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7.1.1 World Climate Research Programme (WCRP)

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The World Climate Research Programme (WCRP): a Short Update to SCOR-2018

General background

WCRP's (draft) Vision: A world that uses relevant and authoritative climate science to ensure a resilient present and sustainable future for humankind.

The World Climate Research Programme¹ (WCRP) coordinates international climate research to develop, share and apply the climate knowledge that contributes to societal well-being. WCRP addresses aspects of climate science that are too large and too complex to be tackled by a single nation or scientific discipline. Through international science coordination and successful partnerships, WCRP aims to lead the way in determining the interactions between human activities and the Earth system. WCRP research provides the climate science underpinning the United Nations Framework Convention on Climate Change, the Agenda for Sustainable Development (including SDG 14) and the Sendai Framework for Disaster Risk Reduction. WCRP also engages with other ocean-related activities such as the UN Ocean Decade and the Arctic Council's Protection of the Arctic Marine Environment Working Group.

Like SCOR, WCRP does not fund science directly, but provides resources to hold meetings and workshops on specific high-priority research topics related to the climate system. Such funds come from its co-sponsors² as well as voluntary contributions from various countries and agencies.

WCRP is finalizing the draft of its new Strategic Plan 2019-2029, which will be made available to the community (including SCOR) for comment from June 11 to August 31 2018.

Please see: <https://www.wcrp-climate.org/wcrp-sp-pc>.

A five-year Implementation plan is also being developed.

WCRP is currently organized as a network of core and co-sponsored projects, working groups, modelling activities and cross-cutting initiatives (see www.wcrp-climate.org). Modifications to the current structure will be considered as the new Implementation Plan is developed; for example, it is envisaged that the current Grand Challenges will wrap up in the 2020-2021 timeframe. All WCRP International Project Offices, including CLIVAR (Climate and Ocean: Variability, Predictability and Change), will play a paramount role in refining and implementing WCRP's upcoming strategy, including their own strategic contributions to the programme. Any changes to the programme structure will be carefully managed over a time frame of several years.

¹<http://www.wcrp-climate.org>

²WMO, the Intergovernmental Oceanographic Commission (IOC) and the International Council for Science (ICSU)

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The WCRP Grand Challenges

<http://wcrp-climate.org/grand-challenges>

The overarching WCRP Grand Science Challenges (GCs) represent major foci of scientific research, modelling, analysis and observations. WCRP promotes 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.

Of the Grand Challenges, *Regional Sea-Level Change and Coastal Impacts* is of most relevant to SCOR, though many others (e.g. decadal climate, carbon feedbacks) have a significant ocean component. The Sea Level GC represents an integrated interdisciplinary program on sea level research reaching from the global to the regional and local scales. Highlights over the last year include:

- The Science and Implementation Plan³ for the Grand Challenge was finalized and published in February 2017.
- A successful international Conference on Regional Sea Level Changes and Coastal Impacts was organized at Columbia University, New York, USA in July 2017. The conference summary was published in *Eos*⁴. Another paper on “Sea Level Change and Coastal Climate Services” that came out of the conference was also published by the GC members⁵.
- A workshop on high-end sea level rise, was held in Hamburg in September 2017. During the workshop it was highlighted that the global mean sea level rise for 2081–2100 relative to 1986–2005 will likely be in the ranges of 0.26 to 0.55 m for RCP2.6, 0.45 to 0.82 m for RCP8.5 (medium confidence). For RCP8.5, the rise by the year 2100 is 0.52 to 0.98 m, with a rate during 2081 to 2100 of 8 to 16 mm/yr (medium confidence). A *Nature* paper on the matter is in preparation.
- Several publications have been made by the WCRP Grand Challenge (also a CLIVAR Research Foci) theme: "Regional Sea Level Change and Coastal Impacts" group, including the latest Science and Implementation Plan, which was online in early 2017, a joint special issue on Sea Level Rise of CLIVAR Exchanges/*U.S. CLIVAR Variations* that has been published in March 2018, and the WCRP conference report of the Regional Sea-level Changes and Coastal Impacts referring to a successful event on Sea-level theme which took place on July 10-14, 2017, in New York, USA (www.sealevel2017.org).

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 -

³<http://www.clivar.org/research-foci/sea-level>

⁴<https://doi.org/10.1029/2018EO090093>

⁵<http://www.mdpi.com/2077-1312/5/4/49/htm>

<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

In 2017, CLIVAR produced its second-generation Science Plan, built on the important legacy of CLIVAR since its inception in 1992. The plan redirects the CLIVAR goals and priorities for the coming decade after consultation with scientists and stakeholders throughout the climate community.

CLIVAR's mission is to understand the dynamics, the interaction, and the predictability of the climate system with emphasis on ocean-atmosphere interactions. In the future, CLIVAR will critically contribute to new challenges of WCRP climate science by covering the following overarching topics:

- Understanding the ocean's role in climate variability, change, and transient sensitivity;
- Understanding the ocean's role in shaping the hydrological cycle and distribution of precipitation at global and regional scales;
- Understanding the drivers of regional climate phenomena that provide predictability on different time scales;
- Provision of coordinated observations, analyses and predictions of variability and change in the Earth's climate system;
- Detection, attribution and quantification of climate variability and change; and
- Development and evaluation of climate simulations and predictive capabilities.

The CLIVAR organisational structure is comprised of four global panels (Ocean Model Development Panel, the Global Synthesis and Observations Panel, the Climate Dynamics Panel, and the joint CLIVAR-GEWEX Monsoons Panel), and five regional ocean basin Panels (Atlantic, Pacific, Indian Northern, and Southern Ocean). 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.

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In response to the rapid pace of scientific advances and recognizing the need for the project to be flexible and responsive to new ideas and challenges, CLIVAR has developed the concept of Research Foci (RF). These are focused research activities on topics (1) with high potential for significant progress in a 3-5 year time-scale, and (2) that would benefit from enhanced international coordination. RF have proven to be effective means to initiate in a bottom-up process new research and to invigorate progress in areas that are of high priority to the climate research community, thereby fostering cross-panel, cross-WCRP community collaboration, while also providing opportunities to entrain new scientists into CLIVAR.

In the past five years, the following topics have been covered: ENSO in a changing climate; Consistency between planetary energy balance and ocean heat storage (CONCEPT-HEAT); Decadal Climate Variability and Predictability (DCVP); and Eastern Boundary Upwelling Systems (EBUS). Three of these activities will sunset as RFs at the end of 2018, after successfully reaching their goals: DCVP will become part of a pan-WCRP effort, CONCEPT-HEAT will evolve into a pan-WCRP activity and the ENSO Research Focus will move into PRP. EBUS will continue its activities to the end of 2019.

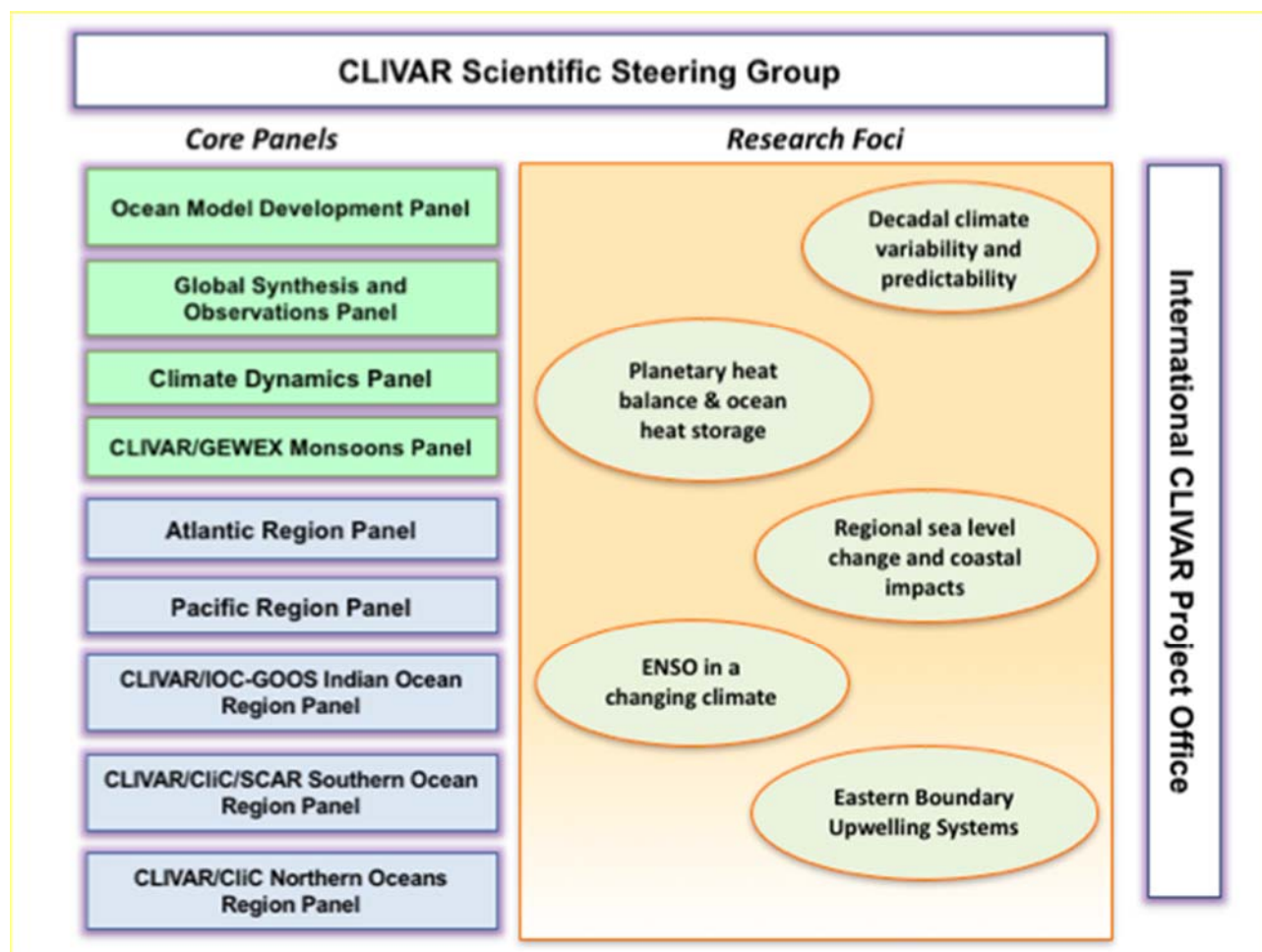
New research foci will be established continuously in a bottom-up process through proposals from members of the CLIVAR and WCRP-at-large community.

