

POGO Capacity Building News

Inauguration of Nippon Foundation-POGO Centre of Excellence at Alfred Wegener Institute for Polar and Marine Research takes place at the Natural History Museum in Berlin

The ten scholars arrive for the start of NF-POGO CoE at AWI



The new NF-POGO CoE at AWI scholars at Berlin's Natural History Museum
Photo Credit: S. Giesecke, AWI

During the first week of December, the ten successful candidates of the new NF-POGO CoE at AWI, from Bangladesh, Brazil, Cuba, India, Indonesia, Tanzania, Tibet, Togo, Trinidad and Tobago, and Thailand, arrived in Germany to start their training at the CoE in observational oceanography, coordinated by Dr. Gerry Plumley. A high-level inauguration event was held at the Berlin Natural History Museum soon after their arrival. Prof. Dr. Johanna Wanka, Federal Minister of Education and Research, Germany, was the guest of honour at the event and addressed the scholars and attendees. She noted her appreciation for the commitment POGO has shown to capacity building in ocean observations. The event was also attended by other dignitaries from the Ministry, including Ms. Andrea Heyn, Deputy Head of System Earth, and Parliamentary State Secretaries, Dr. Ole Schröder and Dr. Helge Braun, General Director of the museum Prof. Johannes Vogel, and senior officials from AWI. Prof. Dr. Karin Lochte, Director of AWI and Prof. Dr. Karen Wiltshire, Vice Director of AWI and Head of the Biological Station Helgoland & Wadden Sea Station Sylt welcomed the new scholars, and spoke of their commitment to the programme. Mr. Kentaro Ogiue, representing the Nippon Foundation and Dr. Shubha Sathyendranath from the POGO Secretariat, also spoke on the occasion.

"Germany is recognised for its excellence in marine research. The Alfred Wegener Institute carries out outstanding research and teaching, and is an ideal choice for the scholarship programme of the NIPPON Foundation. The decision in favour of the AWI is a major recognition for German oceanography," said Johanna Wanka, Germany's Federal Minister of Education and Research, at the presentation ceremony.

For the inauguration event, the ten scholars had prepared poster presentations describing their topics of interest in oceanography as well as cultural background information. They had the opportunity to speak with the guests about their work and their aspirations once they have completed their training. Also attending the inauguration event were representatives from the NANO (NF-POGO Alumni Network for Oceans), who have previously received training from other NF-POGO training programmes. The alumni had converged over the previous days in Berlin to discuss future networked activities and were available for the new scholars to consult and receive advice on their experiences of the CoE and training programmes.



Prof. Dr. Johanna Wanka, Prof. Dr. Karin Lochte, Prof. Dr. Karen Wiltshire, other dignitaries, and the new scholars at the inauguration event.
Photo Credit: S. Giesecke, AWI

News from the POGO members

Norwegian research vessel to be built in Genova

RV Kronprins Haakon, the new advanced Norwegian polar research vessel, is to be built at Fincantieri yards in Genova, Italy



RV Kronprins Haakon.
Image Credit: Eliud Keter, IMR

The Norwegian Government decided in October 2012 to build a new polar research vessel. The Institute of Marine Research is in charge of the project and Rolls Royce Marine has designed the new vessel. RV Kronprins Haakon represents a state-of-the-art for research vessels and the project has a total budget of approx 1400 mill. NOK, or app. 175 mill €. Tromsø will be the homeport for the new polar research vessel, and the Norwegian Polar Institute will be the formal owner of the vessel, on behalf of the Norwegian Government. The vessel is scheduled to be delivered in the second half of 2016, and start regular science cruises in early 2017. The Arctic University of Norway will be the biggest user of the vessel. Fincantieri is one of the largest shipbuilding groups in the world, specialising in design and construction of complex ships with high technological content, such as cruise, merchant and naval vessels, offshore and mega yachts. The signing ceremony took place at the Fram Museum in Oslo. Managing director Tore Nepstad, Institute of Marine Research, and Executive Senior Vice President Naval Vessels Italy, Angelo Fusco, Fincantieri signed the contract.

