Action Plan

2016 Argentina – United States Ocean Sciences Meeting

Mar del Plata, Argentina, August 22-27, 2016

Executive Summary

Scientists and technical staff from the United States and Argentina, together with science policy makers and program managers, met in the city of Mar del Plata, Argentina, in August 2016 to coordinate an action plan to study and monitor the South Atlantic Ocean. Key issues discussed included ocean dynamics, climate, ecosystems, biodiversity, chemistry, and marine biology.

The long-standing tradition of collaboration between the two nations provides a suitable framework to achieve the continuity of ongoing projects and the planning of new scientific proposals. Research areas of common interest to both countries include the study of ocean and atmospheric variables in the South Atlantic, as well as climate change at regional and global levels and its impact on ecosystems, biodiversity, and fisheries.

Recommendations included in this report provide for the continuity of existing research and are geared towards the implementation of new studies. Interdisciplinary and multi-institutional aspects of the recommended actions propose the implementation of new ocean and atmospheric observations, the development of numerical models, and studies contributing to the improvement of weather forecasts, climate variations, and their relationship to fisheries and ecosystems. These are essential tools that ensure the sustainability of biological resources and their management for the benefit of society. To achieve these goals within a framework of high-level scientific collaboration, the support of leaders from institutions in both countries and the exploration of additional mechanisms of funding are needed.

Institutional Framework

In 2014, the Ministry of Science, Technology, and Productive Innovation in Argentina implemented Pampa Azul, an inter-ministerial initiative to articulate scientific-technological actions that involved sea-related topics. The main objectives of this initiative included: strengthening scientific knowledge as a basis for conservation policies and the management of natural resources; promoting technological innovations applicable to the sustainable exploitation of natural resources and industries related to the sea; and enhancing maritime awareness in Argentina. In this context, Pampa Azul was considered essential for establishing international cooperative programs to provide solutions to global problems.

Bilateral cooperation in the marine sciences between Argentina and the United States was formalized in October 2014 under the Second Joint Commission on Science and Technology held in Washington, DC. On that occasion, it was agreed to hold an Argentina-United States meeting on ocean sciences with the goals of enhancing current partnerships and planning future collaborations between research, government, and academic institutions in both countries. On the occasion of the visit of Mr. Barack Obama, President of the United States, to Argentina in March 2016, both countries stressed the importance and positive impact of scientific research, technology, and innovation to protect and study the oceans1 and to generate more sustainable and comprehensive development for all countries of the world. These binational actions are in line with Target 14 of the recent declaration of the United Nations on sustainable development: "Conserve and sustainably use the oceans, seas, and marine resources for sustainable development."

The 2016 Argentina-United States Meeting on Ocean Sciences

In response to the objectives above, an Argentina-United States meeting on ocean sciences was held in Mar del Plata, Argentina, from August 23-26, 2016.

The meeting was organized by the Ministry of Science, Technology, and Productive Innovation (MINCYT) of Argentina, the National Institute of Fisheries Research and Development (INIDEP) of Argentina, the Embassy of the United States in Argentina, and the National Oceanic and Atmospheric Administration (NOAA) of the United States. It consisted of three components: a scientific meeting that included plenary presentations, panels, and working groups; a meeting on data management; and separate meetings between scientific personnel from both countries hosted by Argentine institutions.

The scientific meeting opened with remarks from: Dr. Lino Barañao, Minister of Science, Technology, and Productive Innovation in Argentina; Mr. Noah Mamet, the Honorable Ambassador of the United States in Argentina; Dr. Alejandro Ceccatto, President of the Argentine National Council of Scientific and Technical Research; Dr. Conrado Varotto, Argentine Director of the National Committee on Space Activities; and Dr. Otto Wöhler, Director of the Argentine National Institute of Fisheries Development and Research. Approximately 200 people attended the meeting, including leading government and university officials and marine scientists from both countries.

The main topics of the scientific meeting included: (1) ocean variability and its relation to weather and climate; (2) ocean variability and its impacts on ecosystems, biodiversity, and fisheries in the South Atlantic Ocean; (3) ocean observing networks

and observational platforms; and (4) data management and administration. This document summarizes the main conclusions and recommendations of the meeting.

