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7.1 International Council for Science (ICSU)

7.1.1 International Geosphere-Biosphere Programme (IGBP)

Burkill



Wendy Broadgate, Deputy Director, Natural Sciences, IGBP

IGBP and SCOR have strong collaboration, co-sponsoring two major international projects IMBER and SOLAS as well as jointly sponsoring several IGBP Fast Track Initiatives and a SCOR Working Group. IGBP, SCOR and IOC are together sponsoring the Third Oceans in a High-CO₂ World symposium, in Monterey, California, 24-27 September 2012. The symposium is expected to attract 500 ocean acidification experts and will include discussions on the economics and management implications of ocean acidification.

Below are some other short updates from IGBP.

Planet Under Pressure

The London conference (26-29 March), sponsored by the global-change programmes and the International Council for Science (ICSU), attracted 3000 scientists, decision makers, business representatives, journalists and others; well above the expected 2500. Over 400 articles in the mainstream media have been published worldwide in over 20 languages and the conference still reverberates in the media, online discussions and policy circles. A key outcome was the publication of the first State of the Planet Declaration. 150 science and technology centers for the public and schoolchildren worldwide held Planet Under Pressure related events reaching a further 12,000 people.

The UN Secretary General Ban Ki-moon addressed the conference via video: "I welcome the State of the Planet declaration issued today by the Co-chairs of this conference. Its timing, two months before the UN Conference on Sustainable Development, could not be better. Rio+20 is a major opportunity to advance the policy science interface."

Planet Under Pressure marks a turning point in international Earth-system research towards a focus on global sustainability. The new Future Earth initiative, mentioned elsewhere in this bulletin, was discussed intensely during the conference. The conference also hosted the first major science-policy dialogue on the concept of new universal sustainable development goals. This World Cafe was one of many participatory sessions under the banner "Bridges to the Future".

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Catch some of conference highlights:

Presentations on you tube: <http://www.youtube.com/user/PlanetUnderPressure?feature=watch>
www.planetunderpressure2012.net

Future Earth

Following successful dialogues at the Planet Under Pressure conference, the Future Earth initiative was officially launched at the UN's Rio+20 summit, 20-22 June. The initiative aims to bring together IGBP, DIVERSITAS and the International Human Dimensions Programme under one umbrella, Future Earth: research for global sustainability. Currently, it is planned that the World Climate Research Programme will have observer status in the new initiative. Plans are underway to have an interim Future Earth governing body in place by the beginning of 2013 and a secretariat by mid-2014.

More information: <http://www.icsu.org/future-earth/>

Welcome to the Anthropocene: 700,000 hits

As part of the Planet Under Pressure conference's outreach strategy IGBP and partners launched a beta version of the first educational website on the Anthropocene. www.anthropocene.info. The site also includes a three-minute data visualization of the Anthropocene that has gone viral with over 700,000 hits to date. More interactive content will be developed in the next 12 months.

3-minute film, Welcome to the Anthropocene: <http://vimeo.com/39048998>

Anthropocene: the geology of humanity

The latest issue of Global Change is now out featuring articles on the Anthropocene (by new IGBP chair James Syvitski), urbanization and the re-insurance industry.

<http://www.igbp.net/news/features/features/anthropoceneanepochofourmaking.5.1081640c135c7c04eb480001082.html>

PAGES perspectives newsletter

The latest issue of the PAGES newsletter, co-edited by IGBP science editor Ninad Bondre, is a departure from the past (no pun intended). Each palaeo-centric article is complemented by an article with a current or future perspective.

<http://www.pages-igbp.org/news/523-latest-pages-newsletter/523-latest-pages-newsletter>

7.1.2 World Climate Research Programme (WCRP)

Fennel

The World Climate Research Programme (WCRP): an Update to SCOR-2013

General background

The World Climate Research Programme (WCRP) was established in 1980 by the World Meteorological Organization (WMO) and International Council for Science (ICSU) to address two objectives: determine the predictability of climate and determine the effects of human activities on climate for use in an increasing range of practical applications of direct relevance, benefit and value to society. Since 1993 WCRP has also been cosponsored by the IOC of UNESCO.

This report provides a summary of recent main WCRP ocean-related activities. More information is available from the WCRP, CliC, CLIVAR, and GEWEX websites (see <http://www.wcrp-climate.org>, <http://www.climate-cryosphere.org/>, <http://www.clivar.org>, and <http://www.gewex.org>, respectively). A WCRP accomplishment report published in March 2013 is available for download at: http://www.wcrp-climate.org/images/documents/reports_flyers/WCRP_report03_2012.pdf.

Major events for the past biennium

In 2011 WCRP organized a very successful Open Science Conference (OSC) entitled “Climate Research in Service to Society” (<http://conference2011.wcrp-climate.org>). It was held in Denver, Colorado, USA, in October 2011 and attracted over 1900 participants, many of them oceanographers, from 86 countries. More than 500 scientists from developing nations and regions and 250 young scholars were among the participants. A major emerging theme from the OSC is science behind high value climate information needed to support decision-making dependant on environmental conditions. In 2012 WCRP co-sponsored and contributed to planning and organization of the successful second 2nd PICES/ICES/IOC Symposium “Effects of climate change on the world’s oceans” (Yeosu, Republic of Korea, 15–19 May 2012, in conjunction with Ocean Expo-2012). WCRP also organized a wide range of regional scientific workshops, capacity development and training activities that are described in the subsequent section of this report.

Recent sessions of WCRP working bodies

An Extraordinary Session of WCRP Joint Scientific Committee (JSC) was held on 29 and 30 October 2011 in Boulder, just after the completion of the OSC. The 33rd session of JSC was convened on 16-20 July 2012 in Beijing, China, and the 34th session of JSC was held on 27-31 May 2013 in Brasilia, Brazil. In 2012-2013 the first meetings of the recently established WCRP Data Advisory and Modelling Advisory Councils (correspondingly, WDAC and WMAC) and of the WCRP Working Group on Regional Climate (WGRC) were held. The Councils were established to for further strengthening of coordination of data and modelling activities between the WCRP Core Projects and with sister Global Environmental Change Programs. The WGRC main role is to facilitate support for development of regional science-based climate information for decision makers through such initiatives as GFCS.

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Targeting WCRP climate research to meet societal needs

Following the independent review of the Program by its major sponsors (i.e. ICSU, IOC/UNESCO and WMO) in 2008-2009, WCRP began a series of consultations and deliberations with the international scientific community on its research plan and priorities for the ensuing decade. These efforts culminated in series of community-based scientific papers that were discussed at the OSC in 2011. Six major scientific grand challenges resulted from community consultation to serve as the foci for the development of targeted research efforts that meet the most important information needs of decision makers. These Grand Science Challenges are:

- Provision of skilful future climate information on regional scales (e.g. decadal predictability);
- Regional sea-level variability and change;
- Cryosphere response to climate change (including aspects related to ice sheets, water resources, polar climate predictability, permafrost and carbon);
- Improved understanding of the interactions of clouds and radiation (including the role of aerosols and precipitation and contributions to climate sensitivity);
- Past and future changes in water availability (with connections to water security and water-resources management); and
- The science underpinning the prediction and attribution of extreme events.

Developments in WCRP Projects

The Grand Science Challenges presented above stimulated significant discussion among the Core Projects and the JSC on how to organize the Projects' activities for effective integration of research and delivery of the resulting knowledge. For example, the GEWEX (the new name of the Project is Global Energy and Water Exchanges) project is focussing the research on predicting global and regional energy and water variations, trends, and extremes (such as heat waves, floods, and droughts) through improved observations and modelling of land, atmosphere, and their interactions; thereby providing the scientific underpinnings of climate services. The CliC (Climate and Cryosphere) project main objectives are to address the role of cryosphere in the climate system, facilitate improved understanding of the predictability of the Arctic and Antarctic climate systems, terrestrial cryosphere, and past, current, and future contributions of glacier and ice sheet melt to sea-level variability and change. The updated research focus of SPARC (starting in 2014 the name of the project will be Stratosphere-troposphere Processes And their Role in Climate) is on climate-relevant aspects of atmospheric dynamics and chemistry. CLIVAR is focussing on the oceans and ocean-atmosphere interactions in order to better understand climate variability, predictability and change including such topics as regional sea level and extreme events. Strengthened coordination of activities among the four Core Projects, in the context of a holistic approach to Earth's climate system observation, research, modelling and prediction, will facilitate interdisciplinary research towards fundamental understanding of the Earth's complex climate system and will help to deliver scientific knowledge resulting from these efforts to decision making (also through such newly established initiatives as GFCS and Future Earth).

Expanding and enabling climate research for regional decision makers

Major WCRP experiments provide the framework for advancing research on modelling of climate change and variability and for improving climate projections and predictions. These experiments create the basis for assessing climate variability and change in support of science-based environmental assessments such as the IPCC Fifth Assessment (AR5), Quadrennial Ozone Assessment, newly established Biodiversity Assessment, etc.

The Coupled Model Intercomparison Project, Phase 5 (CMIP5) represents the most ambitious multi-model inter-comparison and analysis project ever attempted. 24 modelling groups from around the world are participating in it. The scope of CMIP5 is much broader than that of the previous intercomparison project (CMIP3) and includes analysis of four representative concentration pathways (RCPs) to support developing mitigation options and adaptation scenarios, as well as the emission-driven Earth System Model (ESM) experiments. This experiment includes both climate projections on the time scale of a century and predictions of decadal climate variability.

WCRP is also continuing its multi-model, multi-institutional set of experiments on seasonal prediction – the Climate system Historical Forecast Project (CHFP). In an attempt to build a joint weather and climate (“seamless”) prediction system, WCRP combined efforts with the World Weather Research Programme and started a joint sub-seasonal to seasonal prediction project (S2S). In order to support the provision of improved regional climate information, WCRP developed an international framework for the Coordinated Regional Climate Downscaling Experiment (CORDEX). The framework is facilitating the evaluation and, where possible, the improvement of regional climate downscaling techniques to support the vulnerability, impact and adaptation analyses and assessments. Many CORDEX regions are developing matrices of regional climate change projections. In some regions, one example being Africa, access to reliable regional climate-change information was particularly limited. The international community therefore targeted Africa as a focus for initial efforts, and at present new regional information on African climate is already available to support the AR5 and decision-makers involved in climate risk management and adaptation planning.

Unprecedented volumes of data containing climate historical simulations, climate predictions and projections, and observational datasets and their-reanalyses are being made available openly to scientists and other users through the Earth System Grid Federation (ESGF) archive. These data include the results from CMIP5, CHFP, CORDEX, the four major international re-analysis products from USA, Japan and Europe, and observation-based data sets prepared by the U.S. National Aeronautics and Space Administration (NASA) for inter-comparison with some of the CMIP5 model results. The ESGF is a highly distributed system with nodes in several continents to ensure ease of access to the large scale data sets, on one hand, and consistency of protocols, formats, projection maps, documentation, etc., on the other hand, to enable more effective analysis and intercomparison among them. WCRP is promoting a pilot effort to improve the connection between data experts and scientists involved in climate model development and evaluation, which

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is called Obs4MIPs (<http://obs4mips.llnl.gov:8080/wiki>). It aims to greatly improve intercomparisons of models and observational datasets.

Ocean model development

The CLIVAR Working Group on Ocean Model Development (WGOMD) met for its tenth session in Venice, Italy, in January 2012, and for its eleventh session in Hobart, Australia, in February 2013. WGOMD, which is the leading coordinating body for ocean modelling, continues to develop the Coordinated Ocean - ice Reference Experiments (CORE) based on the CORE II protocol. A special online issue of the Ocean Modelling journal is in preparation. It will document the state-of-the-science in global ocean-sea ice modelling available through the CORE-II protocol.

Sea level variability and change

Analysis, assessment and prediction of sea-level variability and change, especially at the regional level, are a key focus for WCRP and an area of active development. A dedicated WCRP Workshop hosted by UNESCO-IOC in Paris in February 2011 reviewed the state-of-the-knowledge in sea-level observations, research and modelling. In February 2013 these discussions were continued at another WCRP workshop jointly organized by the CLIVAR and CliC Projects in Hobart, Australia. The main foci of this workshop were ocean dynamics and sea level change, ocean - ice shelf interactions, and dynamics of ice sheets. Based on their outcomes of the two WCRP workshops on sea level, progress is being made in improving the observing networks and developing models capable of capturing essential dynamics of ice-sheets, sea-ice, and glaciers. Another recent observation-based finding discussed at these workshops is the enhanced net mass loss from the major ice sheets, which, if it continues at recently detected rates, will mean that the contribution of the ice sheets to 21st century sea-level rise will be larger than from any other contributing factor (such as the mass loss of glaciers and ocean water thermal expansion).

To manage the potential risks of sea-level changes and develop adaptive measures, it is imperative to know not only the global mean sea-level value but also its regional and temporal variations. WCRP is supporting research on understanding the underlying physical and dynamical processes that contribute to the patterns and magnitude of sea-level variability and change on regional scales. These studies have revealed some patterns of such variability, showing clearly that while sea level is rising on the global average, it may be rising more in some regions of the world and even falling in others, owing to the specifics of ocean dynamics and other geophysical processes. Regional sea-level rise increases the risk of coastal flooding, which also depends on local tides, storm-surges, precipitation, and local hydrological conditions.

Progress in ocean observations and synthesis

Ocean observations continue to be an important focus for WCRP. Together with GOOS and GCOS, WCRP sponsors the Ocean Observations Panel for Climate (OOPC) and contributes to development of the Framework for Ocean Observing (FOO). The WCRP CLIVAR Project, at its recent 20th Scientific Steering Group meeting in Kiel in May 2013, agreed to identify appropriate contacts and to provide for the OOPC the necessary input with respect to development of observations of Essential Ocean Variables and Essential Climate Variables.

The utility of ocean measurements is continuously being enhanced through the efforts of the WCRP CLIVAR Global Synthesis and Observations Panel (GSOP). GSOP coordinates its contribution to implementation of FOO with OOPC. The main objective of GSOP is to create the best possible syntheses of in situ ocean observations, satellite measurements and model outputs. Such ocean synthesis products are needed to understand sea-level changes in the context of climate change and variability and to measure changes in the meridional overturning circulation that could lead to rapid climate change. They also form the basis for assimilation of ocean observations into climate prediction systems, and, in particular, those to be used for decadal prediction. Synthesis products that include information about carbon help to understand and monitor the role of the ocean as a carbon sink. The ocean data synthesis, coordinated by WCRP, involves representatives from all the major modelling centres around the world and provides key information about the state of the ocean to a wide range of users. Significant discussion is ongoing as well on the issue of accumulation of the excess heat in the oceans and its apportion between the upper 700 m and the deeper layers, which are still accessible to Argo.

New measuring techniques such as gliders and integrated physical and biogeochemical sensors are continuously being tested and refined in WCRP international field programmes. For instance, the New Guinea Coastal Undercurrent and its variation has been a major gap in ENSO diagnosis and the link between extra-tropics and tropics. CLIVAR is now addressing this gap in observations through the use of ocean gliders. These autonomous instruments provide a relatively inexpensive means to produce time series measurements. Ultimately it is expected that this sort of instrument will become part of a sustained ocean climate observing system.

Observing and modeling ocean – atmosphere fluxes

Ocean – atmosphere interact through fluxes of energy, matter, and momentum at their interface. Progress in quantitative understanding of surface fluxes is the necessary condition for proper modelling of ocean circulation and for all climate predictions. In January 2012 WCRP published an Action Plan for WCRP Research Activities on Surface Fluxes, which contains recommendations on flux measurement and data processing to create validated datasets for evaluation of model-based fluxes.

Integration of physical, biogeochemical and ecosystem research in the ocean

More and more, experiments in the domain of physical oceanography are merged with ecosystem and biogeochemical research, largely coordinated by the IMBER (Integrated Marine Biogeochemistry and Ecosystem Research) project of SCOR and IGBP. The CLIVAR Scientific Steering Group (SSG) at its 19th session in La Paz (Mexico, June 2012) and the IMBER Scientific Steering Committee held a joint session and agreed to form a task team with a mandate to formulate a strategic approach to future joint work. Research on marine biophysical interactions and dynamics of upwelling systems is now included in the list of science priorities for CLIVAR. By the end of 2013 CLIVAR will develop a white paper on upwelling research opportunities.

WCRP maintains its sponsorship of the very active IGBP/SCOR/WCRP/iCACGP Surface Ocean

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– Lower Atmosphere Study (SOLAS, <http://www.solas-int.org>), which will report to SCOR-2013 individually.

Regional ocean observing systems, field experiments, and process studies

WCRP and its Core Projects provide scientific support to regional ocean observations and help to coordinate them. For example, the 9th Session of the CLIVAR - IOC/GOOS Indian Ocean Panel was held in October 2012 in Cape Town, South Africa, in conjunction with the 9th Session of the Indian Ocean Global Ocean Observing System (IOGOOS), the 3rd SIBER (Sustained Indian Ocean Biogeochemistry and Ecosystem Research) SSG meeting, and the 3rd IndoOS Resource Forum. An international field program CINDY2011 (Cooperative Indian Ocean experiment on intraseasonal variability in the Year 2011), with U.S. participation through the program DYNAMO, and several other projects took place in the central equatorial Indian Ocean in late 2011 - early 2012 to collect in situ observations in order to advance understanding of the Madden – Julian Oscillation (MJO) initiation and improve MJO prediction. Subsequently, a symposium on MJO prediction was held 10 January 2013. Further, in July 2013 the second ‘International Symposium on Boundary Current dynamics’ was held in Li Jiang, Yun Nan, China, and was followed by a joint session of CLIVAR Pacific and Indian Ocean panels. Joint sessions and activities of scientists studying the Indian and Pacific Oceans are warranted by strong interactions of the oceans, as was confirmed, for example, by a very successful CLIVAR/WCRP Workshop on Decadal and Multi-decadal Variability in Pacific and Indian Ocean held in Qingdao, China, in September 2012. The SSG encourages the Pacific panel’s planned connectivity with the WESTPAC.

In the Pacific Ocean, improvements of observing, indexing, modelling and prediction of ENSO remain the focus. The third Workshop on the Evaluation of ENSO Processes in Climate Models was held in Hobart, Australia in January 2013. A vast array of observing experiments is continuing in this basin, including the large-scale Southwest Pacific Ocean and Climate Circulation Experiment (SPICE) and its sub-experiments, field work on the origins of Kuroshio and Mindanao currents, and continuing development and maintenance of the TAO/TRITON ENSO observing system that includes the eastern part of the Indian Ocean. The 7th Session of the CLIVAR Pacific Panel took place in Noumea, New Caledonia, in April 2012.

A significant number of coordinated research, field experiments, and sustained observations are going on in the Atlantic Ocean. They are coordinated by the CLIVAR Atlantic Panel, which held its 12th meeting in September 2012 in Kiel, Germany, including a joint session with the 17th Meeting of the PIRATA SSG. The scope of oceanographic research in the Atlantic Ocean is large and includes subregional activities in the tropical, eastern, southern, northern basins that have differing foci such as the Atlantic meridional overturning circulation and Atlantic Multidecadal Oscillation. At present, this region exhibits the highest potential in terms of possible decadal climate predictability.