Relevant activities by Panels and RF:

New panel formed: NORP:

A new panel co-sponsored by CLIVAR and CliC has been formed: the Northern Ocean Region Panel (NORP). NORP is envisioned to be a forum for coordinating activities on the role of the Arctic Ocean and neighbouring seas in the global coupled climate system, and facilitating progress in developing new tools and methods to observe and model the Arctic Ocean and neighbouring seas. Six task teams have been formed within the panel:

1. Improving Arctic Ocean reanalyses
2. The role of the Arctic Ocean in Arctic amplification
3. Understanding Arctic-midlatitude linkages
4. Quantifying the response to natural variability and external forcings
5. Model errors in Arctic projections
6. Greenland ice sheet–ocean interactions



Earth's Energy Imbalance (EEI) workshop organized by the CONCEPT-HEAT RF:

WCRP is organizing a workshop on "The Earth's Energy Imbalance and its implications" (EEI) in Toulouse, France, on 13-16 November 2018, with the main aim to initiate a new WCRP-wide activity on EEI. Within WCRP, a dedicated focus on Earth's energy budget had been developed by the CLIVAR research focus CONCEPT-HEAT ("Consistency between planetary energy balance and ocean heat storage"), and relevant related science also has been coordinated by the GEWEX core project. One of the workshop goals is to strengthen and extend the community working on the Earth's energy imbalance, both across all relevant WCRP activities as well as with relevant experts currently outside WCRP. This broadness of scope is reflected by the workshop's scientific organizing team, which includes representation from all WCRP core projects as well as experts from the global research community. The workshop announcement and scope, session overviews as well as abstract submission guidelines can be found on the EEI workshop's home page (<http://clivar.org/events/2018-wcrp-workshop-earth's-energy-imbalance-and-its-implications-eei>).

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Ocean Model Development Panel (OMDP): building ocean modelling community standards

OMDP has completed two efforts; the first concerns the documentation and benchmarking of solutions from forced global ocean – sea-ice hindcast simulations from over 20 groups participating in the Coordinated Ocean-ice Reference Experiments phase II (CORE-II) project. This effort produced 9 manuscripts published in a Virtual Special Issue of *Ocean Modelling* devoted to CORE-II:

<http://www.sciencedirect.com/science/journal/14635003/vsi/10PSR6J3BV4>. The CORE-II effort is the most successful coordinated global ocean – sea-ice project ever, and is widely recognized as the community standard for such simulations. It has become a rite-of-passage as the modelling groups compare their solutions to those provided as benchmarks in the Special Issue. The second completed effort involves defining and formalizing the Ocean Model Intercomparison Project (OMIP) – an endorsed project of the Coupled Model Intercomparison Project phase 6 (CMIP6). OMIP aims to provide a framework for evaluating, understanding, and improving the ocean and sea-ice components of global climate and Earth system models contributing to the CMIP6. OMIP addresses these aims in two ways: i) by providing an experimental protocol for global ocean – sea-ice models run with a prescribed atmospheric forcing, and ii) by providing a protocol for ocean diagnostics to be saved as part of CMIP6. The physical component of OMIP is described in Griffies et al. (2016). A companion paper by Orr et al. (2017) covers the details for the simulations with inert chemistry and interactive biogeochemistry, which are now included within OMIP.

Southern Ocean Regional Panel (SORP)'s outreach efforts with partnership projects/groups

Extensive participation in international research coordination and collaboration has occurred with several relevant programmes by SORP members, including the Southern Ocean Observing System (SOOS), the Ocean Observations Panel for Climate (OOPC), the Year of Polar Prediction Southern Hemisphere (YOPP-SH) and the CLIVAR/CliC Northern Oceans Region Panel. SORP has proposed or help organize sessions at several international conferences, including POLAR2018. The panel helped to organize a Polar Prediction Workshop in Bremerhaven, Germany (March 2017), co-sponsored by the Polar Climate Predictability Initiative (WCRP-PCPI), the Polar Prediction Project (WWRP-PPP), and the Sea Ice Prediction Network (ARCUS-SIPN). The panel was represented, with poster or oral presentations at several international conferences/workshops, including the IGS/CliC/IACS International Symposium on The Cryosphere (New Zealand, February 2017), the SOOS SSC meeting, and the SOOS/POGO Observing and Understanding the Ocean below Antarctic Sea Ice and Ice Shelves workshop (Germany, June 2017). SORP is maintaining a list of national representatives from up to almost 20 countries, has posted to the website a series of national reports (<http://clivar.org/clivar-panels/southern/national-representatives>), and has strengthen coordination of national representatives between SOOS and SORP.

Global Synthesis and Observations Panel (GSOP) organized the “COST/CLIVAR Workshop on ocean reanalyses and inter-comparisons (ORA-IP)”, in Toulouse, France, in June 2017, with the attendance of 52 participants from 11 countries. This workshop has started a new phase of ORA-IPv, which will focus on assimilation diagnostics and statistics; regional (basin level) studies; comparisons investigating the representation of water masses in reanalyses; and specific

assessment of currents and mesoscale activity. For the International Quality Controlled Ocean Database (IQuOD) initiative, cooperation of GSOP with the SCOR Working Group (WG) 148 and IOC SG-IQuOD is foreseen. In addition, GSOP members are cooperating to prepare a white paper entitled “Observational Needs for improving Ocean and Coupled Reanalysis, S2S Predictions, and Decadal Prediction” for OceanObs’19.

Atlantic Region Panel (ARP) promotes a sustained observing system and identifies requirements for the implementation of observational systems in the Atlantic, which include the PIRATA array in the tropical region, the RAPID-AMOC and OSNAP arrays in the North Atlantic, and the SAMOC initiative in the South Atlantic. In the Southeast Atlantic, the panel helped to initiate the “Enhancing Prediction of Tropical Atlantic Climate and its Impacts” (PREFACE) project. In 2017, the panel continued promoting a sustained Pan-Atlantic Ocean Observation through active participation in AtlantOS, contributing to the Bélem Statement, and leading the Tropical Atlantic Observing System (TAOS) Review in collaboration with PIRATA. The panel also conducted community work on Ocean Eddies and Air-Sea interactions (via organisation of Ocean Mesoscale Eddy Interaction with Atmosphere Workshop in conjunction with U.S. CLIVAR), and air-sea HiRes CMIP coupled models analysis. The panel will also strengthen international involvement in AMOC science, through representation at the upcoming AMOC meeting (July 2018 in Miami), and engagement with PaleoAMOC Task Team of the U.S. AMOC Science Team. In addition, ARP supported the CLIVAR’s endorsement for Atlantic Tradewind Ocean-Atmosphere Mesoscale Interaction Campaign (ATOMIC, US) & Ocean-Atmosphere component of EUREC4A (EUREC4A-OA, Europe).

Pacific Region Panel (PRP) prepared a review paper on ENSO complexity submitted to *Nature* (Timmerman et al. 2017). Panel members have been involved with capacity building activities at institutions in developing countries, e.g., A. Santoso gave lectures to students at the oceanography department of the Bandung Institute of Technology in April 2017; McPhaden participated in the GODAE Ocean View International School on Mallorca in October 2017. PRP in collaboration with ENSO RF is organizing the 2018 ENSO Conference (16-18 October, 2018, Guayaquil). In addition, PRP is coordinating a review on Tropical Pacific Decadal Variability and ENSO Decadal Variability, and a workshop for preparing a white paper of the review is scheduled on Oct. 13-14, 2018, alongside the 2018 ENSO Conference. The panel also contributed in the planning of TPOS 2020, leading the response to TPOS2020 concerning the decommissioning of mooring sites of the original array in the central and eastern Pacific.

The CLIVAR/IOC-GOOS Indian Ocean Region Panel (IORP), jointly sponsored by the IOC Global Ocean Observing System has designed and overseen the implementation of the first-ever integrated observing system for the Indian Ocean (IndOOS). IORP has played an important role in the design of the International Indian Ocean Expedition-2 (IIOE-2) and implementation of the various associated activities will be a major focus for the Panel in the coming years. The main product of the IndOOS review will be a list of Actionable Recommendations that will guide IndOOS into the next decade so that it can successfully provide sustained observations to (i) advance our understanding of key phenomena, (ii) track the evolving state of the ocean, (iii) support calibration and validation of satellite missions, and (iv) improve forecasting and predictions of climate variability and change. A first draft of 25 IndOOS Review chapters have been written, and comments from an independent Review Board (consisting of IOC PPO, OOPC,

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IMBeR, IOGOOS and CLIVAR), as well as all IORP members and lead authors of different chapters have been received. The final IndoOOS Review Report is anticipated by early 2019.

ENSO in a Changing climate Research Foci (ENSO RF) has produced a prototype software framework for gathering and displaying ENSO metrics, with the aim of eventual insertion into existing community model evaluation tools and aims to release a first version of “CLIVAR ENSO Metric 2018”. The 1st Session of ENSO RF was held on October 2017 at Busan, Republic of Korea, followed by the ENSO Complexity Workshop. This 5-day workshop focused on reviewing the spatio-temporal complexity of ENSO phenomenon. The 2nd Session of ENSO RF will be held right before the ENSO Conference in Ecuador, and then ENSO RF will be incorporated into PRP after the meeting.

