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NOTE

From:	Portuguese delegation
To:	Council
Subject:	Atlantic interactions: Development of a European infrastructure to promote North-South international cooperation in research and innovation - Information from the Portuguese delegation

Delegations will find attached an information note from the Portuguese delegation on the above-mentioned subject with a view to the Competitiveness Council on 29 November 2016.

Information note

AOB request from the PT delegation – COMPET Council (configuration Research), 29th November 2016

Atlantic interactions: development of a European Infrastructure to promote North-South International Cooperation in Research and Innovation

Portugal has been developing, in cooperation with Spain and other European countries, Brazil, the United States of America, and southern Latin American and African countries, as well as with major international research organizations and agencies (including ESA, NASA, AEB), a strategic research agenda aiming at key strategic areas related to societal challenges, through an integrative approach to climate change and energy, space, earth and ocean science in the Atlantic, together with emerging methods of data science.

This agenda will be implemented through an international network of research, academic and business organizations across south and north Atlantic countries, together with the creation of an European and international infrastructure to be located in the Azores Islands ("Azores International Research Centre, AIR Center", emulating the CERN intergovernmental experience in Geneva or that of INL- International Iberian Nano Technology Laboratory, in Braga/Portugal). The Azores Islands are well known for their privileged strategic geographical location in the middle of the Atlantic Ocean and also as a natural laboratory for research in the above mentioned areas.

Portugal believes that the possible development of such an international infrastructure, with Europe in the driver's seat, would be pivotal for the promotion of North-South research cooperation catalyzed by the Atlantic and neighboring seas. It will be the driving force for a new and unique north-south Atlantic observation platform through a network of islands: Azores; Canary Islands, Cape Verde; S. Pedro-S. Paulo and Fernando Noronha (Brazil); and Bermuda, providing access to the Global Geodetic Observing System. In addition it will provide a robust cyber-infrastructure for climate research and an Atlantic Spaceport for small satellites and low cost access to Space, as well as access to new deep-sea research. Also, a full scale smart grid platform for a living laboratory aiming at 100% renewable energy will be promoted.

There are already commitments from some Member States, the US, Brazil and other countries for such endeavor, as co-founders. In this context, Portugal would like to invite Member States to consider the possibility of joining this initiative and the creation of a new intergovernmental organization, in order to reinforce the leading role of the EU in the framework of future north-south international cooperation in research and innovation.

To this effect, Portugal is organizing an event, by the end of April (28-29 April, to be confirmed), in the Azores Islands, in which the participation of EU Ministers would be welcomed to establish a solid cooperation within the EU and between the EU and other countries involved.

ANNEX II

ATLANTIC INTERACTIONS **- "ATLANTIC INTERNATIONAL RESEARCH CENTER (AIR CENTER)"**

A proposal for transatlantic and north-south/south-north cooperation in S&T and innovation
Brief summary, November 2016

(Further details in separate report)

Atlantic Interactions is a new research and innovation agenda to guarantee a reinforced commitment to knowledge through transatlantic and north-south cooperation. It has been established through multilateral cooperation in complex systems engineering and science towards an integrative approach to space, climate change and energy, earth and ocean science in the Atlantic, together with emerging methods of data science.

The agenda is to be promoted through the:

1. Installation of the "**Atlantic International Research Center (AIR Center)"**, in the form of an intergovernmental organization to be created through public-private partnership of international nature with headquarters in Azores and a network of islands regions (Azores; Madeira, Canary Islands, Fernando Noronha and S. Pedro-S. Paulo, both in Brazil; Mindelo in Cape Verde and Bermuda);

2. An **international network of research and academic organizations** across south and north Atlantic countries and in association with other scientific organizations worldwide;

3. An international initiative on "**Knowledge for space – space for knowledge**", to promote education and scientific culture about space science and related opportunities, as well as to use space technology for help promoting educational, cultural and scientific contents worldwide.