The 8th Session of the CLIVAR/CliC/SCAR Southern Ocean Panel took place in February 2013 in Hobart, Australia. This regional community is actively developing the Southern Ocean Observing System, a new international initiative, which was inaugurated in August 2011, to coordinate and

expand efforts to collect and disseminate sustained observations. The research foci in the Southern ocean include ice sheet – ice shelf – ocean interaction, eddies in Southern Ocean, coordinated development of biogeochemical observations and modelling, variability of the Antarctic Circumpolar Current System, and Antarctic Bottom Water Mass formation. The Southern Ocean upwelling system may become a focus of the CLIVAR grand challenge on upwelling. As reported in the recent 2013 update of the SCAR Antarctic Climate Change and Environment Report, this region keeps posing difficult questions to climate science. For example, one of the most rapidly warming regions in the world is around the Siple Region of West Antarctica and, at the same time, the Southern Ocean sea-ice extent has reached its observed maximum in 2012 with an overall positive multidecadal trend of approximately 1.3% per decade. This issue is the main area of research by the Antarctic Sea-Ice Processes and Climate (ASPeCt), a group sponsored by CliC and SCAR, which had its most recent meeting in July 2012, in Portland, USA, and is preparing a review paper on Antarctic sea ice.

With diminishing multi-year sea-ice in the Arctic Ocean, WCRP has been engaged in the research on the reason(s) for significant underestimation of the rate of sea-ice reduction in the CMIP3 experiments, which were used in the analysis of the IPCC AR4 in 2007. These efforts are aimed at improved representation of sea-ice processes in climate models and their exploitation in ensemble climate projections of CMIP5 experiments to be analyzed in AR5. This work will continue in the future through the WCRP Climate and Cryosphere (CliC) project, which will support the development of the WCRP Polar Climate Predictability Initiative and the Grand Science Challenge “Cryosphere in a changing climate”. The CliC project is embarking on a series of activities focused on the Polar Regions including a series of seminars and workshops on the role of sea ice to be conducted with the sponsorship of the Norwegian Research Council. This series of workshops builds on the efforts of the CliC Arctic Sea-Ice Working Group, which had its recent meeting in Boulder, USA, on 31 October – 1 November 2011. A very successful topical workshop entitled “Earth Observation and Cryosphere Science” was organized in partnership with the European Space Agency (ESA), and the European Geosciences Union (EGU) in Frascati, Italy, in November 2012. A paper describing the way forward for cryospheric observations from space, based on the outcomes of this workshop, was prepared and published in the open access online journal “The Cryosphere”.

Support to decision-making, adaptation, planning, and climate risk management

Climate research enabled by WCRP is intended to provide science-based information for decision-makers. Towards this objective, WCRP coordinated the development of the Research, Modelling, and Prediction Annex to the Implementation Plan of the Global Framework for Climate Services. This Annex describes the research objectives and planned activities in support of the GFCS near-term priorities of fresh water reserves management, health, agriculture and food security, and disaster risk reduction.

WCRP, in partnership with other Global Environmental Change programs, regularly informs the intergovernmental process, particularly the Conferences of Parties (CoP) of the United Nations Framework Convention on Climate Change and its Subsidiary Body on Scientific and

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Technological Advice (SBSTA). The recent briefings at the CoP-18 in November 2012 in Doha, Qatar, were on the role of cryosphere in climate and provision of climate services. A report for the research dialogue with policymakers was also prepared for the upcoming SBSTA – 36 (June 2013) in Bonn, Germany. WCRP is also developing cooperation with the emerging Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA).

WCRP has been supporting the development of several recent publications on extreme climate events. Research on their attribution and prediction is a major focus of the WCRP and its Grand Science Challenge. The Expert Team on Climate Change Detection and Indices (ETCCDI), jointly sponsored by CLIVAR, GEWEX, WMO and JCOMM, provides international coordination for objective measurement and characterization of climate variability and change in form of indices that can be used by practitioners and decision makers. ETCCDI will contribute to implementation of the activities under the Grand Science Challenge of climate extremes and is engaged in facilitating data sharing with appropriate national and international agencies. CLIVAR has also decided to form a limited lifetime working group under the CLIVAR GSOP Panel that would initiate development of sub-surface ocean indices. This work will be conducted in cooperation with WGOMD and ETCCDI.

Capacity development

Capacity development is a high priority focus for WCRP. In 2012, WCRP developed its strategy for capacity development, education, training, and outreach to facilitate growth of the diverse future workforce needed to meet the increasingly complex scientific challenges in the future. To implement the priorities identified in its strategy, WCRP is sponsoring active engagement of many early career scientists in all of its sponsored activities, with particular emphasis on scientists from least-developed and developing countries. Through strategic partnerships with WCRP sponsors (WMO, IOC, and ICSU) and sister organizations such as the START (Global Change System for Analysis, Research and Training), APN (Asia-Pacific Network for Global Change Research), and IAI (Inter-American Institute for Global Change Research), WCRP is currently undertaking a wide range of education, training and capacity development activities. About 300 students and early career scientists were supported by WCRP to attend its meetings in 2011/12, and in 2012 more than 30 early career scientists participated in 13 regional WCRP workshops. For example, in March 2012 WCRP sponsored a meeting in Jakarta, Indonesia, aimed at developing an effective monitoring programme for the Indonesian Throughflow. The workshop brought together scientists from around the world with Indonesian oceanographers from different institutions to develop a joint plan to monitor and improve our understanding of this critical link between the Pacific and Indian Oceans.

Recognizing the pressing need to narrow the large gap that currently exists between decision-makers and climate researchers, WCRP is organizing a series of regional projects, conferences, capacity development and training activities focussing on the role of science in climate services and risk management. The first one, on 15-18 October 2013, in Arusha, Tanzania, will be on the State of the African Climate System. It will be followed by a similar forum in Latin America in March 2014 in Montevideo, Uruguay. Likewise, a joint WCRP-IPCC-EU International

Conference on Regional Climate will be held 4-7 November 2013 in Brussels, Belgium. This event aims to discuss the main outcomes of IPCC AR5 WGI, report the key scientific results for the first phase of CORDEX, and identify the future research priorities. A major conference “Climate Research and Earth Observations from Space: Climate Information for Decision Making” is being planned in partnership with the European Meteorological Satellite (EUMETSAT), European Commission (EC), major international and national space agencies, and observations coordination programmes in Darmstadt, Germany, in October 2014.

Contributing to the Transboundary Water Assessment

WCRP is a partner in the Transboundary Water Assessment Project whose overall objective is to develop methodologies to help the Global Environmental Facility (GEF) in setting priorities for their activities and to catalyze a partnership for conducting such a global assessment on a regular basis. WCRP's role is to facilitate access to data sets of future projections of various global marine variables that will be merged with socio-economic data to produce indices of stress and vulnerability of human and natural systems. The ultimate goal is to produce a metric- and mapping-based assessment transforming existing scientific data and projections for the open ocean into stakeholder-relevant information for several themes of relevance such as sea-level rise, coral bleaching, and ocean acidification.

Joint activity with SCOR

In 2009-2012 SCOR, WCRP, and the International Association for the Physical Sciences of the Oceans (IAPSO of IUGG) sponsored a Working Group on “Climatic Importance of the Greater Agulhas System” (Working Group 136). This successful Working Group held three meetings and published a major paper in Nature.

Plans for immediate future

The WCRP Programme Implementation Plan (WCRP 2009, WMO/TD-No. 1503) outlines the main lines of WCRP activities in 2010-2015. WCRP activities are developed with a view to providing a strong contribution to the strategic initiatives of the Programme's Sponsors such as the Global Framework for Climate Services (GFCS), the Future Earth initiative, and the Framework for Ocean Observing (FOO). Implementation plans for WCRP Projects are available at their websites. Some of them are being updated. The community-based papers that were prepared for and presented at the WCRP OSC in October 2011 in Denver, USA, were further revised based on the deliberations at the OSC, and subsequently peer reviewed prior to publication as a monograph entitled “Climate Science for Serving Society: Research, Modeling and Prediction Priorities” (Springer, SPM publishers, 2013). This monograph is intended to serve as the science strategy for WCRP for the next decade.

In addition to pan-WCRP conferences in Arusha (October 2013), Brussels (November 2013), Montevideo (March 2014), and Darmstadt (October 2014), which are focussing on capacity development, regional information and the architecture of climate observations from space, WCRP core projects are also organizing a series of meetings focussing on important aspects of fundamental climate research. A CliC workshop “Cryosphere in a Changing Climate” will be held

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in Tromsø, Norway, in October 2013. A General Assembly of SPARC will be held in Queenstown, New Zealand, on 12-17 January 2014. A major joint meeting of CLIVAR and GEWEX and a GEWEX Conference will be held in The Hague World Forum Convention Center, The Netherlands, in July 2014. Working groups and Councils of WCRP are also planning several major activities associated with the WCRP Grand Science Challenges. A significant number of papers resulting from CMIP5 are appearing in the science literature while preparations for CMIP6 are getting underway. Relevant outcomes of some of these important events and initiatives will be shared with SCOR at its next meeting.

7.1.3 Scientific Committee on Antarctic Research (SCAR)

Brussaard

Ocean Acidification: SCAR Future Plans

1. Background

The carbon dioxide (CO₂) concentration of the Southern Ocean is rising. The dominant source of this increase is in response to partial equilibration with the increasing atmospheric CO₂ concentrations, following worldwide fossil fuel combustion and land use changes. Subsequent shifts in chemical equilibria result in a change to the marine carbonate system and a lowering of seawater pH. This process is termed “ocean acidification” (OA). From a limited number of studies to date, it is already clear that OA is causing rapid changes in ocean chemistry.

There is concern over the future of polar marine organisms that are uniquely adapted to their extreme and cold surroundings. In an environment where development is ten times slower than that in warmer regions of the world, the ability of these (mostly benthic) organisms to adapt to these changing conditions is questionable, especially over the next 50 to 100 years. Studies investigating the impacts of ocean acidification on polar marine calcifying organisms are extremely limited. The major challenges for understanding Southern Ocean acidification are advancing the observational network and better constraining our understanding of the underlining natural variability and the mechanisms that drive it, both of which are still poor. The socioeconomic and cultural effects of Southern Ocean OA are unknown.

2. Future Plans

There is a growing international effort to observe and monitor the marine carbonate system with the emphasis moving to an integrated observing system approach based on ecosystem-carbon-climate coupling. Additionally, modeling efforts are becoming much more unified and assimilated through a multi-model approach, with regional models becoming much more utilised – often informed at the boundaries through coupling to global earth system models. SCAR has appointed an international ocean acidification Action Group, led by Dr. Richard Bellerby (Norway), to document the scientific understanding of ocean acidification. The Action Group consists of an international cross-disciplinary team of ocean acidification experts representing the fields of marine carbonate chemistry, global and regional modelling, marine

ecology, ecotoxicology/physiology and paleoceanography. Dr Bellerby led an equivalent effort in the Arctic.

The OA Action Group will:

- define our present understanding of the contemporary rates and future scenarios of Southern Ocean acidification;
- document ecosystem and organism responses from experimental perturbations and geological records;
- identify present and planned observational and experimental strategies;
- identify gaps in our understanding of the rates and regionality of ocean acidification and;
- define strategies for future Southern ocean acidification research.

The above workplan will be performed in consultation with existing global ocean acidification efforts (e.g. SOLAS/IMBER Sub Group 3, US Ocean Carbon Biogeochemistry, the SCAR co-sponsored ICED programme and the SCAR/SCOR Southern Ocean Observing System).

A draft outline of the report is as follows:

1. Report overview: Background to Ocean Acidification and the Southern Ocean (Bellerby)
2. Recent and present ocean acidification and carbon biogeochemical system change
 - 2.1 From observations (Lo Monaco, Hoppema)
 - Anthropogenic carbon uptake
 - Other biogeochemical processes affected by ocean acidification (nutrients, trace elements, biogases+++)
 - Observational and monitoring programmes
 - 2.2. From models (Lovenduski, McNeil, Lenton)
 - Large scale changes from ESMs
 - Regional OA
 - Surface to benthos OA
 - Geological history of OA and future long term change (from PETM to 2500)
3. Biological Systems:
 - 3.1. Phytoplankton (tbd - Bellerby responsible)
 - 3.2. Zooplankton and mesopelagic (Kurihara)
 - 3.3. Benthic (Suckling)
4. Conclusions, Knowledge gaps and Future Research (Bellerby, All)

The final report will be launched at the SCAR Open Science Conference in August 2014 (www.scar2014.com) and be the subject of a plenary keynote by Dr Bellerby.



SOUTHERN OCEAN OBSERVING SYSTEM

ANNUAL REPORT TO SCOR 2013

● BACKGROUND

The Southern Ocean influences climate, sea level, biogeochemical cycles and biological productivity on a global scale. Many of the most difficult and pressing issues faced by society—how to mitigate and adapt to climate change and sea-level rise, how to manage the effects of ocean acidification, and how best to conserve marine resources and biodiversity—cannot be addressed effectively without improved understanding of Southern Ocean processes and feedbacks and their sensitivity to change. The most urgent research challenges in the Southern Ocean often span traditionally separate scientific disciplines. The Southern Ocean Observing System (SOOS) provides the sustained, integrated, multi-disciplinary observations required to meet these challenges.

The Southern Ocean Observing System (SOOS) is a joint initiative of the Scientific Committee on Antarctic Research (SCAR) and the Scientific Committee on Oceanic Research (SCOR) and endorsed by the Partnership for Observation of the Global Oceans (POGO) and the Climate Variability and Predictability (CLIVAR) and Climate and Cryosphere (CliC) projects of the World Climate Research Programme.

● ACTIVITIES

1) Communication and Outreach:

- SOOS has published 7 articles, 3 of which were in peer-reviewed literature. All are available for download from the SOOS website product database (www.soos.aq/index.php/products/soos-products). The most recent publication, *The vision of the Southern Ocean Observing System* (COSUST, Meredith et al., 2013), provides an overview of the 20-year vision for SOOS and the steps required to achieve this vision.

- SOOS was presented at over 50 international meetings and workshops by the Executive Officer (EO), members of the Scientific Steering Committee (SSC) and representatives of SCAR/SCOR.
- SOOS ran a Town Hall meeting alongside the 2012 American Geophysical Union Fall Meeting, with the objective of bringing together U.S. researchers, and informing them of SOOS activities and objectives.

2) Scientific and Collaborative Initiatives:

- SOOS held a workshop that aimed to develop an international strategy for Under Ice observations (Hobart, Oct 2012). A strategic plan will be released by end-2013.
- SCOR and SCAR were successful in their proposal to ICSU for funding of a workshop on “Identification of Ecosystem Essential Ocean Variables for the Global Ocean”, led by Andrew Constable. The workshop will take place early 2014, and will be complementary to current activities by the Global Ocean Observing System (GOOS) steering committee on this issue. The workshop will contribute directly to SOOS goals and the SOOS EO will support this group.
- SOOS held the 1st SOOS Asian Workshop, in Shanghai, China (23-24 May 2013). This workshop was sponsored by PRIC, SOA, the Institute of Atmospheric Physics Chinese Academy of Sciences (IAP CAS), SCOR, and Climate and the Cryosphere (CliC). Presentations were given by Chinese, Korean, Russian, Indian and Japanese researchers. Two publications are currently in preparation, a workshop report highlighting specifics of the presentations (Jiping et al., in prep), and a publication that outlines the potential for enhanced collaborative efforts (Swart et al., in prep). *Advances in Polar Sciences* has offered to publish both these reports free of charge, by the end of 2013.
- The SOOS/COMNAP workshop was held in July 2013 (Seoul, Korea). The objective of this workshop was to coordinate and maximise operations support that COMNAP can provide towards SOOS objectives. A key outcome of this meeting was the development of a SOOS-COMNAP Collaborative Project, which will be tasked with a number of specific activities. These activities will be put to the COMNAP EXCOM for approval at their September 2013 meeting.
- A SOOS/POGO workshop will be held alongside the POGO Annual Meeting in Hobart, Australia (23 Jan 2014). The prospectus of this workshop is still being developed but it is expected that discussions will revolve around identifying ways that POGO can facilitate SOOS objectives, in a similar vein to the COMNAP SOOS Collaborative Project.

3) Data Management:

- The operational prototype of the SOOS Data Portal was launched on 1 February 2013, hosted by the Australian Ocean Data Network (AODN). A number of issues arose during

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the course of 2013, specifically, changes to the funding of the AODN and a resulting decrease in support available for maintenance and management of the infrastructure. It was therefore agreed that SOOS would work with NASA to develop a SOOS Metadata Portal through the GCMD. This is currently being developed. The previous portal will be taken offline.

- The 2nd SOOS DMSC meeting was held on 23-24 May 2013 in Shanghai, China. Key discussions included the incorporation of Chinese, Korean and Japanese national databases into the SOOS Data Portal, leveraging of resources (human and infrastructure) for ensuring full functionality of the Data Portal, and development of a workplan and timeline for the next 2 years, in parallel with the development of the Thematic workplans of the SSC. This workshop was sponsored by the Australian Ocean Data Centre Joint Facility.

SOOS Governance and Management:

- The SOOS Scientific Steering Committee held its second meeting in Shanghai, China (20-22 May 2013). The meeting was sponsored by SCAR and SCOR, the Polar Research Institute of China (PRIC), and the State Oceanic Administration of China (SOA). Scientific discussions included development of the SOOS 20-year plan, and identification and priority rating of the key gaps in Southern Ocean observations, towards a structured implementation plan for filling these gaps. The minutes from this meeting are available on the SOOS website (www.soos.aq/index.php/about-us/ssc/meeting-minutes).
- Following on from the SSC meeting, the IPO is currently preparing the SOOS Implementation Plan. This plan will build on the strategies outlined in the *SOOS Initial Science and Implementation Strategy* (Rintoul et al., 2012), and will clearly defined the mechanisms for implementation, and steps towards achieving the SOOS vision.
- The IPO has hired a part-time science communications expert to update the SOOS website, and take care of other communication activities. The new website format will provide a lot more information on implementation activities and ways to become involved or contribute.

Sponsorship and Funding

- The Australian Antarctic Division has renewed its sponsorship of the SOOS IPO for the 2013-2014 financial year. The Institute for Marine and Antarctic Studies (IMAS), which hosts the SOOS IPO, has included sponsorship of the office in its proposed 2014 budget and is awaiting approval from the University of Tasmania. Discussions for continuation of support by Antarctica New Zealand and the New Zealand Antarctic Research Institute will take place towards the end of 2013. The IPO is currently in discussion with representatives from Korea regarding potential for Korean sponsorship of the Office.
- SOOS is in the process of developing a Sponsorship Package to increase institutional and organisational sponsorship of the SOOS IPO and related activities. It is envisioned that this package will be sent to relevant research institutes and organisations by the end of 2013.

SOOS greatly appreciates the support provided by SCOR for the annual Scientific Steering Committee meeting, and requests that this support is continued for 2014. Continuation of the support for the SSC meeting will ensure participation by all SSC members, which is imperative for planning and implementation of SOOS objectives. SCAR also provides support for the annual SOOS SSC meeting and continuation of this support for 2014 has been approved. SOOS has accepted the Norwegian Polar Institute's offer to host the 2014 SSC meeting, which will take place in Tromsø during the week starting 16 June.

7.1.4 Future Earth Initiative

Greenslade

See next page.

7.2 Affiliated Organizations

7.2.1 International Association for Biological Oceanography (IABO)

Costello

IABO report to SCOR 2013

IABO is preparing for its next General Assembly as part of the World Conference of Marine Biodiversity in Qingdao, China, October 2014.