The Eastern Boundary Upwelling Systems (EBUS) Research Focus prospectus is currently under re-evaluation by the group, to make sure there is proper coordination with the SCOR working group (WG) 155 on Eastern Boundary Upwelling Ecosystems (EBUE). CLIVAR EBUS will prioritise its research on the links between large-scale climate processes and EBUS, while at the same time, it will cooperate with SCOR EBUS on biogeochemical responses and consequences of EBUS. An EBUS summer school proposal has been submitted to ICTP for organizing a course in 2019. The third EBUS RF meeting is scheduled in December 2018, alongside the 2018 AGU Fall Meeting, in Washington D.C., USA. An IOC meeting on EBUS is planned in early 2019, and members from both CLIVAR EBUS and SCOR EBUS are expected to participate. EBUS RF supported the CLIVAR’s endorsement for ‘S7: Ecological responses to variable climate changes and their applicability to ecosystem predictions’ at PICES 2018 Annual Meeting.

WCRP and CLIVAR look forward to further exploring collaborations in ocean-related activities with SCOR in the future. Please contact Mike Sparrow (WCRP - mssparrow@wmo.int) or Jose Santos (CLIVAR - jose.santos@clivar.org) to discuss further.



Report of the Scientific Committee on Antarctic Research to the SCOR 2018 Meeting

Summary

This paper presents the annual report of the Scientific Committee on Antarctic Research (SCAR) to the 2018 meeting of the Scientific Committee on Oceanic Research. This year is an important one for SCAR because the organisation is celebrating its 60th Anniversary. SCAR is also in the process of developing a new suite of Scientific Research Programs and invites dialogue with all interested parties, especially in light of the importance of ensuring close coordination across those working on Southern Ocean and Antarctic questions.

Background

The mission of SCAR is to advance research in, from, and about Antarctica and the Southern Ocean, and to promote scientific knowledge, understanding, and education on any aspect of the Antarctic and Southern Ocean regions. To this end, SCAR is charged with the initiation and international coordination of Antarctic and Southern Ocean research beneficial to global society. SCAR provides independent and objective scientific advice and information to the Antarctic Treaty System and other bodies, and acts as the main international exchange of Antarctic information within the scientific community. Descriptions of SCAR's activities, and the scientific outputs and outcomes facilitated by SCAR are available at <http://www.scar.org/>.

Sixty Years of SCAR

The Special Committee on Antarctic Research was established by the International Council of Scientific Unions in the closing years of the International Geophysical Year. SCAR held its first meeting from 3 to 5 February 1958 in The Hague, Netherlands. SCAR took the name Scientific Committee on Antarctic Research in 1962. Since its inception, SCAR has played an active international role in Antarctic and Southern Ocean science facilitation, advice and other matters. The landmark volume *Science in the Snow* provides a history of SCAR. A new edition of the volume will be released this year in updated, electronic form (details will be provided at www.scar.org).

Science Priorities

SCAR's current Scientific Research Programs, which are the main vehicles through which SCAR facilitates and coordinates science in, from, and about Antarctica and the Southern Ocean, will draw to a close in 2020. Plans for a new suite of Scientific Research Programs are now being developed for consideration by the SCAR Delegates in 2020.

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A key opportunity currently exists for discussions between SCAR and other organisations, such as SCOR, to ensure that science identified as critical by SCAR, and implemented to various degrees by its Members, can be further enhanced through appropriate collaborations. Program Planning Groups, responsible for drafting Scientific Research Program Research and Implementation Plans, will be considered for approval at the 2018 SCAR Delegates meeting. Opportunity exists between 2018 and 2020 to interact with these groups to understand likely logistic needs for the Scientific Research Programs. The SCAR Secretariat can put interested parties in touch with those developing ideas for new proposals.

2018 SCAR Delegates Meeting and Open Science Conference

The XXXV SCAR Delegates Meeting and Open Science Conference is taking place from 15 to 26 June 2018 in Davos, Switzerland. The meeting will be held in conjunction with the Arctic Science Summit Week 2018 and the Business Meetings of the International Arctic Science Committee (IASC). The title of the joint meeting is Polar2018 *Where the Poles Come Together*. See <https://www.polar2018.org/>

SCAR will be officially celebrating its 60th Anniversary at the meeting with two events: a broad panel discussion on the significance of SCAR to the broader community, and a more focussed discussion on the global implications of changes to the polar ice sheets.

SCAR welcomes the interest of SCOR Members in the Open Science Conference (registration is through the website above) and at its 60th Anniversary celebrations on the evening of Monday, 18 June 2018.

Recent Developments

- SCAR notes the excellent relationship with SCOR in delivery of the Southern Ocean Observing System (SOOS). The Marine Ecosystem Assessment for the Southern Ocean Conference held in Hobart in April 2018 (MEASO 2018) was a notable event supported by SOOS. The question of ongoing resourcing for SOOS is, however, a cause for some concern and requires discussion among the partners supporting SOOS.
- SCAR has engaged a new Executive Director, Dr Chandrika Nath, who will take up the position in July 2018. Dr Nath has a doctorate in high-energy particle physics from the University of Oxford, and considerable experience in the evidence-based policy environment, capacity building in the area of research evidence for policymaking, and in the communication of science outcomes to diverse audiences. Dr Nath's appointment further emphasizes SCAR's focus on excellent science facilitation, the delivery of high-quality evidence-based policy advice, and clear communications.
- SCAR will hold its XXXVI Delegates meeting and Open Science Conference in Hobart, Australia in 2020 alongside the annual meeting of COMNAP. SCAR recognises the significance of holding the meeting in a location that is host to the CCAMLR and ACAP Secretariats. SCAR will seek to have a broad discussion of science, science priorities, and evidence for policy as it highlights the achievements of its current Scientific Research Programs and makes formal decisions on the new suite of programs. SCAR looks forward in particular to the opportunity for close and productive interactions with COMNAP at this coming meeting, and in particular the ready opportunity for COMNAP

Delegates to participate in the Open Science Conference and its associated activities.

7.1.3 Future Earth Initiative **Sicre**

7.2 Affiliated Organizations

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

IABO report to SCOR 2018

IABO held its General Assembly held at the 4th World Conference on Marine Biodiversity (4th WCMB), Montreal, on 13-16 May 2018. A new IABO Executive Committee was elected.

The IABO Nominating Committee, chaired by the Past President Annelies Pierrot, recommended the following five people who were elected as:

President,

1. Patricia Miloslavich – University of Tasmania (Australia) and Universidad Simón Bolívar (Venezuela)

Secretary,

2. Suchana Chavanich - Chulalongkorn University (Thailand)

General members,

3. Siew Moi Phang – University of Malaya (Malaysia)
4. Matt Frost – Marine Biological Association (UK)
5. Tina Molodtsova – Shirshov Institute of Oceanology (Russia)
6. Eulogio Soto – Universidad de Valparaíso (Chile)
7. Isabel Sousa-Pinto – CIMAR, University of Porto (Portugal)

In addition, there are two *ex-officio* positions

8. Mark Costello, *Past President* – University of Auckland (New Zealand)
9. Philippe Archambault – *Ex-officio as Past Chair of the 4th WCMB* - Université Laval (Canada)

Additional people offered to help IABO and the committee will discuss roles for others. Through the Marine-B list, there will be a second call for interest in participating in the IABO committee.

2017-2018 Activities

Organization and completion of the 4th World Conference on Marine Biodiversity (May 13-16, 2018)

The *World Conference on Marine Biodiversity* is the major focal assembly for sharing research outcomes, management and policy issues, and for discussions of the role of biodiversity and biodiversity conservation in sustaining ocean ecosystems. The 4th World Conference on Marine

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Biodiversity (<http://www.wcmb2018.org>) was held during 13-16 May in Montreal. in partnership with the Convention on Biological Diversity secretariat, Fisheries and Oceans Canada, and Canadian Healthy Ocean Network under the theme *Connecting with the living ocean*.

The conference objectives were:

- To address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society;
- To reduce the direct pressures on biodiversity and promote sustainable use;
- To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;
- To enhance the benefits to all from biodiversity and ecosystem services; and
- To enhance implementation through participatory planning, knowledge management and capacity building.

The 4th WCMB was a great success and gathered more than 600 participants from over 50 countries, including scientists, managers, policy makers and leading specialists in the field. Main topics of discussion across these stakeholders were

- To assess past, present, and future critical threats to marine systems and consider management strategies
- To encourage inter-disciplinary discussions among researchers, policy makers, NGOs and industry
- To discuss sustainable development in the context of biodiversity
- To identify future research and policy priorities that will underline the need to replace our current exploitation relationship with the ocean's living resources, with a sustainable connection based on scientific knowledge

Inaugurated the Carlo Heip International Award for outstanding accomplishments in marine biodiversity science

The Carlo Heip International Award for outstanding accomplishments in marine biodiversity science was inaugurated in recognition of Carlo Heip's leadership in marine biodiversity research and founding of the 'World Conference on Marine Biodiversity' (<http://www.wcmb2018.org/carlo-heip-award.html>). The Carlo Heip International Award for outstanding accomplishments in marine biodiversity science will congratulate an individual who has demonstrated exemplary leadership in marine biodiversity science.

The 1st Carlo Heip Award Recipient was Prof. Carlos M. Duarte, Director of the Red Sea Research Center and Tarek Ahmed Juffalli Chair in Red Sea Ecology of King Abdullah University of Science Technology of the Kingdom of Saudi Arabia. He is a world-wide leading authority on seagrasses and has published on all aspects of seagrass ecology, from population biology to genetics, from depth and geographical distribution patterns to their role in biogeochemical cycles, and from conservation strategies to their sensitivity to climate change. His pioneering work on seagrasses and other vegetated systems eventually led – in collaboration

with different UN agencies – to the development of “blue carbon” strategies, which has provided a strong impetus to the conservation of vegetated coastal ecosystems. Carlos Duarte gave a keynote speech during the Award Ceremony Evening on the 15th of May at the Centre des sciences. More info at: <http://www.wcmb2018.org/carlo-heip-award.html>.

The Award will become an annual one. The committee will set up a jury and deadline for the Carlo Heip Award and jointly to short list and encourage nominations more actively.