Figure – Island Research Stations across the world and the Azores archipelago location

The goal is to provide a shared and international environment to support and foster new climate, earth, space, and marine research activities benefiting decision makers, public users, universities and industry, as well as to promote the employment of highly skilled human resources and contribute to growth. The ultimate goal is to stimulate the necessary knowledge-driven conditions to better use the strategic Atlantic positioning of Azores and Portugal to foster North-South cooperation in science and technology:

- By promoting new knowledge on climate change and related issues in the Atlantic, we are fostering conditions to provide the world with more science, more knowledge and more scientific culture;
- By facilitating the access to space from the unique position of Azores, we are promoting access to new frontiers of knowledge, together with the development of new space industries;
- By promoting new research in the Azores´s deep-sea, we facilitate the access to a better understanding of living organisms in extreme environments and new energy sources;
- By stimulating the test of new renewable energy sources and their integration in smart networks in islands environments, we are promoting test beds for the development of new sustainable energy industries;
- By facilitating new mega-sets of data on climate, atmospheric, ocean and energy related themes, we are stimulating new forms of data science and the development of new technology-based companies oriented towards big data processing and usage;

The preparation of the AIR Center has been centered under two main priorities: i) new data collection for innovative research; and ii) synergies Sea/Space towards new knowledge production, diffusion and technology commercialization.

The AIR Center will be operated through a flexible international governance model with international legal status (i.e., emulating the CERN experience in Geneva or that of INL in Braga, Portugal, among others), guaranteeing a solid legal context to overcome potential national constraints, as well as providing an appropriate regulatory framework to efficiently and effectively address operational issues such as staff regulations, financial contributions and definition of the several scientific programs.

The expected impact of the installation of AIR Center includes the development of a new scientific and innovation platform at the best international level, offering a global-scale research site, capable of attracting scientists and technology-based companies from around the world, as well as stimulating different forms of collaboration among European, North and South American, African and Asian public or private entities in a wide range of areas associated with research, education and technology-based businesses.

The scientific agenda for the AIR Center has been developed since June 2016 through an open debate and a series of workshops in Europe, USA, Latin America and Africa in a way that has shown that the need for a better understanding of the Atlantic Ocean and the sustainable management of this common resource requires the alignment of research strategies through international cooperation.
Interdisciplinary research able to face the ocean challenges and the economic transitions, in particular environmental changes, security conditions, and other human dimensions, almost by definition calls for the design of an international partnership that aims for resilience and scientific leadership in the Atlantic Ocean and related north-south cooperation in the following five thematic areas and related research challenges:

- **Atmospheric Science and Climate Change:**
    - The unique opportunity to build a north-south Atlantic observation platform through a network of islands regions: **Azores; Madeira; Canary Islands Fernando Noronha and S. Pedro-S. Paulo (Brazil); Mindelo (Cape Verde); and Bermuda**.
    - Understanding local climate and climate change impacts
    - Understanding the effects of aerosols in the cloud condensation nuclei (CCN) budget
    - Understanding cloudiness transitions, through the integration of in situ ground based, airborne and satellite data

- Monitoring the influx of atmospheric pollutants across the Atlantic
- Integration of the atmospheric and ocean information in global climate models
- Towards developing a regional ocean-atmosphere interactions model for the Atlantic Ocean
- Towards developing a sophisticated data analysis and modeling capability for the Atlantic Ocean

- **Space science and technology:**

  - Establishment of an Atlantic Spaceport for low cost access to Space including launchers for mega constellations and small satellites in the Azores;
  - Establishment of an Atlantic Surveillance Center based in the Azores to leverage the scientific leadership in the Atlantic (North and South);
  - Establishment of a North Atlantic station integrated in NASA Space Geodesy project for Global Geodetic Observing System (GGOS);
  - Implementation of an upgrade program for the existing ground segment stations and infrastructure to support Space missions;
  - Establishment of an ESA/NASA/Azores Launchpad Technology Incubation facility;
  - Installation of an operational network/platform for an efficient "Azores ocean monitoring and environmental management";
  - Establish a center to design and assess/improve the efficiency of the renewable energy resources in the Azores;
  - Integration of ground facilities incorporating high resolution radars;
  - Installation of a network of reception satellite stations in Azores and elsewhere in Atlantic regions (e.g., Natal; Brazil);

- **Ocean Science and Technology:**

  - Monitoring the large-scale Atlantic subtropical gyre circulation variability and change;
  - Observation and monitoring of seamount, open ocean and deep-sea ecosystems;
  - Building knowledge on the deep ocean biology, resources, environmental services;
  - Conservation of marine biodiversity;
  - Oceanic governance for a sustainable use of the oceans and blue growth;
  - Marine technology development;
  - Water availability;

