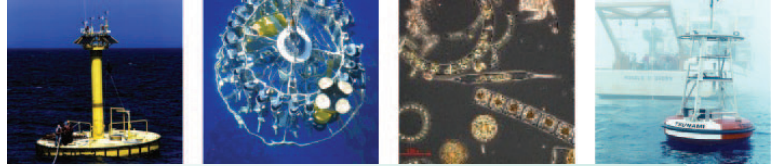




Partnership for Observation of the Global Oceans

Newsletter

Issue 16
Apr 2014



POGO Capacity Building News

The Austral Summer Institute XIV (ASI XIV) at the University of Concepción, Chile

A report from this year's ASI

The Austral Summer Institute XIV (ASI XIV), organized by the Department of Oceanography and the COPAS Sur-Austral Program of the University of Concepcion, Chile, was devoted to Coastal and Open Ocean Studies through Multiple Approaches. ASI's five courses were held during January 2014 with the participation of 80 students coming from Argentina, Brazil, Belgium, Colombia, Cuba, Ecuador, Germany, Peru, Spain, the United States, and Chile.

The courses "Multi-disciplinary satellite oceanography: Platforms, data and applications", "Changing biogeochemical cycles in the coastal ocean", "Time Series Analysis in Natural Sciences" and "Fluvial and glacial sediments impacting coastal ocean processes: An interdisciplinary perspective" were held at the Main Campus of the University of Concepcion on 6-17 January 2014. The course "Ecology and Diversity of Marine Microorganisms" took place at the Biological Marine Station at Dichato on 6-25 January 2014. Invited lecturers offered open conferences on the subjects of their expertise that were attended by the marine sciences community.

Over 850 students have participated in our activities since 2002. Their interaction, with over 150 lecturers coming from prestigious institutions worldwide, has allowed the development of networks and collaboration and consolidated the ASI as one of the strongest capacity building efforts in Latin America (<http://www.udec.cl/oceanoudec/asi-14/>).

Testimonials



Scholars from the ASI-XIV "Multi-disciplinary satellite oceanography: Platforms, data and applications" course
Photo Credit: University of Concepcion

"ASI XIV was a rewarding and enriching experience. I met students and professionals who work in oceanography worldwide in its various aspects and I could share my experiences with them, as well as open my mind to new ideas. The course has exceeded my expectations and added a load of fundamental knowledge in my training. Also, the teacher and organizers were attentive and caring, leaving no doubt about the quality of this program." - Larissa P. Valério, M.Sc. Remote Sensing, Brazilian National Institute for Space Research – INPE.

"My experience in ASI XIV was good from the moment of the application onwards. The course in which I participated "Changing biogeochemical cycles in the coastal ocean" was special because Dr. Kay Emeis is a skilled professional in the subject. Besides the incorporation of students, researchers and scholars of marine biogeochemistry was an essential experience for the integration and exchange of experiences. Facilities at the University of Concepción positively impacted me and we could share with students and faculty of that institution that otherwise would be very difficult for me. I take this opportunity to write about my experience in participating in ASI XIV to deeply thank the organizers and sponsors." - Roberto González de Zayas, Coastal Ecosystems Research Center, Cuba.

"I attended ASI for the first time and thoroughly enjoyed the course. In delivering the class, Dr. Andrew Thomas demonstrated an in-depth knowledge of satellite oceanography. He was very willing to answer questions and he used the feedback to promote useful discussion on a variety of issues. His enthusiasm inspired the entire group to work hard on the small projects that we worked on during the week. Even for the participants who had no prior experience on the subject, it was a great opportunity to be involved with real data, making analysis and building hypotheses. I worked closely with two students from Chile and one student from Ecuador. It was a rich learning experience since I have never seen them before. We were able to share different approaches and ideas to reach a common goal. I look forward to attending other ASI courses in the future. I want to say a big thank you to everyone who makes this program possible." Suene Correa, M.Sc. in Physical, Chemical and Geological Oceanography, FURG, Brazil.

This article was provided by Monica Sorondo and Silvio Pantoja, UNESCO IOC Chair in Oceanography, Department of Oceanography and COPAS Sur-Austral, University of Concepción.

The Nippon Foundation-POGO Centre of Excellence at the Alfred Wegener Institute for Polar and Marine Research 2014-15 is open for applications

The NF-POGO Centre of Excellence in Observational Oceanography at the Alfred Wegener Institute for Polar and Marine Research is now open for applications for the next training programme, which will run from October 2014 to August 2015.

