Commission, the EEA Gants, other bilateral funding schemes and private funding bodies, for science driven projects, and the priorities of the multilateral banks (BAfD, IDB, EIB, WB) for projects with socioeconomic impact. Additionally, the AIR Centre will seek to identify and develop business opportunities together with its partner companies.

The AIR Centre will have a lean central structure with the head offices in the Azores, whose mission is to create value on the existing research, observation, super-computation and big-data infrastructures by identifying relevant projects, promoting cooperation, facilitating the access of research centers and companies to theses infrastructures, while fostering the development of science culture and ocean literature to the wide population.

The AIR Centre Steering Committee and Executive Committee (ExCo) were created in November 2017 by the Florianopolis Declaration in Brazil. Their mandate is to set-up the AIR Centre until November 2018 as a private non-for-profit organization under the Portuguese law and to make it evolve to an international scientific network organization in a later phase. At the present stage, eight months after the Florianopolis Declaration, several important milestones have been attained:

- The definition of a R&D agenda on “Atlantic Interactions” including a Basic Scientific Program and Cross-Cutting Initiatives through consultation with different stakeholders in Brazil, Cape Verde, Nigeria, South Africa, Spain, Portugal, USA, UK and Norway;
- The setup of a non-for-profit organization to promote the AIR Centre under the Portuguese law with financial support from Portugal and the setup of a support team to assist the Steering Committee and Executive Committee in their mission;
- The attraction of partners in countries not yet formally involved in the AIR Centre to promote joint initiatives, such as from the USA, UK and Norway, as well as relevant international organizations such as the GEO, Blue Planet, UNOOSA and World Bank;
- The promotion of MoUs between national and regional S&T funding agencies to support projects within the scope of the AIR Centre, and the understanding that initial projects should focus on mobility of researchers to strength the network and prepare better projects to be developed in 2019.

The AIR Centre’s Scientific Program is aligned with the Sustainable Development Goals (SDGs) of the United Nations, namely SDGs 1, 2, 7, 11, 13 and 14 under three streams:

- Understanding, predicting and adapting to Climate Change
- Understanding the Atlantic Ocean for a Healthy and Productive Ocean
- Clean, Affordable and Secure Energy for All

Its present version is structured in the six following Societal Benefit Areas, with several topics to be further developed:

- Marine Resources and Biodiversity:
    - Sustainable Fisheries
    - Aquaculture
    - Ecosystem Services and Functions
    - Deepsea Ecosystems
    - Biotechnology
- Healthy and Clean Ocean:
    - Plastics
    - Emerging pollutants
- Earth Observation from outer space to deep ocean:
    - Data integration from space, aerial and in situ observation systems
    - Underwater Robotics & Autonomous Vehicles
    - New Sensors
    - Modelling and mapping
- Mitigation and Adaptation to Climate Change and Natural Hazards
    - Resilient Cities & Coastal Areas
    - Disaster Risk Reduction
    - Ocean Acidification
    - Invasive species & loss of biodiversity o Polar Regions
    - Best Practices in Marine Spatial Planning and Maritime Protected Areas
- Sustainable Energy Systems
    - Marine Renewable Energy
    - Global Energy Interconnections
    - Sustainable Energy Systems for Islands and Isolated Areas
- Data Science
    - Artificial Intelligence (AI)
    - Machine learning
    - Deep learning
    - Standardization and Interoperability of data systems

The AIR Centre´s Cross-Cutting Initiatives consist of enablers to support the Scientific Agenda through facilitating access to super-computation & big data, research & observation infrastructures and knowledge:

- The AIR_DataNet, a supercomputing network of facilities and expertise supporting advanced and complex simulation models of the ocean and atmosphere and large sets of data including the Atlantic Data Cube and Atlantic GEOSS, two complementary data access tools focused on the Atlantic Ocean;
- The Atlantic Research Infrastructures, a tool to facilitate the access, cooperation and standardization related to the research, test and observation facilities available within the AIR Centre countries and affiliated organizations;
- The Knowledge for All program intended to foster training and scientific culture and promote citizen science projects and ocean literacy.

The Atlantic GEOSS is proposed to 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. This will be achieved by mobilising and coordinating existing and/or planned resources of the Atlantic countries to create a sustainable data platform for the Atlantic region, to improve the lives of citizens and help governments make good, comprehensive, evidence-based decisions. The Atlantic GEOSS will focus on producst and services for the Atlantic Ocean and coastal areas and work in tandem / complement the AmeriGEOSS, EuroGEOSS and AfriGEOSS.

The Atlantic GEOSS will mainly target four types of users in the Atlantic region: regional, national and local government decision makers/policy officers; researchers and scientists performing environmental related analyses; private-sector companies requiring Earth observation applications for market development and developing applications; citizens who want to know more about their environment and surroundings (fisheries, maritime security, agriculture, water management, land development, air quality, etc.).

A critical success factor for the Atlantic GEOSS setting up will be to engage user needs across the AIR Centre community, and federate service needs, towards access to a wide range of geospatial data sources, collaborative R&D, development and operations. Also central to Atlantic GEOSS is the need to attract funding from international institutions in order to ensure the sustainability of the initiative.

Regarding the engagement of users, the Air centre is organizing and workshop on “Ocean and Coastal Information in Support of Monitoring and Implementation of the UN 2030 Agenda for Sustainable Development in the Macaronesia and Sao Tome and Principe region” to be held at Ocean Science Center Mindelo (OSCM), Mindelo, in October. This workshop will put together end users and experts from UNOOSA, GEO Blue Planet, ESA, INMG, OSCM, Ministry of Maritime Economy of Cape Verde, University of Cape Verde. Ongoing discussions with UNDP and Ocean Foundation. Ongoing listing of other potential data providers and/or information consumers in Macaronesia and Sao Tome, such as Regional Secretariat of Science and Technology of the Azores, Directorate General of Environment of the Ministry of Natural Resources and Environment of Sao Tome & Principe, PLOCAN and other Canary Islands institutions. Potential information consumers could include national/regional Statistical Offices, Ministries of Environment, Education, Science & Technology, Innovation and Maritime Economy, Industry (Local and regional Small and Medium Enterprises and Data-intensive start-ups), non-governmental organizations, traditional community representatives, providers of local/regional ocean and coastal data, products and information, representatives from SDG custodian agencies and any other local policy making institutions.

The workshop will build upon two preliminary cross-sectoral and cross-disciplinary meetings to better understand the information needs of local and regional governments, local businesses and people 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. Particular attention will be devoted to the

contribution of Earth observation data and applications to address climate change and resilience of coastal areas, food security, biodiversity, renewable energies and environmental pollution (namely, plastics and micro-plastics), and its implications for public policies, regulation and monitoring of the SDGs goals.

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