The Norwegian Minister of Fisheries, Ms. Elisabeth Aspaker, also attended the signing ceremony. She underlined the importance of the new research vessel to increase knowledge about the ecosystems both in the Arctic and the Antarctic. In addition, another new vessel is planned to replace the RV Frithjof Nansen, which is currently operating outside West Africa and in other areas. The new vessel will be operating on the same basis as the current one.

This article was provided by Kari Østervold Toft, Communications director, Institute of Marine Research (www.imr.no)

News from POGO Members (cont'd)

Dr. SWA Naqvi, Director, CSIR-NIO receives Dr. HN Siddiquie Memorial Award



Dr. SWA Naqvi receives the Dr. HN Siddiquie
Memorial Lecture Award
Photo Credit: NIO

Dr. SWA Naqvi, Director, CSIR-National Institute of Oceanography (NIO) was conferred with the Dr. HN Siddiquie Memorial Lecture Award by the Indian Geophysical Union (IGU) at their meeting held at Hyderabad from 8 to 11 January 2014. On this occasion, Dr. Naqvi delivered a lecture on "Ocean Iron Fertilization: An update based on LOHAFEX". This award is instituted by IGU to honour scientists who have made outstanding contributions in the field of Earth System Science.

Dr. Naqvi has carried out pioneering research on biogeochemical processes in aquatic low-oxygen environments, especially microbially mediated redox transformations of nitrogen (denitrification) in the seas around India and terrestrial freshwater ecosystems. His research demarcated the zone of denitrification in the Arabian Sea, explored its variability in space and time, and determined its rate using several diverse physico-chemical, isotopic and enzymatic techniques. His work provided new insights into processes associated with suboxic ecosystems, including high respiration rates and associated bacteria-produced nepheloid

layers, and mechanisms of nitrous oxide production. He demonstrated that human activities are causing an increase of nitrous oxide emission from the oceans.

Recipient of several awards and Fellow of all three national science academies in India as well as of the Third World Academy of Sciences (TWAS), Dr. Naqvi has edited/co-authored 4 books and monographs and has 153 research publications to his credit. He also presented a keynote address before the UN General Assembly. Dr. Naqvi is an associate editor of Marine Biology and Aquatic Biology and the editor-in-chief of Biogeosciences.

This article was provided by Ranadhir Mukhopadhyay, National Institute of Oceanography

What Causes the Atlantic to Bloom?

The mechanisms that contribute to the seasonal blooms

Every spring, waters in the North Atlantic Ocean explode into green and white patches as countless microscopic marine plants bloom. The burst, scientists had assumed, is fueled by longer days, more sunlight, and warmer waters.

But a new study has revealed a previously unknown mechanism that triggers the bloom weeks before the sun begins to warm the ocean. The jump-starters are eddies, or swirling whirlpools of water. These eddies prevent phytoplankton from dipping into deeper waters and instead keep them trapped near the sunlit surface where they can grow, said Amala Mahadevan, a physical oceanographer at Woods Hole Oceanographic Institution and lead author of the study, published July 2012 in the journal Science.

The discovery rewrites the textbooks for a seasonal phenomenon on which the entire North Atlantic food web depends. The bloom also has implications for climate. Marine photosynthetic plants absorb enormous quantities of carbon dioxide, helping the oceans store about one-third of the heat-trapping CO₂ we put into the air each year by burning of fossil fuels.

Mahadevan's co-authors, Eric D'Asaro and Craig Lee (University of Washington) and Mary Jane Perry (University of Maine), used floats and gliders in the North Atlantic in April 2008, to track the formation and progression of the bloom and measure a range of ocean characteristics.

During cold, dark winters, storms roil ocean waters, stirring phytoplankton into the depths. In spring, storms diminish and the sun begins to warm the ocean surface, creating a stratified layer of warmer, less-dense water that traps phytoplankton near the surface, where they are exposed to the sunlight they need to grow. But to the scientists' surprise, their glider measurements showed that phytoplankton were blooming even though ocean waters were getting colder, not warmer. It was apparent the bloom was initiated by "some new mechanism, other than surface warming," D'Asaro said.