The present IABO Executive Committee comprises: Mark Costello (New Zealand) (President); Annelies Pierrot (The Netherlands) (Past President); Patricia Miloslavich (Venezuela); Mike Thorndyke (Sweden); Sun Song (China) Convenor WCMB III); David Patterson (UK) (convenor WCMB II); Charles Griffiths (South Africa). Active national representatives are: Dr Alenka Malej, Slovenia; Dr Leonel Carriol, Guatemala; Dr Sajmir Beqiraj, Albania; Dr Tina N. Molodotsova, Russia; Ms dr C.P.D. Brussaard (Corina), The Netherlands; Prof. Dag Aksnes, Norway; Prof. Frano Kršinić, F.C.A., Croatia; Prof. Harri Kuosa, Finland; Prof. MJS Wijeyaratna, Sri Lanka. Suggestions of additional national representatives from countries not represented are welcome.

Future Earth is a 10-year international research programme that will provide critical knowledge required for societies to face the challenges posed by global environmental change and to identify opportunities for a transition to global sustainability.

The need for a coordinated scientific and societal response to global environmental change was highlighted at the 2012 Planet under Pressure conference. The conference declaration called for a new approach to research that is more integrative, international and solutions oriented, reaches across existing research programmes and disciplines, and has input from governments, civil society, local knowledge, research funders and the private sector. This call was echoed in the Rio+20 declaration and the United Nations Secretary General's Global Sustainability Panel report with the latter calling for a major global scientific initiative to strengthen the interface between policy and science. Future Earth is that major global scientific initiative.

Future Earth will answer fundamental questions about how and why the global environment is changing, what are likely future changes, what the implications are for human development and the diversity of life on earth, and what the opportunities are to reduce risks and vulnerabilities, enhance resilience, and implement transformations to prosperous and equitable futures.

Future Earth will deliver science of the highest quality, integrating, as necessary, different disciplines from the natural, social (including economic and behavioural), engineering and human sciences. It will be co-designed and co-produced by academics, governments, business and civil society, encompass bottom-up ideas from the wide scientific community, be solution-oriented, and inclusive of existing international Global Environmental Change projects and related research activities.

The conceptual framework for Future Earth recognises that humanity is an integral part of the dynamics and interactions of the Earth System and that this has important implications for global sustainability.

The main organisational units for Future Earth research will be a set of three broad and integrated research themes:

- (i) **Dynamic Planet** – understanding how planet Earth is changing due to natural phenomena and human activities, with a particular focus on interactions between social and environmental changes across scales;
- (ii) **Global Development** – providing the knowledge for addressing the most pressing needs of humanity: sustainable, secure and fair stewardship of food, water, biodiversity, energy, materials and other ecosystem functions and services;
- (iii) **Transformations towards Sustainability** – understanding transformation processes and options, assessing how these relate to human values and behaviour, emerging technologies, and economic development pathways, and evaluating strategies for managing the global environment across sectors and scales.

Future Earth will also support and deliver scoping and synthesis activities, communication and engagement, capacity development and education, and effective interactions at the science-policy interface.

For more information, go to www.futureearth.info or follow [@futureearth](https://twitter.com/futureearth) on Twitter.

7.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS)

Coustenis



International Association of Meteorology & Atmospheric Sciences 2012 Report (www.IAMAS.org)

IAMAS is one of the eight associations dealing with the Earth system and its environs that make up the International Union of Geodesy and Geophysics (IUGG). The scope of IAMAS includes the atmospheres of the Earth and other planets. IAMAS is made up of ten International Commissions (IC) and one Committee (C..) that play a major role in carrying through IAMAS activities. The ten ICs cover (alphabetically) *Atmospheric Chemistry and Global Pollution* (ICACGP), *Atmospheric Electricity* (ICAE), *Climate* (ICCL), *Clouds and Precipitation* (ICCP), *Dynamical Meteorology* (ICDM), the *Middle Atmosphere* (ICMA), stratospheric *Ozone* (IOC), *Planetary Atmospheres and their Evolution* (ICPAE), *Polar Meteorology* (ICPM), and atmospheric *Radiation* (IRC). The *Committee on Nucleation and Atmospheric Aerosols* (CNAA) brings together scientists covering the following subject areas: Nucleation Theory & Experiment ; Tropospheric and stratospheric aerosols ; Cloud Drop and Ice Nucleation and Aerosol-Climate Interactions.

Many of these commissions play international leadership roles in their specialty areas [see www.iamas.org/Commissions.html]. This set of commissions provides an important supplement and extension to the leadership and research role of the *World Meteorological Organization* (WMO), which is the governmental entity with a comparable scientific scope to IAMAS; for example, the IOC entered into a *letter of agreement* with WMO for the establishment of an ad hoc expert team that will assess ozone absorption cross sections used in atmospheric observations.

a) The IAMAS Bureau and members have actively prepared the **DACA-13 (Davos Atmosphere and Cryosphere Assembly 2013)** meeting, where many interesting (over 40) symposia were held.

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To face today's key challenges of global environmental change it is essential to cooperate at the interface between atmospheric and cryospheric sciences, and to pay attention to the complex interactions between these two vulnerable components. The [International Association of Meteorology and Atmospheric Sciences IAMAS](#) and the [International Association of Cryospheric Sciences IACS](#) therefore welcomed scientists from both fields to the Davos Atmosphere and Cryosphere Assembly DACA-13 in Switzerland from 8-12 July 2013.

The conference brought together some 1200 scientists from both fields who presented and discussed the latest research in separate or joint sessions. A large variety of topics was covered, from ice-sheet modeling to extreme climate events, from solar UV radiation to avalanche formation and permafrost.

IAMAS scientists and all interested parties are encouraged to view the outcome of this highly successful meeting via the official website <http://www.daca-13.org/>.

b) The **IAMAS Business meeting** was held in Davos, during the DACA-13 on two different occasions (Sunday and Thursday of that week). Among other, several resolutions and statements were composed and adopted.

The IAMAS resolution regarding Future Earth, see : http://www.iamas.org/Pdfs/IAMAS-Resolution_FutureEarth-2013.pdf and the Statement on the Radiation Management Climate Engineering at : <http://www.iamas.org/Pdfs/IAMAS-Statement-RadiationManagement.pdf> . The EC also approved the proposal for holding the 2017 meeting in South Africa.

c) **IUGG Union Commission on Climatic and Environmental Changes**

In the past year, IAMAS has proposed a new commission and has been fully involved in the preparation of the commission CCEC.

Considering the proposal from the initiative group led by IUGG Past President Tom Beer, and taking importance of the scientific topics into account, the IUGG Executive Committee decided to establish the Union Commission on Climatic and Environmental Change (CCEC) in order (i) to promote the advancement of the scientific understanding of climatic and environmental change, (ii) to boost research in reducing uncertainties in climate and environmental models, (iii) to define criteria for collaborative trans-disciplinary research on climate and environmental change, (iv) to fulfill the objectives of IUGG and its associations, (v) to provide an all-Union perspective on climatic and environmental change, and (vi) to make available the knowledge and insights developed through scientific research to the benefit of society and planet Earth, including considerations of the science of global change, related vulnerability and impacts, and potential responses.

The IUGG Executive Committee appointed 14 experts to compose the Executive Committee of CCEC with Tom Beer (Australia) as Chair of the Commission, Jianping Li (China, also ICCL

Executive Secretary) as Vice Chair, Keith Alverson (USA, also former ICCL president) as Secretary-Treasurer, and 10 members of the committee representing Union Associations.

IAMAS will be happy to continue to be involved in this commission.

d) **IAMAS commissions' activities**

- IOC, Quadrennial, Ozone Symposium, Toronto, ~ 330 part.
- IRC, Quadrennial Radiation Symposium, Berlin, ~ 500 part.
- ICCP, Cloud and precipitation, Leipzig, ~ 550 part.
- ICDM, Dynamic & Meteorology, Kunming, 170 part.
- IAMAS Bureau meeting, Paris, 15-16 Nov. 2012
- Newsletter : information to the members more regular since mid-2011
- Sponsorship of some symposia and publications

All the information related to IAMAS is now forwarded to its members through an information letter prepared and distributed by the Bureau and in care of Assistant Secretary General Jenny Lin.

Submitted by Athena Coustenis, IUGG/IAMAS representative to SCOR

[23 July 2013, updated 25 Sept. 2013]

7.2.3 International Association for the Physical Sciences of the Ocean (IAPSO) Morozov

IAPSO Report to SCOR in 2013

Introduction

IAPSO has the prime goal of "promoting the study of scientific problems relating to the oceans and the interactions taking places at the sea floor, coastal, and atmospheric boundaries insofar as such research is conducted by the use of mathematics, physics, and chemistry." IAPSO works mainly through 1) biennial scientific assemblies; 2) working groups; 3) commissions; 4) services and 5) website information. Of special importance to IAPSO is to involve scientists and students from developing countries in the oceanographic activities.

IAPSO maintains formal liaison with other scientific commissions and committees. These include the ICSU's Scientific Committee on Oceanic Research (SCOR), and UNESCO's Intergovernmental Oceanographic Commission (IOC). For more information see <http://iapsio.iugg.org/>.

Administration

The IAPSO office has been situated at Gothenburg University, Sweden since July 2007, and the day-to-day business has been managed by the Secretary General (SG) Johan Rodhe, Sweden. The Bureau of IAPSO comprises of the President, Eugene Morozov, Russia, the Past President, Lawrence Mysak, Canada, the SG, Johan Rodhe, and the Treasurer, Fred Camfield, USA. The SG has been responsible for the IAPSO website.

In 2013, there were three IAPSO business meetings and meeting of the EC during the Assembly in

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Gothenburg. The other IAPSO discussions were maintained by means of e-mail communication.

Activities

Three of IUGG's constituent Associations, IAHS, IAPSO and IASPEI, met for a Joint Scientific Assembly in Gothenburg, Sweden, during the week 22 – 26 July 2013. The title of the Assembly, "Knowledge for the Future", was chosen in order to highlight the importance of improved knowledge in hydrology, oceanography and seismology in addressing the challenges posed by climate change and the risks of natural disaster events. The Assembly attracted 1087 participants from 66 different countries. More than 300 registered as IAPSO scientists.

The Assembly's opening day was marked by a joint plenary session with a lecture from each Association:

- James Mori (Japan), the plenary lecturer for IASPEI described the ambitious JFAST expedition, which aimed to study the causes of the major earthquake that caused the 2011 tsunami. The expedition set new records, drilling over 800 metres into the seafloor at a water depth of 8000 metres.
- Kathryn Kelly (United States), the plenary lecturer for IAPSO, focused on meridional heat transport in the Atlantic Ocean, a key component of the global climate system. She combined different data sources to review the heat budget and anomalies in the heat transport, indicating a southern source for the anomalies.
- Kuniyoshi Takeuchi (Japan), the plenary lecturer for IAHS, emphasized the key role for geosciences in a proactive approach to disaster risk reduction. He warned that disasters occur when we ignore nature and the lessons of the past, leading to the take-home message "there is no such thing as a natural disaster".

Each Association offered a broad programme of lectures and posters, with up to 11 parallel sessions at any one time. The lecture programme was organized into 48 Association symposia (11 IAPSO), together with 9 joint symposia focusing on areas such as land-ocean interactions, advanced applied statistics, and tsunamis. 2 of the joint symposia were organized by IAPSO and the rest were co-sponsored by IAPSO. This programme was complemented by two afternoon poster sessions. Some highlights from the Association's programmes:

- IASPEI's Milne lecture on the history of British seismology was delivered by Roger Musson (United Kingdom). This was followed by a documentary film on the life of John Milne, the English scientist who played a leading role development of seismology as a scientific discipline. Dr. Robin Adams was awarded the first IASPEI Medal, for sustaining IASPEI goals and activities and for scientific merits.
- The highlight of the IAPSO programme was the presentation of the Albert I Medal. The medal was presented to Albert L. Gordon (United States), who then delivered the Albert I Memorial Lecture describing his research on the Indonesian Throughflow, the link between the Pacific and Indian Oceans.
- Deltas were a significant focus of the IAHS programme, including a plenary lecture by

Efi Foufoula-Georgiou (United States) where she described an international initiative to develop and deliver the knowledge base for understanding and protecting these vulnerable coastal systems. Several prizes and medals were awarded during the week.

Working groups

Information about SCOR activity and WGs is at the IAPSO webpage.

The following SCORIAPSO working groups (WGs), which have received funding from IAPSO, have been active during the last years and have published important books and/or special journal issues:

SCOR/IAPSO WG 127 “The Thermodynamics and Equation of State of Seawater” (Chaired by T.J. McDougall) was reorganized into a special IACS-IAPSO Commission on Seawater. SCOR/WCRP/IAPSO WG 136 (Co-chaired by L. Beal and A. Biastock): “The Climatic Implications of the Greater Agulhas System” continued their activity.

IAPSO Commissions and Services:

- Commission on Mean Sea Level and Tides (CMSLT), President: Gary T. Mitchum. Website: www.psmsl.org/
- Tsunami Commission (Joint with IASPEI and IVACEI). Chair: Dr. Vasily V. Titov. Website: www.iaspei.org/commissions/JCT.html
- GeoRisk Commission (Joint with IAMAS, IAHS, IASPEI and IAVCEI). Website: www.iugg-georisk.org/
- Permanent Service for Mean Sea Level, hosted by Proudman Oceanographic Laboratory, UK. Contact: Dr. Lesley Richard. Website: www.psmsl.org/
- IAPSO Standard Seawater Service, hosted by OSIL, Havant, Hampshire, UK. Director: Paul, Ridout; Website: www.osil.co.uk

The working groups, commissions and services report to IAPSO. These reports are posted on the IAPSO website <http://iapso.iugg.org/working-groups>

Prince Albert I Medal

IAPSO and Monaco Royal Family established the Prince Albert I Medal for excellence in physical and/or chemical oceanography. The winner is selected every two years and the ceremony is held during the Assemblies. Professor Arnold L. Gordon from Lamont-Doherty Earth Observatory, USA was selected in 2013 as the winner of the Prize for “his outstanding work on ocean dynamics”. During the Assembly in Gothenburg he was awarded with the medal and presented a memorial lecture on the currents in the Indonesian straits (Indonesia throughflow).

Eugene LaFond Medal

This Medal, created in honour of Eugene LaFond who was a former SG of IAPSO, is awarded to a scientist from a developing world country for an oral or poster presented at an IAPSO Assembly. IAPSO forms a special commission to select the winner. In 2013, the medal was

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awarded to Issufo Halo, a student of the Cape Town University, originally from Mozambique.

Members of IAPSO Executive Committee (EC) for 2011-2015:

President: Dr. Eugene Morozov (Russia) Secretary General: Prof. Johan Rodhe (Sweden) Past President: Prof. Lawrence Mysak (Canada) Treasurer: Dr. Fred Camfield (USA) Vice President: Dr. Isabelle Ansoerge (South Africa) Dr. Denise Smythe-Wright (UK) EC Members: M.Sc. Silvia Blanc (Argentina) Prof. Toshiyuki Hibiya (Japan) Dr. Chris Meinen (USA) M.App.Sc. Ken Ridgway (Australia) Dr. Satheesh Shenoi (India) Dr. Stefania Sparnocchia (Italy)



Eugene Morozov, IAPSO President
October 2013



Johan Rodhe, IAPSO Secretary General

7.3 Affiliated Programs

SCOR-Affiliated Projects and Programs

SCOR sponsors many, but not all, of the major international ocean research projects and programs. Some projects not co-sponsored by SCOR can gain benefits from association with SCOR, such as (1) increased visibility; (2) participation in SCOR activities, such as project coordination meetings and annual SCOR meetings; (3) opportunities to provide comments on working group proposals and membership; (4) access to national SCOR contacts; and (5) opportunities to apply for SCOR funding for travel of scientists from developing countries and countries with economies in transition to their workshops and symposia. In 1995, SCOR developed the option of formal affiliation of relevant projects/programs with SCOR. Unlike projects sponsored by SCOR, affiliated projects and programs receive funding from organizations besides SCOR and do not need staff support from SCOR.

SCOR's role in relation to affiliated projects and programs is one of advice and regular review. SCOR gives advice about appropriate balances on the projects' steering committees and adequate rotations of these committees to renew the committees' memberships regularly. SCOR's national contacts can be used to find new members in regions where there is a need, or to entrain new countries into projects. SCOR can also provide an independent mechanism for the review of planning documents such as science or implementation plans.

Application for SCOR Affiliation

Application to SCOR for program affiliation should be initiated with a proposal of 2 to 5 pages, sent to SCOR at least three months before an annual SCOR meeting. The proposal should include an outline of the program's science plan, the terms of reference, current membership of the steering committee, and rotation procedures and schedule. The proposal for SCOR affiliation should also address the following criteria, accepted at the 1995 SCOR Executive Committee meeting (see *1995 SCOR Proceedings*). The Executive Committee agreed that in order to become a SCOR-affiliated project/program, an activity must

- be truly international, with a committee membership that rotates on a regular basis;
- show evidence of existing financial and/or organizational support;
- demonstrate a benefit from SCOR affiliation;
- have a scientifically well-integrated theme;
- show that it is in SCOR's interests to establish this affiliation;
- be of broad scale and global importance;
- show, as appropriate, that any scheme of membership dues includes some nominal level so as to encourage the widest possible international participation by all countries; and
- be willing to adhere to the SCOR Publication Policy.

After a program is affiliated with SCOR, annual reports are required, and scientific presentations may be requested at any annual SCOR meeting, as a basis for the decision on continuing the relationship between SCOR and each project/program. The Chair of each affiliated project/program serves as an ex-officio member of SCOR as a Scientific Rapporteur (see SCOR Constitution, paragraph 4). Continued affiliation with SCOR depends on the project meeting the guidelines specified above, and maintaining high scientific quality and adequate rotations of committee members and chairs.

Reports to SCOR

Annual reports to SCOR should answer the following questions and present any additional information that the project/program would like to transmit to SCOR:

- What scientific accomplishments have been achieved by the project/program in the past year?
- How has the project's steering committee membership changed in the past year?
- What is the financial status of the project?
- What is the status of the project's secretariat?
- What are the plans for the scientific development and implementation of the project over the next two to three years?
- How is the project interacting with and contributing to other SCOR activities?

In addition, projects/programs should communicate regularly with their SCOR Executive Committee Reporter regarding their activities and progress.

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7.3.1 InterRidge - International Ridge Studies (affiliated in 1996)

Feeley

Terms of reference:

- To build and maintain an interactive international ridge-research community
- To identify, through InterRidge working groups and the workshops and conferences they organize, the most compelling questions in ridge research and develop program plans to address these questions
- To continue to develop scientific, technical and logistical co-operation among nations and to strengthen international foundations for innovative research.
- To provide current information about research activities through the InterRidge website and *IR News*.
- To encourage participation of smaller oceanographic countries and individual scientists from non-seagoing countries.
- Through education and outreach, to communicate the importance and excitement of ridge research to the general public and decision makers worldwide.
- To act as a representative body for international ridge scientists in policy discussions.

