7.0 RELATIONS WITH NON-GOVERNMENTAL ORGANIZATIONS

7.1 International Council for Science (ICSU) *Burkill*

ICSU is reviewing SCOR and SCAR this year and next. The review panel includes the following members:

Peter Liss (Chair)
University of East Anglia
UNITED KINGDOM

Isabelle Ansorge
University of Cape Town
SOUTH AFRICA

Motoyoshi Ikeda
Hokkaido University
JAPAN

Nicholas Owens
Scottish Association of Marine Sciences
UNITED KINGDOM

Annelies Pierrot-Bults
University of Amsterdam
THE NETHERLANDS

Volker Rachold
International Arctic Science Committee
GERMANY

ICSU Committee on Scientific Planning and Review Ex- Officio: **Oyewale Tomori**
NIGERIA

ICSU Secretariat: **Lucilla Spini**
Head of Science Programmes, ICSU

The first meeting of the SCAR-SCOR Joint Review Panel was held on 14-15 September 2015 at the ICSU Secretariat in Paris. ICSU has informed SCOR that they would like the review panel to meet with the SCOR President and Executive Director during the review process, but no date has been set yet. A draft report is scheduled to be shared with SCOR and SCAR in February 2016 for comment.

7.1.1 International Geosphere-Biosphere Programme (IGBP) *Burkill*

IGBP Update
24 August 2015

27th IGBP SC Officers Meeting
The IGBP SC Officers meeting (20-21 October 2014) was held in Stockholm at the Royal Swedish Academy of Sciences (KVA). Members of the Future Earth interim secretariat from the five global hubs also attended portions of the meeting. The meeting focused on IGBP's final syntheses, including a Landmark Synthesis Event at the American Geophysical Union (AGU) Fall Meeting, 14-18 December 2015, in San Francisco.

30th IGBP Scientific Committee Meeting
The meeting (28-30 April 2015) was held in Austria at the International Institute for Applied Systems Analysis (IIASA). Over 40 participants met to discuss three main themes: IGBP's landmark synthesis, the program's transition to Future Earth, and a special event to be held at the American Geophysical Union Fall meeting at the end of 2015. An associated symposium, organized by IIASA, included an international symposium and public lecture around the theme of "Integrated Science for Sustainable Transitions."

The SC meeting was preceded by a one-day meeting of our core project international project offices (IPOs), with discussions on what makes a successful core project, and discussions with the newly appointed Future Earth Executive Director, Paul Shrivastava. Following the SC meeting, a one-day IGBP SC Officers meeting was held to further advance detailed discussions on the closing of IGBP as a program.

Interactions with the UNFCCC
As with previous years, the IGBP Secretariat worked closely with the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA) to deliver policy-relevant findings on climate change. SBSTA meetings allow extensive and valuable dialogues between scientists and negotiators, and other policymakers. IGBP receives and acts on feedback from nations regarding current areas of policy interest. In advance of the June 2015 meeting, IGBP responded to guidance from SBSTA that this year's emphasis was to address data and information gaps, including from the AR5, such as in regards to climate change and desertification; to identify good practices for knowledge and research capacity building, in particular in developing countries; and to understand better how findings from the IPCC AR5 can be used at regional and local levels. IGBP Executive Director Sybil Seitzinger worked with WCRP Director David Carlson to bring together the presentation that was presented by Carlson. In preparation for the ending of IGBP, Seitzinger worked with WCRP and Future Earth to chart a path forward for continued engagement with SBSTA.

IGBP Landmark Synthesis Events at AGU
As part of the celebratory event to be held at the 2015 AGU Fall Meeting, IGBP is co-sponsoring over 60 scientific sessions covering a range of topics, as well as co-hosting an early-career scientists' event (in partnership with Future Earth); a booth; and an evening reception. The IGBP Secretariat has raised funds to support the participation of early-career scientists from the developing world and has worked actively to develop sessions as well as encourage abstract submission.

Other activities 2014-2015

Maintaining strong links with international research programs
The IGBP leadership attended the scientific committee meeting of the remaining global-change program, World Climate Research Program (WCRP).

IGBP worked closely with Future Earth's scientific and administrative leadership to develop a research agenda and negotiate a smooth transition of IGBP's projects to the new initiative. This included a meeting between the IGBP SC Officers and Secretariat with members of the Future Earth interim secretariat from the five global hubs. Discussions focused on practical needs of projects as they move towards Future Earth; organizational and operational aspects of the Future Earth secretariat; and other topics. The IGBP Secretariat staff contributed expertise throughout the year to several Future Earth taskforces, such as external communication and core project

operations/guidelines, and helped facilitate a connection between Future Earth and the European Space Agency.

Ocean Acidification Summary for Policymakers and website
In 2013, the Ocean Acidification Summary for Policymakers was published by IGBP, SCOR and UNESCO-IOC. In 2014, we published three translations of the summary, in French, German and Spanish. In addition we launched an Ocean Acidification website containing many policy-relevant resources, including the summaries (www.ocean-acidification.net).

Sustainable Development Goals
One of the key events in 2015 will be the UN General Assembly agreement of the Sustainable Development Goals. IGBP has supported ICSU and Future Earth to help ensure the targets underlying the goals are grounded in science and add up to long-term sustainability.

Synthesis
IGBP's focus last year was on its overarching synthesis. In early 2014, we cosponsored a workshop on the Anthropocene concept in Washington, D.C. The workshop brought together Earth-system experts and social-science leaders to develop fresh perspectives and a more nuanced understanding of the Anthropocene. A series of synthesis papers emerging from this workshop are under review with the journal *Global Environmental Change*.

Our second program synthesis effort is through IGBP's core projects, an effort coordinated by IGAC co-chair Paul Monks. A series of papers will appear in the journal *Anthropocene*. Our third program synthesis will highlight IGBP's leadership and development of the discipline of Earth-system science and IGBP's contributions over the last three decades.

IGBP has updated its "Great Acceleration" indicators, originally published in our first synthesis in 2004. The new suite of graphs, published in *The Anthropocene Review* journal (January 2015), charts the trajectory of the Anthropocene from 1750 to 2010. Similarly, we have also updated the Climate-Change Index, first produced in 2009. The index brings together four parameters: sea level, global average land-surface temperature, atmospheric carbon dioxide and Arctic sea-ice minimum. The Climate-Change Index helps us look beyond natural variability in these parameters and provides a snapshot of the planet's climate as human pressures mount. The latest edition continues to show an unequivocal increase, reflecting continued warming of Earth's systems. The underlying trend is clearly visible. So too is the annual extent of change. Members of the IGBP Secretariat are involved in writing the Anthropocene and Earth-system science papers and did an internal review of all core project papers before submission.

In December 2015, we will hold a series of science sessions as well as other events at the AGU Fall Meeting to discuss and celebrate IGBP's legacy. Many IGBP projects and close partners will hold sessions on topics relating to global environmental change.

7.1.2 World Climate Research Programme (WCRP) *Fennel*

The World Climate Research Programme (WCRP): a Short Update to SCOR-2015

General background
The Mission of the World Climate Research Programme (WCRP) is to facilitate analysis and prediction of Earth system variability and change for use in an increasing range of practical applications of direct relevance, benefit and value to society. The two overarching objectives of the WCRP are (1) to determine the predictability of climate; and (2) to determine the effect of human activities on climate.

WCRP is organized as a network of core and co-sponsored projects, working groups, modelling activities and cross-cutting initiatives (see http://wcrp-climate.org/about-wcrp/about-implementation). Those activities of most relevance to the work of SCOR are highlighted below.

WCRP is sponsored by the World Meteorological Organization (WMO), the International Council for Science (ICSU) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

The WCRP Grand Challenges
http://wcrp-climate.org/grand-challenges

The overarching WCRP Grand Challenges (GCs) represent major foci of scientific research, modelling, analysis and observations over the next decade or so. The WCRP intends to promote these GCs through community organized workshops, conferences and strategic planning meetings to identify high priority and exciting research that require international partnership and coordination, and that yield "actionable information" for decision makers. Currently, WCRP has five GCs, with a sixth with a focus on Decadal Climate Variability in the planning stages:

1. Clouds, Circulation & Climate Sensitivity
2. Melting Ice & Global Consequences
3. Climate Extremes
4. Regional Sea-level Change & Coastal Impacts
5. Water Availability

Of these, the GC on *Regional Sea-Level Change and Coastal Impacts* is of most relevant to SCOR. This Grand Challenge represents an integrated interdisciplinary program on sea level research reaching from the global to the regional and local scales to:

- Establish a quantitative understanding of the natural and anthropogenic mechanisms of regional to local sea level variability;
- Promote advances in observing systems required for an integrated sea level monitoring; and
- Foster the development of seal level predictions and projections that are of increasing

benefit for coastal zone management.

The effort will focus on all components of global to local sea level changes and will consider the necessary analyses on global and regional climate change data and simulations, extreme events and potential impacts, including the evaluation of sea level rise impacts for coastal zones. The program also aims to have close interaction with coastal communities to assure that results of the proposed scientific research are incorporated into practices of coastal zone management, and impacts and adaptation efforts. A WCRP-IOC Joint Sea Level Conference is being planned in commemoration of the ten years' anniversary of the WCRP Sea Level workshop held at IOC in Paris in 2006. The conference is tentatively scheduled for July 2017 in New York City, and 400 participants are anticipated.

The WCRP Core Projects

WCRP carries out a major part of its activities through its four core projects, CLIVAR (oceans and climate - www.clivar.org), CliC (cryosphere and climate - www.climate-cryosphere.org), GEWEX (water and climate www.gewex.org) and SPARC (upper atmosphere and climate - http://www.sparc-climate.org). Both CLIVAR and CliC are official endorsers of the SCAR/SCOR Southern Ocean Observing System (SOOS). Of these core projects, the work of CLIVAR is of particular relevance to SCOR.