With respect to the four above-mentioned topics, participants emphasized the importance of continuously monitoring the state of the ocean, ecosystems, and the atmosphere. They agreed on the importance of having quality scientific data, which are critical for evaluating changes in the ocean, and that data are essential to achieve the goals proposed in the meeting and denoted in this document as medium and long-term objectives.

The South Atlantic component of the network of global ocean observations is supported by the international community, of which Argentina and the United States are active and interested parties. This South Atlantic component is largely supported by countries in the region. Due to financial, logistical, and professional training constraints, however, some aspects of this effort are still insufficient. An enhancement of the collaborations and partnerships currently in place between scientists and institutions from both countries is expected to address some of these current shortcomings.

To improve understanding of the processes that affect oceanic and atmospheric changes, it is necessary to implement an appropriate system for monitoring and forecasting the physical, chemical, and biological variables in the South Atlantic.

Similar systems under development in other regions provide critical information on meteorology, climate, and ecosystems to managers, decision makers, and the general public. These data are necessary to plan and implement solutions and adaptations to address challenges related to agriculture, rainfall, fisheries, etc. This information is also closely connected to regional and global economies and will promote the sustainable use of ocean resources.

Several of the reasons why the study and monitoring of ocean conditions in the southwestern Atlantic are of critical importance include:

● The continental shelf of Argentina is one of the most biologically productive regions of the world's ocean and, therefore, has great socio-economic potential. Fisheries contribute significantly to the national economy, and a large percentage of the Argentine population lives within kilometers of the coast.

● The South Atlantic Ocean connects the Argentine continental shelf with the restof the world ocean through the circumpolar Antarctic Current and Meridional Overturning Circulation cell. Changes occurring in the physical parameters of the South Atlantic Ocean may be responsible for a significant percentage in some global

atmospheric processes such as variations in precipitation, heat waves, and other extreme weather events.

● Water in the continental shelf absorbs large amounts of atmospheric carbon dioxide (CO_2), a critical component in the carbon balance and acidity levels (pH) of the world's oceans.

● Ocean dynamics are critical for marine productivity and biogeochemical cycles in the southern hemisphere and its evolution.

● The southwest Atlantic Ocean follows some of the global changes, which include rising water temperatures and heat content, as well as sea level increases of about 4-5 mm per year. Studies also indicate significant variations in dynamic sea parameters, such as a shift to the south of the Brazil Current. This shift is important because the Brazil Current carries subtropical water to subpolar regions. It also influences a region where commercial fisheries, the absorption of CO_2, and heat transport are significant indicators of the impact of climate change on marine ecosystems .

The long history of ocean research collaboration between scientists and institutions from Argentina and the United States, as well as a mutual interest in certain avenues of research and the great human potential, serves as a motivation to explore new partnerships with the goal of sharing knowledge, experiences, resources, and training to consolidate existing initiatives and implement new networks of observations, monitoring, and forecasts. Some recent partnerships include:

1) The National Aeronautics and Space Administration (NASA) of the United States and the Argentine National Committee on Space Activities (CONAE) on the SAC-D/Aquarius joint satellite mission, launched in June 2011, to measure sea surface salinity from space.

2) The Argentine Naval Hydrographic Service (SHN), the University of BuenosAires, the Argentine National Scientific and Technical Research Council (CONICET), and NOAA to maintain ocean observations and conduct research to measure and study the meridional flow of water and heat in the South Atlantic under joint projects that make up the South Atlantic Meridional Overturning Circulation (SAMOC).

3) The Inter-American Institute for Global Change Research (IAI), through the National Science Foundation (NSF) of the United States, partially funds researchers with the Argentine National Institute for Fisheries Research andDevelopment (INIDEP) to measure biological and physical parameters and the ocean environment through the Estacion Permanente de Estudios Ambientales (EPEA) and Variability of Ocean Ecosystems Around South America (VOCES) projects.

4) High quality tide gauges, provided by NOAA, are now operated by the Argentine SHN to monitor sea level.