Chair: Bramley Murton

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Members:

Fernando Barriga
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John Chen
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Colin Devey
Nicole Dubilier
Jérôme Dymont

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UK
GERMANY
FRANCE
USA

Françoise Gaill
Timothy Henstock
Sung-Hyun Park
Rosario Lunar
Rolf Pedersen
K.A. Kamesh Raju
Nobukazu Seama
Steve Scott

FRANCE
UK
KOREA
SPAIN
NORWAY
INDIA
JAPAN
CANADA

Coordinator:

Executive Committee Reporter: Missy Feeley

2013 InterRidge Update for SCOR

The InterRidge (IR) programme office is in its first year at Peking University, Beijing, China. It is led by a multidisciplinary team: John Chen (IR Chair, marine geophysics, geodynamics) and Jiabiao Li (IR Co-Chair, marine geophysics and geology). The Office Coordinator is Zengxi Ge, whose background is in Geophysics.

InterRidge (<http://www.interridge.org>) promotes interdisciplinary, international studies of oceanic spreading centres by creating a global research community, planning and coordinating new science programmes that no single nation can achieve alone, exchanging scientific information, and sharing new technologies and facilities. InterRidge is also dedicated to reaching out to the public, scientists and governments, and to providing a unified voice for ocean ridge researchers worldwide. An increasing role for InterRidge is our involvement in compiling information and advice for policy makers. This includes meetings and workshops where protocols for codes of scientific conduct for studying chemosynthetic environments, and identifying sites of special scientific interest, are proposed and discussed. InterRidge also has formal links with the United Nations Environment Programme and informal links with the Integrated Ocean Drilling program and the International Seabed Authority.

InterRidge: Third Decadal Plan: 2014-2023

InterRidge developed its Third Decadal Plan statement. It identified six major areas for focus in the coming years:

- 1) Mid-Ocean Ridge Tectonic and Magmatic Processes
- 2) Seafloor and Sub-Seafloor Resources
- 3) Mantle Controls
- 4) Ridge-Ocean Interactions and Fluxes
- 5) Off-axis Processes
- 6) Past, present and future of hydrothermal vent ecosystems

InterRidge Working Groups

Working Groups are the principal mechanism for achieving the InterRidge programme, their main function being to identify new areas of high-priority scientific research. Each Working Group has clear goals and a timescale in which to achieve them (approximately 5 years). InterRidge supports those scientific projects which would benefit from IR coordination by convening group meetings, community-wide workshops, symposia, and theoretical institutes. The resulting reports represent a synthesis of international and interdisciplinary efforts to define scientific questions and a methodology of addressing them. There are currently seven active IR Working Groups in 2013.

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Arc-Backarc Systems

(Chair: Maria Seton)

Objective: Convergent margins, where oceanic lithosphere is subducted into the mantle, form the key interface for large-scale chemical and thermal recycling amongst the ocean, crust, mantle, and atmosphere. Intra-oceanic convergent margins typically produce a forearc-island arc-backarc sequence within an extensional stress regime and contain a disproportionate number of hydrothermal vents per unit area. The working group hopes to foster a holistic approach to address fundamental questions about intra-oceanic arc and backarc basin processes by examining the long-term and short-term evolutionary cycles using geochemical, hydrothermal, biological, tectonic, and subduction dynamics approaches. In addition, they aim to bridge the gap between geologists who study onshore, accreted island-arc and back-arc systems and marine geoscientists who study in-situ backarc systems. The working group seeks to bring together experts from both the observational and modeling communities to facilitate the linkage between surface processes and the deep earth.

Circum-Antarctic Ridges

(Co-Chairs: Anne Briais, Jian Lin, Sung-Hyun Park)

The scientific objectives of the CAR working group are to improve our knowledge on the following issues:

1. How heterogeneous is the mantle? What is the role of mantle heterogeneities in the variability at the axis, compared to that of mantle temperature? Where and how should we collect samples to improve our understanding of mantle heterogeneities?
2. How do the three large mantle domains (Atlantic, Indian, and Pacific) interact as they meet under the Circum-Antarctic Ridges?
3. How do ridge processes vary with time? A few off-axis observations reveal significant evolutions in time, but off-axis surveys and sampling are still too rare.
4. How uniform are chemosynthetic ecosystems along the CAR? Do they constitute a unique biogeographic province?
5. What is the role of Fe released at hydrothermal vents on the global budget?

Oceanic Detachments Faults

(Co-Chairs: Pablo Canales, Javier Escartin)

Objective: Since their identification in the early 1990s, extension along oceanic detachment faults has been recognized as a fundamentally distinct mode of seafloor spreading that does not result in a classical Penrose model of oceanic crustal structure. This type of spreading is characterized by formation of oceanic core complexes; tectonized and heterogeneous lithosphere; extensive exposure of gabbro and serpentinized mantle at the seafloor; some of the largest hydrogen-rich, deep-sea hydrothermal systems and mineral deposits; and large diversity in the deep-sea and subsurface biosphere.

South Mid-Atlantic Ridge Targeted Exploration (SMART)

(Chair: Colin Devey, Germany)

The aims of the SMART Working Group are:

1. Collate and combine information already available from recent and older cruises to establish a thorough "State of the art" of Southern MAR studies. For this work active participation of scientists from many countries working toward this common goal is essential - a core strength of InterRidge.
2. Provide focus for the international coordination of further South Atlantic exploration, specifically aiming to identify and then fill gaps in our knowledge of this relatively unexplored region. The group will convene a workshop to produce a project plan of how to explore the SMAR thoroughly in the next 5-10 years, defining and prioritizing goals, identifying cruises needed.
3. In a larger framework, the South Atlantic Basin as a whole is an important yet relatively little-explored ocean region. We expect the SMART WG to provide a seed to establish basin-scale studies within the framework of bodies such as SCOR. This could spearhead international efforts to use the Atlantic Basin as a test-bed for collection and synthesis of, for example, the phylogeographic history of chemosynthetic faunas (vent and seep) from the Arctic to the Antarctic and to study gene flow. These efforts, in collaboration with mapping, physical oceanographic studies, studies of reproductive biology and larval distributions, and modeling efforts would make important contributions to science and to management of resources associated with chemosynthetic ecosystems.

Hydrothermal Energy and Ocean Carbon Cycles

(Chair: Nadine Le Bris, Christopher R. German)

Objective: The importance of hydrothermal energy transfer to the biosphere through chemosynthetic primary production has long been recognized. Initially, this was only considered to occur at discrete, isolated, hydrothermally active hotspots around the global ridge crest and to have minor impact on the global ocean carbon cycles. But recent results suggest that this assumption may not be correct. We now know that hydrothermal venting can be widespread throughout all oceans, along the entire thermohaline conveyor, and that both the local fixation of carbon and the export of bio-limiting nutrients to the broader ocean may be much greater than previously recognized. For too long, fragmentation of our understanding of biogeochemical interactions in hydrothermal systems has prevented any quantitative estimation of hydrothermally driven primary production. Now, however, recent advances in molecular methods as well as in situ and in vivo experimentation provide us with new opportunities for a coordinated, integrating effort in which interdisciplinary approaches and modelling can be brought to bear. Consequently, we believe that it is very timely to plan a revised consideration of the diverse pathways of biomass generation driven by hydrothermal processes and the potential contribution that they may make to the global ocean carbon cycle. 2013 is the last year of this working group and it is in the stage of finalization.

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Seafloor Mineralization

(Chair: Maurice Tivey)

Objective: Hydrothermal vent systems host seafloor massive sulfide (SMS) deposits that are typically rich in copper, zinc, gold, and silver. The primary scientific objective of a Working Group on Seafloor Mineralization would be to examine SMS deposit distribution, maturation and evolution and to investigate the processes (biological, chemical, geological) that are responsible for their formation and preservation. A sound scientific base of knowledge would both advance science but also inform the commercial and political world of the importance of these multi-faceted resources and encourage responsible development.

Vent Ecology

(Chair: Stephane Hourdez and Yoshihiro Fujiwara)

Objective: The understanding of vent ecology requires contributions from and interactions among a wide range of biological disciplines as well as chemists, geologists, and physical oceanographers. The current composition of the hydrothermal vent community at a given vent site is the result of very complex interplay among the evolutionary history of the taxa, the present-day interactions among species (symbiosis, predation, competition etc.), and the physiological adaptations of each of the species to the challenging environmental conditions encountered at deep-sea hydrothermal vents. A primary goal of the Vent Ecology WG will be to foster cutting edge collaborations and other studies that will contribute to our understanding of the ecology of hydrothermal vents. The WG will also work to encourage and facilitate international collaborations and sharing of samples to maximize the scientific return from the resources available to our community and minimize our collective impact on vent communities.

Since some of the working group are in their final stage, InterRidge is calling for proposals for new working groups, such as subduction zone processes.

Other InterRidge Office Activities in 2013

In 2013, InterRidge continues the annual funding of three early-career scientists from developing countries. InterRidge also awarded three Fellowships from InterRidge funds. All Fellowships are designed to encourage international collaboration on any aspect of ridge-crest science.

InterRidge has overseen the establishment of its Cruise Travel Bursary scheme. This has enabled eight early-career scientists to make new collaborations with established scientists, with InterRidge paying their travel and hotel costs. Details at:

<http://www.interridge.org/cruisebursary>. Two best students' presentation (one oral and one poster) are awarded by InterRidge in the CEB5 meeting in Victoria, Canada. We plan to award two more best student presentation in the 2013 AGU fall meeting, in San Francisco in December.

For more information about IR's activities and national updates, please visit the IR Web site (<http://www.interridge.org>) and recent newsletters (<http://www.interridge.org/IRNewsletter>), or

contact the IR Office (coordinator@interridge.org) for a hard copy of the 2013 *InterRidge News*, which will be published in Nov. 2013.

7.3.2 International Ocean Colour Coordinating Group (IOCCG) (Affiliated in 1997)

Volkman

IOCCG Report to SCOR

The International Ocean-Colour Co-ordinating Group (IOCCG) is an Affiliated Program of SCOR, and was established in 1996 to promote communication and co-operation between the space agencies that provide ocean-colour data, and the user community. The IOCCG has a wide-ranging mandate addressing technological and scientific issues through its working groups, conducting training courses in both developing and developed countries, and helping to ensure continuity of the ocean-colour data stream through the CEOS Ocean Colour Radiometry-Virtual Constellation (OCR-VC). The group is currently chaired by David Antoine (LOV, Villefrance, France). The IOCCG Project Office is located at the Bedford Institute of Oceanography, Canada, staffed by Project Scientist, Venetia Stuart.

1. IOCCG Scientific Working Groups

These relatively short-lived IOCCG scientific working groups investigate various aspects of ocean-colour radiometry and its applications and publish reports on the topic (13 reports published to date). Two reports listed below were published by the IOCCG this past year.

- IOCCG Report 12 (2012): *Ocean-Colour Observations from a Geostationary Orbit*, edited by David Antoine (LOV, France). This report reviews science questions that can be addressed via ocean-colour observations from a geostationary orbit (significantly improved temporal, spatial and spectral sampling which enhances monitoring and assessing the dynamics of the coastal ocean).
- IOCCG Report 13 (2012): *Mission Requirements for Future Ocean-Colour Sensors*, edited by Charles McClain and Gerhard Meister (NASA GSFC). The group developed consensus on the minimum basic radiometric and sensor requirements for detailing global observations of the ocean's chemistry and biology from space.

On-going IOCCG working groups: Six active IOCCG scientific working groups are currently in various stages of deliberation, as outlined below.

- i. ***In-flight Calibration of Satellite Ocean-Colour Sensors*** (Chair: Robert Frouin, Scripps Institution Oceanography, USA). This WG is reviewing techniques for radiometric calibration of ocean-colour sensors in orbit, and will provide recommendations on how to meet calibration requirements for science applications during mission lifetime.
- ii. ***Joint GEOHAB/IOCCG WG on Harmful Algal Blooms*** (Chair: Stewart Bernard, CSIR, South Africa). This is a joint working group between the IOCCG and GEOHAB (IOC-SCOR), the main goal of which is to provide a resource to improve communication

between the satellite ocean colour community and the *in situ* HAB scientific community. The two primary deliverables of the WG are an IOCCG report, followed by a special issue in a peer reviewed journal. A complete draft monograph is expected by the end of 2013.

- iii. ***Ocean Colour Remote sensing in Polar Seas:*** (Chairs: Marcel Babin, Univ. Laval, Canada; Kevin Arrigo, Stanford University, USA; Simon Bélanger, Univ. Québec, Canada). This WG is examining ocean colour remote sensing in polar seas, highlighting some of the difficulties encountered in such areas. A draft report was submitted to the IOCCG Committee for review before the IOCCG-18 meeting. The group also plans to publish a synthesis in the Oceanography magazine.
- iv. ***Phytoplankton Functional Types (PFTs):*** (Chair: Shubha Sathyendranath, PML, UK). The WG is reviewing existing techniques and algorithms used to detect PFTs from marine reflectance and will compare the results of the various algorithms on selected case studies. A complete draft of the full report is expected by the end of this year.
- v. ***Uncertainties in Ocean Colour Remote Sensing:*** (Chair: Roland Doerffer, GKSS, Germany). This WG will address all the different sources of uncertainty in ocean-colour applications (e.g. calibration, sun glint, white caps, cloud cover). A Wiki has been set up for exchange of information and contributions for the IOCCG report. It is anticipated that a first draft version of the report will be ready for review by October 2013.
- vi. ***Intercomparison of Retrieval Algorithms for Coastal Waters:*** (Chair: Kevin Ruddick, RBINS, Belgium). The main objective is to understand how algorithm performance relates to algorithm design and calibration of specific IOPs. They aim to have a first draft of the report by November 2013. The WG also intends to setup algorithm comparisons via a highly automated web site, which could be kept running after completion of the WG.

2. IOCCG Task Forces

These task forces are established to address matters that require an ongoing capability and/or expertise and are expected to continue until that need no longer exists.

- ***Task Force on ECV Assessment*** (Chairs: James Yoder, Woods Hole, USA; Nicolas Hoepffner, JRC, Italy): The IOCCG formed this task force to carry out a critical comparison of essential climate variables (ECVs) produced by different space agencies, and to provide guidance on the generation of better, long-term OCR climate data records. The group has met opportunistically (Glasgow, 2012 and Darmstadt, 2013) and could potentially evolve to start carrying out comparisons, but this would require agency support to complete these projects.
- ***Proposal for a Task Force on Satellite Sensor Calibration:*** A proposal from Ewa Kwiatkowska (EUMETSAT) aims to establish an IOCCG Task Force to facilitate collaboration among experts from various space agencies to maximize the accuracy and stability of ocean colour radiometry records from individual missions. The Task Force will not produce an IOCCG report, but will meet to discuss sensor calibration issues. The establishment of this task force is still under discussion.

3. Capacity Building Initiatives

IOCCG sponsored a number of students from Africa to attend the training course on “*Methods and Applications of Remote Sensing in African Coastal and Regional Seas*” organized by the JRC (5-16 November 2012, Morocco). In addition, the IOCCG also conducted the highly successful Summer Lecture Series (Villefranche-sur Mer, 2-14 July 2012), dedicated to high-level training in ocean optics, bio-optics and ocean colour, and focussing specifically on current critical issues of concern. A total of 17 students were selected from an overwhelming 106 applications, all of an extremely high standard. A number of prominent scientists delivered a comprehensive program including lectures, discussion sessions and hand-on tutorials. Because of the high demand for the course, all lectures were video recorded and made available on the IOCCG website as a teaching resource. Due to the overwhelming interest in the course and the excellent feedback, the IOCCG plans to conduct the next Summer Lecture Series in July 2014.

Request to SCOR for Support for 2014 Summer Lecture Series: The IOCCG would like to request support from SCOR for 2 to 3 students from developing countries to attend the 2014 IOCCG Summer Lecture Series. Ideally this support would include return airfare, plus food and accommodation expenses for 2 weeks (~\$6 to \$7K in total). The course will be financially supported by the IOCCG with additional support from a French consortium including the Laboratoire d’Océanographie de Villefranche (LOV), which has offered to house the students in dormitories for the duration of the training. A report from the 2012 Summer Lecture Series can be viewed at: http://www.ioccg.org/training/Report_Summer_Lecture_Series.pdf

4. International Ocean Colour Science Meeting

The IOCCG held a highly successful International Ocean Colour Science (IOCS) meeting in Darmstadt, Germany (6-8 May 2013) to maintain consultation and interaction with the broader ocean colour community (important because of the limited membership on the IOCCG Committee). The meeting was co-sponsored by NASA (through a ROSES grant managed by SCOR), EUMETSAT, CNES and ESA. The primary focus of the IOCS meeting was to build and strengthen the international ocean colour community by providing a structure and mechanisms to collectively address common issues and goals (through 12 splinter sessions and open plenary discussions). The meeting attracted more than 240 ocean colour scientists from 36 different countries, thus helping to bring together users and providers of ocean colour data. Presentations and a full report of the meeting will be posted on the meeting website at: <http://iocs.ioccg.org/>

5. Project Management and Coordination

The IOCCG Committee meets once a year to coordinate the activities of the group as a whole, and to review the progress of the various working groups and discuss plans for the year ahead. The IOCCG-18 Committee meeting took place from 5-7 February 2013 in Quebec City, Canada (see

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<http://www.ioccg.org/reports/Minutes-18.pdf> for the minutes of the meeting) and the 19th IOCCG Committee meeting is planned for 28-30 January 2014 in Cape Town, South Africa.

6. Current IOCCG Membership

The IOCCG Committee consists of members drawn from space agencies as well as the scientific ocean-colour community. Rotation of members is being implemented according to a roster: five members marked with an asterisk (*) were appointed after the last Committee meeting.

IOCCG Committee Members (2012/2013)

Antoine, David (Chairman)	-	Laboratoire de Physique et Chimie Marines, France
Bernard, Stewart	-	University of Cape Town, South Africa
Bontempi, Paula	-	NASA HQ, USA
Chauhan, Prakash	-	ISRO, India
Crevier, Yves	-	Canadian Space Agency, Canada
Dierssen, Heidi *	-	University of Connecticut Avery Point, USA
DiGiacomo, Paul	-	NOAA, USA
Doerffer, Roland	-	GKSS, Germany
Dowell, Mark	-	JRC, Italy
Dutkiewicz, Stephanie	-	MIT, USA
Feldman, Gene	-	NASA HQ, USA
Hardman-Mountford, Nick	-	CSIRO, Australia
Hirata, Taka *	-	Hokkaido University, Japan
Kampel, Milton	-	INPE, Brazil
Kwiatkowska, Ewa	-	EUMETSAT, European Union
Lambin, Juliette	-	CNES, France
Mao, Zhihua	-	Second Institute of Oceanography, China
Murakami, Hiroshi	-	JAXA EORC, Japan
Park, Young-Je *	-	Korea Institute of Ocean Science & Technology (KIOST)
Regner, Peter	-	ESA/ESRIN, Italy
Ryu, Joo-Hyung *	-	Korea Institute of Ocean Science & Technology (KIOST)
Tyler, Andrew *	-	University of Stirling, UK
Yoder, James (Past-Chair)	-	Woods Hole Oceanographic Institution, USA
Zibordi, Giuseppe	-	JRC, Italy

7. IOCCG Sponsors

Activities of the IOCCG are supported by contributions from various national space agencies and other organisations (see <http://www.ioccg.org/about/sponsor.html>) and upon infrastructure support from SCOR. Representatives from these funding agencies are members of the Executive Committee. This year, new sponsorship was received from EUMETSAT (for the IOCS meeting). CSIRO have also indicated that they will sponsor the IOCCG. The Bedford Institute of

Oceanography (DFO, Canada) provides in-kind support (office space, informatics) while SCOR provides logistic support and manages the NASA funds.