The CLIVAR Project

CLIVAR is celebrating 20 years of progress since the publication of its first Science Plan in August 1995. The overarching goals of the project continue - to improve understanding and prediction of the ocean-atmosphere system and its influence on climate variability and change, to the benefit of society and the environment. However, CLIVAR's structure has evolved to meet the changing nature of the science and the community it serves. There are now four global Panels: the Ocean Model Development Panel, the Global Synthesis and Observations Panel, the Climate Dynamics Panel, and the joint CLIVAR-GEWEX Monsoons Panel. The regional ocean basin Panels (Atlantic, Pacific, Indian and Southern Ocean) promote and provide advice on the implementation of multi-national observational systems and process studies in support of research on climate and ocean variability and predictability. All Panels report to the CLIVAR Scientific Steering Group.

The regional ocean basin panels have developed through the years strong partnerships with groups that also work on the implementation of the ocean observing system, like the CLIVAR/IOC-GOOS Indian Ocean Region Panel links with IIOE-2 activities and the CLIVAR/CliC/SCAR Southern Ocean Region Panel's links with SOOS. More recently, the Atlantic Region Panel and the Pacific Region Panel are involved with AtlantOS and TPOS2020, respectively. The upcoming issue of the CLIVAR newsletter Exchanges provides an overview of CLIVAR's role in the development of a sustained ocean observing system, in terms of research and advances in understanding.

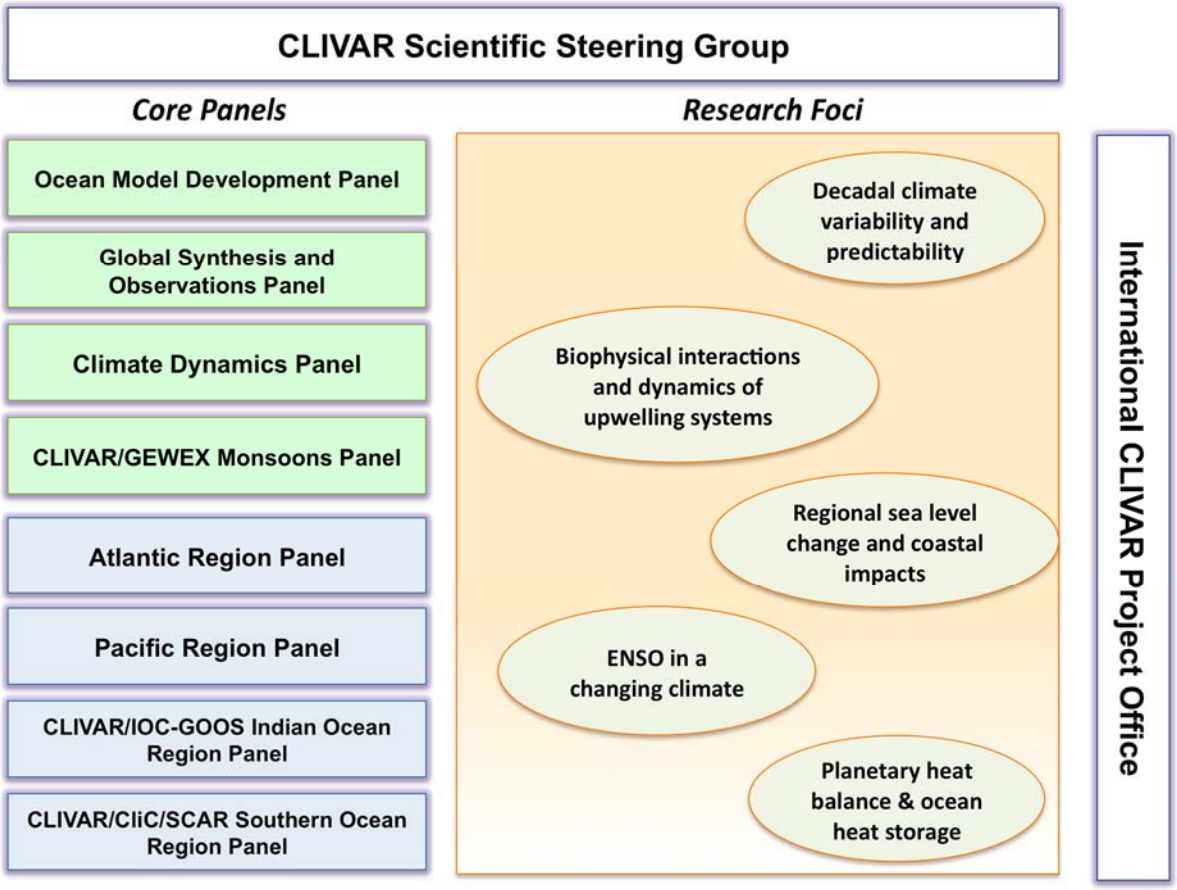
Recognizing the need for the CLIVAR project to be flexible and responsive to new ideas and challenges, the CLIVAR SSG has initiated the concept of *Research Foci* (RF, http://www.clivar.org/about/research-foci). These are focused research topics identified by members of the CLIVAR community as being ripe for progress in the next 5-10 years and that would significantly benefit from enhanced international coordination. The RF have already

demonstrated to be an effective means for CLIVAR to initiate activities and invigorate progress in areas that go beyond the traditional areas addressed by the Panels, fostering cross-panel, cross-community collaboration, and an opportunity to bring young scientists into CLIVAR. Four RF have presented their plans to the SSG and been endorsed to organize meetings and workshops this year to further define their science focus and implementation plans for the coming years: ENSO in a Changing Climate, Decadal Climate Variability and Predictability, Sea Level Rise and Regional Impacts (also a WCRP Grand Challenge) and Planetary Heat Balance and Ocean Heat Storage (CONCEPT HEAT). A fifth Research Focus on biophysical interactions and dynamics of upwelling systems is under development.

Panels highlights:

GSOP: The production of ocean reanalyses, or ocean state estimates, is now an established activity in several research and operational centres. A new generation of products has recently been produced and a coordinated community effort on the intercomparison of those ocean reanalyses has been undertaken addressing a variety of aspects. These include: i) quantifying uncertainty; ii) measuring progress in the quality of the reanalyses; and iii) defining indices for ocean monitoring. These are the motivations for the current Ocean Reanalyses Intercomparison Project (ORA-IP), which was jointly developed by GSOP and GODAE Ocean View (CLIVAR Exchanges, 2014; Balmaseda et al., 2015). A special issue of *Climate Dynamics* with results of the intercomparison is almost complete.

SORP: Members of the CLIVAR/CliC/SCAR Southern Ocean Region Panel, jointly with the Southern Ocean Observing System (SOOS) project, and representing the Southern Ocean community, have provided comprehensive comment on the Year of Polar Prediction (YOPP) Implementation Plan. These comments have been published and the document is now available online. This Working Paper is designed to highlight key Southern Ocean field and modelling capabilities of relevance to YOPP, identify key areas for collaborative efforts, and raise the imperative of the Southern Ocean's role in prediction capabilities.



ARP: The CLIVAR Atlantic Region Panel have been involved with the newly funded European project AtlantOS, that brings together scientists, stakeholders and industry from around the Atlantic to provide a multinational framework for more and better-coordinated efforts in observing, understanding and predicting the Atlantic Ocean. It will also continue to recognize the importance and urgency of resolving the tropical Atlantic bias issue, and will interact with the CLIVAR Upwelling Research Focus in a concerted effort within the CLIVAR Atlantic community to understand causes of the bias.

PRP: The CLIVAR Pacific Region Panel focuses on the process studies, ocean circulation and interannual to decadal climate variability and predictability in the region. Observation projects on understanding the Western Boundary Currents such as NPOCE and SPICE have been coordinated by the panel. The panel also supported the CLIVAR Indonesian Throughflow task team (ITF). Regional sea level and ENSO study have also been the research priorities of the panel. PRP is much involved in the TPOS-2020 planning via its task teams. Significant interactions between the Panel and the CLIVAR ENSO Research Focus have taken place.

IORP: The CLIVAR/IOC-GOOS Indian Ocean Region Panel is working to design and implement an integrated observing system for the Indian Ocean, IndOOS, including the RAMA array. The climate variability modes of different timescales from intraseasonal to decadal are the research priorities of the IORP. IORP interacts with the PRP on the research theme of Indo-Pacific climate interactions and Indonesian Throughflow. IORP is working on development of the YMC (Year of the Maritime Continent) project. The panel is also heavily involved in the planning of the IIOE-2 project as one of the four organizing groups.

OMDP: Fosters the development of ocean models for research in climate and related fields through the development of models and improved representation of ocean processes (parameterizations, resolution, numerics, addressing model biases) and the design and implementation of coordinated ocean-ice modelling studies and their analysis. The Coordinated Ocean-ice Reference Experiments (COREs) are a framework for performing global ocean – sea-ice coupled simulations forced with common atmospheric data sets. The second phase - CORE-II effort has gained unprecedented momentum over the past few years and attracted participation of over 20 ocean and climate modelling groups world-wide. These are hindcast simulations covering the period from 1948 to 2007 and are used to evaluate ocean and sea-ice model performance, to study mechanisms and their variability from seasonal to decadal time scales and to initialize climate, e.g., decadal, prediction experiments. The CORE-II protocol is the basis for the CMIP6 Ocean Model Intercomparison Project (OMIP). OMDP and collaborators have provided the ocean model diagnostics guidelines for the evaluation of ocean-ice model components of CMIP6 (ocean physics, ocean inert chemistry, ocean biogeochemistry).

The next OMDP 14-15 January in Yokohama, Japan, will focus on a detailed evaluation of the new reanalysis product, JRA-55. A 2-day workshop on the Kuroshio and its extension will precede the OMDP meeting. Scientists from various communities including ocean dynamics, modeling, and observation, as well as climate dynamics and marine ecosystems, are invited to attend.