Mahadevan, who runs computer models of evolving oceanic processes, recognized in her simulations how eddies stratify the sea surface and could trigger blooms. Using data from her colleagues' study site, her models confirmed that eddies were the underlying cause of the stratification and blooms that they saw. "Our results show that the bloom starts through eddies, even before the sun begins to warm the ocean," Mahadevan said.

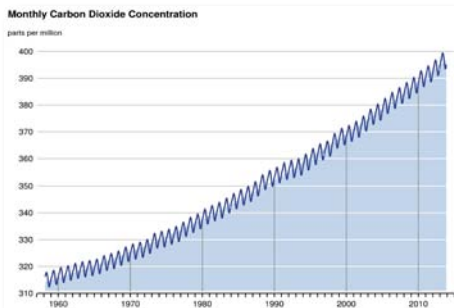
This article was provided by Stephanie Murphy, Woods Hole Oceanographic Institution



Spring algal blooms in the North Atlantic.
Photo Credit: WHOI

News from the POGO members (cont'd)

Long Time Series on CO₂: Keeling Curve Hits 400 ppm Milestone



Keeling Curve charts the CO₂ levels.
Image Credit: SCRIPPS

The effect of human activities on climate manifested itself in a new way in May 2013 when the concentration of carbon dioxide in the atmosphere surpassed 400 parts per million (ppm), likely for the first time in at least 3 million years. In the weeks leading up to the annual peak concentration, Scripps Institution of Oceanography at UC San Diego observed the symbolic milestone by offering for the first time daily updates of the iconic Keeling Curve CO₂ measurement. NOAA, which operates a complementary CO₂ measurement program, followed suit shortly thereafter. The threshold was passed 55 years after the establishment of the Keeling Curve, which recorded its first monthly average concentration, 315.70 ppm, in March 1958. Prior to the Industrial Revolution, data from ice cores revealed that concentrations had never exceeded 300 ppm in the past 800,000 years. The Keeling Curve, developed by Scripps geochemist Charles David Keeling, has continued through the decades with near-constant threats to its funding status but has only experienced one brief interruption in its data collection in the mid 1960s. The main measurement of CO₂ and other atmospheric gases

at Mauna Loa, Hawaii, is one of more than a dozen made at locations ranging from the South Pole to the Arctic Circle. The longevity of the data series has enabled researchers to observe new phenomena taking place in response to the steady increase in atmospheric CO₂ levels. For instance, the Scripps CO₂ group that operates the Keeling Curve reported in August 2013 that the annual range of CO₂ concentrations has expanded in recent decades. Researchers suggest the widening range is the result of changes in Northern Hemisphere forests that are causing trees and plants to take up greater amounts of CO₂ during photosynthesis.

This article was provided by Robert Monroe, Scripps Institution of Oceanography, UC San Diego

New actors in the Arctic ecosystem: Atlantic amphipods are now reproducing in Arctic waters

Biologists from the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI) have for the first time shown that amphipods from the warmer Atlantic are now reproducing in Arctic waters to the west of Spitsbergen.

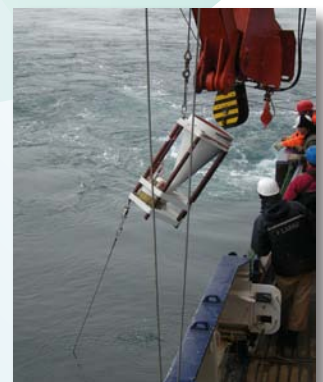
This surprising discovery indicates a possible shift of the Arctic zooplankton community, scientists report in the journal *Marine Ecology Progress Series*. Amphipods have been found in AWI's sediment traps which have been monitored in the AWI long-term observatory for the past 13 years in HAUSGARTEN, in the Fram Strait.