Applications are invited from trainees from both emerging and developed countries with at least a bachelor's degree in science. Ten scholars per year will be trained at the NF-POGO CofE at AWI in integrated, multi-disciplinary oceanography. Scholars will receive ten months of training to include one of formal introductory training, followed by detailed courses emphasising core skills and specialised scientific topics such as modelling, remote sensing, ocean-atmosphere interactions as well as training in instrumentation, sample collection and analytical protocols. The NF-POGO CofE at AWI will be conducted in Helgoland with focus on open-ocean sciences and also in Sylt where shelf/basin interaction are topics of study.



For more information and the details on how to apply, please visit www.awi.de/NF-POGO-AWI-COE.

POGO Capacity Building News (cont'd)

POGO-SCOR Visiting Fellowships 2014

The 8 successful candidates for the 2014 programme have now been selected and notified. The fellows are from Argentina, Brazil, India, Indonesia, Iran and Mozambique. This year, institutions that will host the fellows are Nansen Environmental and Remote Sensing Centre in Norway, Lamont-Doherty Earth Observatory Columbia University, Plymouth Marine Laboratory in the UK, University of Hawaii at Manoa, Queen Mary University of London in the UK, Institut de Ciències del Mar in Spain and Hooakido University in Japan.



Mochamad Furqon Azis Ismail - Indonesia

"Interannual variability of Makassar Strait throughflow from moored and archived hydrographic data"



Lilian Krug - Brazil

"Delineation of biogeochemical provinces in SW Iberia"

Georgina Cepeda - Argentina

"Metagenetic methods for time series monitoring of zooplankton biodiversity in the Argentine Sea"



Manoj Kumar Mishra - India

"Evaluation of various methods for retrieving inherent optical properties in case-2 waters using ocean colour data"



Forough Fendereski - Iran

"Phytoplankton functional types detection from space and its application in biological validation of marine ecoregions"



Seyedeh Naghibi - Iran

"Interaction of the Earth's Wobble and Large Scale Oceanic Currents Modification and Numerical Validation of a Semi-analytical Approach"

Issufo Halo - Mozambique

"Modelling the mesoscale ocean circulation in the southwest Indian Ocean"



Sunita Pandey - India

"How to organize, maintain and get the most from a Fixed-Point Time-Series Coastal Observatory for marine microbial ecology and biogeochemistry, with emphasis on the contribution and potentialities of single cell biogeochemistry techniques"



POGO-AMT fellowships

POGO is pleased to announce that it will once again offer a Visiting Fellowship for training on-board an Atlantic Meridional Transect (AMT) cruise in 2014. This programme, now in its 7th year, has proved to be a very successful in providing sea-going experience to young scientists from developing countries, and the opportunity for them to be involved in an internationally renowned scientific programme.

This year the cruise will take place between 12th September and 28th October 2014. The selected candidate will be announced in the next issue of the POGO Newsletter.



POGO Capacity Building News (cont'd)

POGO Visiting Professorship 2014



Prof. Renzo Mosetti

The 2014 POGO Visiting Professorship has been selected and this year, Prof. Renzo Mosetti from the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), a POGO member, will be visiting the Center for Marine Studies, Federal University of Paraná. The Professorship will be hosted by Dr. Eduardo Marone.



The title of the proposed training course is "Innovative integrated marine monitoring systems in coastal regions" and will be designed for those interested in learning more about the coastal zone and its relationship with human activities. Students will examine the problem of efficient and innovative monitoring systems based on: fixed stations, meteo-oceanographic buoys, satellite and airborne remote sensing data, drifters and coastal HF radars. Analysis will include investigation of the case studies from the Gulf of Trieste (Italy) where an integrated monitoring system is active.



News from the POGO members

IPCC devoted much attention to the topic of oceans

"Ocean Systems" own chapter in the second part of the fifth IPCC Assessment Report

The Intergovernmental Panel on Climate Change (IPCC) released the second part of their fifth assessment report "Climate change 2014: Impacts, Adaptation, and Vulnerability" on the 31st of March 2014 in Yokohama. The focus of this second part lies on the effects that climate change has on the ecosystems of our planet, as well as on how humans, animals and plants can adapt.

Scientists from the German Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), substantially contributed to the IPCC report with their research and publications. Moreover, AWI biologist Prof Dr Hans-Otto Pörtner coordinated one of the articles of the fifth assessment report. As a coordinating lead author of the chapter "Ocean systems" he summarized the effects climate change has on life in the oceans, a premiere, as the oceans have never before been included in an IPCC report with a chapter on their own. The expert jointly headed the work on the chapter "Ocean Systems" with his colleague David Karl of the School of Ocean and Earth Sciences, University of Hawaii at Manoa.