Climate Dynamics Panel: The newly established panel held its first meeting in July 2015 and is in the process of preparing a science and implementation plan of its activities for the coming years. The panel will foster and coordinate international research efforts to increase understanding of the dynamical processes that control circulation variability and change in the atmosphere and ocean on synoptic to centennial time scales. The focus is on large-scale phenomena, processes, and mechanisms of coupled climate variability/modes, teleconnnections and change on seasonal to centennial time-scales, in particular i) storm tracks, jet streams and weather systems, ii) tropical-extratropical interactions, and iii) long-term coupled atmosphere-ocean circulation.

CLIVAR is organising a major Open Science Conference "Charting the course for future climate and ocean research" in Qingdao, China (www.clivar2016.org) on 19-23 September 2016, with an associated Early Career Scientist Symposium 18, 24-25 September and a Stakeholder Forum on 18 September.

WCRP and CLIVAR look forward to exploring possible collaborations in ocean-related activities in the future. Please contact Mike Sparrow msparrow@wmo.int or Valery Detemmerman valery.detemmerman@clivar.org to discuss this further.

7.1.3 Scientific Committee on Antarctic Research (SCAR) *Brussaard*

26 October 2015

SCAR activities of relevance to SCOR

SCAR and SCOR have a strong overlap of interest in the Southern Ocean region. In many cases the two organisations work together (e.g., with the SOOS) and in other cases there are SCAR activities that may be of interest to SCOR (as well as vice versa). Below are a few of those activities. Please see www.scar.org for further details.

(i) The Southern Ocean Observing System
Louise Newman <newman@soos.aq>

SCOR and SCAR jointly sponsor the Southern Ocean Observing System and provide funds for the meeting of the Steering Committee (see separate report to SCOR for details).

(ii) Ocean Acidification
Richard Bellerby <richard.bellerby@niva.no>

SCAR appointed an international ocean acidification Action Group 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. The Ocean Acidification Action Group is finalizing a report to:

- 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 report will be completed by the end of 2015 and launched at the 4th International Symposium on the Ocean in a High-CO_2 World held from 3-6 May 2016 in Hobart, Australia.

(iii) The International Bathymetric Chart of the Southern Ocean
Jan Erik Arndt <Jan.Erik.Arndt@awi.de>

The International Bathymetric Chart of the Southern Ocean (IBCSO) project was initiated in 2006 with the objective to design and implement an enhanced digital database that contains bathymetric data available south of 60°S latitude. IBCSO is endorsed by international organizations such as the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the International Hydrographic Organization (IHO), and the Scientific Committee on Antarctic Research (SCAR).

In April 2013, IBCSO Version 1.0 was released by the Alfred-Wegener-Institute (AWI), in Germany. The map and data are now available: http://www.ibcso.org.

(iv) Antarctic Biodiversity Informatics
Bruno Danis <bdanis@ulb.ac.be>

Biodiversity Informatics is the application of informatics techniques to biodiversity information for improved management, presentation, discovery, exploration and analysis. The application of modern computer techniques can yield new ways to view and analyse existing information, as well as predictive models for information that does not yet exist. More specifically, the Expert Group and Antarctic Biodiversity Informatics plans to optimize ongoing developments in biodiversity informatics for the community. A series of relevant initiatives are ongoing, all aiming at offering free and open access to biodiversity information, but also at carrying out open-source technical developments, and promoting international standards.

(v) Continuous Plankton Recorder
Graham Hosie <graham.hosie@iinet.net.au>

The sensitivity of plankton to changes in the environment makes them useful early warning indicators of the health of ocean systems. The Southern Ocean Continuous Plankton Recorder Survey maintains a database on plankton abundance and distribution.

(vi) Birds and Marine Mammals
Mark Hindell <Mark.Hindell@utas.edu.au>

The Retrospective Analysis of Antarctic Tracking Data (RAATD) has also progressed significantly through the publication of a paper on multi-species tracking data over the last two decades [10]. This study developed global and regional habitat usage maps for key species based on physical and biological attributes of their "hot-spots" and overlaid species-specific maps to identify multi-species areas of ecological significance. This new approach identified regions that are important to multiple species, and therefore provides a much better understanding of the regions and processes that require monitoring and management in the future.

A workshop was held in Brussels in May 18-22, 2015, in conjunction with EG-ABI to process the datasets collected within the EG-BAMM community. The meeting assembled a team of around 12 specialists and produced a homogenised dataset of more than 2 million data points

from more than 2,000 individuals from 13 species. Modelling approaches were decided at this occasion and the first modelling steps were initiated (a full report is available on the EG-BAMM webpage).

(vii) Antarctic Climate in the 21st Century
Nancy Bertler <Nancy.Bertler@vuw.ac.nz>

The goals of the SCAR Scientific Research Programme Antarctic Climate in the 21st Century (AntClim21) are to deliver improved regional predictions of key elements of the Antarctic atmosphere, ocean and cryosphere for the next 20 to 200 years and to understand the responses of the physical and biological systems to natural and anthropogenic forcing factors. A primary form of data that we see being used by AntClim21 are the global coupled atmosphere-ocean model runs that form the basis of the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). Palaeo-reconstructions of selected time periods, recognised as past analogues for future climate predictions, will be used to validate model performances for the Antarctic region.

Mayewski, P.A., T. Bracegirdle, I. Goodwin, D. Schneider, N.A.N. Bertler, S. Birkel, A. Carleton, M. H. England, J-H. Kang, A. Khan, J. Russell, J. Turner and I. Veliconga, 2015: Potential for Southern Hemisphere climate surprises, Quaternary Science, DOI: 10.1002/jqs.2794.

Bracegirdle, T., N. Bertler, A. Carleton, Q. Ding, C. Fogwill, J. Fyfe, H. Hellmer, A.Karpechko, K. Kusahara, E. Larour, P. Mayewski, W. Meier, L. Polvani, J.Russell, S. Stevenson, J. Turner, J. van Wessem, W. van de Berg, and I. Wainer, 2015: A MULTI-DISCIPLINARY PERSPECTIVE ON CLIMATE MODEL EVALUATION FOR ANTARCTICA. Bull. Amer. Meteor. Soc. doi:10.1175/BAMSD-15-00108.1.

(viii) State of the Antarctic Ecosystem
Jan Strugnell <J.Strugnell@latrobe.edu.au> and Huw Griffiths <hjg@bas.ac.uk>

Biological diversity is the sum of all those organisms that are present in an ecosystem, that dictate how ecosystems function, and that underpin the life-support system of our planet. The State of the Antarctic Ecosystem (AntEco) Scientific Research Programme has been designed to focus on patterns of biodiversity across terrestrial, limnological, glacial and marine environments within the Antarctic, sub-Antarctic and Southern Ocean regions, and to provide the scientific knowledge on biodiversity that can be also used for conservation and management. In essence, we propose to explain what biodiversity is there, how it got there, what it does there, and what threatens it. A primary product of this programme would be recommendations for its management and conservation.

(ix) Antarctic Thresholds - Ecosystem Resilience and Adaptation
Julian Gutt <Julian.Gutt@awi.de>

Stresses on Antarctic ecosystems result from global climate change, including extreme events, and from other human impacts. Consequently, Antarctic ecosystems are changing, some at a rapid

pace, while others are relatively stable. A cascade of responses from molecular through organismic to the community level are expected. The differences in biological complexity and evolutionary histories between the polar regions and the rest of the planet suggest that stresses on polar ecosystem function may have fundamentally different outcomes from those at lower latitudes. Polar ecosystem processes are therefore key to informing wider ecological debate about the nature of stability and potential changes across the biosphere.

The main goal of the Scientific Research Programme Antarctic Thresholds - Ecosystem Resilience and Adaptation (AnT-ERA) is to facilitate the science required to examine changes in biological processes, from the molecular to the ecosystem level, in Antarctic and Sub- Antarctic marine, freshwater and terrestrial ecosystems. Tolerance limits as well as thresholds, resistance and resilience to environmental change, will be determined.

(x) The Biogeographic Atlas of the Southern Ocean
Claude deBroyer <claude.debroyer@naturalsciences.be>

Biogeographic information is of fundamental importance for discovering marine biodiversity hotspots, detecting and understanding impacts of environmental changes, predicting future distributions, monitoring biodiversity, or supporting conservation and sustainable management strategies. The recent extensive exploration and assessment of biodiversity by the Census of Antarctic Marine Life (CAML), and the intense compilation and validation efforts of Southern Ocean biogeographic data by the SCAR Marine Biodiversity Information Network (SCAR-MarBIN / OBIS) provided a unique opportunity to assess and synthesise the current knowledge on Southern Ocean biogeography.

The scope of the Biogeographic Atlas of the Southern Ocean is to present a concise synopsis of the present state of knowledge of the distributional patterns of the major benthic and pelagic taxa and of the key communities, in light of biotic and abiotic factors operating within an evolutionary framework. Each chapter has been written by the most pertinent experts in their field, relying on vastly improved occurrence datasets from recent decades, as well as on new insights provided by molecular and phylogeographic approaches, and new methods of analysis, visualisation, modelling and prediction of biogeographic distributions.

The Atlas was launched at the last SCAR Meeting and Open Science Conference (Auckland, New Zealand August 25-28, 2014) and is available online via http://atlas.biodiversity.aq, or to purchase at http://www.amazon.co.uk/gp/product/0948277289.