5) Efforts by NOAA and the Argentine Prefectura Naval (PNA) to jointly monitor surface salinity from the Argentine ship Dr. Bernardo Houssay (formerly the R/V Atlantis of the Woods Hole Oceanographic Institution in the United States).

These collaborations have been long-lasting and have had a significant impact on the development of scientific knowledge, achieving both concrete applications and forging collaborative ties between researchers and their institutions. These partnerships have also contributed to building mutual trust between agencies and institutions in both countries.

During the meeting, specific areas of cooperation and possible synergistic partnerships were identified based on existing mutual interests between the two countries, including the impact that such partnerships will have on studying and monitoring the South Atlantic and its relationship with weather, climate, and regional and global ecosystems. The suggested recommendations that follow imply a great challenge to the scientific and technical personnel in charge of their implementation and completion.

Successful research will rely on varied sources of support, including the financial resources of institutions and agencies in both countries. However, the potential socioeconomic impacts and benefits of such research largely outweigh the needed investments in training, research, and technological advances.

Recommendations

Participants recognized the critical value of multidisciplinary, continuous, and uninterrupted ocean observations. These observations will enable them to obtain long time series to correctly identify and assess average and extreme conditions, monitor the state of the ocean, marine ecosystems and fisheries, and project their future evolution. An assessment of changes in ocean conditions, which may be of natural or anthropogenic origin, is also essential for evaluating potential changes in weather, climate, and ecosystems on regional and global scales. Participants also recognized the importance of implementing institutional and governmental policies that acknowledge the value of sustained and uninterrupted multidisciplinary observations that are necessary for the continuous monitoring of the state of the ocean. The importance of an ocean-observing network and the distribution of quality data for climate studies according to international standards were considered critical aspects of these recommendations.

Short-term Recommendations

Short-term recommendations from the meeting include the following:

1) Continue to properly maintain the series of multidisciplinary time series already underway that are part of existing collaborations in areas of common interest. Define protocols to prevent an interruption in the acquisition, transmission, and analysis of data from them. For example, Argentine scientists have highlighted the value of high quality measurements from tide gauges which, besides contributing to navigation safety, enable them to evaluate the quality of satellite-derived sea level measurements and ocean currents along the continental shelf and the South Atlantic.

2) Use data from the existing ocean observing network to create and distribute ocean indicators of the South Atlantic, including regions where marine protected areas are being planned. This implementation is critical to inform scientists, managers, and decision-makers on the state of the ocean, e.g., data on sea level, temperature, heat content, and ocean currents, all of which are key to establishing links between physical parameters and the abundance of phytoplankton, marine species, etc.

3) Continue the study of variations occurring in the South Atlantic and their impact on climate and extreme weather events in South America and throughout the world.

4) Explore the possibility for how CONICET, INIDEP, the University of Buenos Aires, SHN, and other Argentine scientific institutions can become actively involved in some aspects of the Ocean Observatories Initiative (OOI) project of NSF, as well as explore possible collaborations with other US agencies such as the Woods Hole Oceanographic Institution to support this effort.

5) Seek the formal inclusion of Argentina in the NSF Partnerships Program for International Research and Education (PIRE) that supports international collaboration projects advancing research and education.

6) Examine the possibility that Argentine scientists and technicians receive permanent support from their institutions to participate in international working groups for data management and to conduct training courses to incorporate knowledge and experience in the area of data evaluation and management.

7) Support collaborations between Argentine and US institutions that collect ocean observations to conduct joint activities using different observational platforms (e.g., autonomous sensors, ships, etc.) for the purpose of validating and evaluating data for the next satellite mission, i.e., SABIA-Mar Argentina.

8) Identify new systems of observations, sampling strategies, and analysis currently being developed in the United States for their potential application in interdisciplinary studies of common interest in the South Atlantic. Specifically, it was agreed to increase Argentina's participation in gathering observations from ships of opportunity (e.g., research cruises, cruise ships, and/or cargo vessels) transiting the South Atlantic Ocean. It was also agreed to install and/or use observational equipment, some on non-conventional platforms such as autonomous vehicles and high-frequency radar, to monitor currents in coastal areas. Many of these systems provide continuous, high quality, and very low cost observations in comparison with traditional ocean observations.