Communications

The IABO email list, MARINE-B, has over 1,200 subscribers. A Facebook page was launched in May 2018 and currently has 144 members and growing. MARINE-B provides news and relevant information related to biological oceanography, marine biology and biodiversity, including funding, job and studies opportunities, relevant papers and reports, conferences, etc. MARINE-B is administered by Mark Costello and the Facebook page is administered by Suchana Chavanich.

Associations

IABO encourages international networking and cooperation in marine biological science. To that end, it continues to endorse global scale marine initiatives and encourages its members and members of SCOR to support them. These are

- Ocean Biogeographic Information System OBIS (www.iobis.org)
- Marine Biodiversity Observation Network MBON (<http://geobon.org/networks/thematic-bons/marine-bon/>)
- World Register of Marine Species WoRMS (www.marinespecies.org)
- Global Ocean Observing System – GOOS Biology and Ecosystem Panel (www.goosocean.org)

Some of the goals shared by IABO with these organizations are to

- build a unified and globally consistent ocean observing system that includes biological measurements
- encourage open access and data sharing
- enhance existing observation capacity
- use the best available resources
- implement best practices and international standards
- enhance global capacity
- ensure continuity and sustainability of global marine biological and ecosystem observations

Planning for the 5th World Conference in Marine Biodiversity (5th WCMB)

The 5th WCMB will be held on the 13-16 December 2020 and will be hosted by the University of Auckland under the auspices of IABO. A mailing list is available for subscription to provide important information and updates about the conference.

Supporting capacity development

IABO thanks SCOR for providing financial support to three PhD students to attend and present their research at the 4th WCMB in Montreal: Hannah Omogoriola (Nigeria), Irawan Asaad (Indonesia), and Lisa Mertens (South Africa).

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


The International Association of Meteorology and Atmospheric Sciences 2018 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, which together 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 <http://www.iamas.org/commissions-within-iamas/>]. The commissions provide an important supplement and extension to the leadership and research role of the *World Meteorological Organization (WMO)*, which is the intergovernmental body with a comparable scientific scope to IAMAS.

The current Bureau of IAMAS consists of:

- President - John Turner (UK)
- Secretary General – Teruyuki Nakajima (Japan)
- Vice President – Joyce Penner (USA)
- Vice President – Laura Gallardo Klenner (Chile)
- Deputy Secretary General – Steven Ackerman (USA)
- Assistant Secretary General – Yoshi Sasaki (Japan)
- Assistant Secretary General - Nozomi Tomizawa (Japan)

- Assistant Secretary General - Miyuki Miyazaki (Japan)

The organization also has five Members at Large who promote IAMAS activities:

- Prof. Daren Lu (China) 2015-2019
- Prof. Colin Price (Israel) 2015-2019
- Dr. Lisa Alexander (Australia) 2015-2023
- Dr. Keith Alverson (USA/Japan) 2015-2023
- Dr. Iracema Cavalcanti (Brazil) 2015-2023

a) IAMAS, IAPSO and IAGA held a successful joint assembly in Cape Town, South Africa over 27 August–1 September 2017. The event was particularly important for IAMAS, as it was the first full assembly to be held in Africa. The IAMAS-registered participants constituted 36% of the total attendees of more than 1,000 scientists from 64 countries. IAMAS supported the registration fee/accommodation of 21 young scientists and scientists from developing countries.

b) Since the Cape Town assembly, the IAMAS Bureau, commissions and Executive have been heavily involved in planning of the IUGG assembly, which will be held in Montreal, Canada over 8–18 July 2019. In 2019, both IUGG and IAMAS will be 100 years old and a number of special events are being planned. The conference web site can be found at <http://iugg2019montreal.com/>.

c) The successful collaboration between IAMAS and its associated journal *Advances in Atmospheric Sciences* (AAS) has continued. AAS regularly publishes meeting reports on IAMAS activities, such as the Cape Town assembly and the IAMAS-sponsored Twelfth Workshop on Antarctic Meteorology and Climate.

d) The 2017 IAMAS Early Career Scientist Medal was awarded to Prof. Corinna Hoese of Karlsruhe Institute of Technology for her work on modelling of aerosol-cloud interactions. Corinna was presented with her medal at the IAPSO-IAMAS-IAGA assembly in Cape Town in August 2017.

e) The IAMAS Information E-mail continues to be published several times a year and provides news on IAMAS activities, meeting reports, information from the commissions and details of forthcoming meetings. The current and past issues can be found at <http://www.iamas.org/NewsLetters/>.

f) IAMAS co-sponsored a summer school on the Polar Climate System at Hohai University, Nanjing, China over 21–25 May 2018. The school was attended by over 100 early-career scientists, with 20 coming from outside China. John Turner was one of the lecturers and discussed the work of SCOR and other organisations that provide leadership in polar science.

g) Each year the IAMAS commissions hold a number of high-profile conferences either alone or in conjunction with other organizations. Some recent and planned meetings are given below. Details of all IAMAS meetings can be found at <http://www.iamas.org/meetings/>.

7-16

- The 16th ICAE conference on atmospheric electricity will be held in Nara, Japan, 17 – 22 June 2018.
- ANtartic Gravity Wave Instruments Network (ANGWIN) 4th workshop (**ICMA**), Sao Paulo, Brasil, 24 – 26 April 2018.
- Aerosols, Clouds, Precipitation and Climate workshop (**ICCP**), Colorado, U.S.A, 3 – 6 April 2018.
- First IUGG Symposium on Planetary Science (IUGG-PS 2017), Interdisciplinary observation and understanding of the Solar System, DLR, Berlin, Germany, 3 – 5 July 2017.

For more information on IAMAS please contact:

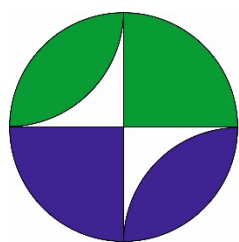
John Turner, President (jtu@bas.ac.uk)

Teruyuki Nakajima, Secretary General (terry-nkj@nifty.com)

Submitted by John Turner, IUGG/IAMAS representative to SCOR, 11 June 2018.

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

Smythe-Wright



IUGG



International Association
for the Physical Sciences of the Oceans

International Association for the Physical Sciences of the Oceans (IAPSO)

<http://iapso.iugg.org>

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 the involvement of scientists and students from developing countries in 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://iaps0.iugg.org/>.

ADMINISTRATION

The 2015-2019 Bureau of IAPSO comprises:

President:	Denise Smythe-Wright, (UK)
Past President:	Eugene Morozov, (Russia)
Secretary General:	Stefania Sparnocchia (Italy)
Treasurer:	Ken Ridgway (Australia)

The Executive Committee comprises the Bureau members and

Vice-Presidents:	Dr Isabelle Ansorge (South Africa)
	Trevor McDougall (Australia)

Members:

- Dr Agatha de Boer (Sweden)
- Dr Hans van Haren (The Netherlands)
- Prof Toshiyuki Hibiya (Japan)
- Dr Christa von Hildebrandt-Andrade (USA and Puerto Rico)
- Dr Chris Meinen (USA)
- Dr Satheesh Chandra Shenoi (India)

The IAPSO office is located at the Institute of Marine Science of the National Research Council of Italy, Trieste and day-to-day business is managed by Secretary General (SG), Stefania Sparnocchia. 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/iaps0.iugg.org>). Together with the President, the SG also prepares and distributes a bi-annual Newsletter to IAPSO delegates and interested parties.

Financial management is presently split between Australia and Sweden. The previous Secretary General, Johan Rodhe, was co-opted by the IAPSO Executive to assist the Treasurer, Ken Ridgway, with day-to-day banking until the Assembly in Montreal, Canada, in 2019.

IAPSO business meetings were conducted in August 2017, during the Joint IAPSO-IAMAS-IAGA Scientific Assembly in Cape Town, South Africa. These included four meetings of the Executive Committee (EC), on 28, 29 and 31 August and 1 September, 2017, and one General Business meeting also involving National Correspondents or their Delegates on 31 August 2017. No formal business meeting have been arranged for 2018 and any business has been conducted by email where appropriate.

7-18

ACTIVITIES

2017 Assembly

The Joint IAPSO-IAMAS-IAGA Scientific Assembly entitled ‘Good Hope for Earth Sciences’ was held in Cape Town, South Africa, during the week of 27 August-1 September 2017. The Assembly had a total of 1,038 registrations from 64 different countries, although there were 57 ‘no-shows’ despite payment having been made; approximately 230 participants registered as IAPSO scientists. In keeping with IAPSO’s goals of promoting scientists from developing countries, IAPSO was able to grant financial assistance, either as registration fees or lodging allowance, to over 60 participants from African and other countries.

The Assembly’s opening day was marked by a joint plenary session with a lecture from each Association. The plenary lecturer for IAPSO, Dr Essam Yassin Mohammed (United Kingdom), emphasized the importance of investing in the blue economy, discussing the why and what of investing in marine and coastal ecosystems. A range of critical services was discussed, from fishery production to flood protection, from recreation and tourism to ecosystem-based adaptation and carbon storage. Yet such services are rapidly degraded by pollution, overfishing, climate change and habitat destruction. Dr Mohammed stressed the need for greater investment to be directed towards conserving, restoring and enhancing marine ecosystems and also presented some innovative financing mechanisms.

Each Association offered a broad programme of lectures and posters, organized in parallel sessions. IAPSO organised 6 IAPSO symposia (107 oral presentations and 59 posters), 3 IAPSO-lead Association-Joint symposia (89 oral presentations and 43 posters). In addition, IAPSO co-sponsored 5 Joint symposia lead by another Association (88 oral presentations and 29 posters).

On Thursday, 30 August 2017 each association hosted their medal awards. IAPSO presented the Prince Albert I Medal 2017 to Professor Lynne Talley (United States) and the Eugene LaFond Medal 2017 to Dr Jonathan Durgadoo from Mauritius.

Professor Talley, awarded for her seminal contributions to our understanding of all ocean basins, including landmark discoveries in the Pacific, Atlantic and Southern Oceans, delivered the Albert I Memorial Lecture ‘A case for sustained observations of the ocean: observing the overturning circulation and its variability’.