7.3.3 Global Alliance of CPR Surveys (GACS)

Hosie

Global Alliance of CPR Surveys (GACS) – report of activities.

Graham Hosie
Chair of the Board of Governance
GACS@sahfos.ac.uk

GACS was initiated in September 2011 with the primary goal of understanding changes in plankton biodiversity at ocean basin scales through a global alliance of CPR surveys. By “understand” we mean characterise, analyse and interpret. GACS has a number of initial specific aims which include:

- development of a global CPR database
- to set up and maintain a website for publicity and data access
- production of a regular Ecological Status Report for global plankton biodiversity
- ensuring common standards and methodologies are maintained
- to facilitate new surveys and develop capacity building procedures
- to facilitate secondments of CPR scientists between GACS institutions
- providing an interface for plankton biodiversity with other global ocean observation programmes

A Board of Governance was established with Dr Graham Hosie (Australia, SCAR Southern Ocean CPR Survey) as Chair and Dr Sonia Batten (Canada, SAHFOS North Pacific CPR Survey) as vice-Chair. The current membership is listed in the appendix. Two working groups were also formed to help address the above objectives, these being Standards and Methodology (WGSM) and Database (DWG).

The WGSM, chaired by Dr Hans Verheye (South Africa, Benguela Current CPR), has the task of ensuring the methods and standards are agreed and properly documented for all CPR operations, from setting up the machines through to the analysis of data. In order to ensure these are maintained, WGSM is also tasked with developing training programmes within and between CPR laboratories, as well as considering capacity building.

The DWG, chaired by Dr Batten, has the job of coordinating the creation and development of the global CPR Database. This includes agreeing on a common schema for data input and ease of access, and what should be stored in the database in addition to the obvious taxonomic and ecological plankton data. The database, when fully developed will be held at the Sir Alister Hardy Foundation for Ocean Science (SAHFOS).

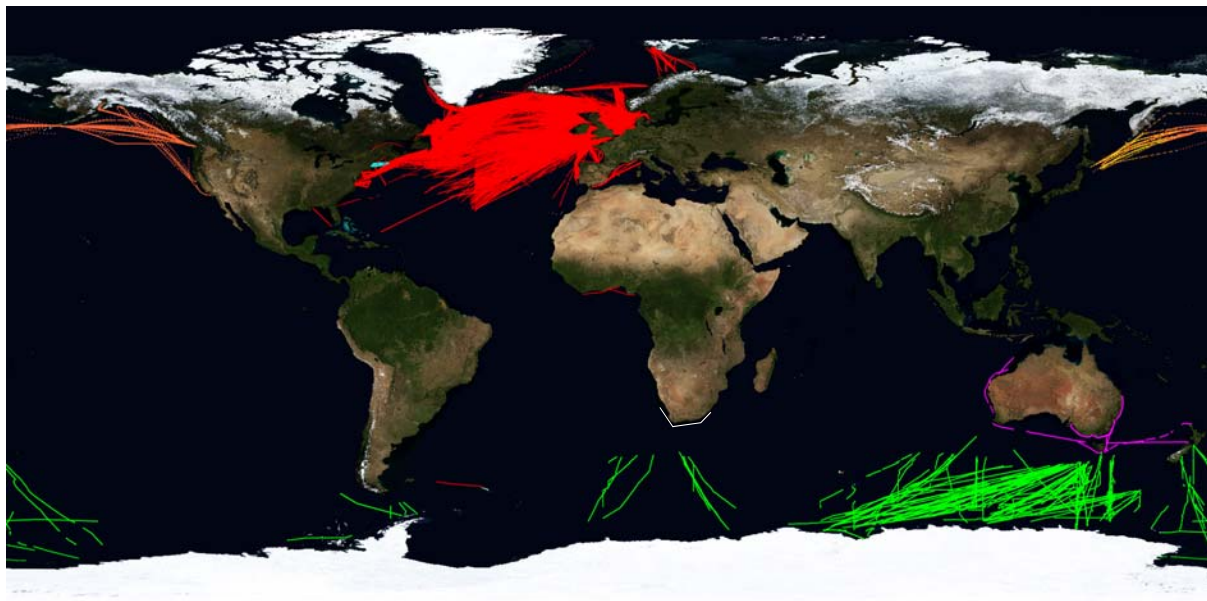
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The Board of Governance (BoG) has held two annual meetings to date, the first at UNESCO Paris, hosted by IOC-GOOS in September 2012, the second at SAHFOS Plymouth in September 2013. These meetings were open to observers/representatives from IOC, POGO, SCAR, SCOR, and OBIS, as well as representatives from developing CPR Surveys.

The rest of this report deals with activities over the last 12 months relative to each objective.

Database

The various regional CPR datasets have been brought together into a single global database as scheduled. The global CPR database is the heart of the GACS initiative. This has been achieved by the excellent effort of the GACS Data Manager Mike Flavell, working with the IT team at SAHFOS and the regional CPR data owners. Unfortunately, we here now lost Mike's services as he has taken up a new position at UNESCO-IOC as Data Manager for OBIS. However, this provides us with a stronger link with OBIS, and GACS is applying to become a node (Associate Data Unit – ADU) of OBIS. Mr Flavell remains an important member of GACS' Database Working Group. SAHFOS hosts the GACS database and provides considerable support in maintaining it. The database holds approximately 350,000 records from the North Sea, North Atlantic, Norwegian/Greenland/Barents seas, Gulf of Mexico, western Mediterranean, North Pacific, Southern Ocean/Antarctic, South Africa waters, Gulf of Guinea, Australian and New Zealand waters, see figure below.



Coverage of current CPR data held in the GACS Global Database.

With the establishment of the new global database the data are now being analysed collectively to look for regional and global differences, similarities and changes in plankton biogeographic and temporal patterns. These results will be included in the next annual GACS Global Marine

Ecological Status Report. We are also working on making various data products visible through the GACS website. These include static maps showing areas of GACS coverage, intensity of sampling, gridded mean abundances of plankton and estimates of Average Copepod Community Size (ACCS) which is a metric indicating changes in dominance between small or large species. Metadata descriptions of the global CPR data will be made publicly available through the GACS website.

Website

The GACS website (www.globalcpr.org) officially went on line on 8 February 2012. Further developments to the website will include the addition of various data products mentioned above. These are being tested on the GACS member website and will be transferred to the GACS public website by the end of 2013.

Status Report

The first Global Marine Ecological Status Report has now been distributed and is available online at <http://www.sahfos.ac.uk/research/publications/ecological-status-report.aspx>. The second report is scheduled for March 2014 and will include results of the ACCS analyses mentioned above as well as changes observed in other data such as mean abundances.

Common standards and methods

The CPR is unique in being a standardised instrument that has changed very little since Sir Alister Hardy's design in 1931. In association, the CPR has recognised standards in usage, sample processing and a growing list of analytical methods for studying changes in plankton biodiversity, abundance and development in relation to time and geography. The Working Group on Standards and Methodology has been active during GACS meetings and electronically documenting and promoting a common set of standards and methods. This has involved working with the Database WG to develop an agreed set of data protocols and collating a set of frequently asked questions to develop a "Start up kit" for those wanting to start a new survey.

New surveys, capacity building and secondments

During the last year new surveys were initiated or tested, others are about to start and some of the existing surveys have expanded. France commenced its new *Marion Dufresne* CPR (MDPR) Survey in February 2013 of the austral summer around the Kerguelen and Crozet archipelagos in the southern Indian Ocean. This is a region important area of elevated phytoplankton production supporting high concentrations of seabirds, marine mammals and fish. South Africa conducted five tows in the Antarctic region during the 2012 austral winter, providing much valuable information on the winter composition of plankton. Little is known about Southern Ocean plankton during winter, primarily because of the lack of ships operating in the region at that time. South Africa then conducted a further 14 tows during the 2012/13 austral season from September to May. South Africa is also now a member in the Southern Ocean CPR Survey. In October 2012, New Zealand completed the longest CPR run with 10 tows across the South Pacific between Wellington and Valparaiso. Australia completed a pilot tow between Brisbane and Fiji

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to support the Pacific Islands Global Ocean Observing System (PI-GOOS). The South Pacific is another region not previously surveyed by CPR.

During the recent September 2013 meeting, Dr Ramaiah Nagappa of the National Institute of Oceanography, Goa, and Ms Rana Abu Alhaja of the Cyprus Institute were invited as observers to attend the GACS Board meeting. Both gave presentations on their proposed new surveys. Cyprus plans to conduct regular CPR tows in the eastern Mediterranean starting in October 2013. India's first CPR tow is scheduled for January 2014 with a run from Goa on the west coast of India to Chennai on the east coast. India has a particular interest in the Arabian Sea and Bay of Bengal. Our CPR Ambassador Prof. Burkill played a key role in helping make contact with and encouraging the team in India. We expect that Cyprus and India will join GACS in the near future. Dr Nagappa's travel to GACS was supported by SCOR.

Through SOOS, Dr Hosie has been working with a representative from the Indian Antarctic programme (National Centre for Antarctic and Ocean Research), also based in Goa, who are interested in towing CPRs in the Southern Ocean. Similarly, the Korea Polar Research Institute has a CPR which they plan to use from their new polar research vessel *Araon*.

In order to facilitate the new surveys, various capacity building procedures have been implemented, such as developing an exchange programme of staff between CPR laboratories, holding training workshops and developing the "Start-up Kit". The latter will provide the basic information (FAQs) required for those wanting to develop a new survey, information on how the CPR works, designing and establishing CPR routes, at sea methodology, laboratory procedures, taxonomic tools, data storage and analysis.

A number of training and standardisation workshops were conducted over the last year at SAHFOS Plymouth and at the Southern Ocean CPR laboratories of the Australian Antarctic Division, Hobart, aimed at both novices wanting to acquire the correct skills and experienced personnel seeking to maintain their standards. For example, representatives from the new Cyprus survey have already received training at SAHFOS in CPR preparation, maintenance and at sea methodology in preparation for the start of that survey. French, Brazilian and Korean scientists received similar training at the AAD in October 2012 for surveys in the southern Indian Ocean, Drake Passage and Pacific sector of the Antarctic region. In association with the GACS September 2013 meeting, a workshop was conducted for CPR analysts, aimed at providing instruction on identification and recording of micro-plastics, which are becoming more prevalent in CPR samples, identification of *Ceratium* and coccolithophores, and assessment of the phytoplankton colour index (PCI). The workshop and GACS meeting both gave Ms Alhajah and Dr Nagappa the opportunity to discuss their future training and CPR development requirements with GACS and key SAHFOS personnel. Future training workshops at SAHFOS are scheduled on phytoplankton taxonomy in 2014 and zooplankton in 2015. In addition, Dr Hosie will be visiting the South African team in Cape Town in early 2014 to provide training on Southern Ocean methods and taxonomy to support the extended operations in the Southern Ocean. This is supported by an award from SCAR.

Interfacing with other programmes

GACS maintains active contact with and where possible attends meetings of a number of agencies/stakeholders, e.g. PICES, SCAR, OBIS, IOC-GOOS, POGO, CCAMLR. GACS has become affiliated programme of SCOR and also the SCOR-SCAR sponsored SOOS programme. GACS is currently involved in an exercise to provide data and advice on changes in zooplankton abundance and copepod composition (ACCS values) for the zooplankton component of the GEF-Transboundary Water Assessment Programme.

Future activities

GACS will focus over the next year in analysing the combined dataset for identifying trends and changes key plankton groups, e.g. copepods and calcifying organisms, enhancing the data products and making them available through the public website, improving data exchange between the regional CPR surveys and the central database, conducting capacity building workshops and training sessions, encouraging new surveys and publication of the next status report. GACS' initial funding contract will end in June 2014. This will mark the end of the establishment period of GACS. At the September 2014 GACS meeting, the specific objectives will be reviewed and if require revised and/or new objectives will be developed. We will be seeking the involvement of SCOR and other stakeholders in the review/development of the objectives in order that we address stakeholder requirements.

Benefits of affiliation with SCOR

There has been direct benefits for GACS through travel support for representatives from developing nations to attend the initial GACS establishment workshop and the recent 2013 GACS meeting (Dr Nagappa). Dr Verheye has been successful in being granted a POGO Visiting Professorship award to bring Dr Declan Schroeder (PML) to Cape Town to run a training programme entitled "MoM-CPR: Molecular Mining of the Continuous Plankton Recorder and other archived datasets". The programme will be conducted from 28 November to 4 December 2013. GACS has welcomed the advice received from the Executive Director and from other SCOR Committee members, four of whom are members of the GACS Board. Indirectly, new developing surveys have been able to justify the establishment of their programmes, and some existing surveys their expansion, because the resulting research through GACS will contribute to SCOR's objectives. Funding agencies and CPR host institutes recognise the importance of international organisations such as SCOR. This has led to enhanced ratings on their proposals, gaining travel support to attend meetings or gaining the financial support to purchase CPR units.

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Appendix Members of the GACS Board of Governance

Name	Survey	Country	Affiliation
Dr Graham Hosie (Chair)	SCAR Southern Ocean CPR Survey	Antarctica, Australia	SCAR, AAD
Dr Sonia Batten (Vice Chair)	North East Pacific	Canada	SAHFOS
Prof. Nicholas Owens	North Atlantic Arctic	UK	SAHFOS (Director)
Dr Sanae Chiba	North West Pacific	Japan	JAMSTEC
Prof. Martin Edwards	North Atlantic Arctic	UK	SAHFOS (Chief Scientist)
Prof. Mitsuo Fukuchi	Japanese Antarctic Program	Japan	NIPR
Dr Julie Hall	New Zealand	New Zealand	NIWA
Dr Chris Melrose	US East Coast	USA	NOAA
Prof. Erik Muxagata	Developing	Brazil	FURG
Dr Anthony Richardson	IMOS Australia CPR	Australia	CSIRO
Dr Hans Verheye	Benguela LME	South Africa	DEA, BCC
Dr Sun Song	China	China	IO-CAS
Prof. Philippe Koubbi	Marion Dufresne CPR	France	UPMC, IPEV

AAD: Australian Antarctic Division
BCC: Benguela Current Commission
CSIRO: Commonwealth Scientific and Industrial Research Organization
DEA: Department of Environmental Affairs
FURG: Federal University of Rio Grande
IMOS: Integrated Marine Observing System
IO-CAS: Institute of Oceanology, Chinese Academy of Science
IPEV: Institut polaire français Paul Emile Victor
JAMSTEC: Japan Agency for Marine-Earth Science and Technology
NIPR: National Institute of Polar Research
NIWA: National Institute of Water and Atmospheric Research
NOAA: National Oceanic and Atmospheric Administration
SAHFOS: Sir Alister Hardy Foundation for Ocean Science
SCAR: Scientific Committee on Antarctic Research
UPMC: Université Pierre et Marie Curie

7.4 Other Organizations

7.4.1 Partnership for Observation of the Global Oceans (POGO)

Feeley

See July 2013 POGO Newsletter at end of tab.

7.4.2 Marine Working Group of the International Arctic Science Committee

Fennel

The following is information from the Marine Working Group's Web site (see <http://www.iasc.info/home/groups/working-groups/marineaosb>).

SCIENTIFIC FOCI

Arctic Ocean System: Predicting and Understanding Rapid Changes in the Arctic

There is widespread agreement that the Arctic Ocean is now in a state of rapid transition with potentially tremendous economic, social and environmental consequences. This transition is best exemplified by the marked reduction in sea-ice cover witnessed in instrumental records over the last 30 years. Scientific knowledge of the present status of the Arctic Ocean and process-based understanding of the mechanisms of change are required to make useful predictions of future conditions throughout the Arctic region.

These predictions are also urgently needed to plan for the consequences of climate change. For example, understanding the feedbacks between physical and biogeochemical components of the Arctic Ocean are extremely important not only for the Arctic environment but for the global community as well. The Marine WG intends to play a leading role to further our understanding of this complex system.

Sea ice, its structure, dynamics and role in the Arctic system

The IPY has provided a wealth of extensive and intensive observations of the Arctic Ocean, of its hydrography, circulation and interaction with other parts of the Earth climate system. At the same time, nature exhibited a most drastic example of Arctic change by creating the smallest summer ice extent observed to date - an event that defied the model projections, and whose occurrence and consequences have been analyzed and debated, without conclusive answers being found.

Building on knowledge gained during the IPY and on new observational technologies the Marine WG will endeavor to better understand sea ice structure, its growth and decay and its dependence and dynamical interactions with the radiation balance, the atmosphere and the ocean within the Arctic system. It will also include evaluation on the impacts of these changes on the associated sea ice biota.

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Ecosystem responses to changing physical parameters in the Arctic

Although recent major changes in the physical domain of the Arctic are well documented, such as extreme retreats of summer sea ice in 2007, large uncertainties remain regarding potential responses in the biological domain. Reduction in sea ice extent in the Arctic has been seasonally asymmetric, with minimal changes until the end of June and delayed sea ice formation in late autumn.

The effect of this seasonal asymmetry in sea ice loss on ocean primary production is equivocal, with satellite images showing variable chlorophyll concentrations with no secular shifts for the region as a whole. However, clear changes have occurred at higher trophic levels, including shifts in species ranges for zooplankton, benthos, and fish, and loss of sea ice as habitat and platform for marine mammal species. The Marine WG intends to play a role in increasing our understanding of potential ecosystem changes under further loss of sea ice.

Understanding Geochemical process in the Arctic Ocean and Sub-Arctic Seas

The changes in the sea ice coverage of the Arctic Ocean, present and predicted for the future, will likely have major impacts on the fluxes of chemical constituents as well as the ventilation of deep waters.

The Arctic Ocean system is moving from a state where the biological productivity mainly has been confined to the shelf areas to a situation with potentially higher activity over the deep central basins. Such a change could increase the export production that would result in a change of the biogeochemistry of the deep and bottom waters. The Marine WG will promote in-depth studies of relevant properties of the full water column of the central Arctic Ocean.

Facilitating Deep Sea drilling in the Arctic Ocean

The Arctic appears to be changing faster than any other region. To understand the potential extent of high latitude climate change, it is necessary to sample the history stored in the sediments filling the basins and covering the ridges of the Arctic Ocean.

The Marine WG intends to support the collection of a long-term geological record of the Arctic Ocean in order to supplement current and long time series observations which are vital to improve our understanding of Arctic processes.

Cross-cutting

The following three general themes were identified by the Marine WG as important cross-cutting issues which should be addressed by most, if not all, the IASC Working Groups:

- » How will the diminishing ice cover affect the carbon cycle in the Arctic and what are the impacts?

- » How does the variability of different components of the Arctic system impact the heat and momentum exchanges between ocean, ice, atmosphere and space in a changing climate?

» How will changes in the hydrological cycle impact various components of the Arctic system?

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Vice Chair: Rolf Gradinger (USA)
Vice Chair: Jinping Zhao (China)
Past Chair: Savithri Narayanan (Canada)

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 Hajime Yamaguchi (Japan)
 Waldemar Walczkowski (Poland)
 Jeremy Wilkinson (UK)

ACTIVITIES

Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC) – Building a Process-level Understanding of the New Arctic

COMPLETED

Distributed Biological Observatory (DBO) Data Workshop

When: February/March 2013 | Where: Seattle, USA

The dramatic seasonal retreat and thinning of sea ice, record-setting seawater temperatures and multiple observations of biological changes in the Pacific Arctic sector has highlighted the need for understanding ecosystem response to climate forcing. The “Distributed Biological Observatory (DBO)” was developed by the international Pacific Arctic Group (PAG) as a change detection array along a latitudinal gradient extending from the northern Bering Sea to the Barrow Arc in the Amerasian Arctic.