Over the years changes have been observed in the number of amphipods caught and also in the species composition. "In the first four years our catches consisted exclusively of the Arctic and sub-Arctic individuals *Themisto libellula* and *Themisto abyssorum*. We found examples of the smaller species *Themisto compressa*, which is native to the Atlantic Ocean, in our sediment traps in July 2004 for the first time. They had apparently come that far north during a warm phase of the West Spitsbergen Current", the scientist reports.

During subsequent years what had begun as an exception turned into a seasonally recurrent rule. From this time scientists documented increasing numbers of the Atlantic species *T. compressa*, especially in summer months. Despite this, scientists at that time believed water in the West Spitsbergen Current, with its average temperature of 3 to 3.5 degrees Celsius, to be too cold to permit the animals from the southern part of the North Atlantic, which have a greater sensitivity to cold, to reproduce there.

New findings contradicted this assumption: "The catches in the months of August and September 2011 contained ovigerous females and recently hatched juveniles of the Atlantic species for the first time. Moreover in following months we were able to provide evidence of the migrating amphipod in all stages of development, despite the fact that the warm phase of the West Spitsbergen Current had already subsided", says Eva-Maria Nöthig.

The scientists calculated that the water masses of the West Spitsbergen Current running northwards require approximately 150 days to get from the North Atlantic to the Arctic Ocean. This was too long to transport egg-bearing females from their native habitat at 60 degrees north latitude in time for their larvae to hatch near the west coast of Spitsbergen. "We believe that the Atlantic amphipods are reproducing in the waters of the eastern Fram Strait. This means the animals reach sexual maturity here and also have their offspring here", Eva-Maria Nöthig says. The study was originally published under: Angelina Kraft, Eva-Maria Nöthig, Eduard Bauerfeind, David J. Wildish, Gerhard W. Pohle, Ulrich V. Bathmann, Agnieszka Byszczynska-Möller, Michael Klages (2013): First evidence of reproductive success in a southern invader species indicates possible community shifts among Arctic zooplankton, *Marine Ecology Progress Series*, MEPS 493:291-296 (2013), doi:10.3354/meps10507, Online publication date: November 20, 2013.



One of the sediment traps, moored in the AWI long-term observatory HAUSGARTEN
Photo Credit: A.Kraft, Alfred-Wegener-Institut

This article was provided by Sina Loeschke, Department of Communications and Media Relations, Alfred Wegener Institute

News from the POGO members (cont'd)

Drilling into the fault of the 2011 Tohoku-Oki earthquake (M9.0) reveals new insights into the rupture mechanisms

CHIKYU's IODP expedition produces better understanding of the devastating earthquake and tsunami hazards

Integrated Ocean Drilling Program (IODP) Expeditions 343/343T (April 1 - May 24 and July 5-19, 2012), entitled as The Japan Trench Fast Drilling Project (JFAST), were carried out using the deep-sea scientific drilling vessel CHIKYU. The major purpose of the expeditions were to understand how the fault moved with such large displacement (approx. 50m horizontally and 7-10m vertically) near the Japan Trench axis during the 2011 Tohoku-Oki Earthquake.



Deep sea scientific drilling vessel CHIKYU
Photo credit: JAMSTEC

The JFAST expedition had two main objectives. One was to collect geological samples in order to analyze the physical properties of the seismic fault, which caused the devastating earthquake. Another was to measure

the temperature near the fault in order to estimate the frictional heat produced by fault slip during the earthquake. However the borehole drilling encountered many technical challenges, because the target was quite deep (water depth was approx. 7000m and penetration required about 1000m).

Eventually CHIKYU operations overcame severe engineering difficulties and revealed the following scientific results:

- 1) The shallow rupture of the 2011 Tohoku-Oki earthquake occurred on a thin plate-boundary fault zone, which was less than 5m in thickness.
- 2) The huge shallow slip during the earthquake can be explained by very low coseismic shear stress on the plate-boundary fault.
- 3) The small (0.3°C) temperature anomaly on the plate boundary fault suggested that friction was extremely low during the earthquake.