Dr Durgadoo was awarded for his oral presentation ‘Indian Ocean sources of Agulhas leakage’, delivered within the IAPSO-IAMAS joint symposium ‘The Second International Indian Ocean Expedition (IIOE-2) and related oceanic and coupled Atmospheric research in the Indian Ocean’.



Prof Talley and Dr Durgadoo showing their awards at the Medal Award Ceremony, Cape Town 31 August, 2017 (Photo courtesy – Sara Durante, Italy)

IUGG Centenary and General Assembly 2019

In September, 2017 President Denise Smythe-Wright and SG Stefania Sparnocchia participated in a number of IUGG meetings in Montreal, Canada. 2019 is the IUGG (and IAPSO) Centenary year and much of the business was related to events to mark the centenary and to the planning of the IUGG General Assembly in 2019. Besides the IUGG General Business Meeting (GBM), the President attended a meeting of the Centenary Committee, where events and activities were discussed, including the publication of an IUGG Centenary book. Following the GBM the SG joined other association SGs and the local organizing committee for the Scientific Planning Committee (SPC) meeting to further plan the joint assembly.

Following the meetings the President, with contributions from three others, wrote a chapter ‘Tales from IAPSO’ for the IUGG centenary book and the IAPSO Executive put forward titles and ideas for the 2019 symposia. A follow-up meeting of the SPC was held in Vienna in April 2018 and was attended by the SG. Planning of the 2019 IUGG General Assembly is now well in hand and details can be found on the IUGG and IAPSO websites. IAPSO extends a warm welcome to all oceanographers to attend the Assembly and celebrate its centenary.

2021 Assembly

Two bids were made in Cape Town for the 2021 IAPSO joint assembly, one from Korea and the other from the UK. Following a discussion on 31 August 2017, the IAPSO EC voted that Busan, Republic of Korea should host the next joint assembly. The EC felt that it was timely to hold an assembly in Southeast Asia and also that the venue offered better facilities than the City of Manchester, UK. Independently, IAMAS and IACS had reached a similar decision and so the 2021 assembly will be joint with them in Busan, Korea.

SCOR Administration

IAPSO has maintained its formal relations with SCOR during the year. EC members were involved in the evaluation of the 2017 Working Group proposals to be funded by SCOR in 2018 and are presently evaluating the 2018 proposals. President, Denise Smythe-Wright participated in the SCOR Annual Meeting in Cape Town, South Africa, 4-6 September, 2017. While much of the business centred around reports from current SCOR working groups and affiliated organizations, substantial time was devoted to the evaluation of five working group proposals submitted for the 2017 round of funding. The IAPSO President presented the IAPSO views suggesting that the proposals FLOTSAM and P-OBS were in the category 'must fund', while EBUS was a 'may fund' others were 'do not fund'. Since none of the proposals were directly related to IAPSO interests, the IAPSO EC had decided not to co-fund this time.

Alongside the IAPSO-IAMAS-IAGA Joint Assembly in Cape Town, 2017, IAPSO supported the UNESCO/IOC/SCOR IIOE-2 by organizing with IAMAS a symposium entitled 'The Second International Indian Ocean Expedition (IIOE-2) and related Oceanic and Coupled Atmospheric Research in the Indian Ocean', The symposium was convened by Nick D'Adamo (Australia), Juliet Hermes (South Africa), Christopher Duncombe Rae (South Africa), and Tamaryn Morris (South Africa). It attracted 29 oral presentations and 16 posters (details in the annex). Six scientists received funds (ZAR 58000 in total) from IAPSO and the LOC for their attendance.

An IIOE-2 Early Career Scientist Workshop was also hosted on 30 August 2017. Its objectives were to promote interdisciplinary collaborations within the IIOE-2 family and to introduce a mentorship program for early-career scientists (ECS). A number of more senior scientists, including the IAPSO President, were invited to act as mentors and a question and answer session ensued, with the younger scientists posing questions regarding the mentor's career experiences and opportunities available to ECSs. In addition, there were discussions on the role of the IIOE-2 ECSN and future directions for its development during the IIOE-2.

Early Career Scientist Network

An important decision at the 2017 IAPSO Executive Committee Business meetings was to establish an IAPSO Early Career Scientists (ECS) network. To this end, in December 2017, the President put out a call for expressions of interest in setting up such a network and three scientists were appointed to become the chair and 2 vice-chairs of an IAPSO-ECS Working Group. Their remit was to co-opt others to the group and take forward the development of the network. Two of the officers met at the Ocean Sciences meeting in Portland, Oregon in February and it was hoped to have a further meeting between the Working Group chairs and members of the IAPSO EC at the EGU Assembly in Vienna, but other commitments prevented this.

IUGG/IAPSO support to scientific meetings

IAPSO endorsed three scientific meetings that were supported by IUGG in 2017:

- The IndoOS Review Workshop was held from 30 January to 1 February 2017 in Perth, Australia. It consisted of 24 review presentations along three themes: Past and present IndoOS; new scientific drivers in the Indian Ocean; and new technologies for future IndoOS. The last day of the workshop was dedicated to discussion sessions to outline the science drivers and observing requirements of IndoOS, leading towards a framework for the

IndOOS review white paper. Two scientists from the United States benefited from IUGG funds to attend the workshop that gathered 36 participants.

- The Past Antarctic Ice Sheet (PAIS) conference was held from 10 to 16 September 2017 in Trieste, Italy. It was attended by 210 scientists and students from 18 countries. More than half the participants were early-career researchers and graduate students. 62 oral presentations took place in a single plenary session, which ensured cross-disciplinary participation and each day finished with a facilitated open plenary discussion. 130 posters were presented throughout the week. The conference showcased the latest advances in the current state of Antarctic ice sheet and sea-level science and identified future research gaps and priorities for the next phase of the SCAR Research Programmes. IUGG funds were used to support travel, accommodation and registration expenses for an early-career scientist and a student from India.
- The workshop ‘THEMES 2017 - Physics and biogeochemistry of marine environments: multi-scale analysis of past and present variability’ took place in Venice, from 15 to 17 November 2017. The workshop brought together more than fifty climatologists, ecologists, oceanographers, and modellers to discuss the present state of knowledge and the opportunities for progress about measuring, modelling and predicting marine environments. The workshop included nine sessions and 52 talks, including four solicited talks by prominent international scientists. Two evening discussion sessions and a closing open discussion paved the way toward improved cooperation between the different groups active in the climatological, ecological and oceanographic investigation of our planet. IUGG funds were used to support travel of the four participants from Croatia, France, Italy and Spain.



Participants of the Past Antarctic Ice Sheet (PAIS) conference, Trieste, Italy, 10-16 September, 2017 (Photo courtesy – Laura De Santis, Italy)

Anniversary

Professor emeritus Walter Heinrich Munk of the Scripps Institution of Oceanography at the University of California San Diego, celebrated his 100th birthday this year. Prof Munk is arguably the most distinguished living oceanographer, and one of the founding fathers of modern Physical Oceanography. His innumerable contributions to our field are milestones in the evolution of Physical Oceanography during the last fifty years. He pioneered wartime wave forecasting, tide prediction, ocean sound transmission, ocean circulation, deep-sea tides and much more. His talk at the last IUGG General Assembly in 2015 in Prague, Czech Republic, attracted the attention of the entire geophysical community. He has received numerous national and international medals and awards, including IAPSO's first Albert I Medal in 2001.

Obituary

IAPSO scientist Dr Christopher Michael Duncombe-Rae, a Specialist Scientists in physical oceanography and data management in the Oceans and Coast branch of the Department of Environmental Affairs, in Cape Town, passed away unexpectedly on October 11, 2017, while on a flight from South Africa to the USA. His research interests included the ocean and shelf environment of Marion Island, a subantarctic island south of Africa, and the Benguela and Agulhas ecosystems. He participated in many research cruises in the North Atlantic and North Pacific oceans and recently had turned his attention to data stewardship and marine information systems, leading South Africa in the development of its Marine Information Management System (MIMS). He was coordinating South Africa's IIOE-2 planning committee and was also one of the co-convenors of the IIOE-2 symposium in Cape Town detailed above. Chris is survived by his wife, Dr Deidre Byrne, who is also an ocean scientist and his 12 year-old son Jacob. He will be sadly missed by the oceanographic community.

Other activities

The following IUGG/IAPSO sponsored meetings, selected for support in 2017, will have taken place in 2018 by the time of the SCOR annual meeting:

- 2nd IndOOS Review Workshop, Lombok, Indonesia, 22-23 March. The final workshop of international experts aiming to review the sustained Indian Ocean Observing System (<http://www.clivar.org/indoos-review-2006-2016>) and to propose a way forward in the context of new scientific frontiers and observing technologies. It is co-sponsored by WCRP, U.S. CLIVAR, OOPC, IMBeR, IOC Perth Office, and IO-GOOS.
- Understanding the Problems of Inland Waters: Case Study for the Caspian Basin (UPCB), Baku, Azerbaijan, 12-14 May. A conference aimed at strengthening the exchange of international scientific cooperation on the Caspian Sea, the Aral Sea and the Urmia and Van Lakes, all remnants of the ancient sea of Paratethys. It is co-sponsored by ECOSF, COMSTECH, BP, IFS, and AEHMS.
- X Jornadas Nacionales de Ciencias del Mar, Buenos Aires, Argentina, 30 July-3 August. A regional conference encompassing marine science abroad, bringing together local scientists and invited foreign experts.