(xi) The SCAR Antarctic Science Horizon Scan
Chuck Kennicutt <mckennicutt@gmail.com>

The 1st SCAR Antarctic and Southern Ocean Science Horizon Scan assembled some of the world's leading Antarctic scientists, policy makers, leaders, and visionaries (including representatives from CCAMLR) to identify the most important scientific questions that will or should be addressed by research in and from the southern polar region over the next two decades. The Scan outcomes will assist in aligning international programmes, projects and resources to

effectively facilitate Antarctic and Southern Ocean science in the coming years. The outcomes have so far been published in the journals *Nature* and *Antarctic Science*.

Many national Antarctic programmes are now developing their own strategies on how they will deliver their science programmes in the future. Delivery of such a "roadmap" is not without its challenges. Therefore, with SCAR's assistance, COMNAP is leading a second stage in the process with the Antarctic Research Challenges (ARC) Project (www.comnap.aq) in order to assist national Antarctic programmes to understand, and develop ways to address the challenges, and share any innovation or access to such technology. The ARC project focuses on answering the question: "How will national Antarctic programmes meet the challenges of delivery of their Antarctic science in the next 20 years and beyond?"

(xii) ANTOS (Antarctic Nearshore Terrestrial Observing System)

This new Action Group aims to establish an integrated and coordinated trans-continental and trans-regional environmental surveillance system to identify and track environmental variability and change at biologically relevant scales, and to use this information to inform biological, physical, and earth science studies. www.scar.org/ssg/life-sciences/antos

(xiii) The Monaco Assessment
Aleks Terauds (Aleks Terauds@aad.gov.au)

A meeting of biodiversity and Antarctic experts, entitled '*Antarctica and the Strategic Plan for Biodiversity 2011-2020: The Monaco Assessment'*, was convened for three days in Monaco in June 2015, with the support of the Monaco government, the Centre Scientifique de Monaco, SCAR, and Monash University. The central purpose of the meeting was to examine the extent to which conservation of the biodiversity of Antarctica and the Southern Ocean is realizing the set of ambitions agreed for the world as part of the Strategic Plan for Biodiversity 2011-2020. The meeting also aimed to provide guidance for action that can effectively help deliver further conservation successes for Antarctica and the Southern Ocean.

One of its first outcomes is a statement by the participants, on Antarctic and Southern Ocean conservation in the context of the Strategic Plan for Biodiversity 2011-2020, based on an expert elicitation process, and entitled *The Monaco Assessment*. It is provided on the SCAR website at http://www.scar.org/monaco-assessment. Further outcomes and products of *Antarctica and the Strategic Plan for Biodiversity 2011-2020: The Monaco Assessment* will be made available over the next several months.

(xiv) Upcoming Conferences

- ***XXXIV SCAR Meetings and Open Science Conference***. 19-31 August 2016, Kuala Lumpur, Malaysia. The SCAR Open Science Conference will be held on 25-29 August. See *http://scar2016.com*

- ***The XXXV SCAR Meetings and Open Science Conference in 2018*** in Davos, Switzerland, will cover both polar regions, being organized jointly with the International Arctic Science Committee (IASC).

(xv) Staff Changes

In December 2014, Eoghan Griffin was appointed as SCAR Executive Officer, replacing Renuka Badhe, who became the new Executive Secretary of the European Polar Board. In May 2015, Mike Sparrow also left SCAR to take on a position with the Joint Planning Staff of the World Climate Research Programme. Jenny Baeseman replaced Mike in July 2016.

7.1.4 Future Earth Initiative

Burkill

The vision of Future Earth is for people to thrive in a sustainable and equitable world.

This requires contributions from a new type of science that links disciplines, knowledge systems and societal partners to support a more agile global innovation system.

Future Earth is a global research platform designed to provide the knowledge needed to support transformations towards sustainability. Future Earth seeks to build and connect knowledge to increase the impact of research, to explore new development paths, and to find new ways to accelerate transitions to sustainable development.

Future Earth will contribute to achieving goals on global sustainable development, as called for at the United Nations (UN) Conference on Sustainable Development (Rio+20) and subsequently articulated under the auspices of the UN General Assembly.

Future Earth will work with partners in society to co-develop the knowledge needed to support decision-makers and societal change at all scales and in diverse contexts, by focusing on three Research Themes – Dynamic Planet, Global Sustainable Development and Transformations towards Sustainability.

This document outlines what Future Earth needs to contribute to achieve its vision by 2025.

Why do we need Future Earth?

By 2025 Future Earth will have

Inspired and created ground-breaking interdisciplinary science relevant to major global sustainability challenges

Key focal challenges are to:

1. Deliver water, energy, and food for all, and manage the synergies and trade-offs among them, by understanding how these interactions are shaped by environmental, economic, social and political changes.
2. Decarbonise socio-economic systems to stabilise the climate by promoting the technological, economic, social, political and behavioural changes enabling transformations, while building knowledge about the impacts of climate change and adaptation responses for people and ecosystems.
3. Safeguard the terrestrial, freshwater and marine natural assets underpinning human well-being by understanding relationships between biodiversity, ecosystem functioning and services, and developing effective valuation and governance approaches.
4. Build healthy, resilient and productive cities by identifying and shaping innovations that combine better urban environments and lives with declining resource footprints, and provide efficient services and infrastructures that are robust to disasters.
5. Promote sustainable rural futures to feed rising and more affluent populations amidst changes in biodiversity, resources and climate by analysing alternative land uses, food systems and ecosystem options, and identifying institutional and governance needs.
6. Improve human health by elucidating, and finding responses to, the complex interactions amongst environmental change, pollution, pathogens, disease vectors, ecosystem services, and people's livelihoods, nutrition and well-being.
7. Encourage sustainable consumption and production patterns that are equitable by understanding the social and environmental impacts of consumption of all resources, opportunities for decoupling resource use from growth in well-being, and options for sustainable development pathways and related changes in human behaviour.
8. Increase social resilience to future threats by building adaptive governance systems, developing early warning of global and connected thresholds and risks, and testing effective, accountable and transparent institutions that promote transformations to sustainability.

What will Future Earth deliver?

By 2025 Future Earth will have

Delivered products and services that our societal partners need to meet these challenges

Key focal outputs are:

1. Open and inclusive platforms for observing and monitoring the status, trends and thresholds of the planet in a timely manner at different scales, including tracking fast-changing sentinel processes and systems.
2. Tailored metrics and evaluation tools for well-being and sustainable development.
3. A new generation of integrated Earth system models to deepen our understanding of complex Earth systems and human dynamics across different disciplines, and to underpin systems-based policies and strategies for sustainable development.
4. Science-based data, tools and resources to support improved resilience of people, communities and economics, including disaster risk reduction.
5. Scenarios for transformative development pathways that enable global sustainability, to help evaluate different strategies and options.
6. Critical contributions to key debates on global sustainability issues, including inputs to scientific assessments and decision-relevant syntheses.
7. Innovations in communicating, engaging and visualising global change and sustainability, fully exploiting the potential of new technologies and overcoming differential access to information across the world.

How will Future Earth work?

By 2025 Future Earth will have

Pioneered approaches to co-design and co-produce solutions-oriented science, knowledge and innovation for global sustainable development

Key approaches for focus are:

1. Conducting fundamental and applied research in ways that engage with diverse societal partners across all regions of the world to maximise impact and responsiveness to society's needs, and monitoring the effectiveness of these new approaches to research.
2. Establishing Future Earth as a globally recognised model for engagement and collaboration in research for global sustainable development, effective in all world regions.
3. Stimulating debate, illustrating good practice and mobilising capacities for solutions-oriented science, technology and innovation for sustainability.
4. Changing international research funding practices to better support interdisciplinary and transdisciplinary research and engagement across and within regions.
5. Fostering collaboration among national and international agencies' research programmes, to maximise resources for and impacts of research towards sustainability.
6. Contributing to improved modes of sharing data about environmental change and progress towards sustainability in order to support policy and practice at different levels.

Who will Future Earth be?

By 2025 Future Earth will have

Enabled and mobilised capacities to co-produce knowledge, across cultural and social differences, geographies and generations

Key areas for focus are:

1. Inspiring and supporting a new generation of scholars and practitioners doing integrated science for global sustainability to carry forward Future Earth's vision and mission.
2. Building a diverse and connected community of participants and organisations, including scientists, policy makers, civil society practitioners, private sector actors and funders from all regions of the world.
3. Engaging influential stakeholders globally in the UN system, including major assessments and the post-2015 development agenda, key nations, business and civil society.
4. Mobilising capacities in all parts of the world to cooperate on research that connects local to global processes and promotes alternatives for sustainable development trajectories.
5. Creating a critical mass of scientists, policy makers and civil society leaders who believe in and can serve as ambassadors for Future Earth, including a body of Future Earth Fellows.

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ISBN 978-0-9330357-95-5

Cover Photo iStock 1192081 Antarctica
Design Curie Kure/ www.curiekure.de

Printed by S.A. Pure Impression. Paper: Balance Pure, 100% recycled

7.2 Affiliated Organizations

7.2.1 International Association for Biological Oceanography (IABO) *Miloslavich*

Annual Report of the International Association for Biological Oceanography (IABO)

IABO General Assembly
The IABO General Assembly was held in conjunction with the 3rd World Conference in Marine Biodiversity in Qingdao, China on 13-16 October 2014 http://wcmb2014.csp.escience.cn/dct/page/1. The IABO Executive Committee met on 15 October 2014 at the World Conference of Marine Biodiversity.

IABO thanks SCOR for grants for delegates from Developing Countries to its GA (WCMB III). These grants, and some others, have now been offered to applicants.

Ten delegates from developing countries received travel grants from SCOR to the IABO General Assembly, i.e.:

1. Sanna Durgappa (India)
2. Girish Beedessee (Mauritius)
3. Mhairi Alexander (South Africa)
4. Fernando A. Zapata (Colombia)
5. Joel Kareithi Gatagwu (Kenya)
6. Olesia S. Vishchuk (Russia)
7. Hoang Dinh Chieu (Vietnam)
8. Junior Vitor (Peru)
9. Nadeem Nazurally (Mauritius)
10. Tammy (Tamara) Robinson (South Africa)

The **4th WCMB** will be held in Montreal in May 2018 (Table 1).