A DBO data workshop was held at the NOAA Pacific Marine Environmental Laboratory (PMEL) in Seattle on 27 February-1 March 2013. The meeting brought together scientists and

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associated project data sets collected during the 2010-2012 DBO pilot effort. The purpose of the meeting was to discuss the results, share data sets, develop an international data policy for this observing effort, and organize collaborative publications. The MWG has endorsed the DBO project, and supports development of similar activities in the Atlantic sector of the Arctic.

Workshop: Collaboration with ICES (International Council for the Exploration of the Sea)

When: 17-21 September 2012 Where: Bergen, Norway

In 2011, ICES and IASC signed a Letter of Agreement to cooperate. ICES held its annual workshop on September 17-21 in Bergen, Norway and AOSB/MWG was invited to co-host two of the sessions, both dealing with the Arctic. The first session, co-chaired by Dr. Loeng and Dr. Bogi Hansen, focused on the Arctic and North Atlantic from a climate change perspective as they play an important role in the global climate system. The second session, co-chaired by ICES/PICES/ESSAS and AOSB/MWG examined the influence of subarctic inflows on the physical conditions and biology in the Arctic basin and shelves, as well as the role of fluxes of water from the Arctic basin onto the surrounding shallow shelves and into the subarctic. Papers covered multiple trophic levels or investigate biophysical coupling.

Arctic in Rapid Transition I ART

The Arctic in Rapid Transition (ART) Initiative is an integrative, international, interdisciplinary, pan-Arctic network to study the spatial and temporal changes in sea ice cover, ocean circulation and associated physical drivers over multiple timescales to better understand and forecast the impact of these changes on the ecosystems and biogeochemistry of the Arctic Ocean. The ART Initiative was initiated by early career scientists in October 2008 and subsequently endorsed by the Marine Working Group of IASC. ART will be implemented via a three-phase approach:

Phase I: The development of an active international and multidisciplinary network of scientists sharing a common interest in improving our understanding of the implications of sea ice transitions in the Arctic Ocean.

Phase II: The coordination of dedicated, multicountry, interdisciplinary field campaigns and data collection activities that would provide input into an integrated modelling effort.

Phase III: The synthesis of knowledge including the development of robust scenarios regarding the future state of Arctic marine ecosystems and their role in global processes.

Mentoring and educational programs will be integral to all three phases to help maintain the organic identity of ART as a network led by early-career scientists. The ART Science Plan was approved by the Marine WG in 2010 and the Implementation Plan in 2011.

For more information go to: www.iarc.uaf.edu/en/ART.

ART Zopot Workshop

The ART Science Plan was approved by the Marine WG in 2010 and the Implementation Plan in 2011. The ART Executive Committee planned its first science symposium from 22 - 26 October 2012 in Sopot, Poland.

Arctic in Rapid Transition (ART) Cruise Planning

When: June 25-26, 2012 I Copenhagen

An Arctic in Rapid Transition (ART) meeting with the European members of the ART Executive Committee Meeting was held June 25-26, 2012 at the Geological Survey of Denmark and Greenland in Copenhagen (GEUS).

ART-Polarstern Drafting Meeting

An Arctic in Rapid Transition (ART) meeting which was held February 29 – March 1, 2012 at AWI in Bremerhaven, Germany, focused mainly on the design of a collaboration for a full expedition proposal for the German RV “Polarstern” in 2015 dedicated to “Transitions in the Seasonal Sea Ice Zone (TRANSSIZ)” in the European Arctic Ocean within the framework of ART. The draft proposal suggested three legs focusing on ecological and biogeochemical studies on seasonal transitions (winter-spring, fall-winter) in the Eurasian Arctic Ocean. The main objectives are to complement summer data sets and advance biological/ biogeochemical process studies and modeling, calibrate algorithms used in remote sensing and proxies used to interpret sea ice and ocean circulation changes in the geologic past. The North-American members of the ART Executive Committee planned a complementary US-led expedition in the North-American Arctic (Beaufort, Chukchi and towards the basin).

"Overcoming Barriers to Arctic Ocean Scientific Drilling: The Site Survey Challenge"

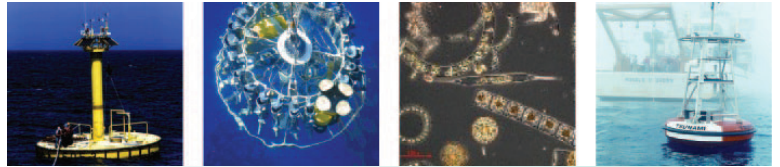
A Workshop to address Arctic Ocean Scientific Drilling was held 1-3 November 2011 in Copenhagen, Denmark. The workshop was co-chaired by N. Mikkelsen, R. Stein, and B. Coakley.



Partnership for Observation of the Global Oceans

Newsletter

Issue 14
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POGO Capacity Building News

International Scholars will attend the New Nippon Foundation-POGO Centre of Excellence in Observational Oceanography at the Alfred Wegener Institute for Polar and Marine Research for 2013

Ten scholars will receive multidisciplinary training at the NF-POGO CoFE at AWI

This December will see the arrival of the ten successful candidates, selected from a pool of 84 applicants, at the new NF-POGO CoFE at AWI. The ten scholars will attend an inauguration event in Berlin and will then receive 10 months of training at AWI's well-equipped training and teaching facilities in marine and oceanographic science. The first half of the training will take place on the island of Helgoland focussing on the study of open-ocean sciences, and the second part of the training will take place on the UNESCO reserve Waddensea island of Sylt, where shelf/basin interactions will be the topic of study.



Essowe Panassa
Togo



Lobsang Tsering
Tibet



Natalia Signorelli
Brazil



Shaazia Mohammed
Trinidad and Tobago



Sutaporn Bunyajetpong
Thailand



Joeline Ezekiel
Tanzania



Mathew KA
India



Pedro Enrique Montoro Gonzalez
Cuba



Subrata Sarker
Bangladesh



Widya Ratmaya
Indonesia

Austral Summer Institute (ASI XIV)

The Austral Summer Institutes (ASI) are run annually at the University of Concepción in Chile and are co-sponsored by POGO. The Institute takes approximately 30 students for a series of lectures on specific topics relating to a different theme each year.



The Department of Oceanography and the COPAS Sur-Austral Program of the University of Concepción, Chile, have announced that the next Austral Summer Institute XIV (ASI XIV) will be held in January 2014 at the Main Campus in Concepción and at the Experimental Laboratory of Marine Biology in Dichato. ASI XIV is devoted to Coastal and Open Ocean Studies through Multiple Approaches.

The course topics will include:

- Multidisciplinary satellite oceanography: platforms, data and applications
- Changing biogeochemical cycles in the coastal ocean
- Ecology and diversity of marine microorganisms
- Fluvial and glacial sediments impacting coastal ocean processes: An interdisciplinary perspective

Information on the courses, lecturers, program and application process is available at www.udec.cl/oceanoudec/asi-14/eng/index.html

Upcoming POGO Capacity Building Programmes for 2014

Following the high demand for this year's POGO-supported capacity building programmes, POGO will soon be announcing opportunities for:

- POGO Visiting Professorship 2014
- POGO-SCOR Visiting Fellowships 2014

Further details and instructions for applications will be posted on the POGO website at: <http://ocean-partners.org/index.php/training-and-education>

The NF-POGO CoFE at AWI will be offering a Regional Training Programme "Detection of HABs in Southeast Asia by Remote Sensing: Operational Warning and Regional Monitoring Protocols". This will be hosted by the Bolinao Marine Laboratory (BML), Marine Science Institute, University of Philippines, Bolinao, Pangasinan from February 24 to March 15, 2014. Application material and more info are available at <https://sites.google.com/site/habseatraining/>.

POGO Capacity Building Updates (cont'd)

POGO-PAP-GreenSeas Fellowship 2013

Reports from the Fellows who have completed studies from the Porcupine Abyssal Plain Cruise



Following the success of the POGO-AMT fellowship programme, this year saw the inaugural POGO-Porcupine Abyssal Plain (PAP)-GreenSeas Fellowship Programme. The PAP observatory is situated in the Northeast Atlantic away from the continental slope and mid Atlantic ridge. The site is an open ocean time-series representing processes in the North Atlantic Drift Region and accessible from many EU ports.

Thanks to collaborative support from the PAP Observatory and the UE Project GreenSeas, POGO was able to offer two fellowships this year. The two candidates successfully completed their fellowships, which included approximately one month spent with their host supervisors, before spending three weeks on board RRS James Cook during May and June, followed by a further month at the host institution processing and interpreting the data collated from the cruise.



Bellineth Valencia

Fellow: Bellineth Valencia
From: University of Valle, Cali, Colombia
Hosted by: Dr Marja Koski, Aquatic Science and Technology, Technical University of Denmark.
Project Title: Copepods grazing and pellet production: there are changes in particle production according to the sexual condition and vertical distribution?

Bellineth reported "For me, to have the opportunity to participate in this fellowship programme was an enriching experience. I learned a lot during the time that I spent at DTU Aqua laboratories, not only because of the facilities that they have to work with live zooplankton, but also because I had the opportunity to share with masters and Ph.D. students, and highly experienced researchers.

Likewise, the experience during the cruise was very good. It was the first time that I participated in such a complete cruise. I consider that this is a very good opportunity for researchers working in developing countries to learn from highly experienced researchers, to work in well-equipped laboratories, to try to agree future collaborations between institutions (host and parent institutions), and in this way strengthen the research capabilities at the parent institutions.

In a long term, the aim will be to explore the possibility to conduct a project of carbon flux in the Colombian Pacific in collaboration with DTU and/or PAP researchers, and to explore the possibility to do a zooplankton course with Colombian professors that are working with zooplankton and DTU and other international researchers."

Dr Marja Koski commented " We have been extremely happy to host Bellineth, and are impressed both by her skills and her interest on the topic of her study. Irrespective of little previous experience with experimental work, Bellineth was able to perform demanding ship-board experiments, to the amount and quality which is sufficient for a research article. During her stay she has worked extremely hard, and has used every opportunity to improve her skills and knowledge on the plankton ecology. She has proven to be skilful in both planning and conducting experiments, and in analysing the results against the existing knowledge on the topic. I am therefore confident that the stay in Denmark has helped her in her future work, and that she will without doubt succeed in her upcoming PhD project."



Çağlar Yumruktepe

Fellow: Veli Çağlar Yumruktepe
From: Institute of Marine Sciences, Middle East Technical University, Turkey
Hosted by: Dr Adrian Martin and Prof Richard Lampitt, National Oceanography Centre, UK.
Project Title: Model-Data Integration of Key Nitrogen Cycle Processes

Çağlar reported "After the expertise I gained from this fellowship, we now have the conceptual experimental knowledge on how to build incubations on deck, sample at sea and conduct necessary laboratory work. Our institute has the access to three different seas with three unique ecosystems: the Mediterranean, the Marmara and the Black Sea. The techniques followed at the PAP site will be carried on to these three seas and unique estimations of vital rates will be made. We are also planning to train new students, so that the technique can be sustained in time, and hoping that this study will be used in our time series stations at different regions.

Scientists in our institute are also running physical and ecosystem models in all of the seas mentioned. The modelling expertise will be transferred, and I hope to improve the modelling skills of my colleagues and their individual models.

From this programme, I had the chance to work in a highly professional environment, and met many experts of my field. I will carry on working with them and hopefully collaborate on future scientific works. Also, the chance for me to attend a different and highly advanced vessel, and observe the state-of-the-art work scientists are carrying out was remarkable. I witnessed a well-planned, and successful cruise, with all the scientific works linking with each other for a better, bigger picture. I will try hard to achieve such a thing in our cruises back home. I also thank all the POGO members, that made it possible for me have such an experience."

Dr Martin wrote "Çağlar had been developing 1d models as part of his PhD with the intention of reproducing the biogeochemistry observed at key open ocean time series sites which includes the PAP sustained observatory. By coming to NOC Çağlar was able to discuss this modelling work with a range of scientists who have been instrumental in making observations at and studying PAP as well as a number of experienced modellers. Çağlar spent a fruitful period obtaining data, discussing key processes and analysing trial model runs with a wide range of scientists. Çağlar's visit will only strengthen our desire to remain working with IMS.

The fellowship programme provided an excellent opportunity for training that would have been very difficult by any other means. Furthermore, Çağlar was an excellent example of what it can allow a fellow to achieve."

News from the POGO members

RV Mtafiti - Flemish research vessel donated to Kenya

A new collaboration between Flanders Marine Institute (VLIZ) and KMFRI is agreed in the field of marine sciences



RV Mtafiti on her journey to Mombasa, Kenya.
Photo Credit: Eliud Keter, VLIZ

On 31 August 2013 the former Flemish research vessel RV Zeeleeuw, renamed RV Mtafiti, departed from the harbour of Ostend for its journey to Mombasa, Kenya. There the ship will be used by the Kenyan Marine and Fisheries Research Institute (KMFRI) to carry out marine studies of benefit to the local population and to several regional tasks in the West Indian Ocean.

Earlier this year, following the launch of the brand-new vessel RV Simon Stevin, it became apparent that the RV Zeeleeuw (a pilot vessel 1977) transformed to a research vessel (2000) would not be sold but instead donated to Kenya. This donation is the result of the cooperation between the Flanders Marine Institute (VLIZ) and the Kenya Marine and Fisheries Research Institute (KMFRI). The ship has been renamed RV Mtafiti, which means "researcher" in Kiswahili.

On 31 August, the vessel departed from its previous home port Ostend. With 29 crew members of the Kenyan navy on board the ship sailed a total distance of 7 000 km to arrive to its new home port, the Kenyan harbour city of Mombasa.

With the arrival of the oceanographic research vessel, Kenya will be able to investigate its entire Exclusive Economic Zone in the Western Indian Ocean. This will allow Kenya to reach its goals for 2030 specified in 'Kenya Vision 2030'. This policy vision explicitly refers to the fishing research, a healthy environment and the role that science, technology and information can play in this. The operation of RV Mtafiti will allow KMFRI to pursue the objectives of the National Oceans and Fisheries Policy. Additionally, it will facilitate scientific research for the sustainable management of Kenya's natural marine resources. In this way the donation of RV Mtafiti is important for the stimulation of the national strategy for food safety, poverty reduction and job creation. In collaboration with WIOMSA (Western Indian Ocean Marine Science Association), KMFRI will support and coordinate the operation of the RV Mtafiti for the research of the large marine ecosystems of the East African coast. In this regard it will contribute to priority themes, identified by African Member States of the Intergovernmental Oceanographic Commission of UNESCO, including coastal erosion, pollution, sustainable use of living resources, management of key habitats and ecosystems and tourism.

This article was provided by Karen Rappé, Communication & Information, Flanders Marine Institute.

New Harmful Algal Bloom forecast service wins award

Forecast system to help aquaculture industry

A forecasting system to warn of impending harmful algal blooms has won this year's most beneficial Earth-monitoring service for European citizens. The Harmful Algal Bloom (HAB) Forecast is the first system of its kind and is designed to combine information from in-situ monitoring, satellite data and biological and physical oceanic models. The service provides a weekly alert warning of likely toxic or harmful events in the Atlantic Europe area in the following week. Early warning of severe blooms will give fish and shellfish farmers time to adapt their culture and harvesting practices to help reduce potential losses. HAB Forecast has been developed by the European-funded ASIMUTH project. Professor Keith Davidson, ASIMUTH's lead scientist at SAMS, said the team was really pleased to receive the award.



Aerial view of a "red tide" algal bloom.
Photo Credit: ASIMUTH

"We've been working with the end users and hope very much this forecast system will benefit the aquaculture industry. In 2014, subject to funding, the system will be fully operationally tested in Shetland, which has this year suffered months of closure."

ASIMUTH is led by Dr Julie Maguire from Daithi O'Murchu Marine Research Station in Ireland. The project brings together 11 institutes and SMEs from five European countries on Europe's Atlantic coast. The group includes experts in aquaculture, modelling, earth observation, HAB monitoring programmes, and biological and physical oceanography.

Each of the partner countries experience HAB problems with prolonged closures of aquaculture areas and, in some cases, large losses of farmed fish.

HAB Forecast won the award for Best Service Challenge from Copernicus Masters, a European Earth monitoring competition that annually awards prizes to innovative solutions for business and society based on Earth observation data. The team will receive EUR 40,000 in satellite data, made available with financial support by the European Commission. The HAB Forecast bulletin is available from www.asimuth.eu.

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

News from the POGO members (cont'd)

New Research Project to unravel how wind drives Antarctic Bottom Water Change *Dynamics of the Orkney Passage Outflow (DynOPO)*



Autosubs take measurements in the Orkney Passage.
Photo Credit: National Oceanography Centre

DynOPO is a project funded by the UK Natural Environment Research Council that will assess the dynamics of the outflow of Antarctic Bottom Water (AABW, a water mass formed near Antarctica that integrates the deepest layers of the global ocean's overturning circulation) at one of its key sites of export from the subpolar Southern Ocean: the Orkney Passage.

During the last three decades, AABW has exhibited a striking warming and contraction in volume over much of the global ocean abyss, particularly in the Atlantic basin. The causes of these changes are unknown. Possible explanations in terms of a climate-scale perturbation to the properties of the AABW precursor water masses near the Antarctic margins have been tentatively put forward by a number of authors, yet endorsement of these ideas by time series of water mass characteristics near the AABW sources is at best equivocal. In the Atlantic sector, observations strongly suggest a tantalizing alternative (or complementary) explanation: that climatic variations in the basin-scale properties of AABW downstream of its source region are primarily controlled by wind-forced changes in

export, via a mechanism involving the modulation of small-scale turbulent mixing in the Orkney Passage.

DynOPO will test this emerging hypothesis by (i) measuring the circulation, water mass transformations and their underpinning physical processes in the passage for the first time, using a combination of ship-deployed instrumentation and an autonomous underwater vehicle (Autosub); and (ii) assessing the climatic significance of those processes with a mooring array.

Project Timeline:

Early 2015 – Deployment of DynOPO moorings
Early 2017 – DynOPO process cruise and mooring recovery
2017 – 2020 – Analysis of DynOPO data set

This article was provided by A.C. Naveira Garabato, E. Frajka-Williams, M.P. Meredith, E.P. Abrahamson and K.W. Nicholls and featured on the SOOS website.

Red Sea Research Vessel Arrives at KAUST

Saudi Arabia's first research vessel is acquired by KAUST

King Abdullah University of Science and Technology (KAUST) has recently acquired Saudi Arabia's first research vessel, the R/V Thuwal. "This vessel will help bolster innovative research and knowledge of this largely unexplored resource at our doorstep," shared President Jean-Lou Chameau. "Our scientists and students are now equipped to explore the Red Sea aboard the R/V Thuwal with greater flexibility and access. This new tool will accelerate discoveries in marine science research, enhance teaching opportunities, and strengthen partnerships with industry, governments, and academia."