Submitted by
Denise Smythe-Wright, IAPSO President
Stefania Sparnocchia, IAPSO Secretary General
June 2018

Annex - Scientific Program JP3

JP3 - The Second International Indian Ocean Expedition (IIOE-2) And Related Oceanic And Coupled Atmospheric Research In The Indian Ocean (IAPSO, IAMAS)

IAPSO-IAMAS-IAGA Joint Assembly, Cape Town 2017

Oral program

Title	Lead-author	Date
Observed Agulhas Current sensitivity to interannual climate forcings	Shane Elipot	29-Aug
Indian Ocean sources of Agulhas leakage	Jonathan Durgadoo	29-Aug
Mesoscale activity in the Comoros Basin	Charine Collins	29-Aug
Lagrangian evolution of Madagascar cyclonic eddies from two dedicated Argo floats experiments	Tamaryn Morris	29-Aug
Mean equatorial upwelling induced by intraseasonal Mixed Rossby-Gravity waves in the Indian Ocean	Yukio Masumoto	29-Aug
BoBBLE (Bay of Bengal Boundary Layer Experiment): Exploring the ocean-atmosphere system in the southern Bay of Bengal during the summer monsoon	P N Vinayachandran	29-Aug
Role of sub-surface intensified eddies in the southern Indian Ocean	Fehmi Dilmahamod	29-Aug
Identifying pathways between the South Indian Ocean and Leeuwin Current System	Helen Phillips	29-Aug
Nitrous oxide and hydroxylamine measurements in the southwest Indian Ocean	Damian L. Arévalo-Martínez	29-Aug
Monsoonal influence on the development of the Island Mass Effect in the Northern Indian Ocean	Danielle Su	29-Aug
The dynamics of the Southwest Monsoon Current in the Bay of Bengal	Ben Webber	30-Aug
Characterization of Air-sea fluxes over the Bay of Bengal during the southwest monsoon	Alejandra Sanchez-Franks	30-Aug
Observations of a mixing event in southern Bay of Bengal during summer monsoon	Jenson George	30-Aug
Seaglider observations of a phytoplankton bloom within the Sri Lanka Dome during BoBBLE	V Thushara	30-Aug
Ocean surface warm layers: development and spatio-temporal variability in the Bay of Bengal during the 2016 summer monsoon	Dariusz Baranowski	30-Aug

The seasonal cycle of the tropical south Indian Ocean and its impact on intraseasonal and interannual variability	Kelvin Richards	30-Aug
An IIOE-2 Capacity Building Initiative - The Indian Ocean Early Career Scientist Network	Danielle Su	30-Aug
A shallow seamounts ecosystem Project in the SW Indian Ocean	Francis Marsac	30-Aug
Second International Indian Ocean Expedition IIOE-2 overview of endorsed science projects and cruises	Nick D'Adamo	30-Aug
Results from the First Expedition of IIOE-2	P N Vinayachandran	30-Aug
Meridional variability of subsurface light field along IIOE-2 transect using satellite data	Aneesh Lotliker	30-Aug
Web Based Applications and Infrastructure for the Second International Indian Ocean Expedition (IIOE-2)	Kiran Kumar N	30-Aug
Space Observation of Surface Hydrodynamics and Carbon Cycle in North Indian Ocean	W. Timothy Liu	30-Aug
Sub-surface oxygen maxima in the equatorial Indian Ocean	Satya Prakash	30-Aug
Estimation of terms of temperature equation using in situ observations alone during BoBBLE (Bay of Bengal Boundary Layer Experiment)	V Vijith	30-Aug
Special features of air-sea interaction over the North Indian Ocean during boreal summer	Ganapati Bhat	30-Aug
Subsurface radiant flux during summer monsoon in the southern Bay of Bengal	Aneesh Lotliker	30-Aug
High Spatial Resolution Imageries for Climate change impact studies at inhabited Islands of Lakshadweep - India	J Sundaresan Pillai	30-Aug
Key Biogeochemical and Ecological Problems in the Indian Ocean	Raleigh Jenny Hood Huggett	30-Aug

Poster program

Title	Lead-author	Date
Modelling the mixed layer in the Bay of Bengal during the Indian summer monsoon	Simon Peatman	29-Aug
The effect of chlorophyll variability on Bay of Bengal surface temperature as observed during the 2016 BoBBLE campaign	Jack Giddings	29-Aug
Modeling Larval Connectivity of Coral Reef Organisms in the Kenyan-Tanzanian Region	C. Gabriela Mayorga Adame	29-Aug
Salinity intrusions in the Bay of Bengal from a highly resolved Argo float array	Alejandra Sanchez-Franks	29-Aug
Connectivity between the Somali Current and Arabian	Pierre L'Hégaret	29-Aug

Sea interior		
Climate Change Adaptation and Geospatial Technology at Kavaratti Island - Lakshadweep Islands, India	J Sundaresan Pillai	29-Aug
Web Based Applications and Infrastructure for the Second International Indian Ocean Expedition (IIOE-2)	Kiran Kumar Kumar	29-Aug
Space Observation of Surface Hydrodynamics and Carbon Cycle in North Indian Ocean	W. Timothy Liu	29-Aug
Eddies control oxygen availability and denitrifying potential in the north west Arabian Sea.	Bastien Queste	29-Aug
Biogeochemistry of carbon dioxide system, oxygen and nitrogen in the Southern Bay of Bengal: Findings from Bay of Bengal Boundary Layer Experiment (BoBBLE)	Amit Sarkar	31-Aug
Phytoplankton physiological response and Air-Sea CO ₂ dynamics during the First IIOE-2 cruise in Indian Ocean	Satya Prakash	31-Aug
Special features of air-sea interaction over the North Indian Ocean during boreal summer	Ganapati Bhat	31-Aug
Subsurface radiant flux during summer monsoon in the southern Bay of Bengal	Aneesh Lotliker	31-Aug
Meridional variability of subsurface light field along IIOE-2 transect using satellite data	Aneesh Lotliker	31-Aug
High Spatial Resolution Imageries for Climate change impact studies at inhabited Islands of Lakshadweep - India	J Sundaresan Pillai	31-Aug
Special features of air-sea interaction over the North Indian Ocean during boreal summer	Ganapati Bhat	31-Aug

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)

Devey

2018 InterRidge Update for SCOR

I. InterRidge – International Cooperation in Ridge-Crest Studies

Since its creation in early 1990s, [InterRidge](#) has been an international forum for mid-ocean ridge (MOR) scientists, expanded to other oceanic spreading centers and related processes. InterRidge promotes interdisciplinary studies by creating a global research community, planning and coordinating new science programs that no single nation can achieve alone, exchanging scientific information, and sharing new technologies and facilities. InterRidge plays a dual role. Its primary aim is to favor the emergence of new concepts and make possible ambitious experiments at the international level. InterRidge also supports community-wide initiatives such as the definition and dissemination of a code of conduct for scientific studies in relation to chemosynthetic hot-spot ecosystems and their vulnerable environments. More recently, with the growing interest of countries and industries for deep-sea mineral resources, including sea-floor massive sulfide (SMS) deposits at MOR, InterRidge has become a voice of expert scientists in different fora. Through its observer status at the International Seabed Authority (since 2012), particularly, InterRidge developed formal interactions with this organization created under the United Nations Law of the Sea (UNCLOS).

InterRidge scientific activities are currently led under the frame of the 3rd Decadal Plan 2014-2023 'From Ridge Crest to Deep-Ocean Trench: Formation and Evolution of the Oceanic Crust and Its Interaction with the Ocean, Biosphere, Climate and Human Society', launched in 2012. Beside its affiliation with SCOR, the InterRidge program has links with international research

programs such as the International Ocean Discovery Program and the International Lithosphere Project. InterRidge activity includes meetings and workshops where the advancement of scientific knowledge, new issues, methodological improvements and standardized protocols are discussed. InterRidge also dedicates itself to interact with the public, scientists and governments, and to provide a unified voice for ocean ridge researchers worldwide. While committed to the level of fundamental science, an increasing role for InterRidge is our involvement in compiling information and advice for policy makers. The multidisciplinary coverage of InterRidge working groups give the organization a key role in future discussions concerning the exploration and exploitation of mineral resources associated with ridges, volcanic arcs and back-arcs and associated hydrothermal systems.

InterRidge has a Steering Committee comprising representatives of the member countries and of working group chairs that are scientists nominated for their expertise in a particular field. The Steering Committee meets at least once a year (the last meeting was held on 20-21 July 2017 in Paris (France); the next one is planned on 20-22 June 2018 in Bergen (Norway)). The Steering Committee considers updates to its Science Plan, endorses InterRidge memberships, approves the InterRidge budget, decides on membership fees, oversees the operation of the InterRidge Office, reviews bids for the InterRidge Office and nominates the Program's chair. It also evaluates working group progress, assesses and admits/rejects working group proposals, and nominates the working group chairs.

The InterRidge contribution is 25,000 US\$ for a Principal Member country and 5,000 US\$ for a Regular Member country. Considering the present membership (China, France, Norway and USA as Principal members and Canada, Germany, India, Japan, South Korea and UK as Regular members) and the double contribution for the host country, the resulting annual budget is c.a. 150,000 US\$.

II. Achievements and changes during the last year

1. InterRidge Office

The InterRidge Office is hosted at the Institut de Physique du Globe de Paris (IPGP), which is responsible for the budget management and administration of the program. The French National Center for Scientific Research (CNRS) is the French institution affiliated to InterRidge and is paying the French host contribution. Jérôme Dymont (jdy@ipgp.fr; IPGP - CNRS, marine geophysics) and Nadine Le Bris (lebris@obs-banyuls.fr; Sorbonne Université - CNRS, Marine ecology and marine environmental sciences) are the co-chairs of the program. Kamil Szafranski (interridge@ipgp.fr) has been the InterRidge Coordinator since 1 April 2017. Since the final establishment of an operational office in early 2017, all the activities of InterRidge have been restarted.