- **Energy Systems:**

  - Satellite based capacity to design sustainable energy systems
  - Micro-grid management tool to exploit the use of high penetration of renewable resources, including distributed generation;
  - Integration of multiple efficient and flexible storage systems;
  - Demand response in buildings and large facilities;
  - Electrification of energy systems, in particular in the transportation sector

- **Data Science:**
    - Exploitation of large sets of data originating from different levels and sources of research;
    - Integrating at scale, data collection, curation, and storage with advanced computing and analysis;

The AIR CENTER aims to provide the following "potential" new and additional resources to those already existing at Azores:

- **Atmospheric Science and Climate Change**:
    - A new and unique north-south Atlantic observation platform through a network of islands: Azores; Madeira; Canary Islands, Cape Verde; S. Pedro S Paulo and Fernando Noronha (Brazil) and Bermuda;
    - A robust cyber-infrastructure for climate research;
    - Integration in the European and Global Research Infrastructure Landscape, namely: PICO-NARE; Global Atmospheric Watch; ACTRIS (Aerosols, Clouds, and Trace gases), IAGOS (In-Service Aircrat for a Global Observing System), ICOS (Integrated non-CO2Greenhouse GAs Observing System) and InGOS;
    - Laboratory for detailed measurement of over 40 greenhouse gases, at high altitude (over 2000 m) at the Pico Island;

- **Space science and technology**:
    - Atlantic Spaceport for low cost access to Space;
    - Atlantic Surveillance Center;
    - NASA Space Geodesy project for Global Geodetic Observing System;
    - Space Surveillance and Tracking programme
    - ESA/NASA/Azores Launchpad Technology Incubation facility

- **Ocean Science and Technology**:
    - Land based facilities: laboratories, experimental stations and monitoring stations;
    - Remote platforms: vessels, satellites and underwater robots;
    - Deep sea and open ocean long term fixed point observatories;
    - Equipment: sensors, vehicles and sensors that can operate below 200m;
    - Secure and reinforce high skilled critical mass of researchers through international collaboration;

- **Energy Systems**:
    - Geothermal exploration on Terceira: "Central Geotérmica do Pico Alto";
    - Electric Vehicle Deployment Demonstration in an island environment;
    - Flexible, efficient and resilient storage systems;
    - Renewable energy technologies deployment demonstration in a confined environment;

- Full scale smart grid management of full scale laboratory aiming at 100% renewable energy;
- Integration of renewable energy with desalination technologies for simultaneously balancing the grid and providing freshwater;
- Integration of renewable energy with hydrogen production (via electrolysis) or methane production (via methanation) for simultaneously balancing the grid and providing domestic fuels;
- Ocean thermal energy conversion (OTEC), which uses temperature differences between the ocean surface and depths to generate electricity;
- Osmotic power, which uses salinity gradients between freshwater onshore with saltwater offshore to generate electricity;

- **Data Science:**

  - A robust cyber-infrastructure, enabling tools, data sets, and computational models;
  - "Atlantic Maritime Cloud" as a technological platform and data hub responsible for providing: a portal, iAtlantic for open web access; Data correlation and fusion; Data storage and retrieval capabilities; Open interface; among other facilities;

Invitation:

There are already commitments from the European Commission, some European Union Member States, the United States of America, Brazil and other countries for such endeavor, as co-founders. In this context, Portugal would like to invite all other countries to consider the possibility of joining this initiative and the creation of a new intergovernmental organization, in order to reinforce the leading role of Azores and the Atlantic in the framework of future north-south international cooperation in research and innovation.

To this effect, the European Commission, Portugal, Spain, Brazil and other founding partners are organizing an event in April 2017 (20-21, to be confirmed) in the Azores Islands, in which the participation of EU Ministers would be welcomed to establish a solid cooperation within the EU and between the EU and other countries involved. A second meeting will be organized in Lisbon in June 2017.

Next steps:

- Until February 2017: new workshops in Europe, United States of America, Latin America and Africa, following those organized since June 2016;
- 20-21 April 2017 (date to be confirmed), Azores: International Summit in Azores, with signature of an International Convention establishing the AIR Center and the agenda "Atlantic Interactions";

- June 20017 (date to be confirmed) , Lisbon, potential AIR Convention ratification;
- May-December 2017: initial installation of the AIR Center.

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