These results indicated that a weak and thin geological layer, which was formed of mainly clay minerals (smectite), facilitated the huge fault slip. Also the coseismic slip may have been enhanced by fluidization through thermal pressurization effects.

The scientific outcomes through JFAST have proven the strength of borehole sampling and monitoring for elucidating the slip behavior of shallow mega-earthquakes.

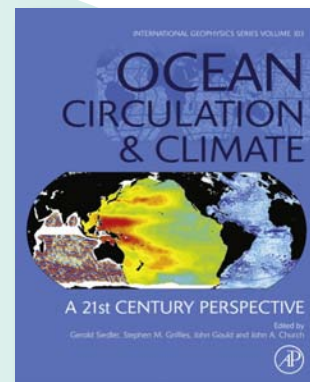
These results are outlined in papers published in "Science" and reveal several factors that clarify our understanding of mechanisms that produced the unexpectedly huge fault slip during the earthquake and the severe tsunami. <http://www.jamstec.go.jp/chikyuu/exp343/e/findings.html>

This article was provided by CDEX (Center for Deep Earth Exploration), JAMSTEC

The Role of the Ocean for Climate Change

A new book presents the current state of knowledge

The ocean is one of the most important components of the climate system. It contributes large reservoirs for heat and carbon and is thus a major player in controlling climate change. The current state of knowledge is summarized in a new book, "Ocean Circulation and Climate – A 21st Century Perspective", written by 76 authors from 15 countries. It was edited by four experts, Gerold Siedler, from GEOMAR Kiel, Germany, was joined by John Gould from NOC Southampton/UK, Stephen Griffies from GFDL Princeton/USA and John Church from CSIRO Hobart/Australia.



The first edition of this book published in 2001 was based on results from the multi-year international research program WOCE (World Ocean Circulation Experiment). It was very successful and had quickly become a standard reference on the topic. Meanwhile, two developments in particular provided new knowledge on the oceanic circulation and led to the decisions of the editors to prepare a major and extended update.

First there has been a most remarkable progress in ocean observations to long-term monitoring. The program ARGO with more than 3,000 profiling drifters now provides physical data from the ocean's interior with global coverage. Also, the potential of satellite observations is used extensively to observe distributions of temperature, plankton, currents and other properties.

The second cause is the rapid progress in the modeling of ocean, sea ice and atmosphere. This is based both on the speedy development of computer systems and the close collaboration of modeling groups in the leading research centers.

The book, although mostly aimed at ocean and climate researchers and graduate and post-graduate students, also attempts to provide access to the topic for those who are interested in the science of this field in general.

Reference: Siedler, G., Griffies, S., Gould, J. und Church, J. (eds.), 2013: Ocean Circulation and Climate: a 21st Century perspective. 2nd Ed., Oxford, GB, Academic Press, 898pp.

This article was provided by Andreas Villwock, Communication and Media, GEOMAR

News from the POGO members (cont'd)

New Instruments Deployed in the Southwest Atlantic to Monitor Meridional Transports Across 34.5° S

Scientists from Brazil, France, Argentina and the United States collaborate in the SAMOC initiative

The South Atlantic Meridional Overturning Circulation (SAMOC) is an international initiative aimed at studying the variability of the MOC in the South Atlantic and its impacts on climate change. The Brazilian contribution is carried out in close cooperation with colleagues from France, Argentina and the United States of America. As of December 2013, a total of nine cruises have been conducted in the western end of a transatlantic line along 34.5°S, the SAMOC Basin-wide Array (SAMBA). From these, six were carried out on the Argentine R/V Puerto Deseado and the remaining three on Brazilian vessels. The most recent cruise was carried out 7 to 17 December 2013 onboard the University of São Paulo's R/V Alpha-Delphini, with the participation of researchers from Argentina and Brazil.