9) Continue to improve joint cooperation for different aspects of maintaining the global system of ocean observations, such as increasing Argentina's participation in the Argo program, the eXpendable BathyThermograph (XBT) network, and surface drifter array.

10) Share experiences to promote the scientific and educational value of the oceans and conduct oceanographic studies that include the active participation of the scientific community.

Medium and Long-Term Recommendations

Scientists at the meeting recognized the importance of implementing institutional and governmental policies that value the ocean and the multidisciplinary, long-term observations needed to assess the state of the ocean. The importance of establishing a high quality system for observations and data management following international standards was considered critical for climate studies.

It was recognized and recommended to:

1) Develop and implement physical and biogeochemical models of the Argentinean continental shelf first, and then the South Atlantic, with the objective of eventually generating products that can be used for weather and climate studies, outlooks, and forecasts.

2) Continue with state-of-the-art complementary systems and multidisciplinary observations, necessary for the implementation of new observations (e.g., CO2 and pH), with the implementation of studies and analyses that include numerical models.

3) Implement new ocean observations to support a comprehensive study of ocean variability that will lead to a significant increase in our understanding of the physical processes involved in ocean dynamics at large and medium scales, with a particular interest in processes related to the interactions between the shelf, continental slope,

and the deep ocean. The use of advanced technologies was also recommended to carry out these observations (e.g., autonomous vehicles) and for the implementation of such studies.

4) Facilitate the import into/export out of Argentina of used or new equipment and of those sent for repair or calibration to the United States, as well as the biological or geological samples for studies conducted within the framework of the agreements between both countries into the framework of the recommendations issued by this meeting.

5) Explore the possibility of setting inter-institutional agreements among institutions of the two countries to facilitate concrete and continuous cooperation in the fields of oceanography and marine biology.

6) Explore the possibility of institutional arrangements between the two countries to facilitate cooperation for developing studies that analyze the effect of climate change on ecosystems where major fisheries activities in the southwest Atlantic are developed, including hake, shrimp, and squid.

Human Resources Training

During the meeting the need for increased training of technicians and students was discussed and recognized, including support for training processes that will benefit future generations in regard to various areas of research, observational techniques, development of equipment and instruments, etc.

Among others, it was recommended to:

1) Enable Argentine observers to board US oceanographic research vessels for training purposes.

2) Explore the possibility of training Argentine technicians, experts, professionals, crews, and undergraduate and graduate students at US institutions, as well as provide them with training courses and/or workshops.

Specifically, it was discussed and recommended to capitalize upon opportunities funded and/or supported by MINCYT, the Global Office of the US Navy (ONR Global), the Partnerships Program for International Research and Education (PIRE) of the NSF, the University of Miami, NOAA, etc.

Specific Benefits

Argentina and the United States share an interest in marine conservation issues. The recommendations indicated in this Action Plan try to pave the way for the consistent implementation of collaborations and partnerships between the two countries focused on supporting this objective. Recommendations include actions that may be immediately achieved, while others are long-term and will require greater logistical and financial support, training, and a wider community effort.

Specifically, the implementation of these recommendations is geared towards the following:

1) Improve and develop new observations, methods, techniques, and numerical models to monitor and assess ocean, weather, and climate conditions at regional and global levels.

2) Conduct monitoring activities and achieve an understanding of how changes in ocean temperature, acidification, sea level, and other ocean parameters impact ecosystems, fisheries, and biodiversity using novel techniques and advanced equipment. This will enable the relevant parties to take appropriate action for the sustainable exploitation of fisheries, preserve marine resources, and establish protected areas.

3) Form an international technical and scientific team composed of members from both countries. This will enable future generations to increase their understanding of the factors involved in the sustainability of marine environments and marine biodiversity.

Final Recommendations

It was proposed to create a committee to monitor the progress and state of the actions recommended in this Action Plan. Committee members would be responsible for communicating with the contact points of each working group and panel that originated each recommended action to discuss the progress achieved on each recommendation every six months.