Professor Xabier Irigoien, the Director of KAUST's Red Sea Research Center, explained that this acquisition also reflects the Kingdom of Saudi Arabia's wider commitment to independent research efforts into its sea resources. "The Red Sea represents a large oasis at hand. The sea has a yet untapped potential to produce water, food, and income at the levels required in the future" Prof. Irigoien said. He further highlighted the "big plan for aquaculture development along the coast of the Red Sea." Those plans include the development of large fish farms near the coral reefs. The successful management of the ecosystem requires the ability to regularly acquire and measure information.



RV Thuwal, Saudi Arabia's first research vessel. Photo Credit: KAUST

The 35 meter-long R/V Thuwal, which was previously used as a survey boat, was purchased from an Australian boat builder. Dr. Abdulaziz Al-Suwailem, Manager of the Coastal and Marine Research Core Lab (CMOR) at KAUST added, "The addition of this vessel to the scope of research facilities at KAUST reaffirms the university's commitment to strengthening marine science research and education in the Kingdom. R/V Thuwal will certainly cater to strategic needs for unhampered and increased marine research and explorations in the Red Sea. Hopefully, it will also open new opportunities for more multidisciplinary scientific collaborations."

KAUST scientists are aiming to venture on their maiden expedition later this fall. "Our first projects will include biodiversity and impact studies. We are collaborating with Saudi Aramco on setting up fixed instruments to measure and collect samples at intervals along the Red Sea," said Prof. Irigoien.

In addition to the planned project with Saudi Aramco to perform impact studies for environmental protection, KAUST plans to develop partnerships with other universities and surrounding countries.

This article was provided by Samia Falimban, Communications, KAUST.

News from the POGO members (cont'd)

Long-term data reveals: The deep Greenland Sea is warming faster than the World Ocean

Recent warming of the Greenland Sea Deep Water is about ten times higher than warming rates estimated for the global ocean

Since 1993, oceanographers from the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), have carried out regular expeditions to the Greenland Sea on board the research vessel Polarstern to investigate changes in this region including extensive temperature and salinity measurements. For the present study, the AWI scientists have combined these long term data sets with historical observations dating back to the year 1950. The results of their analysis: In the last thirty years, the water temperature between 2000 metres depth and the sea floor has risen by 0.3 degrees centigrade.

'This sounds like a small number, but we need to see this in relation to the large mass of water that has been warmed' says the AWI scientist and lead author of the study, Dr. Raquel Somavilla Cabrillo. 'The amount of heat accumulated within the lowest 1.5 kilometres in the abyssal Greenland Sea would warm the atmosphere above Europe by 4 degrees centigrade. The Greenland Sea is just a small part of the global ocean. However, the observed increase of 0.3 degrees in the deep Greenland Sea is ten times higher than the temperature increase in the global ocean on average.'



A member of the Polarstern crew lowers the CTD probe into the depths. Photo: Thomas Steuer, Alfred-Wegener-Institut

The cause of the warming is a change in the subtle interplay of two processes in the Greenland Sea: the cooling by deep convection of very cold surface waters in winter and the warming by the import of relatively warm deep waters from the interior Arctic Ocean. "Until the early 1980s, the central Greenland Sea has been mixed from the top to the bottom by winter cooling at the surface making waters dense enough to reach the sea floor" explains Somavilla. "This transfer of cold water from the top to the bottom has not occurred in the last 30 years. However, relatively warm water continues to flow from the deep Arctic Ocean into the Greenland Sea. Cooling from above and warming through inflow are no longer balanced, and thus the Greenland Sea is progressively becoming warmer and warmer."

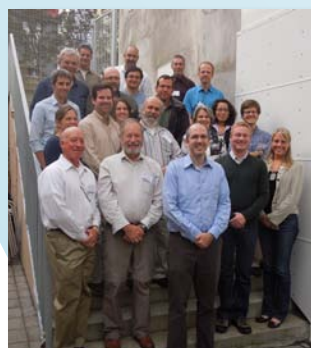
To understand how the world's oceans react to climate change, scientists need to investigate the Arctic Ocean in more detail. "Due to its large volume and its thermal inertia the deep ocean is a powerful heat buffer for climate warming. The polar oceans are scarcely studied. If we want to understand the role of the deep ocean in the climate system, we need to expand the measurements to remote regions like the Arctic," AWI-scientist Ursula Schauer says. For that, she has already planned further Polarstern expeditions. In 2015, Ursula and her group will return to the Arctic.

The publication in Geophysical Research Letters can be found at: <http://onlinelibrary.wiley.com/doi/10.1002/grl.50775/abstract>

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

Report from 'Workshop on the effects of climate change on ocean productivity and marine fisheries'

Trans-Atlantic workshop on climate change hosted by IMR and NOAA



Attendees of the Workshop on the effects of climate change on ocean productivity and marine fisheries

In September 2013, the Institute of Marine Research (IMR) and the National Oceanic and Atmospheric Administration (NOAA) jointly hosted a workshop of 23 researchers from the US and Europe in Iceland to discuss 'Climate change and the effects on ocean productivity'. A strong motivation for organizing this workshop was that understanding consequences of climate change requires a multidisciplinary approach from large-scale physics to small-scale biology. This trans-Atlantic workshop brought together ecologists, climate modelers, and fisheries experts to discuss key research questions related to how global climate change may affect biological production in Arctic and sub-Arctic ecosystems.

One goal of the workshop was to discuss how climate change may affect the physics and biology of marine ecosystems with a particular focus on the flow of energy from phytoplankton to zooplankton to fish. The workshop participants not only discussed consequences of climate change on biological production, but also focused on the mechanisms responsible for the expected changes. Identifying the mechanisms and processes that govern energy transfer between trophic levels is necessary for predicting consequences of climate change on biological production. Discussions also focused on research developments that will need to be implemented before we are able to accurately predict changes to higher trophic level species such as fish. The discussions and presentations from this workshop will be published as a synthesis paper in the near future.

This article was provided by Erlend Moksness, Institute of Marine Research, Norway

News from the POGO members (cont'd)

Early Ocean Observing for the State of Texas
GERG at Texas A&M University assist in oil spill operations

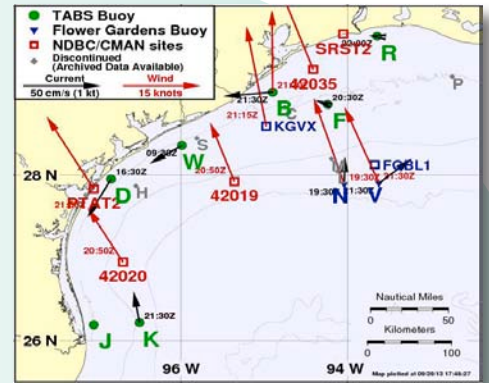
In 1994, due to concerns of oil pollution events off the coast of Texas, the Texas General Land Office (TGLO) implemented plans for an operational system of instrumented buoys off the Texas coast, to be known as the Texas Automated Buoy System (TABS), to protect Texas coastal waters by providing timely, accurate observations of winds and currents for use in spill response operations.

The Geochemical and Environmental Research Group (GERG) at Texas A&M University was selected to design, build, and operate a system of moored, telemetering current meter buoys using off-the-shelf technology. GERG, working with Woods Hole Group (WHG) of East Falmouth, MA, designed buoys to measure surface current velocity using an electromagnetic current sensor and transmit the data to shore on a regular schedule via the existing offshore cellular telephone network. In early 1995, less than nine months after receiving the contract, GERG deployed the first five buoys using this technology. Today the buoys use acoustic current sensors and low-earth orbit satellite data communications.

The primary mission of TABS is to provide near-real-time data when a spill occurs. However, the TGLO recognized from the inception of the project that three factors would form TABS into an effective public resource as well. Thus, the TGLO supports research to improve the reliability, operational range, and versatility of the TABS buoys; it insists that all TABS data be immediately disseminated through a user-friendly Internet website; and it encourages other scientific research projects to build on the TABS resources. To that end, the buoys have been continuously improved since the original design to incorporate new technology, lessons learned in the field, and expanding mission goals. From its inception in 1995, when the Internet was just beginning to emerge, the buoy observations have been made available to the TGLO and the general public on the Internet.

Also in 2003 real-time analysis of the daily observations was implemented to provide quality-controlled oceanographic, meteorological, and engineering products. Today the TABS buoy network consists of nine actively monitored sites, seven along the coast and two near Flower Garden Banks National Marine Sanctuary. The seven coastal sites are funded by the TGLO. The two Flower Garden Banks sites are funded separately by an oil industry consortium and operated as part of the TABS program. Today GERG operates all aspect of the program, from buoy design, construction, deployment, maintenance, data management and public dissemination of the data. GERG is now expanding its observing capabilities with a number of gliders and AUV's (<http://gerg.tamu.edu>).

This article was provided by Tony Knap & Norman Guinasso, GERG, Texas A&M University



Position of the TABS buoys off the Texas coast.
Image Credit: GERG

Plymouth Marine Laboratory deploys the buoys
Plymouth Marine Laboratory joins forces with the Met Office



New buoy for the Western Channel
Observatory
Photo Credit: PML

Plymouth Marine Laboratory (PML) has recently launched a new autonomous data buoy, built in collaboration with the UK Met Office, to take high frequency measurements at one of the monitoring stations 20 miles south of Plymouth UK.

In-situ measurements are undertaken weekly at two coastal stations near Plymouth in the Western English Channel, as part of a long-term oceanographic time-series and marine biodiversity study known as the Western Channel Observatory (WCO). The WCO has some of the longest time-series in the world for zooplankton and phytoplankton.

The two scientific buoys operated and developed by PML are positioned offshore at stations known as 'L4' and 'E1'. The new autonomous data buoy has now been deployed at the E1 station, which has a historical hydrographic series dating from 1903. The measurements from these buoys are collected using the research vessels of PML and the Marine Biological Association in the UK, assessing several key parameters important to the functioning of the marine ecosystem such as light, temperature, salinity, dissolved oxygen, chlorophyll, turbidity, and nutrients.

The buoys capture events otherwise missed when data is taken in the traditional way, i.e. in-situ sampling, with hourly assessments of meteorological conditions, wind speed, atmospheric pressure, temperature and humidity. Once collected the information is then sent via satellite communication back to PML in real time, in order to immediately display the data on the web.

When developing the buoys it was essential that they were built to withstand the harsh conditions at sea, not just above the water but also below. A particular underwater threat to the efficiency of the databuoys is 'biofouling': the accumulation of excessive organic growth on equipment deployed in marine environments. Biofouling creates engineering and environmental challenges with significant maintenance and health & safety costs. PML Applications Ltd, PML's trading subsidiary, does a great deal of work in the study of biofouling, helping clients to reduce its effects and achieve increased efficiency, as well as health & safety performance.

The data gathered by the databuoys on the underwater environment and ecosystems is crucial to providing PML with data for ecosystem modelling and remote sensing. The UK Met Office also utilizes the information to drive weather forecasting, waves and sea states.

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

News from the POGO members (cont'd)

POGO at the Science and Technology for Society (STS) forum, Kyoto, Japan



Yoshihisa Shirayama at the STS forum
Photo Credit: JAMSTEC

Approximately one thousand global leaders in science and technology, policy, business and media from around one hundred countries, regions and international organizations attended the Tenth Annual Meeting of the Science and Technology for Society (STS) forum held in Kyoto, Japan on 6 – 8 October, 2013. Prime Minister Shinzo Abe of Japan addressed the inaugural session. The goal of the meeting was to reflect on how to expand the “lights” and control the “shadows” of science and technology, in the context of the two main themes of the meeting: innovation and sustainability.

The parallel session on “Oceans” was chaired by Prof. Jane Lubchenco (former Administrator of National Oceanic and Atmospheric Administration, currently professor at Oregon State University), and Dr. Yoshihisa Shirayama (Executive Director of Research, Japan Agency for Marine-Earth Science and Technology and Member of POGO Executive Committee). Speakers in the session included Dr. Mamoru Mohri (Astronaut and Executive Director of National Museum of Emerging Science and

Innovation), Dr. Hang Soon Choi (Vice President of Policy, The Korean Academy of Science and Technology) and Dr. Shubha Sathyendranath (POGO Secretariat, Plymouth Marine Laboratory). Other participants, predominantly executives of influential organizations, attended the session and joined the discussion for two hours. Their names are withheld for compliance with the Chatham House Rules that the meeting followed.

The discussions that followed were broad, and touched upon conservation, issues facing fisheries and aquaculture, threats to marine life from ocean acidification, the Arctic, the need for an integrated approach to studying the oceans and the entire Earth System, user engagement and commitment, the interconnected nature of oceans, the need for capacity building, the importance of international coordination and collaboration, sustainability of resource exploitation and communication strategies. Dr. Philip Campbell (Editor-in-Chief, Nature) reported to the plenary from the breakout session.

The statement from the meeting contained a special reference to the oceans: “The oceans and seas are a major and essential part of the Earth’s environment, with significant impacts on climate and food, and are being affected by human activity. Neither policymakers nor the public know enough about the oceans. Both research and dissemination for awareness need to be greatly reinforced.”

This article was provided by Shubha Sathyendranath (POGO Secretariat, Plymouth Marine Laboratory), Yoshihisa Shirayama and Aska Vanroosebeke (JAMSTEC)

Two New Research Vessels Closer to Joining U.S. Academic Fleet

The United States continues to invest in oceanographic research vessels critical for ocean observing infrastructure and seagoing scientific research. The U.S. academic research fleet provides the mobility and flexibility needed to conduct observing capability worldwide. The U.S. Navy is contributing to the framework for increasing the efficiency and effectiveness of the nation’s Earth observation enterprise through the development of two new Ocean Class research vessels that will be operated for the U.S. Office of Naval Research and are currently under construction.



New Research Ships in construction
(L) RV Neil Armstrong; (R) RV Sally Ride
Photo Credits: WHOI & Scripps

The new ships will possess novel features that will enable advanced capabilities at sea. With berthing for scientific parties of 24, the ships’ features include spacious main, wet, and computer labs, and 5,000+cubic feet of science storage plus extensive cranes and hands free over-the-side handling systems. The ships will be maneuvered by controllable pitch propellers with variable speed motors along with bow and stern thrusters for improved efficiency over varying modes of operation. Both ships will have a range up to 10,800 nm at optimal transit speeds, with maximized ability to work in sea state 5 and higher.

The first vessel to be completed will be R/V Neil Armstrong (AGOR 27), which will be operated by Woods Hole Oceanographic Institution. As of June 2013, approximately 50 percent of overall construction is complete and many large components have been installed such as main engines, transformers, and air conditioning compressors. The research ship is on schedule for tentative launch in February 2014. Directly following by a few months is R/V Sally Ride (AGOR 28), which will be operated by Scripps Institution of Oceanography, UC San Diego.

“The construction of these research vessels marks an important milestone in the renewal of our oceanographic research fleet. Scientists and students rely on capable research infrastructure to study and observe our planet. Both R/V Sally Ride and R/V Neil Armstrong will enhance the oceanographic community’s ability to conduct high-quality, ship-based scientific research globally,” said Bruce Applegate, Scripps Associate Director for Ship Operations and Marine Technical Support.

This article was provided jointly by Cindy Clark, Scripps Institution of Oceanography, UC San Diego, and Stephanie Murphy, Woods Hole Oceanographic Institution.

News from the POGO members (cont'd)

Plymouth Marine Laboratory supports \$2 million XPRIZE seeking new sensors to study ocean acidification



Sensors for the detection of Ocean Adification
Photo Credit: Dreamtime © Willyam Bradberry

Plymouth Marine Laboratory (PML) has been named official supporter of the Wendy Schmidt Ocean Health XPRIZE foundation, following the exciting announcement last month that XPRIZE will be offering a \$2-million prize challenge to an innovator who can build cheaper and better pH sensors in the quest for a global solution to ocean acidification.

While ocean acidification is well documented in a few temperate ocean waters, little is known in high latitudes, coastal areas and the deep sea, and most current pH sensor technologies are too costly, imprecise, or unstable to allow for sufficient knowledge on the state of ocean acidification.

The 22-month competition will award two \$1-million prizes, one to the best low-cost sensor and one to the most accurate. The competition's organizers decided to award two prizes because the two goals present different engineering challenges. Registration opens on 1 January 2014.

This is the second collaboration between the XPrize Foundation of California and Wendy Schmidt, who co-founded the Schmidt Ocean Institute with her husband Eric Schmidt, Google's executive chairman. In 2011, the Wendy Schmidt Oil Cleanup X Challenge awarded \$1.4 million to projects cleaning up oil spills.

Whilst ocean acidification research is still in its infancy, PML has been at the forefront of this developing area, earning an internationally recognised reputation for research and advice to policy makers. More knowledge is still required about how ocean acidification will impact upon the oceans environmentally, socially and economically, and PML is leading part of the UK Ocean Acidification Research Programme (<http://www.oceanacidification.org.uk/>) to investigate the impacts of ocean acidification, including co-ordinating how the knowledge gained will be made available to stakeholders, policy makers, scientists and the public.

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

Royal Research Ship Discovery named by HRH The Princess Royal

A new, state-of-the-art research ship for UK marine science - RRS Discovery - was named by Her Royal Highness The Princess Royal at the National Oceanography Centre in Southampton.

Around 200 guests, including the Science Minister David Willetts, local MPs, civic guests and senior figures from the UK's marine science community were present to see a bottle of champagne smashed in the traditional manner on the vessel's bow. The Honorary Assistant Bishop of Winchester, the Right Reverend John Dennis, blessed Discovery.

Following the ceremony, Her Royal Highness toured the ship, meeting officers and crew, representatives of the Freire shipbuilders and members of the Discovery replacement team who were praised by the Minister for delivering the project on time and on budget. The Princess was shown some of the equipment used by scientists to carry out research in the deep ocean. She also met researchers inside the centre where she learned about science impacts funded by the Natural Environment Research Council (NERC), or delivered by its centres.

Mr Willetts also toured the vessel and in a speech spoke of the UK's world-leading role in marine science.

RRS Discovery is a state-of-the-art platform for world-leading oceanographic research and represents a £75 million investment in frontier science by the Department for Business Innovation & Skills. Commissioned by NERC and operated on NERC's behalf by the National Oceanography Centre (NOC) for the United Kingdom's marine science community, Discovery's wide capability will allow deep-ocean research in the remotest and least hospitable parts of our planet, from tropical seas to polar waters.

Discovery joins RRS James Cook as one of a brace of vessels with deep ocean capability that will deliver NERC's science priorities for decades to come. Her Royal Highness also named James Cook in 2007.

At almost 100-metres in length, and with a displacement of 6,075 tonnes, Discovery will carry a marine crew of 24 and has accommodation for 28 scientists and technicians. The ship is fitted with a comprehensive suite of laboratories, handling systems and sensors that will enable her to carry out research spanning a wide range of ocean issues that impact on society.

This article was provided by Jacky Wood, National Oceanography Centre



RRS Discovery is named by HRH The Princess Royal
Photo Credit: NOC

News from the POGO members (cont'd)

Australia-Japan Marine Science Workshop

A joint Australia-Japan marine science workshop took place in Tokyo, Japan on 11 and 12 July 2013. This workshop was hosted by the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE) of Australia and the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan, based on an agreement from the 14th Australia-Japan Joint Science and Technology Committee meeting held in Tokyo on 23 August 2012.

John Gunn, Chief Executive Officer of the Australian Institute of Marine Science (AIMS) and Yoshihisa Shirayama, Executive Director of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) co-chaired this workshop.