Table 1. Statistics on the WCMB.

	Location	Dates	Delegates	Talks	Posters
1st	Valencia, Spain	11-15 November 2008	600	200	160
2nd	Aberdeen, Scotland	26-30 September 2011	800	500	400
3rd	Qingdao, China	12-16 October 2014	480	154	89
4th	Montreal, Canada	May 2018			

Keynote talks at the IABO GA and 3rd WCMB
A recurring theme in many of the keynote presentations was the value and insights from collaborative international research:

- Angelika Brandt described exciting discoveries of deep-sea diversity and productivity in the Kurile Kamchatka Trench by joint German and Russian cruises.
- Suchana Apple Chavanich reviewed the state of marine biodiversity in the Western Pacific (SE Asia) following disturbances ranging from over-fishing to tsunami, and how new international scientific programmes are leading research in the region.
- Sun Song described the factors influencing how jellyfish blooms near Qingdao may provide a template for how such blooms occur elsewhere in the world.
- Graham Edgar summarised some of the analyses from a replicated global survey of over 2,400 sites through collaboration with citizen scientists in the Reef Life Survey programme
- Emmett Duffy introduced approaches to develop methods for monitoring ecological interactions that can be replicated globally.
- Mark Costello illustrated insights from using global species databases to see trends in taxonomic discovery and biogeographic patterns in species richness, including latitudinal gradients, involving over 65,000 species.
- John Gunn presented recent efforts to define “essential ocean variables” that could be a basis for monitoring trends in the oceans at global scales, and the need for a top-down approach to their definition.

The first keynote speaker and President of IUBS, Nils Stenseth, was unable to attend due to illness.

A call for **new committee members** resulted in 6 new members. Thus the present committee (with country and affiliations) of

- David Paterson (Scotland, convenor WCMB II)
- Patricia Miloslavich (Venezuela)
- Annelies Pierrot (Past-President, Netherlands);
- Michael Thorndyke (Sweden)
- Sun Song (China, convenor WCMB III, SCOR Vice-chair)
- Mark Costello (President, New Zealand, WoRMS, GEO BON)

are joined by

- Eulogio Soto (Chile)
- Tina Molodtsova (Russia)
- Isabel Sousa Pinto (Portugal) (IPBES, GEO BON)
- Suchana Apple Chavanich (Thailand, IOC/WESTPAC)
- Prof Siew Phang Moi (Malaysia)
- Philippe Archambault (Canada, 4th WCMB convenor)

Other activities

The committee and the President of IUBS published a joint paper calling for greater coordination within the marine biodiversity community:

> Costello, M. J., Archambault, P., Chavanich, S., Miloslavich, P., Paterson, D. M., Phang, S. M., Sousa Pinto I., Pierrot-Bults A., Song S., Soto E.H., Stenseth N.C., Molodtsova T.N., Thorndyke, M. 2015. Organizing, supporting and linking the world marine biodiversity research community. *Journal of the Marine Biological Association of the United Kingdom*, 95(3), 431–433.

ICSU
IABO's nomination, Dr Annelies Pierrot, was selected to the ICSU ad hoc panel for the review of SCAR and SCOR.

IABO Email list
IABO has an email list with ca. 1,000 subscribers. It welcomes SCOR Working Groups and associated organisations to subscribe and send out news of new positions available, meetings, publications and questions to subscribers.

- MARINE-B, the MArine Research Information NEtwork on Biodiversity
- official email network of the International Association for Biological Oceanography www.iabo.org
- for communication related to marine biodiversity research
- Archived at https://listserv.heanet.ie/marine-b.html
- to join send message "SUBSCRIBE MARINE-B firstname surname" to listserv@listserv.heanet.ie

7.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS) *Turner*

The International Association of Meteorology and Atmospheric Sciences 2015 Report to SCOR
(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 and one committee that play a major role in implementing IAMAS activities. The ten commissions cover *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 areas of Nucleation Theory and Experiment, Tropospheric and stratospheric aerosols, Cloud Drop and Ice Nucleation and Aerosol-Climate Interactions.

Many of these commissions play international leadership roles in their specialist areas [see www.iamas.org/Commissions.html]. The commissions provide an important supplement and extension to the leadership and research role of the *World Meteorological Organization* (WMO), which is the governmental body with a comparable scientific scope to IAMAS.

a) The IAMAS Bureau and members played an active part in the planning for the 26th IUGG Assembly, which was held in Prague, Czech Republic over 22 June to 2 July 2015. The meeting was a great success with over 4,300 participants taking part, of which around 550 were associated with IAMAS. There were more than 5,300 presentations given in 202 symposia.

b) Two meetings of the IAMAS Executive were held in Prague during the IUGG Assembly, and many of the IAMAS commissions also organized business meetings. A new Bureau of IAMAS was elected for 2015 - 2019 consisting of John Turner, UK (President), Joyce Penner, USA (Vice President), Laura Gallardo, Chile (Vice President), Teruyuki Nakajima, Japan (Secretary General), Peter Pilewski, USA (Deputy Secretary General). In addition, five Members-at-Large were elected - Lisa Alexander (Australia), Keith Alverson (USA/Kenya), Iracema Cavalcanti (Brazil), Daren Lu (China), and Colin Price (Israel).

c) The IAMAS Early Career Scientist Medal is presented every two years to an early career scientist working in any area of the atmospheric sciences who has carried out excellent scientific research and who has the potential to make a significant contribution in the future. The 2015 medal

was awarded to Dr. Yuan Wang of JPL, USA for “his seminal contributions in elucidating the role of natural and man-derived atmospheric particles in air quality, atmospheric dynamics and climate”. The medal was presented to Dr. Wang at the second meeting of the IAMAS Executive.

d) Planning is underway for the IAPSO/IAMAS/IAGA assembly, which will be held in Cape Town, South Africa over 27 August – 1 September 2017. A conference web site is now available at http://www.iapso-iamas-iaga2017.com and a call is out for possible symposia.

e) Some recent IAMAS activities have been:

- A meeting of the IAMAS Bureau, 17 – 18 July 2014 in Munich, Germany.
- High Latitude Dynamics workshop (ICDM and ICPM), 23-27 March 2015, Rosendal, Norway
- Atmospheric Composition and the Asian Monsoon workshop (ICACGP and ICDM), 8-10 June 2015, Bangkok, Thailand
- Conference on Sun-Climate Connections (ICMA), 16-19 March 2015, Kiel, Germany
- 13th Solar-Terrestrial Physics symposium, SCOSTEP, 12-17 October 2014, Xi'An, China
- 13th quadrennial ICACGP symposium, 22-26 Sep. 2014, Natal, Brazil
- 15th ICAE conference, 14-19 June 2014, Norman, OK, USA
- Global data for solar - terrestrial variability studies, SCOSTEP, 28-30 Sep. 2015, Tokyo, Japan

f) IAMAS periodically issues an Information Email to the IAMAS community. Up to July 2015 these were edited by Assistant Secretary General Jenny Lin, but since that time this responsibility has been taken over by the new Assistant Secretary General Yoshi Sasaki. Past Information Emails can be accessed via http://www.iamas.org/NewsLetters/

For more information on IAMAS please contact :

John Turner, President (jtu@bas.ac.uk)
Teruyuki Nakajima, Secretary General (nakajima.teruyuki@jaxa.jp)

Submitted by John Turner, IUGG/IAMAS representative to SCOR
[23 October 2015]

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

Smythe-Wright

IAPSO Report to SCOR in 2015

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://iapso.iugg.org/.

Administration

The IAPSO office has been situated at Gothenburg University, Sweden until June 2015, and the day-to-day business has been managed by the Secretary General (SG) Johan Rodhe, Sweden. In July 2015 the IAPSO office moved to the Institute of Marine Science of the National Research Council of Italy, Trieste and since then the day-to-day business has been managed by the newly elected SG, Stefania Sparnocchia.

The new Bureau of IAPSO comprises the President, Denise Smythe-Wright, the Past President, Eugene Morozov, the SG, Stefania Sparnocchia and the Treasurer, Ken Ridgway. The SG is responsible for the IAPSO website and in July 2015, a new IAPSO page was created in the Facebook social network, with the aim of facilitating the spreading of information in the community (see https://www.facebook.com/iapso.iugg.org).

In 2015, there were four IAPSO business meetings and meeting of the EC during the IUGG General Assembly in Prague. Other IAPSO discussions were maintained by means of e-mail communication.

Activities

The IUGG General Assembly in Prague, was held from 22 June - 2 July 2015. The meeting was characterized by the central theme: “Earth and Environmental Sciences for Future Generation”. The Assembly attracted over 4,200 participants from 90 countries covering all five inhabited continents. Almost 5,400 contributions out of more than 5,700 submissions were presented (more than 2,200 as posters) in a total of 202 symposia and workshops, divided into 639 sessions. IAPSO contributed to the 26th IUGG General Assembly 2015 by organizing 13 IAPSO-only symposia and 11 interdisciplinary symposia. 345 scientists registered as IAPSO participants, with 446 oral or poster presentations.

The next Scientific meeting will be the IAPSO-IAMAS-IAGA Joint Assembly in Cape Town, South Africa, from 27 August - 1 September 2017. A first meeting for planning was held in Prague, involving IAPSO, IAMAS and IAGA officers. Information about the conference at http://www.iapso-iamas-iaga2017.com/.

President Eugene Morozov and Secretary General Johan Rodhe participated in the SCOR General Meeting in Bremen, Germany, on 15-18 September 2014. One important issue during the meeting was the decision about which working groups to fund.