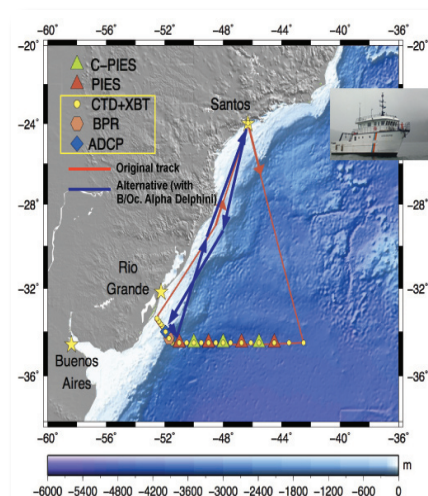


Fig 1: Red line: The ship track and positions of stations in the regular cruises. Blue circuit: Track of the December 2013 cruise on board the Alpha Delphini (shown in the insert).

The field component of the Brazilian contribution to SAMOC includes continuous observations of the western boundary current employing PIES (Pressure Inverted Echo Sounder) and C-PIES (PIES equipped with Currentmeter) in conjunction with NOAA's Atlantic Oceanographic and Meteorological Laboratory, and oceanographic sections in the western end of SAMBA. Oceanographic cruises are conducted nominally once a year to acoustically retrieve the data stored in the PIES/C-PIES and to carry out maintenance operations. During these cruises a hydrographic section designed to observe a number of physical and biogeochemical properties is also occupied (see Fig. 1).

Because the Alpha-Delphini is a small size vessel, the activities were restricted to the shelf break region (dark blue track in Fig. 1). The fieldwork included the mooring of a Bottom Pressure Recorder (BPR), at the shelf break (blue star), and a bottom mounted ADCP (Acoustic Doppler Current Profiler), at the 400 m isobath (red icon), is shown in Fig. 2.

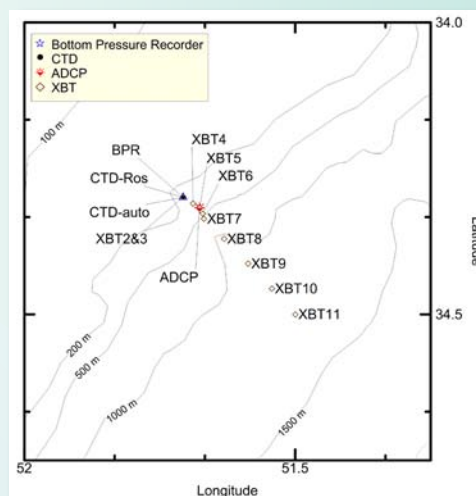


Fig 2: Distribution of CTD and XBT stations and locations of mooring of the BPR (blue star) and the ADCP (red icon) during the SAMOC-BR2 Cruise on board the Alpha Delphini.

This article was provided by Edmo Campos (Instituto Oceanográfico da Universidade de São Paulo, Brazil), Raúl Guerrero (Instituto Nacional de Investigación y Desarrollo Pesquero - INIDEP, Argentina) and Alberto Piola (Servicio de Hidrografía y Navegación - SHN and University of Buenos Aires - UBA, Argentina)

Ocean color radiometry and aerosol optical properties data gathered by the Jeodo Ocean Research Station will be distributed worldwide through NASA

The Korea Institute of Ocean Science and Technology (KIOST), with Kang Jung-keuk as president, announced that it has successfully installed AERONET-OC (the AERosol RObotic NETwork-Ocean Color) at the Jeodo Ocean Research Station as part of the Stay Type Research Plan of the Korea Hydrographic and Oceanographic Administration (KHOA), and that it has started providing observation data on the sea around Jeodo to the NASA homepage.

AERONET-OC is an unmanned automatic observation device that measures the amount of light coming out of the atmosphere and from the sea water according to a set observation schedule. It is installed on ocean towers or other ocean research station structures. About 15 AERONET-OCs have been installed world-wide, including in Europe, the United States, and Australia.

KIOST's successful installation and gathering of data from the AERONET-OC, a first in Northeast Asia, is expected to contribute to providing precise satellite data to nations throughout the world in conjunction with other devices already installed in other regions.