Recognising "Understanding Global Change Impacts and Opportunities in Tropical and Subtropical Marine Ecosystems" is a common priority theme for both countries, experts from Australia and Japan discussed the following three key questions:

- a) What are the biogeochemical processes that influence ocean acidification and the impacts of acidification on biodiversity?
- b) What do we understand about the limits to the adaptability of tropical and sub-tropical marine ecosystems to climate change?
- c) What new technologies are required to better explore and routinely observe tropical and subtropical marine systems?

As a result of the workshop it was agreed that both countries would develop a work program to guide future collaborative research into tropical and sub-tropical marine science between Australia and Japan.



Marine Science Experts from Australia and Japan (Mita Conference Hall, Tokyo, Japan) Photo Credit: JAMSTEC

The workshop was followed by the Australia-Japan Marine Forum: Coral Reefs and Global Change, which was co-hosted by AIMS and JAMSTEC in Tokyo on 13 July 2013, in collaboration with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Marine and Atmospheric Research (CMAR), the Australian Embassy, Tokyo, the Australian Academy of Science, MEXT and the Oceanographic Society of Japan.

This public forum provided the audience with an opportunity to learn about an outline of the bilateral expert workshop and to recognise the importance of Australia-Japan cooperation in marine science and technology.

This article was provided by Mizue Iijima, International Affairs Division, JAMSTEC

Scripps Oceanography Welcomes Director Margaret Leinen

Scripps Institution of Oceanography at UC San Diego recently welcomed Margaret Leinen as its new director. A highly distinguished, award-winning oceanographer and an accomplished executive with extensive national and international experience in ocean science, global climate, and environmental issues, Dr. Leinen is a name familiar to many members of the POGO community.

She is a geological oceanographer whose research specialized in paleoceanography, paleoclimatology, and the present-day processes that are responsible for the formation of the sedimentary record. Her early educational interests in geology quickly expanded to include the oceans and she has had far-reaching research experience with the Deep Sea Drilling Program (DSDP), known today as the International Ocean Discovery Program. A seagoing researcher who participated in three cruises with DSDP, she also led two ALVIN diving expeditions to the Juan de Fuca Ridge and Mariana back-arc environments, studying the sedimentation from hydrothermal vents and a variety of other oceanographic cruises.

Dr. Leinen served for seven years at the U.S. National Science Foundation (NSF) as Assistant Director for Geosciences and Coordinator of Environmental Research and Education and led government-wide planning for climate and ocean research. While at NSF, she directly influenced some of the most consequential programs in marine, atmospheric, and earth science.

Dr. Leinen has set her vision on defining Scripps Oceanography as a national and international leader in the great challenges and opportunities facing ocean, atmospheric, and earth sciences.

"I am excited by the combination of Scripps's 110 years of research and educational excellence and UC San Diego's culture of interdisciplinary innovation," said Dr. Leinen.

With annual expenditures approaching \$200 million and a fleet of four research vessels and research platform FLIP, Scripps encompasses physical, chemical, biological, geological, and geophysical studies of the oceans, Earth, and atmosphere. Scripps offers graduate and undergraduate educational programs in marine biology, oceanography, and Earth sciences.

This article was provided by Cindy Clark, Scripps Institution of Oceanography, UC San Diego.



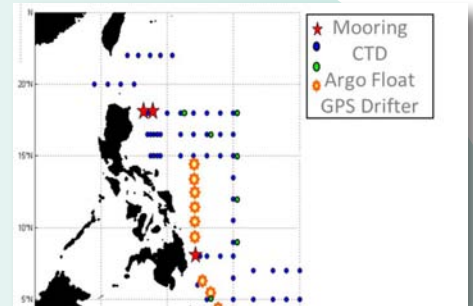
Margaret Leinen new Director of Scripps Institution of Oceanography
Photo Credit: Scripps Institution of Oceanography

News from the POGO members (cont'd)

NPOCE observation breakthrough in the western Pacific Ocean by China

Endorsed as an international joint program by CLIVAR/WCRP in 2010, NPOCE (Northwestern Pacific Ocean Circulation and Climate Experiment) is designed to observe, simulate, and understand the dynamics of the NWP ocean circulation, joined by 19 institutions from 8 countries, and steered by its Scientific Steering Committee (SSC).

On December 21, 2012, the R/V Science-1 of IOCAS fulfilled its third cruise to the western Pacific since its inauguration in 2010. During the cruise three subsurface moorings measuring WBCs at 8°N and 18°N (see figure) were retrieved and redeployed. In addition one more was deployed in Maluku Strait in November 2012. Two year current observation data were obtained from the mooring off Mindanao, which revealed a number of new features of the MUC, much deeper and stronger than the geostrophical velocity in the past.



Mooring observations in NPOCE domain (2010-2012): 3 moorings (red stars)
Image Credit: Institute of Oceanology, CAS

A CAS program on Tropical Northwestern Pacific Ocean System and Consequences (2013-2017) has been newly funded, the key of which is designed to set up 29 subsurface moorings in the western tropical Pacific Ocean in order to understand the interaction between the WBCs and equatorial currents and hence its climatic effects. The program is a tremendous support for NPOCE.

This article was provided by Yixin Ma, Institute of Oceanology, Chinese Academy of Sciences

The Launch of the Caribbean Netherlands Science Institute



The new CNSI at St Eustatius
Photo Credit: NIOZ

Since the constitutional reform of the Kingdom, the Netherlands are directly responsible for a number of Caribbean islands and the marine system surrounding them. The Netherlands Ministry for Education, Culture and Science (OCW) has taken this opportunity to set up a research institute at St Eustatius, the Caribbean Netherlands Science Institute (CNSI) and to fund a multidisciplinary research programme aiming at stimulating excellent research on themes of scientific and societal relevance regarding the Caribbean region. OCW asked the Netherlands Organisation for Scientific Research (NWO) to organise both initiatives.

NWO has asked NIOZ to study the feasibility of setting up CNSI and to propose an organisation structure that addresses the interests of the island of St Eustatius and the Caribbean Netherlands, OCW and NWO, and the multidisciplinary scientific communities. The NIOZ feasibility study resulted in a positive advice, after which NIOZ was asked to take formal responsibility for the implementation of CNSI.

CNSI's mission is to realise a permanent scientific presence in the Caribbean Netherlands with research facilities (e.g. laboratories, research boat, ICT), outreach facilities (e.g. exposition space, seminar room, information centre) and accommodation for visitors. CNSI will support basic, strategic, applied, societal and policy relevant research and education in the fields of the natural sciences, life sciences, social sciences and humanities. Its mission is based on the vision that the Caribbean and European Netherlands share mutual responsibility for the sustainable development of the Caribbean Netherlands islands and their marine territories. Working toward this goal requires an understanding of each other's institutional organizations, historical and cultural backgrounds, management and development priorities and natural and societal resources. It also requires a commitment to multidisciplinary knowledge development and human and institutional capacity building. It is clear that the sustainability of these small island economies cannot be regarded in isolation and should be addressed within the scientific, political and socioeconomic context of the greater Caribbean region.

CNSI fosters the ambition to develop the institute as an authoritative expert and facility centre acknowledged in the wider Caribbean region, positioned at the intersection of science, research, education, management and governance.

CNSI welcomes and supports relevant activities of users from around the globe. For its activities, CNSI anticipates on research projects financed through the Caribbean research call of NWO that will use CNSI's facilities as home base for its research.

This article was provided by Nienke Bloksma, Communications, NIOZ

POGO Activities

Jesse Ausubel in the Oceanauts "Hall of Fame"



Jesse Ausubel's Portrait by Zofia Kostyrko

Jesse Ausubel, one of the founding fathers of POGO, has recently been honoured by having his portrait included in the art exhibition Oceanauts: Living the Dream of the Sea, at the Aquarium of the Pacific in California, USA.

The exhibition comprises 24 mixed-media portraits by artist Zofia Kostyrko, of the world's most famous and notable "ocean explorers", including historical figures such as James Cook and Charles Darwin, as well as some more recent leaders in the field, such as Robert Ballard, Jacques Cousteau, John Delaney, Sylvia Earle, Harry Hess, Walter Munk, and Jacques Piccard, to name a few. Of particular relevance to POGO, John Delaney has been an advocate for launching next-generation ocean science and educational capabilities, particularly using distributed robot-sensor networks, such as the NEPTUNE cabled observatory.

The work of all these "Oceanauts" has contributed in fundamental ways to our current understanding of the oceans, and in many cases has made the oceans more accessible and inspiring to the general public. This exhibition recognises Jesse's outstanding contributions to both ocean science and public engagement, in particular through his leading role in the Census of Marine Life.

"The portraits, whose subjects span sea floor to sea surface, life to rock, and satellites to submarines, convey the scope and excitement of ocean exploration", commented Jesse.

The portraits can be viewed on-line, at http://www.aquariumofpacific.org/exhibits/ocean_exploration/art_exhibit.

The SeaKeeper Award 2013 is presented to The Sargasso Sea Alliance

Throughout its existence SeaKeepers has made it a practice to honour and promote those key decision makers and influencers who have made extraordinary commitments to preserving our planet's oceans. Each year the prestigious SeaKeeper Award is presented at the Bal de la Mer, typically held in Monaco. This year the 2013 SeaKeeper Award was presented to The Sargasso Sea Alliance (SSA), of which one of Executive Committee Members is Prof. Howard Roe, co-founder and past chairman of the POGO. This year, the event took place in San Francisco during the America's Cup.



The Sargasso Sea Alliance are presented with the SeaKeeper Award 2013
Photo Credit: The International SeaKeepers Society

The award ceremony took place on September 9th, with nearly two hundred guests gathered at the St. Francis Yacht Club in San Francisco. Michael T. Moore, Chairman of the Board of SeaKeepers; Skip Zimbalist, Event Chair; and Patty Elkus, Honorary Committee Chair, welcomed the SSA into the ranks of past recipients of the award include Sylvia Earle, H.S.H. Prince Albert II and Kelly Slater for their extraordinary commitment to ocean conservation.

David Shaw, SSA Founding Chair, along with Executive Committee members Howard Roe, Richard Rockefeller, Kristina Gjerde, Derrick Binns and David Freestone accepted the SeaKeeper Award on behalf of the SSA. Formed in 2010, the SSA strives to preserve the ecologically significant yet highly vulnerable Sargasso Sea through improved management regimes and novel legal protection strategies.



The SeaKeepers Award 2013

GACS Business Meetings September 2013

The second annual business meetings of the Global Alliance of CPR Surveys (GACS) were hosted by the Sir Alister Hardy Foundation for Ocean Science (SAHFOS) in the last week of September. The two GACS working groups dealing with the development of the global CPR database, and maintaining common standards and methods met on Tuesday 24th. The Board of Governance comprising the heads of regional CPR Surveys then met over the next two days. The meetings were attended by representatives from Antarctic (Southern Ocean), Australian, USA, Canada (North Pacific), Japanese, South African, Brazilian and SAHFOS CPR surveys, plus a number of SAHFOS staff, and observers from developing surveys in Cyprus and India, and representatives from stakeholder agencies, SCOR, OBIS and Dr Sophie Seeyave representing POGO.

Continued....

POGO Activities (cont'd)

GACS Business Meetings September 2013 (cont'd from previous page)



The meetings highlighted the success to date in meeting GACS initial objectives:

- the global database of CPR data has been established,
- a website has been established,
- assistance has been provided to developing surveys (France, Brazil, Korea, Cyprus, India) which has included training workshops at SAHFOS and the Australian Antarctic Division; FAQs have been developed to provide advice for new surveys,
- the first Global Marine Ecological Status Report has been published; the second report is scheduled for March 2014,
- documenting and promoting a common set of standards and methods.

The establishment of the global CPR database now allows us to conduct a global assessment of plankton patterns and changes. This includes providing data and advice on changes in zooplankton abundance and copepod composition for the GEF-Transboundary Water Assessment Programme. Other data products have been prepared and tested, and will be transferred to the GACS public website by the end of 2013.

During the Board meeting, Dr Ramaiah Nagappa of the National Institute of Oceanography, Goa, and Ms Rana Abu Alhaja of the Cyprus Institute gave presentations on their new surveys. Cyprus plans to conduct regular tows in the eastern Mediterranean starting in October 2013. India's first CPR tow is scheduled for January 2014, with a particular interest in the Arabian Sea.

As part of GACS capacity building and knowledge sharing, a workshop was conducted for CPR analyst after the GACS meeting, aimed at providing instruction on identification and recording of micro-plastics, which are becoming more prevalent in CPR samples, identification of Ceratium and coccolithophores, and assessment of the phytoplankton colour index (PCI).

This article was provided by Graham Hosie, Chair of GACS

The International Research Cruise Information Database and web-site: A joint POGO-CoML-NOAA initiative

The POGO Cruise Information Database (www.pogo-oceancruises.org) was launched in May 2007 and is maintained by the British Oceanographic Data Centre (BODC). It is a joint initiative by POGO, the Census of Marine Life (CoML), and National Oceanic and Atmospheric Administration (NOAA). The objective of the project was to develop, update and maintain an international cruise information database to facilitate resource sharing and information exchange related to past and planned research cruises.

Benefits of the project include helping scientists from different countries coordinate future funded research through information about research vessels of opportunity; aiding in the retrospective ability to find data in regions of interest; making it possible for projects to conduct joint work and to fill empty berths; creating capacity-building and training opportunities; aiding in the tracking and distribution of data; allowing cost sharing among institutions, projects, and nations; making possible intercomparisons, intercalibrations, and validation among different data types (e.g. CTD vs. Argo, in situ vs. remote sensing).

The website focuses on vessels greater than 60m in length and incorporates three major databases:

(i) The Cruise Programme Database – this continues to be operational and contains approximately 2700 cruise programmes, covering 60 research vessels from 20 countries. The web portal was developed and is maintained by MARIS, Netherlands.

(ii) The Research Vessels Database – this contains facts and figures of approximately 170 Research Vessels. Vessel operators have access to the database and are able to update details of their own vessels. It has been developed by EurOcean with support from MARIS.

(iii) The Cruise Summary Report (CSR) database - this is operational for the input of new CSRs and the searching of existing ones. This database has been developed by BSH/DOD, Germany based on the Cruise Summary Report and its predecessors originally conceived by the IOC's International Oceanographic Data and Information Exchange (IODE) programme.

In addition, a forum for users comprising general information of upcoming cruises is being planned.

The priorities for the project in the future are to:

- Continue requesting cruise programmes and update the database, including information on 2013 and 2014 (and beyond) cruise programmes
- Continue to work with operators to improve timeliness and content of cruise programme information
- Develop links with POGO

- members not currently supplying information, through POGO contacts and also ship operators (e.g. International Research Ship Operators (IRSO), European Research Vessels Operators (ERVO))
- Utilise spreadsheet input for preliminary Cruise Programme input from CCHDO, IOCCP and GO-SHIP and other sources
- Improve links with other projects and programmes including Argo, OceanSITES, IMBER, SOLAS, GEOTRACES and EURO-BASIN
- Advertise to other organisations and request links on their web-sites (e.g. IOC/IODE, IRSO, ERVO, Global Observing Systems Information Center (GOSIC), national ship operator sites, UNOLS, Rolling Deck to Repository (R2R), SeaDataNet)
- Develop links with JCOMMOPS (in particular the Ship Logistics Coordinator) possibly leading to exchange of information through Web Map Services (WMS)
- Routine maintenance of the system and web-site – including ensuring the research vessels database is kept up to date
- Synergy from working with EU EUROFLEETS-2 project



NOAA Research Ship Nancy Foster.
Photo Credit: National Oceanic and Atmospheric Administration

In addition to ongoing database maintenance, recent outreach activities have included describing the POGO research cruise information system at the final EUROFLEETS annual meeting at SeaDataNet plenary meetings and International Marine Data and Information Systems (IMDIS) conferences.

This article was provided by Lesley Rickards, The British Oceanographic Data Centre

POGO Activities (cont'd)

POGO Executive Committee Meeting



POGO Executive Meeting attendees
Photo Credit: POGO

On August 13th, a meeting of the POGO Executive Committee was hosted by Plymouth Marine Laboratory (PML). A full day's agenda of discussion items included the review of POGO activities and follow-up on the Action Items from the last annual meeting, POGO-14, in Cape Town. As proposed by the members, the agenda for the POGO-15 meeting, scheduled for January 2014 in Hobart, will include a number of parallel workshops, a Partners-only meeting and a review of the membership dues. Other topics of discussion by the Executive Committee included the projected budget for 2014, the incoming Chairman for 2016, the proposed host for the POGO-16 meeting in 2015, and the "Oceans and Society: Blue Planet" Task and its inclusion in the upcoming GEO Ministerial Summit.

The POGO Secretariat thanks the Chairman and all of the Executive Committee Members for travelling to Plymouth, and to PML for hosting what was a productive and very useful meeting.

Conference on Ocean Literacy in Europe

The European Marine Science Educators' Association (EMSEA) is an association dedicated to facilitating the exchange of success stories and good practices in marine education, to providing a networking directory for marine educators and to co-organizing annual conferences for educators throughout Europe. This was the second conference on Ocean Literacy in Europe organised by EMSEA, the first one having been held in Bruges in 2012. Both conferences were attended by Sophie Seeyave on behalf of POGO.



Public outreach is part of POGO's mandate, and school children are an important target audience, since they will grow up to become either scientists, policy makers or any other type of stakeholder of the ocean. They are also able to pass on knowledge to, and exert pressure on, their parents and extended families. "Ocean literacy" is a growing movement in Europe and worldwide, and the community of marine educators is increasingly aware that international coordination is valuable to exchange ideas and expertise, as well as to avoid duplication of efforts. There could be a role for POGO to play in coordinating these efforts.

There were many interesting presentations on various aspects of marine education, ranging from educational programmes of museums and aquaria, to activities aimed at exposing students to field work and hands-on research projects. Several projects had on-line materials that have been added to the POGO web page (<http://ocean-partners.org/outreach>). There was also an initiative called "Ocean Explorer", which is using Skype in the Classroom to deliver lectures by marine scientists to school classes. This initiative has been over-subscribed by interested schools, and as a result the organisers were looking for additional speakers. As part of this programme, POGO has been organising a series of lessons covering different aspects of ocean observations, with guest speakers from Plymouth Marine Laboratory (PML) and the Sir Alister Hardy Foundation for Ocean Science (SAHFOS) who will teach students about ocean colour remote sensing and the Continuous Plankton Recorder (CPR).

An ad hoc meeting of the POGO News and Information Group was held during one lunch break, attended by Vikki Cheung, Jan Seys, Anuschka Miller, Clare Buckland and Sophie Seeyave. This was very useful to discuss progress on the Action Items from the last meeting (Jan 2013), and in particular plans for a 500th Anniversary celebration of the first circumnavigation of the globe by Magellan.

POGO-15 Meeting

22-24 January 2014, Hobart, Australia - Hosted by CSIRO and IMAS

The agenda for the POGO-15 Meeting will soon be finalised and will be placed on the POGO website at <http://www.ocean-partners.org/meetings-and-workshops/meetings-and-workshops/pogo-15>. Members are advised to make their travel and accommodation bookings well in advance since it will be the peak holiday season in Australia at the time of the meeting.



Attendees should register for the meeting using the online form at https://docs.google.com/forms/d/1MsAKY4_Cprib6O2SSBNe9jbsIVb7Y2Lrtox_dAtm7z4/viewform



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