2. Steering Committee

The Steering Committee met on 20-21 July 2017 in Paris and discussed the different aspects of the InterRidge activity. The discussions and the decisions related to all matters of importance for the program (scientific strategies, actions to be taken, procedures, budget...). Below the summary of the discussions and the decisions taken:

- a. Twelve voting representatives, both co-chairs and two Working Group leaders participated at the meeting. National and Working Group updates were presented by the national representatives. The coordinator summarized the activity of the InterRidge Office in its report.
- b. The Steering Committee has decided to support the creation of two new Working Groups (Working Group on Oceanic Transform Faults & Working Group IMOVE: Integrating Multidisciplinary Observations in Vent Environments), pending minor modifications of the proposals, and has recommended some more substantial improvements after which the three other proposals will be reconsidered, if the proponents choose to resubmit them.
- c. The applications for IR/ISA Endowment Fund fellowships of Seyedeh Elnaz Naghibi, Surya Prakash and Egidio Marino have been accepted for funding, pending acceptance of the ISA. Two applications for the InterRidge Cruise Bursaries (Alexander Diehl and Zhongwei Zhao) have also been validated by the Steering Committee.
- d. The application of Poland to join InterRidge as Corresponding Member has been accepted unanimously by the Steering Committee. Dr. Teresa Radziejewska (University of Szczecin) will be the Polish national correspondent and will interact with the InterRidge Office.
- e. The Steering Committee has accepted the budget of InterRidge for 2017 and the preliminary budget for 2018, pending some minor modifications to the proposed funding plans.
- f. The Steering Committee has discussed an improvement of IR rules for more efficiency (budget use, earlier bid for a better transition to next Office, role and rotation of National correspondents). InterRidge will start collecting ideas within the community for update of the IR Code of Conduct.
- g. InterRidge attended the 23rd Session of ISA on 8-18 August 2017 and the 24th session meeting of the ISA Council on 5-9 March 2018. The InterRidge observer status gives an opportunity to discuss IR–ISA collaboration like the joint fellowships, reports on IR activity, and contribute to discussions about legal questions concerning research activity in the area of permits.
- h. Because of the delay in the IR Office installation in France, the Steering Committee members have agreed unanimously to postpone the Office rotation to the end of 2019, pending acceptance by the French funding agencies.
- i. An InterRidge Theoretical Institute will be organized in 2019. The Office will collect ideas for such an Institute within the community and will launch its organization.
- j. Norway has invited the Steering Committee meeting to take place in Bergen on 20-21 June 2018.

3. InterRidge Working Groups

InterRidge Working Groups build small task forces to meet, brainstorm on specific topics and ultimately draft reports and plans. Working Groups convene group meetings and community-wide workshops, promote and coordinate new cruises, experiments, and related work. They generally expand their interaction with the interested community by organizing an InterRidge Workshop or a session at an international conference. Working Groups should address emerging research themes or bridge communities working on a unique geographic setting along global ridge-crests and spreading centers. New proposals should be innovative in their

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objectives as regard to existing or former Working Groups. They are coordinated by two co-chairs and are gathering about ten active members reflecting the national and disciplinary diversity of InterRidge, which work closely with the InterRidge Steering Committee and the InterRidge Office. Working Groups convene group meetings and community-wide workshops, promote and coordinate new cruises, experiments, and related work.

The first call for new Working Group proposals was launched on 24 April 2017 and open to the whole international community. Proposals of about two pages long describing the WG objectives, importance and timeliness to ridge-related science, available and required means, and expected achievements, should have at least four proponents from at least three InterRidge member countries. Special attention is paid to cross-disciplinary projects, although this is not mandatory. Deadline for submissions was fixed on 9 June 2017. The Office received 5 proposals. The Steering Committee decided to support the creation of two new Working Groups (Working Group on Oceanic Transform Faults & Working Group IMOVE: Integrating Multidisciplinary Observations in Vent Environments), pending minor modifications of the proposals, and has recommended some more substantial improvements after which the three other proposals will be reconsidered at the next Steering Committee meeting in Bergen if the proponents choose to resubmit them.

4. Report on activities of the InterRidge Working Groups

a. **Working group on Oceanic Transform Faults**

Co-Chairs: Marcia Maia (France, geophysics, tectonics), Barry Hanan (USA, isotope geochemistry), Daniele Brunelli (Italy, petrology)

The first workshop of the InterRidge Working Group on Oceanic Transforms took place from 22 to 24 May in Brest/Plouzané (France). The workshop was attended by more than 40 international scientists from 7 specialties (geochemistry, petrology, geophysics, tectonics, structural geology, hydrothermalism, modelling). Participants dedicated the first day and a half for oral presentations and poster session discussing the state of the art on transform faults (TF) and fracture zones (FZ) concerning all aspects of the mechanics, petrology, structure, morphology and dynamics of these systems. The acronym Transform Fault System (TFS) has been proposed to identify the whole tectonic system from the active part to its prolongation into the drifting plates. Afterwards, the attendees discussed all aspects necessary to identify the key questions for a comprehensive understanding of TFS. Experiments were proposed on how to answer basic questions on imaging the TF to FZ transition and thermo-mechanical, compositional alteration and stress-strain relationships to constraint physical parameters that control the TFS evolution through time. A major point was to find appropriate target regions to apply these experimental approaches. Two major outcomes of the workshop are (1) the need to systematically integrate modelers to the exploratory and experimental actions and (2) the need for high-frequency investigation of TFS over long time stretches. To achieve this aim, the participants propose to launch a call for white papers addressing the different aspects putting together integrated experimental and modeling approaches to the main TFS problems. It also appears necessary to sustain the exchange in the community by dedicated workshops and/or sessions at AGU-EGU.

- b.** Working Group on Integrating Multidisciplinary Observations in Vent Environments (IMOVE)
Proponents board led by Thibaut Barreyre, University of Bergen (Norway)

WG objectives and timeliness – IMOVE will contribute to the InterRidge research community by fostering and coordinating the integration of hydrothermal data from vent fields where observatory-style data have been acquired. A large set of temporally and spatially variable multi-disciplinary data have been collected from deep-sea vent fields at considerable cost to the international community, but to this point the datasets have mostly been analyzed in a piecemeal fashion. Systematic efforts to integrate data from different disciplines and synthesize these products into quantitative, cross-disciplinary models relevant to hydrothermal processes on the global MOR system have the potential to produce transformative scientific results, and are clearly needed at this point in time. This WG will provide an international framework for this effort, and the relatively modest funding required will effectively leverage all of the previous funding allocated (logistical and scientific) to gather and study these data by individual countries and organizations. We propose (1) to develop a collaborative platform to access the existing data and metadata in standardized formats, along with the available relevant analytical and modeling tools and (2) to hold two IMOVE workshops in order to synthesize data products, facilitate technology transfers and address the challenge of integrating observatory-style data at the global-scale.

The first workshop of this Working Group should be organized in late 2018.

- c.** Working Group on Circum-Antarctic Ridges
Co-Chairs: Anne Briais (OMP Toulouse, France), Jian Lin (WHOI, USA), Sung-Hyun Park (KOPRI, Korea)

A proposal for a follow-up of this working group to continue the major, coordinated effort started in 2012 was submitted to the Steering Committee in July 2017. The Southern Ocean area is so vast that no single nation can make large scientific advances on the Circum-Antarctic Ridges. InterRidge can help with the survey of Circum-Antarctic Ridges, launch new projects, coordinate existing cruise projects, and share information. The Steering Committee recommended the proposal to be re-submitted with a more focused scientific objective, for example, concerning biogeography or the link between hydrothermal systems and oceanic circulation.

The activities of the InterRidge Working Group on Circum-Antarctic Ridges in the last few years included coordinating science with one workshop, gathering new data, with cruises performed all around the Antarctic, and sharing the results. To have a new update on the results and projects regarding the southern ridges, a special session at the 2017 Fall AGU meeting was organized. This event was included in Session T31C/T33G “From Mantle Plumes to Ocean Plumes: Mapping Heat Transfer from Mantle to Ocean” (Co-conveners: Richard W Hobbs (University of Durham, UK), Anne Briais (CNRS, France), Seung-Sep Kim (Chungnam National University, South Korea), and Ali Mashayek (Scripps Institution of Oceanography, USA). The session brought together members of the solid earth and ocean research communities to discuss interactions between the mantle, the crust and the ocean, focusing on the mid-ocean ridge and its

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flanks, through a holistic interdisciplinary approach. Twelve posters and 8 talks were presented during the session on 13 December 2017

(<https://agu.confex.com/agu/fm17/meetingapp.cgi/Session/34811>). This activity concluded the WG in its present form. A proposal to continue the WG in a different form has been submitted and awaits further revision, if the proponents choose to resubmit it.

d. Working Group on Ecological Connectivity and Resilience

InterRidge Working Group on Ecological Connectivity and Resilience, chaired by Anna Metaxas (Dalhousie Univ., Canada) and Lauren Mullineaux (WHOI, USA), published a review entitled "Exploring the Ecology of Deep-Sea Hydrothermal Vents in a Metacommunity Framework" in *Frontiers in Marine Science* in February 2018. This article reviews current knowledge and gaps on the mechanisms supporting the stability of vent meta-communities, of high relevance to the assessment of impacts at regional scales and design of protection plans. InterRidge financed the publication fee. This publication concluded the activity of the WG.

5. SCOR - InterRidge Meeting on "Mid-Ocean Ridges and Other Geological Features of the Indian Ocean"

The SCOR - InterRidge Meeting on "Mid-Ocean Ridges and Other Geological Features of the Indian Ocean" will take place on 14-16 November 2018, in Goa, India. This meeting aims to encourage involvement of the Ridge and Marine Geology and Geophysics communities in the International Indian Ocean Expedition - 2 (IIOE-2). The budget allocated by SCOR and InterRidge will mostly be used to allow students, young scientists, or other scientists to participate, with special attention given to countries bounding the Indian Ocean and potentially involved in the IIOE-2. The following seven themes cover the main peculiarities of the Indian Ocean ridges and geology:

- a) Indian Ocean mid-ocean ridges: hydrothermalism, fragile ecosystem, and deep-sea mining exploration
- b) Indian Ocean mid-ocean ridges: tectonics and magmatism in a wide range of spreading rates
- c) Evolving lithosphere of the Indian Ocean: from mid-ocean ridges to basins to active or passive margins
- d) Complex physical and geochemical aspects of the Indian Ocean mid-ocean ridge system
- e) Aseismic ridges, oceanic plateaus, micro-continentals and seamounts of the Indian Ocean
- f) Implications of the collision and subduction on the complex history of the Indian Ocean
- g) Submarine fans and sedimentation history in the Indian Ocean

6. **InterRidge Info** is an e-newsletter sent to our subscribers on InterRidge-members mailing list, published every 2-3 weeks. It contains current and most important information to be disseminated within the InterRidge community. So far, 25 newsletters and 1 special on AGU Fall Meeting were sent (15 in 2017; 10 in 2018). Past issues, starting from 24 April 2017, can be found in the InterRidge Info archive at <http://interridge.org/publications>.