Using AERONET-OC, KIOST will conduct research to improve the accuracy of data collected by the Chollian Geostationary Ocean Color Imager (GOCI), the world's first GOCI* operated by the Korea Ocean Satellite Center (KOSC).

Park Young-Je, director of KOSC at KIOST, said, "AERONET-OC will provide real-time data on the ocean surrounding Jeodo to users of satellite data all around the world. We expect that AERONET-OC will also help improve the accuracy of satellite data, giving people the benefit of more precise and useful data, such as changes in the marine environment, observation of suspended sediment plumes, algal blooms and less-saline water masses originated from Yangtze river."

*Geostationary Ocean Color Imager: This satellite is located at an orbit where it revolves around the earth at the same speed as the earth rotates. Unlike low-orbit satellites that change observation locations every hour, the GOCI observes changes in one area of the ocean.

This article was provided by Young-Je Park, Director, Korea Ocean Satellite Center

POGO Activities

POGO-15 Meeting



Delegates at the POGO-15 Annual meeting
Photo Credit: R. Catt, Tasmanian Government

The 15th POGO Annual Meeting was jointly hosted by CSIRO and IMAS, in Hobart, Australia from 22-24 January 2014. Over 50 participants from 15 countries were given a warm welcome by the local hosts, including the Tasmanian Government.

In addition to reports on POGO activities from 2013 (e.g. Blue Planet, capacity building) and from partner organisations, workshops took place on topics of interest to the Members and POGO community including Communications; Autonomous Devices for Deep Sea Observations; What POGO can do for SOOS; Data from Observing Systems (Time Series); and Autonomous Observing System for Tropical Air-Sea Interaction. The Members also had the opportunity to discuss future activities and POGO business during a 2-hour Partners' Meeting.



Further information will be provided in the next issue of the POGO Newsletter.

POGO attends GEO-X Plenary and Geneva Ministerial Summit

In January 2014, representatives of POGO attended the 10th Plenary and Ministerial Summit of the Group on Earth Observations (GEO) in Geneva. During the Plenary, the proposal for preparation of the next GEOSS Implementation Plan and the draft Geneva Declaration were discussed. POGO leads the GEO Oceans Task, which is the overarching task that aims to integrate and coordinate all the marine initiatives in GEO. This Task, called Oceans and Society: Blue Planet, cross-cuts the nine societal benefit areas defined by GEO (agriculture, biodiversity, climate, disasters, ecosystems, energy, health, water and weather).

Following the GEO-X Plenary, at the Ministerial Summit, GEO received unanimous endorsement to "unleash the power of open data for a second decade". There was agreement to continue building on the organisation's first 10 years of pioneering environmental advances which are designed to improve the quality of life of people everywhere, beyond the current mandate which runs until 2015. Fuelled by open data, GEO's efforts are now evident in most regions of the world. GEO is comprised of 90 member nations, the European Commission and 77 Participating Organizations including POGO.

Blue Planet was featured in a showcase video shown to the Ministers. It was also available to delegates throughout the Plenary meeting in the exhibition area. Also, Blue Planet hosted a joint side event in collaboration with the European Commission entitled "Towards an Integrated Atlantic Ocean Observation System aided by GEO's Blue Planet Initiative", which was very well attended. The agenda consisted of a series of short talks followed by a panel discussion. Speakers included senior figures from the European Commission, the European Space Agency and representatives of major observing programmes in Europe and North America. During the entire Plenary and Ministerial, interest in the Blue Planet Task was evident from the numerous endorsements made by delegates in their formal statements, including representatives from various member nations and representatives of major intergovernmental and international organizations.



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This article was provided by Vikki Cheung, POGO Secretariat

POGO-16 Meeting

January 2015, Tenerife - Hosted by IEO

The next POGO annual meeting will be hosted by El Instituto Español de Oceanografía (IEO) in Tenerife, Spain in January 2015. At this meeting, Prof. Dr. Karen Wiltshire will take over from Prof. John Field as Chair of POGO.



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