This document was prepared by:

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- Dr. Aleta Hohn, National Oceanic and Atmospheric Administration, United States.
- Dr. Marina Sabatini, IIMyC, Argentina .
- Dr. Carla Berghoff, National Institute for Fisheries Development and Research, Argentina.

Appendix 1: Agenda

Appendix

Agenda of the Meeting

Organizers:

Ministerio de Ciencia, Tecnología, e Innovación Productiva de Argentina (MINCyT)

Instituto Nacional de Investigación y Desarrollo Pesquero de Argentina (INIDEP)

United States Department of State

United States National Oceanic and Atmospheric Administration (NOAA).

Dates:

Science Meeting: August 22, 23, 24, and 25, 2016

Location:

Hotel Costa Galana

Address: Peralta Ramos 5725, Playa Grande, B7602EAI Mar del Plata, Argentina

Background:

A recommendation of the US-Argentina JCM (Joint Commission Meeting on Science and Technology) in 2014 included to hold a US-Argentina meeting on ocean sciences. The goal of this meeting would be to discuss current and future partnerships between research, government, and academic institutions of both countries to enhance collaborative research work on the following four areas:

1) Oceans, Climate, and Weather

Research cooperation to include enhance observations (e.g., research cruises, autonomous vehicles, ocean observatories initiatives, etc.), data analysis, and theoretical and numerical modeling studies of regional to basin-scale ocean dynamics (e.g., mesososcale eddy variability and transport across and mixing within the Brazil–Malvinas confluence zone; etc.), and the link of their variability to extreme weather patterns.

2) Fisheries, Ecosystems, and Biodiversity Research cooperation in:

● Fisheries Oceanography,

● Protected Marine Areas,

● Climate impact on fisheries and ecosystems in key regions in the Southwestern

Atlantic Ocean (Agujero Azul, Argentine Continental Shelf, etc.) and Southern Ocean,

● Long-term measurements and modeling of bio-physico-chemical parameters in the shelf and shelf break,

3) Technologies and Observational Systems

Discussion of sustainability of current observing systems (in situ, autonomous, and remote/satellite) and the development of new technologies. Management, coordination and standards for usage of research vessels. Discussion of monitoring strategies, seagoing platform management, and integration/complementation of different observational systems/strategies (for example, SAMOC South Atlantic Meridional Overturning Circulation, OOI Ocean Observatories Initiative, CASSIS - Corrientes del Atlántico Sudoccidental Sat é lite in-Situ).

4) Data Management

Overview of current general processes for acquisition, transmission, quality control, and distribution of ocean data. Overview of marine data bases management systems. This area will coincide with the start of the NOAA data management training session.

Format

It is proposed that each of the areas above include a combination of plenary talks, panels, working groups, and discussions. The languages of the meeting are English and Spanish.

Expected Outcomes of the Meeting

A document will be written, which is expected to provide details on:

1) Strengthening and setting up of new strategies for the studies of ocean variability and global changes, impacting ecosystems and fisheries in the Southwestern Atlantic Ocean and relevant regions of the Southern Ocean

2) Sharing of resources, such as instruments, human resources, oceanic platforms ships, etc.

3) Data management and information sharing, and

4) Capacity building, including academic, scientific, and engineering exchanges.

Day 1: Monday August 22, 2016

5:00PM Registration and icebreaker

Day 2: Tuesday August 23, 2016

08:00 AM – 08:45 AM

Welcome:

- Dr. Lino Barañao (MINCyT)
- Embajador USA Noah Mamet
- Dr. Alejandro Ceccatto (CONICET)
- Dr. Conrado Varotto (CONAE)
- Dr. Otto Wöhler (INIDEP)

Presentation of objectives of the meeting: Raúl Reta and Gustavo Goñi

Chairperson: Lisa Clough

8:45-9:45 AM

Plenary Talk: Pampa Azul Initiative: Alejandro Mentaberry

Plenary Talks: Local initiatives in Argentina:

- INIDEP: Otto Wöhler
- CIIMAR: Oscar Iribarne
- CONAE: Sandra Torrusio

9:45 AM – 10:10 AM

Plenary Talk: US - Argentina partnerships in Ocean Sciences: Gustavo Goñi

10:40 AM – 12:40 AM

Plenary Talk: Climate and fisheries: Francisco Chavez

Plenary Talk: The Global Ocean Observing System: Steve Piotrowicz

Plenary Talk: Oceans and climate: Alberto Piola

Plenary Talk: Marine ecosystems and management: Cisco Werner

Chairperson: John Lamkin

02:00 PM - 03:30 PM

Plenary Talk: Time series and ecological observations: Vivian Lutz and Rubén Negri

Plenary Talk: Marine Protected Areas: Myra Brouwer

Plenary Talk: The US University-National Oceanographic Laboratory System (UNOLS): ship scheduling and the distributed management of ocean research assets: Peter Ortner

04:00-04:30 PM

Panel: Ocean ecosystem, fisheries, and climate (Panel members: Marcelo Pájaro, Francisco Chavez, Cisco Werner, Marcela Ivanovic; Transcriber: Paula Moriondo)

04:45 5:15 PM

Panel: Ocean dynamics and climate (Panel members: Silvia L. Garzoli, Alberto Piola, Elbio Palma, Ricardo Matano; Transcriber: Martin Saraceno)

5:30 to 6:00 PM

Panel: New technologies, observational networks, research vessels, and ships of opportunity (Panel members: Peter Ortner, Adrián Madirolas, Julio Morell, Lisa Clough, Ariel Troisi; Transcriber: Martin Ehrlich)

Day 3: Wednesday, August 24, 2016

Chairperson: Julio Morell

08:15 AM - 09:00 AM

Panel: Ocean data management and stewardship (Panel members: Hernan Garcia, Raúl Guerrero, Silvia Nakano, Steve Piotrowicz; Transcriber: Marcela Charo)

9:00 AM - 9:15 AM

Formation of the Working Groups: Charges, goals, and objectives (Silvia Garzoli and Patricia Martos)

Working Groups:

1) Biological and Chemical Oceanography (Hernan Garcia and Marcelo Acha); Transcriber: Carla Berghoff)

2) Fisheries, Ecosystems and Climate Change (Cisco Werner and Vivian Lutz; Transcriber: Aleta Hohn);

3) Ocean Observing Systems and Ocean Variability (Victor Zlotnicki and Martin Saraceno; Transcriber: Maria Paz Chidichimo)

4) Capacity Building, Infrastructure, and Collaborations (Lisa Clough, Peter Ortner, Raul Reta, Diego Rodriguez and Mirtha Lewis; Transcriber: M. Josefina Olascoaga)

9:15 AM – 12:30 PM

Meeting of Working Groups

2:00 PM - 3:00 PM

Meeting of Working Groups

3:15 PM – 04:15 PM

Meeting of Working Groups

4:15 PM – 05:30 PM (members of Working Groups)

Cross-Working Group discussions

05:30 PM

Adjourn for the day. Members of Working Groups and Panels meet to draft their report and prepare slides for Thursday morning session.

Day 4: Thursday, August 25, 2016

Chairperson: Gustavo Goni

8:30 AM – 10:00 AM

Presentation of reports by Working Groups and Panels

10:30 AM – 12:30 AM

● Continuation of earlier session, discussion, amendments, and agreement on recommendations from the working groups and panels

● Action items

● Action Plan Writing Group (Gustavo Goñii, Raúl Reta, Cisco Werner, Alberto Piola)

12:30 PM to 1:30 PM

Meeting of Action Plan Writing Group with Panel Chairs, Work Groups Co- Organizers, and Transcribers.

1:30 PM to 3:30 PM

Writing of the Action Plan of the Meeting (Action Plan Writing Group, closed meeting).

3:30 PM - 5:30 PM

Presentation and discussion of the draft of the Action Plan (Action Plan Writing Group)

Work ahead and action items (Action Plan Writing Group)

5:30 PM

End of the Meeting