Working groups

IAPSO has co-funded with SCOR several working groups that have produced important books and/or special journal issues. Detailed information about SCOR activity and WGs is on the IAPSO webpage. The following WG started in 2014 and is continuing its activity:
SCOR/IAPSO Working Group 145 "Chemical Speciation Modelling in Seawater to Meet 21st Century Needs (MARCHEMSPEC)", co-chaired by D. Turner, S. Clegg and S. Sander.

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 Rickards. Website: www. www.psmsl.org/
- IAPSO Standard Seawater Service, hosted by OSIL, Havant, Hampshire, UK. Director: Paul, Ridout; Website 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 the 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. Emeritus Professor Toshio Yamagata from University of Tokyo and Director of Application Laboratory, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), was awarded the medal in 2015 for "his ground-breaking work and exceptional contribution to our understanding of El Niño/Southern Oscillation and the newly discovered Indian Ocean Dipole". The Award ceremony took place on June 29 at IUGG 2015 in Prague, during which Prof. Yamagata gave the Albert I Memorial Lecture.

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 country for an oral or poster presented at an IAPSO Assembly. IAPSO forms a special commission to select the winner. In 2015, the medal was awarded to Dr. Sana Ben Ismail from Tunisia for her oral presentation "Surface circulation features along the

Tunisian coast (central Mediterranean sea): the Atlantic Tunisian current", delivered within the IAPSO symposium "Physics and Biogeochemistry of Semi-Enclosed and Shelf Seas" during the IUGG 2015 General Assembly.

Members of IAPSO Executive Committee (EC) for 2015-2019:
President: Dr Denise Smythe-Wright (UK); Secretary General: Dr Stefania Sparnocchia (Italy); Past President: Dr Eugene Morozov (Russia); Treasurer: M.App.Sc. Ken Ridgway (Australia); Vice Presidents: Dr Isabelle Ansorge (South Africa); Dr Trevor McDougall (Australia); EC Members: Dr Agatha de Boer (Sweden), Prof Toshiyuki Hibiya (Japan), Dr Christa von Hildebrandt-Andrade (USA and Puerto Rico), Dr Chris Meinen (USA), Dr Satheesh Chandra Shenoi (India), Dr Hans van Haren (The Netherlands).

Denise Smythe-Wright
IAPSO President

Stefania Sparnocchia
IAPSO Secretary General

1 September 2015

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.

7.3.1 InterRidge - International Ridge Studies (affiliated in 1996) *Urban*

2015 InterRidge Update for SCOR

The InterRidge (IR) programme office is now in its last year at Peking University, Beijing, China. It is led by John Chen (IR Chair, marine geophysics) and Jiabiao Li(IR Co-Chair, marine geology). The Office Co-ordinator is Zengxi Ge, whose background is geophysics.

Individual IR membership is ~2,900, with about one hundred new members in 2015. The bi-weekly "interridge-mail" e-news is received by ~1,400 IR members.

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.

Reform of InterRidge in 2014
A reform plan for the new structure of the InterRidge membership fees and privileges of each member country was adopted at the 2014 InterRidge Steering Committee in Beijing, China on 27-28 September 2014.

Twenty-two years after its birth in 1992, InterRidge has continued to evolve based on the principle of collaboration. It is an international organization that pools the resources of its member countries to coordinate oceanic ridge research in a way that is cost-effective, cooperative and proven to be successful. InterRidge is supported by its member countries via membership fees that supports the InterRidge Office and various InterRidge initiatives and activities. Please visit http://www.interridge.org/reform for details.

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 (approx. 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 four active IR Working Groups in 2015, including a new working group starting in 2015.

New working Group: Ecological Connectivity and Resilience
(Chairs: Anna Metaxas (Dalhousie University, Canada) and Lauren Mullineaux (Woods Hole Oceanographic Institution, USA)).

The ecological connectivity of vent communities, and their resilience in the face of disturbance, has been a hot topic of research ever since their discovery. Of late, this topic has become particularly timely and societally relevant as plans for deep-sea mining progress toward implementation. It is also directly relevant to management decisions under consideration for recently designated deep Marine Protected Areas (MPAs), such as those on the Endeavour Segment, in the Marianas region, on the mid-Atlantic Ridge off the Azores, and in the Guaymas Basin and Eastern Pacific Rise. These topics were also identified in InterRidge's third decadal plan.

2nd InterRidge International Workshop Circum-Antarctic Ridge
The 2nd InterRidge International Workshop on Circum-Antarctic Ridges will be held at the Korea Polar Research Institute (KOPRI) in Songdo, Incheon, Republic of Korea during October 12-15, 2015. The conveners are

Sung-Hyun Park (Korea Polar Research Institute)
Seung-Sep Kim (Chungnam National University, Korea)
Anne Briais (University of Toulouse, France)
Jian Lin (Woods Hole Oceanographic Institution, USA)

Charles Langmuir (Harvard University, USA)
Nobukazu Seama (Kobe University, Japan)
Chunhui Tao (Second Institute of Oceanography, China)
Please visit https://ircar.kopri.re.kr/ for more information

The third InterRidge Theoretical Institute will be held in Hangzhou, China on 25-27 September 2015

The Third InterRidge Theoretical Institute on "Magmatic and Tectonic Processes and Seabed Resources at Mid-Ocean Ridges" is going to be organized by the InterRidge Office to take place in Hangzhou, China on 25-27 September 2015. The theoretical institute will focus on the first two themes of "the InterRidge Third Decadal Plan" (www.interridge.org) and the following co-conveners will lead the scientific programs of the theoretical institute.

Theme One: Magmatic and Tectonic Processes
Dr. Jian Lin (USA), Co-Conveners
Dr. Marcia Maia (France), Co-Conveners
Dr. Nobukazu Seama (Japan), Co-Conveners

Theme Two: Seabed Resources
Dr. Jiabiao Li (China), Co-Conveners
Dr. Sergei Silantyev (Russia), Co-Conveners
Dr. Jérôme Dyment (France), Co-Conveners

Scientists from China, France, United Kingdom, Japan, Korea, Germany, Canada, Portugal and India will participate this main event.

The InterRidge Vents database has update to a Version 3.3.

Version 3.3 is the present live site hosted by InterRidge China. Version 3.3 launched on 26 May 2015 with two structural changes to the content type "vent field":

1) we added an rdf:type to match to http://dbpedia.org/resource/Hydrothermal_vent, and
2) we added a database record field to link to the Smithsonian Institution Global Volcanism Program volcano profile for those vent fields that are sub-features of these identified volcanic features.

Please visit http://vents-data.interridge.org/about_the_database for updates.

Other InterRidge Office activities in 2015

In 2015, we plan to award 3 Fellowship to early-career scientists. All Fellowships are designed to encourage international collaboration on an aspect of ridge-crest science.

InterRidge continued its new Cruise Travel Bursary scheme. This has enabled two early career scientists to make new collaborations with established scientists, with InterRidge paying their

travel and hotel costs. Details at: http://www.interridge.org/bursary/list

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

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

Sun Song

IOCCG Annual Report to SCOR

By Venetia Stuart (IOCCG Project Coordinator)

Reporting Period: July 2014 – August 2015

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 and the ocean-colour user community. The IOCCG has a wide-ranging mandate addressing technological and scientific issues through its scientific working groups and task forces, conducting intensive training courses in developing and developed countries, and helping to ensure continuity of the ocean-colour data stream though the CEOS Ocean Colour Radiometry-Virtual Constellation (OCR-VC). This year the IOCCG also hosted the very successful second International Ocean Colour Science (IOCS) meeting in San Francisco (15-18 June 2015). SCOR has been instrumental in helping the IOCCG secure funding from NASA to host the IOCS meeting and carry out the ongoing activities of the group. Further details about all IOCCG activities are given below. The group is currently chaired by Stewart Bernard (CSIR, South Africa), and the IOCCG Project Office is located at the Bedford Institute of Oceanography, Canada, staffed by Project Coordinator, Venetia Stuart.

1. IOCCG Scientific Working Groups

IOCCG scientific working groups are relatively short-lived (2-4 years) and investigate various aspects of ocean-colour radiometry and its applications, generally publishing an IOCCG report on the topic. Over the past year, two IOCCG reports were prepared for publication, one new IOCCG working group was established, and four IOCCG working groups are in various stages of deliberation, as follows:

1.1 Newly Published Reports from IOCCG Working Groups

- **Phytoplankton Functional Types from Space,** IOCCG Report 15 (2014), edited by Shubha Sathyendranath (PML, UK). This report provides an overview of Phytoplankton Functional Types (PFTs) and examines the advantages and limitations of various methods used to detect PFTs from space, along with suggestions for further development (see www.ioccg.org/reports/IOCCG_Report_15_2014.pdf).
- **Ocean Colour Remote sensing in Polar Seas**, IOCCG Report 16 (2015 - in press), edited by Marcel Babin (U. Laval, Canada), Kevin Arrigo (Stanford U., USA) and Simon Bélanger, (U. Québec, Canada). This report highlights some of the difficulties encountered

in using satellite remote sensing in polar seas and proposes new approaches and concepts for studying Polar Regions using ocean colour remote sensing.

1.2 Newly Established IOCCG Working Group

- **Ocean Colour Applications for Biogeochemical, Ecosystem and Climate Modeling** (Chaired by Stephanie Dutkiewicz, MIT, USA). The goal of this WG is to facilitate a better dialogue between numerical modellers and ocean colour specialists. The group aims to synthesize current uses of ocean colour products and will prepare a document that can be used by both communities to address common questions and lay out recommendations for continued and better use of ocean colour products in the future.