Certain species or life stages like juvenile Antarctic krill live underneath ice floes.
Photo Credit: Mario Hoppmann, Alfred Wegener Institute

"It's the first time that the IPCC has devoted so much attention to the topic of oceans. Two entire chapters of the Fifth Assessment Report, Part 2, focus on climate-related changes in the oceans and their consequences. Chapter 6, which we coordinated, examines climate change and possible adaptation options from a global perspective, chapter 30 describes the changes in selected oceanic regions," says Hans-Otto Pörtner.

This emphasises the essential role of the oceans in the Earth's heat balance and in the regulation of the global climate system. The global climate has undergone changes in the geological past before, but today the velocity of change is faster than everything we know from the past 65 million years. Therefore, organisms have less time to adapt to this changing environment.

The first part of the IPCC fifth assessment report was presented in Stockholm, Sweden, on 27th September 2013. After the report of Working Group II, the Working Group III made its report public in Berlin, Germany, on 13th April 2014, and the Synthesis Report will be presented in Copenhagen, Denmark, at the end of October 2014.

This article was provided by Magarete Pauls, Information Strategy, Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association.

News from the POGO members (cont'd)

Large scale toxic red tides plague the eastern and southern coasts of South Africa

The coastal areas between East London and Wilderness have been subjected to the largest, and most persistent, red tide in recorded history

The coastal areas between East London and Mossel Bay, South Africa, have been subjected to the largest and most persistent red tide in recorded history. The east and south coast's regularly have red tides at a frequency of approximately 1 - 2 a year, but these have always in the past been caused by a non-toxic species, *Noctiluca miliaris* Suriray.



The largest and most persistent red tide in recorded history was observed during December 2013.
Photo credit: SAEON

Oceanographic conditions during December 2013 were typical for summer along the south-east coast, with a strongly stratified water column and the periodic decrease in water temperatures in responses to easterly wind induced upwelling.

The upwelling enriched surface waters triggered a phytoplankton bloom around 17 December 2013. True colour satellite images indicated that the surface waters of Algoa Bay were advected offshore, entrained in the Agulhas Current and returned inshore near Mossel Bay.

The introduction of nutrient rich waters and possibly biological material induced a bloom of dinoflagellates, creating a red tide. The dominant species in the bloom was *Lingulodinium polyedrum* (F.Stein) J.D.Dodge and this was the first recording of a bloom of this species in South Africa. Atypical conditions along the 500 km coastline favoured the dinoflagellate bloom with surface water temperatures in excess of 22°C and limited wind, current or upwelling induced mixing. Chl-a biomass of the surface water often exceeded 50 µg l⁻¹ and the persistence of the bloom for more than three months had a significant impact on the ecosystem and socio-economics of the region. As the bloom decayed the decomposition of the cells reduced the bottom oxygen concentrations to below 1 mg l⁻¹ and these anoxic conditions resulted in several separate instances of marine organism mortality. The production of temporary planktonic cysts meant that cysts were able to continuously re-seed the area after each subsequent upwelling event.

It is predicted that this species and these large scale red tide events may become a more regular feature along this stretch of South Africa's coastline in future.

This article was provided by Tommy Bornman and Wayne Goschen (SAEON Elwandle Node) and Paul-Pierre Steyn (Nelson Mandela Metropolitan University).

New digital Atlas for the Ocean

A new three-dimensional atlas shows the concentrations of nutrients and trace elements dissolved in the world's seas.

A new three-dimensional atlas, contributed to by Plymouth Marine Laboratory (PML) scientists, shows the concentrations of nutrients and trace elements dissolved in the world's seas.

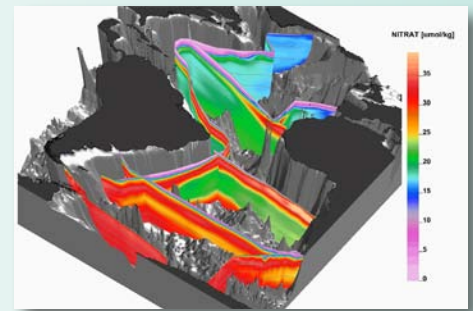
The digital maps were released at the International Ocean Sciences meeting in Hawaii in February 2014. Using new 3D graphical representation for nutrients and trace elements in the ocean, the electronic atlas was constructed with data from GEOTRACES, an international programme which aims to improve the understanding of biogeochemical cycles and distribution of trace elements in the marine environment. Scientists from approximately 35 nations have been involved in the programme, which is designed to study all major ocean basins over the next decade.