1.3 On-going IOCCG Working Groups

- **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 program of 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. An IOCCG report on this topic should be published by the end of next year.
- **Uncertainties in Ocean Colour Remote Sensing** (Chair: Roland Doerffer, GKSS, Germany). This group will address the various sources of uncertainty in ocean-colour applications and will outline procedures on how best to determine the uncertainties, and develop methods to routinely distribute the information.
- **Intercomparison of Atmospheric Correction Algorithms Over Optically-Complex Waters** (Cédric Jamet, Wimereux, France). This group is comparing and evaluating atmospheric correction algorithms over optically-complex waters to understand retrieval differences. They will provide recommendations for improving and selecting the optimal atmospheric correction scheme for various water types, along with the range of validity and limitations of each algorithm.
- **Earth Observations in Support of Global Water Quality Monitoring** (Chairs: Arnold Dekker, CSIRO, Australia; Paul DiGiacomo, NOAA/NESDIS; Steven Greb, Wisconsin Depart. Natural Resources, USA). This WG was established to help develop a strategic plan for incorporation of Earth observation information into coastal and inland water quality monitoring efforts. To date, management agencies have been slow to embrace satellite-derived measurements, even though important parameters such as chlorophyll, suspended solids, light attenuation, and coloured dissolved organic matter have been quantified with required accuracies.

2.0 International Ocean Colour Science (IOCS) Meeting

Because of the excellent feedback from the first IOCS meeting held in Germany (2013), as well as the synergy achieved with the various international space agencies working towards common goals, the IOCCG decided to convene a second IOCS meeting, which took place in San Francisco, USA (15-18 June 2015). NASA and NOAA were the primary sponsors of the meeting, with additional sponsorship being obtained from ESA, EUMETSAT, CNES, SCOR and the Gordon & Betty Moore Foundation. SCOR sponsored four students from developing countries to attend the meeting, which is gratefully acknowledged. The IOCS meeting helped to bring together both the

users (research scientists) and providers (space agencies) of ocean colour data to collectively address common issues and goals, and also to provide a forum (breakout sessions) for discussion of new concepts and techniques. A total of 260 scientists from 29 different countries participated in the four-day meeting, including representatives from space agencies with an interest in ocean-colour radiometry.

The format of IOCS-2015 included seven invited keynote talks, eleven space agency presentations, ten breakout splinter sessions on a wide range of topics, two poster sessions, the NASA Ocean Color Research Team (OCRT) meeting, a SeaDAS/BEAM workshop as well as a plenary panel discussion. The full meeting agenda plus all the poster abstracts can be accessed via the IOCS website at iocs.ioccg.org/. All presentations given during the meeting can be viewed at iocs.ioccg.org/program/iocs-2015-presentations/.

3.0 Capacity Building

IOCCG conducted the highly successful second Summer Lecture Series at the Laboratoire d'Océanographie de Villefranche (France) from 21 July to 2 August 2014. The training course was dedicated to high-level training in bio-optics and ocean colour, and focussed specifically on current critical issues in ocean colour science. A total of 23 students from 16 different countries were selected to attend the course, out of an overwhelming 140 mostly excellent applications. SCOR sponsored three students (two from Brazil and one from Vietnam), which is greatly appreciated. Twelve prominent scientists delivered a comprehensive program including lectures, discussions and hands-on tutorials. Because of the high demand for the course, all lectures were video recorded and can be downloaded from the IOCCG website at video.upmc.fr/differe.php?collec=S_ioccg_villefranche_2014&video=khgfdf. The IOCCG is considering hosting another Summer Lecture Series in July 2016, although plans have not yet been finalised.

4.0 Project Management and Coordination

The IOCCG Committee meets once a year to coordinate the activities of the group as a whole and review the progress of the various working groups. They also discuss plans for the year ahead, and the Executive Committee approves a budget for the coming year. The IOCCG-20 Committee meeting took place in Paris, France (3-5 March 2015, see minutes at www.ioccg.org/reports/Minutes-20-FINAL.pdf). The 21st IOCCG Committee meeting is planned for 1-3 March 2016 in Santa Monica, California, USA.

5.0 IOCCG Membership (2015)

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: the five members marked with an asterisk (*) are new members for 2015. The IOCCG Executive Committee consists of representatives from the sponsoring agencies.

Antoine, David (Past-Chair)	-	Curtin University, Australia
Bélanger, Simon	-	Université du Québec à Rimouski, Canada

Bergeron, Martin*	-	Canadian Space Agency, Canada
Bernard, Stewart (Chairman)	-	University of Cape Town, South Africa
Bontempi, Paula	-	NASA HQ, USA
Boss, Emmanuel	-	University of Maine, USA
Chauhan, Prakash	-	ISRO, India
Dierssen, Heidi	-	University of Connecticut Avery Point, USA
DiGiacomo, Paul	-	NOAA, USA
Dowell, Mark	-	JRC, Italy
Dutkiewicz, Stephanie	-	Massachusetts Institute of Technology, USA
Escudier, Philippe*	-	CNES, France
Franz, Bryan*	-	NASA GSFC, USA
Hardman-Mountford, Nick	-	CSIRO, Perth, Australia
He, Xianqiang*	-	Second Institute of Oceanography, China
Hirata, Taka	-	Hokkaido University, Japan
Kampel, Milton	-	INPE, Brazil
Kwiatkowska, Ewa	-	EUMETSAT, EU, Germany
Loisel, Hubert*	-	Université du Littoral, France
Murakami, Hiroshi	-	JAXA EORC, Japan
Park, Youngje	-	KIOST, Korea
Regner, Peter	-	ESA/ESRIN, Italy
Ryu, Joo-Hyung	-	KIOST, Korea
Tyler, Andrew	-	University of Stirling, UK
Wiafe, George	-	University of Ghana, Ghana
Wilson, Cara	-	NOAA / NMFS, USA
Yoder, James	-	Woods Hole Oceanographic Institution, USA
Zibordi, Giuseppe	-	Joint Research Centre, EU, Italy

6.0 IOCCG Sponsors

Activities of the IOCCG are supported by contributions from various national space agencies and other organisations (see www.ioccg.org/about/sponsor.html) and in-kind support (office space, informatics) from the Bedford Institute of Oceanography (Canada). SCOR provides infrastructure support for submitting proposals to NASA, and manages the NASA funds.

7.3.3 Global Alliance of CPR Surveys (GACS) *Burkill*

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

Sonia Batten, Chair of the Board of Governance
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GACS@sahfos.ac.uk

Dr Graham Hosie stepped down as the Chair of the GACS Board of Governance after three years and following his retirement from the Australian Antarctic Division. I was pleased to take over the position and hope to build on the solid foundations set during the first few years of the Alliance.

The most recent annual meeting was held at the offices of the Sir Alister Hardy Foundation for Ocean Science (SAHFOS) in Plymouth in September 2015. With specific funding ending in 2014, the meeting was scheduled to take advantage of some members existing travel plans, as well as utilising technology to facilitate remote participation. The meeting reviewed GACS progress and set priorities for the upcoming year:

- Development of the GACS database was acknowledged to be slower than originally anticipated, owing for the most part to the high turnover rate of IT personnel – many surveys had seen key database staff move to new appointments – leading to inevitable delays as new staff are appointed and get up to speed. Probably most impacted by personnel movements has been SAHFOS itself, which houses the GACS database, so that progress in the last year has stalled. On a positive note, recruitment of new personnel has recently occurred here and a clear way forward was set at the annual meeting.
- The next Global Status Report is due to be produced in 2016, according to the planned two-year publication cycle, with an annual report highlighting more ad hoc results to be released each spring. Future Status Reports will rely on peer-reviewed, published results but time-scales are too long for this to be completed in time for the 2016 report, which will therefore be modelled on its predecessor.
- Training and capacity building has been a particular strength of GACS recently, with a workshop held at SAHFOS in September to provide CPR workshop training to survey members from Brazil and Australia. It was originally intended that participants from India would also attend but visa problems caused last minute changes to that plan. SAHFOS has agreed to host an additional training workshop for the Indian participants early in the new year so that the POGO funding can still be utilised. Exchange of personnel has also been very active with North Atlantic Survey members visiting the AusCPR and MedCPR surveys this autumn.
- As a consequence of both the training and taxonomy workshops held recently (see previous reports for more details) and through personnel exchanges the Standards and Methodologies Working Group (SMWG) achievements can be considered a significant highlight of the first few years of GACS. There is now a strong overall awareness of the methods used by the different surveys, where issues of comparability may complicate analyses, agreements on where methods can be improved or refined, and most

importantly, a large body of reference material for establishing surveys to draw on. The SMWG has now become a task team which will consider ad-hoc issues as they arise, including exploring technological advancements to automate protocols such as the Phytoplankton Colour Index, and investigating the mechanism and utility of recording microplastic variables in CPR samples.

- Conducting and publishing the first global analysis from the GACS database was seen as a major priority, and will focus initially on representative Essential Ocean Variables (EOVs) currently being discussed by the GOOS community. By bringing together the data from individual CPR surveys GACS offers the best opportunity for describing plankton community variability at quasi-global scales.

Interfacing with other programmes

The Executive Director of POGO, Dr Sophie Seeyave, attended the GACS meeting and presented information on the GEO Blue Planet program, which aims to facilitate interactions between observing activities, programmes and systems. The upcoming 3rd symposium in Monterey, September 2016 offers an opportunity to promote GACS and improve links to these other programmes.

The recently established GOOS Biology and Ecosystems Panel invited Dr Batten as the chair of GACS to participate as a panel member. The panel will use the experience of its members with sustained ocean biological and ecosystem observations to develop and identify relevant Essential Ocean Variables (EOVs). It is hoped that promotion of the EOVs and expanding successful observing systems will enable them to become part of a sustained, GOOS framework. The goals of GACS match very closely with the goals of the panel and our involvement should be mutually positive.