The eGEOTRACES electronic atlas contains animated 3D scenes for a large number of hydrographic parameters as well as trace elements and isotopes measured along GEOTRACES cruise tracks. PML provided nitrate, silicate and phosphate data which contributed to the stunning new 3D images. PML also worked in close collaboration with Plymouth University, who were responsible for some of the trace metal data presented.

Malcolm Woodward from PML was part of the UK GEOTRACES cruise team that investigated the 40 degree South Atlantic Ocean transect between South Africa and South America. He commented: 'It made us very proud to be part of this and for PML to be involved in this global data effort. The data have been very carefully scrutinised and checked by a global committee specifically looking at cross-over stations between different cruises, data of lesser quality was not included.'

The eGEOTRACES Electronic Atlas, hosted by the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, can be found here: <http://egeotraces.org/>

This article was provided by Helen Murray, Communications, Plymouth Marine Laboratory.



3D scenes showing nitrate concentrations as part of the GEOTRACES programme.
Image credit: eGEOTRACES Electronic Atlas (www.egeotraces.org)

News from the POGO members (cont'd)

Autonomous sub to dive deep and long

Autosub Long Range sets off to collect scientific data from the ocean shelf edge



Autosub Long Range Autonomous Underwater Vehicle
Photo credit: www.noc.ac.uk/business

At the end of March, a cutting edge, unmanned submarine was launched off Donegal on a mission to investigate the marine environment of the little-known slopes of the ocean shelf edge.

Fitted with the latest oceanographic sensors, battery technology and advanced satellite communication, the Autosub Long Range (ALR) was developed by the National Oceanography Centre (NOC) in Southampton. It is an autonomous underwater vehicle (AUV) that has been kitted out specifically to collect data for a research programme studying the water exchange between the UK's shelf edge seas and the deep ocean.

Called UK FASTNEt (Fluxes Across Sloping Topography of the North East Atlantic), this four-year project is a consortium of six British research institutes and universities combining their fields of expertise in studying the shelf edge. This is where the shallow coastal waters around UK and Ireland meet deep ocean water across the steep sloping sides of the shelf edge. These meeting points are nutrient-rich, productive

and important for fisheries, and are open to a lot of movement and exchange of water and nutrients.

Professor Mark Inall, lead scientist on FASTNEt at the Scottish Association for Marine Science (SAMS) said: "Without ALR we would miss the crucial interaction between the strong northward flowing warm waters of the eastern north Atlantic and the uneven seabed terrain at the edge of the continental shelf. Autosub Long Range will provide a new and unique insight into the turbulent boundary between oceanic flows and the shelf edge."

Dr Maaten Furlong who is head of Marine Autonomous Robotic Systems (MARS) at NOC said: "I am very excited about the launch of Autosub Long Range AUV on this FASTNEt mission. It has been developed over a number of years by a dedicated group of engineers at NOC, and it is very rewarding for me and the team to see the vehicle starting to serve the scientific community."

This article was provided by Cathy Winterton, Communications Officer, Scottish Association for Marine Science (SAMS).

Coral Bleaching Early Warning System

The Australian Institute of Marine Science provides an "early warning system"

As sea water temperatures along the Great Barrier Reef (GBR) reach their warmest during the summer months, this is the time of year when corals are most at risk from heat-induced bleaching.

Corals are sensitive to prolonged elevated sea temperatures and this stress can cause widespread coral bleaching and mortality.

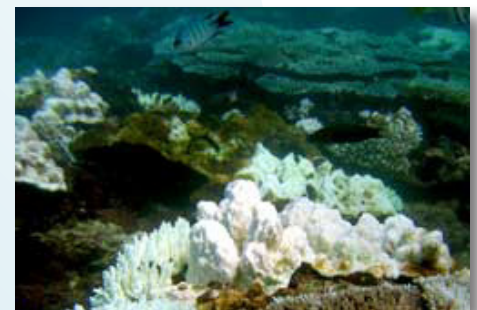
Through ocean observing technologies, AIMS keeps a close watch on coral reefs along the GBR, providing data fundamental to an 'early warning system' for the Great Barrier Reef Marine Park Authority (GBRMPA) to detect and respond to mass coral bleaching events.

AIMS maintains a network of weather stations, temperature loggers and oceanographic moorings along the GBR which measure and transmit (some in near real-time), sea surface temperature, wind speed, humidity, air pressure data and ocean circulations.

Sea surface temperature data from stations such as the one at Davies Reef, are monitored and compared against known thresholds of bleaching for that particular reef based on analyses of previous bleaching events (e.g. 1998, 2002) and in-situ temperature logger data. This near real-time coral bleaching risk indicator enables GBRMPA reef managers to be alerted to conditions indicative of thermal stress build up and is a key component of GBRMPA's Coral Bleaching Response Plan.

These instruments are one element of ocean observing systems managed by AIMS as part of its role in coordinating the Queensland Integrated Marine Ocean Observing System (Q-IMOS) node of the nation-wide Integrated Marine Observing System (IMOS).

This article was provided by Georgina Kenyon, AIMS Communication, the Australian Institute of Marine Science.



The range of bleaching stress can be seen here with the pale hard corals (*Acropora* sp.) on the left and completely bleached corals on the right. Photo credit: AIMS

News from the POGO members (cont'd)

JAMSTEC and ECORD sign MoU

JAMSTEC and ECORD signs a Memorandum of Understanding on Scientific Ocean Research Drilling

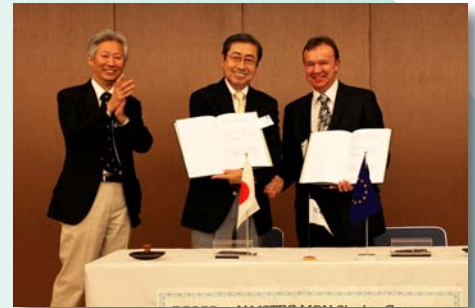
The International Ocean Discovery Program (IODP) is a multinational program of scientific research in the oceans, which was started on 1st October 2013. It uses drilling and logging to undertake research on earth system processes ranging from changes in the earth's climate to the rifting and drifting of continents. In the framework of the recently started new phase of scientific ocean drilling, JAMSTEC executed a memorandum of understanding with the European Consortium for Ocean Research Drilling (ECORD) regarding their participation in the Chikyu Program under the IODP 2013-2023. The signing ceremony was conducted on 17th Feb 2014 at Tokyo, in cooperation with the Delegation of the European Union to Japan.

The memorandum of understanding stipulates that JAMSTEC and ECORD will collaborate further especially by exchanging on-board scientists between the JAMSTEC's scientific drilling vessel "Chikyu" and the ECORD's Mission Specific Platforms (MSPs). D/V Chikyu will continuously engage in tackling scientific challenges in IODP over the next 10 years.

The ambitious scientific challenges in the new framework of IODP are addressed in the science plan Illuminating Earth's Past, Present, and Future, which includes scientific questions such as "How do ice sheets and sea level respond to a warming climate?", "What are the limits of life in the seafloor?", and "What mechanisms control the occurrence of destructive earthquakes, landslides, and tsunami?". The IODP science plan addresses four major research themes:

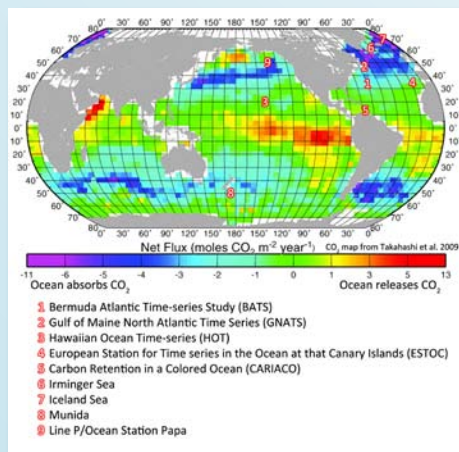
1. Climate and Ocean Change: Reading the Past, Informing the Future
2. Biosphere Frontiers: Deep life, Biodiversity, and Environmental Forcing of Ecosystems
3. Earth Connections: Deep Processes and Their Impact on Earth's Surface Environment
4. Earth in Motion: Processes and Hazards on Human Time Scales

This article was provided by Aska Vanroosbeke, International Affairs, JAMSTEC.