7.4 Other Organizations

7.4.1 Partnership for Observation of the Global Oceans (POGO) *Shapovalov*

Partnership for Observation of the Global Oceans (POGO)
Report to SCOR Annual General Meeting 2015

Introduction
POGO was established in 1999 by a group of directors of marine research institutions who met to discuss ways in which they could work together more effectively in support of global oceanography. As stated at the founding of POGO, the objective of POGO is to make a major contribution to the attainment of sustained in situ observations of the global ocean that meet the requirements of international research and operational programmes.

In the last fifteen years, POGO has established itself as a respected and credible voice for the marine science community. Members value POGO as a forum in which they can meet their peer-directors at least annually, in well-attended meetings, to discuss matters of common interest.

The POGO programme in capacity-building is universally admired; it receives substantial support from the Nippon Foundation. The pool of former scholars trained under Nippon Foundation-POGO initiatives have been integrated into a global network (NANO), which now has a biannual newsletter and five regional, collaborative research projects and one outreach project. Since 2011, POGO has taken a leadership role with GEO in the formulation of an oceans Task, "Oceans and Society: Blue Planet". On a broader scale, POGO has created an informal grouping, Oceans United, to allow many organisations to speak with a common voice on issues of relevance to oceans and society. POGO enjoys excellent working relations with all relevant partner organisations.

Collaboration with SCOR

SCOR is the leading international organisation in the marine science arena, and it is essential that POGO maintain good relations with it. We enjoy the highest level of cooperation with SCOR, especially with its Executive Director, Dr Ed Urban. For example:

- POGO funds jointly with SCOR a fellowship programme that enables young scientists from developing countries to study for up to three months in a major oceanographic institution chosen by the candidate. The programme is managed by POGO. Candidates are selected by a committee in which both POGO and SCOR are represented.
- SCOR also runs a Visiting Professorship modelled on the POGO one, and on several occasions the two programmes have complemented one another (for example, in Southern Africa).
- POGO and SCOR also collaborate in assessing capacity building at the world level in marine science and coordinate their respective capacity-building programmes. Together with partner organisations IOC/IODE, SCOR and POGO have created a website advertising summer schools and other training opportunities in ocean sciences (www.oceansummerschools.org).
- In 2015, SCOR and POGO Secretariats have been working on an impact evaluation questionnaire to send all past trainees of their respective and joint training programmes. They are planning on using the data obtained for joint publications on the POGO-SCOR fellowship and professorship programmes.
- SCOR has established jointly with POGO a new research initiative, the International Quiet Ocean Experiment (IQOE). This is a programme aimed at the acoustic background in the ocean, including its anthropogenic and natural components. The Science Plan was published in 2015. The Sloan Foundation was instrumental in starting up this initiative, and in providing seed funding for coordination.
- POGO contributed to the establishment, and continues to support the development, of the SCOR-SCAR Southern Ocean Observing System (SOOS).
- Both POGO and SCOR support the Global Alliance of Continuous Plankton Recorder Surveys (GACS).
- POGO has an interest in contributing to the activities planned under the International Indian Ocean Expedition 50th anniversary (IIOE-2), an initiative of SCOR and IOC.

Priorities for 2015

At the last POGO Annual Meeting (POGO-15) held in Tenerife, Spain, in January 2015, four workshops were held on the following themes that were identified as priority areas for POGO.

Deep-ocean observations (Leaders Uwe Send/ Pedro Velez/Alicia Lavin)
Mini-presentations were given by Pedro Vélez-Belchí (IEO), Mike Meredith (BAS), Tony Knap (GERG), Alicia Lavin (IEO) and Uwe Send (Scripps), on current and planned deep layer observing elements.

The group then addressed what POGO could do to underline the economic need for and impact of deep ocean observations. It also discussed how POGO could support existing initiatives and opportunities (promote, enhance, supplement, add to, fund…). Some ideas included

- Adding biogeochemical and ecosystem sensors
- Adding capability for benthic layer
- Coordinating/synergizing Go-Ship, deep Argo, deep OceanSITES
- Issuing a POGO Declaration.

Once POGO becomes a legal entity in Europe in can be part of funding proposals as a guarantee for quality. POGO itself cannot provide enough funding for a seed project, but can encourage its members to donate equipment, as was done for the OceanSites.

The DOOS document is a very comprehensive and solid statement of the need for deep observations, although POGO could make a contribution on the technology readiness levels. POGO could issue a Declaration similar to the Sao Paolo declaration, indicating the need to observe the deep ocean. Another idea would be to translate the DOOS strategy into a summary for policy makers.

Members would need a clear mandate to create a Working Group. For example, to produce a Declaration, an assessment of the technology readiness, or an overview paper focused on stake-holders.

POGO actions to follow up:

- Directors to discuss what they can and want to do
- POGO to assure deep coordination with new GOOS panels.

Ocean observations and Marine Protected Areas (Leaders Stefan Hain/Margaret Leinen)
The group discussed the following:

- Objectives of observations
- Communities involved in the observations
- Scales of areas

- Degree of consensus about strategies of observation and what kinds of measurements are allowed
- Technologies for observation.

It was agreed that the best way forward was probably to convene another Workshop at POGO-17 to educate the POGO community about the issues surrounding MPAs. We would need to invite external participants from the MPA community, e.g. from the Convention on Biological Diversity (CBD), and those who are involved in setting up MPAs.

Enhancing visibility of and access to long-term data (Leader Karen Wiltshire/Alex Kraberg)
The group briefly discussed the historical and emerging challenges surrounding time-series data:

- Diversity of data types (images, sequence information, numeric data)
- Increasing diversity of methodologies (technological advances are a blessing and a curse)
- Different methodologies
- Increasingly complex metadata
- Data access
- Potential lack of interoperability
- Still many geographic areas not represented sufficiently in ongoing data-collection efforts
- Considerable differences in visibility of time series
- Lack of inclusiveness.

All of these issues could potentially make large-scale comparisons difficult. They could also threaten the internal consistency of the time series.

The group agreed on issues that were either beyond or within the scope of POGO:

Beyond the scope of POGO activities (based on data):

- Support technical solutions to data integration repositories (e.g. new portal)
- Contributions to standardization efforts, metadata catalogues, standardization of vocabularies.

Within the scope of POGO (based on metadata only):

- Address lack of (and unevenness of) visibility of data and further data discovery
- Review data gaps and provide advice
- Produce guidelines on maintaining internal consistency

An unresolved issue was whether POGO should engage in time series-specific capacity building, e.g. combined ship/land-based training. This issue needs to be addressed as part of a more general discussion.

The agreed goal was to enable visualisation of global time-series data in a WebGIS (simple use case already established at AWI). This will facilitate data discovery without having to access the data themselves, and provide a description of time series, but leaving judgement on usability for purpose x,y,z to potential users. The broad mission is to capture existing, historic and emerging time series.

The first steps are to:

- Produce and circulate a concept with suggested data layers to be included
- Set up a small working group to organize work between meetings
- Collect simple metadata and parameter information for as many time series as possible
- Explore the use of Google tools for metadata visualisation (maps)
- Explore the use of DOI/handle for metadata summaries
- Can overlay base map with bathymetry (deep sea stations).

Possible layers could include:

- Duration
- Depth
- Parameters
- Networks
- Sensor types
- Sampling frequencies
- Links to data
- Regions

Possible links to Google were discussed, and ESRI was highlighted as having more scientifically-oriented tools than Google (e.g. WebGIS).

Engaging with industry: lessons learned, successes and failures (Leader Susan Avery)

Short presentations were given by:

- Sam Walker: BP, formerly NOAA
- Jim Bellingham: WHOI, formerly MBARI, co-founder of Blue Fin Robotics
- Len Srnka: Scripps, formerly Exxon, Professor of Practice
- Ken Lee: CSIRO, formerly DFO
- Steve de Mora: PML.

The group discussed the diverse benefits to industry and academia, such as:

- Training, research and development projects
- Solutions-oriented problems that are interdisciplinary

- Risk management, Operational and safety requirements, engineering integrity
- Ocean governance and policy – conflict avoidance.

The participants then discussed opportunities and barriers, such as:

- World Ocean Council (WOC), which has a large number of members
- Scientific community coordination: POGO
- IOGP – International Oil &Gas Partnerships – 40 years
- Joint Industry Partnerships (JIP – Arctic Response Technology; JIP – Sound and Marine Life (more opportunities here), hardware, making measurements
- Very few projects where Met Ocean data shared between companies
- IP, intellectual dividend, perspectives, cultures, training, business decision-making
- Talking at right levels from both sides, people with time to commit
- Lack of clarity about who to go to (and how?).

What works:

- Dialogue, WHOI, NOC, CSIRO, PML place and industry specific
- Trust, open, engage with business on home space.

Unintended or unanticipated consequences:

- Long-term project within changing business environment
- Conflict of interests, impacts on individuals
- Being drawn into litigation and associated cultural impacts.

Opportunity for POGO:

- Business advisory council for POGO – focus on advice on approaches
- Bridge to WOC
- POGO representation means industry will engage -- further advice can be taken
- Engage with industry associations.

As of 2015, POGO has started providing funding for Working Groups and new training initiatives proposed by its members. A call for proposals was issued in February 2015, and four proposals were successful:

- WG on Observing and Modeling the Meridional Overturning Circulation in the South Atlantic (SAMOC), led by Edmo Campos (Brazil).
- WG on Implementation of IQOE Science Recommendations on Marine Noise Exposure and Broad-Scale Acoustic Monitoring, led by Alexander Vedenev (Russia) and Peter Tyack (UK).

- International Training Course on ‘Emerging trends in Ocean Observations with special emphasis on Moored Buoys and Time series Data Analysis and Applications’ at INCOIS, India.
- Technical Training in Continuous Plankton Recorder Survey Operations at the Sir Alister Hardy Foundation for Ocean Science (SAHFOS) –funding for participants from NIO, India.