Signing Ceremony at the Delegation of the European Union to Japan, Tokyo. L-R: Dr. Azuma, Director-General of CDEX (Associate Executive Director since April 1st 2014)/JAMSTEC, Dr. Taira, President of JAMSTEC, and Dr. Camoin, Director of ECORD Managing Agency
Photo credit: JAMSTEC

Why Taking the Long View Yields Better Science



CO₂ Map from Takahashi *et al.*, 2009

When Charles David Keeling began to track atmospheric carbon dioxide (CO₂) concentrations at the Mauna Loa Observatory in 1958, he never could have imagined the lasting scientific and societal impacts of these observations. The decades-long record, now known as the Keeling Curve, showed for the first time that human activities were inextricably tied to rising CO₂ levels.

Teasing natural variability in an environmental dataset from variability due to anthropogenically-linked trends can be tricky, so researchers value sustained time-series measurements such as the Keeling Curve. Michael Lomas, a senior research scientist at the Bigelow Laboratory for Ocean Sciences, has devoted much of his career to studying how the oceans are changing in response to growing CO₂ emissions and associated climate change. Lomas and his colleagues at the Bermuda Institute of Ocean Sciences run the Bermuda Atlantic Time-series Study (BATS), a sampling program in the North Atlantic Ocean, just southeast of Bermuda that has been monitoring temperature, pH and a range of other biological and chemical properties since 1988.

The ramifications of the observations made at the BATS site have extended far beyond the shores of the small subtropical island. This research has yielded key insights into how phytoplankton diversity may respond to the gradual acidification of the ocean due to dissolution of atmospheric CO₂, as well as how plankton diversity can absorb and store large amounts of CO₂ in particle

form. BATS' vast dataset, along with those of its sister site in Hawaii, the Hawaii Ocean Time-series, and seven other open ocean time-series programs, have been mined to write hundreds of peer-reviewed journal articles and generate countless more ideas and hypotheses. And yet their greatest contributions may only come in later decades as the trends they are beginning to show become more definitive—as was the case for the Keeling Curve.

Lomas will be leading a UNESCO Intergovernmental Oceanographic Commission effort to assemble and document some of the many contributions made by these time series datasets and to describe how they have guided policymakers in their management decisions. "I hope that it will underscore time-series' underutilized potential. Until now only a handful of studies have directly compared datasets, and much can be gained from further comparisons, particularly when interpreted on a global scale," says Lomas.

This article was provided by Jeremy Jacquot & Darlene Trew Crist, Bigelow Laboratory for Ocean Sciences.

News from the POGO members (cont'd)

Earthquake Sensors Address Ocean Data Gaps with New Green Technology

Industry-academia collaboration seeks to supply key information

A critical gap in earthquake and tsunami data is being addressed by novel technology in development at Scripps Institution of Oceanography at UC San Diego.

The Autonomously Deployed Deep-Ocean Seismic System (ADDOSS) links green technology for navigating the oceans with seismic instrumentation for a potentially transformative data source with implications for earthquake monitoring, tsunami warning systems, and research on deep Earth structure. Using Liquid Robotics Inc.'s surfboard-sized autonomous unmanned vessels, which are powered by wave energy and solar power, ADDOSS is designed to serve as a communications hub to relay information from seismometers deployed on the seafloor to shore via satellite. The system circumvents traditional ocean-floor seismometer deployments and data retrieval that involve ship time and long time lags in recovery.

ADDOSS, currently being tested off Southern California, is planned as a 20-station array with each unit spread 2,000 kilometers (1,242 miles) apart across the oceans where no islands exist.

ADDOSS data will be integrated into Project IDA (the International Deployment of Accelerometers), the global seismographic network operated by Scripps Oceanography's Cecil H. and Ida M. Green Institute of Geophysics and Planetary Physics.

"Combining the Liquid Robotics technology with Scripps Oceanography's ocean bottom seismometer and global network technologies, this development will provide a means of increasing global coverage not only to seismic observations, but also to a variety of ocean bottom observables in an affordable and sustainable way," said Scripps geophysicist Jon Berger, a leader of the project.

Berger and Scripps Geophysics Professor John Orcutt say the data from their new system could become an important asset for enhancing tsunami warning systems as well as other applications, which currently rely upon expensive buoy installations with high life cycle costs.

"When you have a large earthquake, it's important to quickly estimate the location and displacement of the event," said Orcutt. "In order to do this, we need improved coverage in the ocean. During the devastating April 2011 Japanese earthquake and tsunami there were many places where there was no (seismographic) coverage, so this effort improves upon that." The U.S. National Science Foundation, the Cecil H. and Ida M. Green Foundation for Earth Sciences, and Liquid Robotics have supported the development of ADDOSS.

This article was provided by Mario Aquilera, Assistant Director of Communications, Scripps Institution of Oceanography.

The Recovery of the "Vulcano" real-time monitoring buoy over the El Hierro submarine volcano.



The Autonomously Deployed Deep-Ocean Seismic System (ADDOSS)
Photo credit: Liquid Robotics Inc.



Submarine image taken with the ROV Liropus 2000 of the Vulcano buoy lying on the seabed at 204 meters depth. Image Credit: IEO

On 8th November 2013, in the context of the Vulcano project, a real-time monitoring buoy was moored over the main crater of the El Hierro submarine volcano at the Canary Islands, Spain. It was equipped with temperature, conductivity, pressure, pH, pCO₂ and dissolved oxygen sensors in order to monitor the variability of the physical-chemical anomalies due to the CO₂ released from the submarine volcano.

One month later and after one of the most powerful storms experienced in the Canaries during recent years, the Vulcano buoy disappeared. The Spanish Institute of Oceanography (IEO) organized a recovery cruise on board R/V Angeles Alvarino which was equipped with a ROV Liropus 2000. The search area had a 200 meter radius around the main crater divided into four different quadrants. During the second dive of the ROV and after an 8 hour search, the anchor of the Vulcano buoy was found 20 meters deeper and to the southwest of the initial position.

From this point, the ROV Liropus 2000 followed the mooring line for 75 meters where it finally found the Vulcano buoy lying on the seabed at a total depth of 204 meters. The ROV Liropus 2000 is equipped with two hydraulic arms, which were responsible for attaching a hook to the buoy to finally recover it to the main deck of the R/V.

Although the internal parts of the buoy, including the batteries and modem-sensor connectors, were completely unusable, all the main sensors were recovered in perfect condition and are completely reusable with the exception of the pH sensor, which suffered serious damage. The one-month data measured with the Vulcano buoy completely justifies the need of a real-time monitoring system in the area.

This article was provided by Eugenio Fraile-Nuez, Spanish Institute of Oceanography (IEO).

News from the POGO members (cont'd)

New modelling tool to enhance global understanding

ERSEM, an ecological modelling tool is released

This spring, scientists at Plymouth Marine Laboratory (PML) were delighted to announce the release of the open-source Shelf Seas Biogeochemistry programme-ERSEM model, as a modelling tool for the global marine science community. This is an open access model to allow scientists to predict climate and other anthropogenically influenced environmental changes.

ERSEM (the European Regional Seas Ecosystem Model) is a numerical representation of an ecological system, studied to gain understanding of the real-life system. It is designed to simulate carbon and nutrient cycling and ecosystem response in European shelf seas and beyond. This enables scientists to make predictions about future conditions and changes within the Earth system under anthropogenic influences and climate change.

PML was not only part of the original consortium which developed ERSEM, but has since led the development of the original model, finding applications in a number of fields. Working in collaboration with the Centre for Environment, Fisheries and Aquaculture Science (Cefas), the National Oceanography Centre (NOC) and the UK Met Office, this version brings together aspects of ERSEM developments made at PML, Cefas and the Royal Netherlands Institute for Sea Research (NIOZ).

By making the model open access and freely available to all (including full documentation), the scientists involved hope to foster collaborations within the scientific community, as well as improve transparency and sharing on a global scale. It will also allow PML scientists to monitor ERSEM's user base, providing adequate and rapid support, whilst enabling them to assess and increase its impact in order to further enhance and refine the model.



Scientists from PML lead the development of the European Regional Seas Ecosystem Model.

Photo Credit: Plymouth Marine Laboratory

the uncertainty in our understanding of nutrient and carbon cycling within the shelf seas, and of their overall role in global biogeochemical cycles. The SSB-ERSEM code download can be found here: <http://www.shelfseasmodelling.org/Download-code>.

This article was provided by Helen Murray, Communications, Plymouth Marine Laboratory.

Winter conditions crucial for phytoplankton growth in Southern Ocean

Evidence for iron distribution through the water column is found by Southern Ocean scientists

An international team of researchers, including the British Antarctic Survey, have found new evidence that winter conditions in the Southern Ocean play a key role in mixing surface level and deeper waters, and distributing iron. This iron is crucial for the growth of phytoplankton (microscopic plant-like organisms) and ultimately enhances the ocean's capacity to store carbon dioxide.

Reporting in *Nature Geoscience*, the team describes the first observation that the mixing of deep and surface ocean waters that occurs during winter, is the central process by which iron reaches the ocean's surface. This provides the nutrient needed for year-round phytoplankton growth.

Phytoplankton sustains the entire aquatic food web and stores carbon dioxide in the ocean. In order to grow, it requires iron and sunlight but whereas light reaches the surface of the ocean, iron accumulates at greater depth. Phytoplankton is therefore dependent on deep water iron reaching the surface of the ocean.

Co-author, Dr Jean-Baptiste Sallée from the British Antarctic Survey and Centre National de la Recherche Scientifique explains: "The ocean is layered and very little mixing occurs between the surface and the deeper waters. But in winter, when it is cold and windy, these layers do mix and iron from the deep comes up to the surface. This means iron can reach the well-lit layer where photosynthesis occurs and, thereby sustains the biological activity of the largest ocean basin of the world."

"We are really excited to make this discovery because until now we didn't know exactly the physical processes allowing iron to reach the ocean surface and maintain the biological activity. The combination of strong winds and intense heat loss in winter strongly mixes the ocean surface and the mixing reaches deep iron reservoir."

"With this understanding of how iron reaches the ocean surface we are better placed to understand the effects of changing climate and future carbon absorption by the ocean. We know that winter processes are key."

The research involved the British Antarctic Survey, the University of Liverpool, Southern Ocean Carbon and Climate Observatory, Sorbonne Universités, CNRS, University of Tasmania, University of Cape Town and University of Otago.

This article was provided by Rachel Law, Communications and PR Manager, British Antarctic Survey.



Winter conditions in the Southern Ocean mix water layers. Photo Credit: P. Bucktrout, British Antarctic Survey

POGO Activities

POGO-15 Meeting



IEO Tenerife

Following on from the article in the January edition of the newsletter, the presentations, Minutes and Action Items from the 15th POGO Annual Meeting (POGO-15) that took place in January 2014 are now available to download from the POGO website, at <http://www.ocean-partners.org/meetings-and-workshops/meetings-and-workshops/pogo-15>. Action Items were related to the four themes of the Workshops that were conducted during the Meeting, namely the Southern Ocean Observing System (SOOS), tropical moored arrays, deep ocean observing, and access to time-series data. In addition, POGO resolved to engage collectively with industry, and to continue to engage with partner organisations, particularly through the GEO Blue Planet initiative.

Some changes to the composition of the Executive Committee were made during the meeting. Peter Herzig (GEOMAR, Germany) rotated off, while Karen Wiltshire (AWI, Germany) joined as incoming Chair, Eduardo

Balguerías-Guerra (IEO, Spain) joined as host of the next Plenary Meeting, and Margaret Leinen (SIO, USA) was co-opted to the Committee. The full membership of the Committee can be viewed here: <http://www.ocean-partners.org/about-pogo/executive-committee>.

POGO-16 will be hosted by the Instituto Español de Oceanografía in Tenerife, Spain, from 27 to 29 January 2015. The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) has offered to host POGO-17 in January 2016. JAMSTEC is currently commissioning a new ship and plans to showcase its research fleet at the POGO Meeting. The offer was gratefully received by the membership.



Other News

Oceans and Society: Blue Planet Book

Cambridge Scholars Publishing is printing *Oceans and Society: Blue Planet*



'Oceans and Society: Blue Planet' is a global initiative bringing together many ocean-observing programmes with a societal benefit focus. It was created in 2011 as a Task within the Work Plan of the Group on Earth Observations' (GEO). The Geneva-based GEO is a voluntary partnership of some 90 governments and 77 intergovernmental, international, and regional organisations including POGO. GEO is committed to integrating global observations through strengthened cooperation and coordination among global observing systems and research programmes.

Blue Planet held its inaugural Symposium in Ilhabela, Brazil, in November 2012. Participants from some 25 countries representing a diverse array of international programmes, presented and discussed issues including: coordination of and information access from global ocean observing systems for open ocean, coastal and inland ecosystems; operational ocean forecasting; applications of observations for sustainable fishery and aquaculture; and capacity building.

A major outcome of the Symposium was the production of a book. The contributions to the Symposium served as a starting point, and were developed to provide a comprehensive overview of the scope and breadth of the 'Oceans and Society: Blue Planet' initiative. Targeted at all stakeholders within the ocean and marine community, this volume discusses current activities and future actions and raises awareness for the further development and implementation of the Blue Planet agenda. Readers will learn more about ocean observations, how they can be integrated, and their applications to benefit society as a whole. The book has gone to print and should be available from Cambridge Scholars Publishing within two months.

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