7. **Cruise Information** is a section of the InterRidge website promoting the exchange of information, technologies and facilities among international research groups. All scientists are continuously invited to provide InterRidge with any details on recent or upcoming ridge-related cruises to feed the InterRidge Cruise Database.

8. InterRidge actions for early-career scientists

a. InterRidge Fellowships promote the involvement of young scientists in international, collaborative, and interdisciplinary studies of oceanic spreading centers. The fellowships are designed to encourage international collaboration on any aspect of InterRidge science by graduate students or postdoctoral researchers, fostering long-standing partnerships for their future careers.

InterRidge announced the launch of the Student and Postdoctoral Fellowship Program on 9 May 2017. Up to 6 IR Fellowships, including 3 joint IR-ISA Endowment Fund Fellowships, can be granted. The Fellowships of up to 5,000 US\$ each can be used for any field of research identified in the InterRidge 3rd decade plan (<http://interridge.org/thirddecade>). Applications were to be submitted to the IR Office by 13 June 2017 for the first call and by 6 November 2017 for the second call. Five applications were received after the first call (including 2 to the IR/ISA Endowment Fund fellowships) and another 5 after the second one. Fellowships have been awarded to 6 young scientists (3 at each call).

In 2018, up to 6 IR Fellowships, including 1 joint IR-ISA Endowment Fund Fellowship, can be granted. The Office is currently waiting for applications (deadline on 17 June 2018).

b. InterRidge Cruise Bursaries

These bursaries are awarded for travel and subsistence costs to encourage new collaborations across InterRidge member nations and to enable early-career scientists to participate to research cruises. Bursaries of up to 2,000 US\$ may serve for travel costs to join the cruise. Applicants should have a clear role on the research cruise and not be part of the original research team. Preference is given to applicants from InterRidge member countries and from countries other than those of the cruise leader. The call for IR Cruise Bursaries was launched on 22 May 2017. Candidates can apply at all time. Five bursaries were granted until now.

c. InterRidge-related international Symposia.

The International Symposium on Chemosynthesis-Based Ecosystems is a community-wide meeting organized every 4 years (3 years for the next edition), started at the initiative of the Biology working group of InterRidge. In 2017, the 6th International Symposium on Chemosynthesis-Based Ecosystems (CBE6), organized by the Woods Hole Oceanographic Institution (WHOI), took place from 27 August to 1 September in Woods Hole (Massachusetts, USA).

More than 160 participants took part in the symposium, which included 4 plenary sessions and 72 talks. A total of 68 posters were presented along with 18 selected flash talks. The program of the congress included several sessions dedicated to topics such as biogeography, biogeochemistry, chemosynthetic habitats and society, community structure and dynamics, evolution and evolutionary history, metapopulation and metacommunity (including connectivity

and resilience), microbiology, physiology and adaptation, symbiosis, and trophic interactions (including chemosynthetic energy transfer). The Symposium closure included a panel discussion on questions about current knowledge gaps and challenges for the research on chemosynthesis-based ecosystems and deep-sea research.

InterRidge organized an open meeting that took place on 29 August 2017. Kamil Szafranski (IR Coordinator) introduced the activities of the program, with particular focus on actions supporting early-career scientists. Stace Beaulieu (WHOI) presented the vent database and highlighted some aspects of its upcoming revision. Nadine Le Bris (IR co-chair) launched the discussion about the revision of the Code of Conduct on responsible research practices at hydrothermal vents. The Symposium offered the IR Office the opportunity to attend the General Assembly of the Deep-Sea Biology Society, followed by a young scientist meeting. The IR Office took the opportunity to present and discuss about InterRidge support initiatives to early-career scientists at the DSBS young scientist meeting.

InterRidge awarded Travel Grants to 11 students and 3 post-docs from 8 countries attending the Symposium, with the primary aim of fostering exchange across fields and disciplines and promote international collaboration, by increasing the participation of early career scientists at symposia.

d. Support to InterRidge Workshop on Oceanic Transform Faults

The Organizing Committee has awarded travel grants (300 - 700€) to encourage the participation of young scientists. Five attendees were supported: 3 from USA, 1 from China and 1 from Germany.

e. Spare berths information is a section of InterRidge website informing about any berth availability for young scientists, that could eventually led to support requests by the Cruise Bursary program. All members are asked to notify the IR Coordinator about any berths available.

9. Update of the IR website and Vent Database

The InterRidge website (www.interridge.org) and vent database (<http://vents-data.interridge.org/>) are running at IPGP and have been updated regularly since April 2017.

The InterRidge Vents Database (<http://vents-data.interridge.org/>), upgraded to Version 3.4 and revised by Stace Beaulieu (stace@whoi.edu) (supported by the [NSF Grant “Metacommunity Dynamics at Hydrothermal Vents”](#)) and in relation with the InterRidge Office, has a total of 701 records – confirmed or inferred active vent fields in the database and the corresponding kml file for visualization in Google Earth. The InterRidge Coordinator is progressively taking the responsibility for the database management and updating, in connection with Stace Beaulieu.

III. Bridges between the scientific community and the society

1. **A scientific voice to international/national agencies, policy makers, etc.**

InterRidge has built a privileged relationship with the International Seabed Authority (ISA). It is affiliated to the Scientific Committee for Ocean Research (SCOR) and has developed specific interactions through joint working groups and conferences. Through these specific relationships

and new partnerships to be developed, InterRidge should be recognized as the voice of the scientific community, providing authoritative advice on societal topics such as environmental impacts of Sea-floor Massive Sulfides (SMS) exploration and exploitation.

The peculiar ecosystems found at MOR hydrothermal systems are important with respect to biodiversity, and several of such systems have been recognized as EBSAs (Ecologically and Biologically Significant Areas) and are or may be later proposed as Marine Protected Areas (MPAs). InterRidge may provide decision-makers with the most accurate and recent knowledge and identify knowledge gaps to help considering the need for conservation and/or management with the necessary scientific exploration and provide relevant scientific information in the design and regulations of such MPAs.

2. 23rd and 24th annual sessions of the International Seabed Authority
 Jérôme Dymont (IR co-chair) and Kamil Szafranski (IR Coordinator) attended the 23rd annual session of the International Seabed Authority (ISA), held on 8-18 August 2017 in Kingston, Jamaica. The presence of InterRidge at the ISA Assembly and Council sessions gave the opportunity to introduce IR activities in extending our knowledge on mid-ocean ridges (e.g., working groups and workshops), disseminating information (e.g., vent database), and developing capacity building (e.g., fellowships and cruise bursaries). InterRidge expressed its readiness to collaborate with the ISA through our collective scientific expertise, to ensure a proper balance between sustainable development and protection of the marine environment.

Both co-chairs (Nadine Le Bris & Jérôme Dymont) attended the first part of 24th Session of the Council of the ISA on 5-9 March 2018. This time, the InterRidge observer status allowed to emphasize the importance of up-to-date knowledge bases, interdisciplinary integration and international cooperation as proposed by InterRidge in supporting best available evidence and expertise for the assessment of risks, and elaboration of norms and management plans in this context. InterRidge reminded the Council of "the crucial need of fundamental knowledge to answer questions on the vulnerability of ecosystems, the scales and intensity of environmental perturbations, the cumulative impacts of climate change and exploitation. This should involve all willing research teams, beyond those associated with the permit holders".

IV. Outreach

Although InterRidge does not have the resources to produce its own outreach material – a task that would be hampered by the diversity of languages in which this material should be produced – the office can play a role in facilitating attempts by Working Groups, member countries and any third party to produce media material related to MOR and ABA (e.g., papers for the general press, movies, websites...).

V. Plans for future development of InterRidge

- maintain and reinforce **InterRidge as an efficient scientific forum**
- open new **InterRidge Working Groups**, co-organize **workshops** with current Working Groups
- organize **SCOR - InterRidge Meeting** on "Mid-Ocean Ridges and Other Geological Features of the Indian Ocean"
- update the **Code of Conduct** for responsible research at hydrothermal vent

- organize an **InterRidge Theoretical Institute**

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

Sun Song

IOCCG Annual Report to SCOR
Venetia Stuart (IOCCG Project Coordinator)
Reporting Period: June 2017 – May 2018

The International Ocean-Colour Co-ordinating Group (IOCCG) was established in 1996 to promote communication and co-operation between the space agencies and the ocean-colour user community. IOCCG is an Affiliated Program of SCOR, and an Associate member of CEOS (Committee on Earth Observation Satellites). The IOCCG has a wide-ranging mandate addressing technological and scientific issues through its scientific working groups and task forces, conducting advanced training courses, and helping to ensure continuity and quality of the ocean-colour data stream through the CEOS Ocean Colour Radiometry-Virtual Constellation (OCR-VC) and Ocean Colour Radiometry-Implementation Team (OCR-IT). SCOR has been instrumental in helping the IOCCG secure funding from NASA for general IOCCG activities, as well as funding to host the biennial International Ocean Colour Science meetings. The group is currently chaired by Cara Wilson (NOAA, USA). The IOCCG Project Office is located at the Bedford Institute of Oceanography, Canada, staffed by Project Coordinator, Venetia Stuart.

1. IOCCG Scientific Working Groups and Task Forces

Currently, the IOCCG has six specialized working groups investigating various aspects of ocean-colour technology and its applications, as well as a semi-permanent “Task Force” to help facilitate inter-agency collaboration on an ongoing basis. The “*Satellite Sensor Calibration Task Force*” provides a permanent inter-agency framework under which characterization/calibration experts from various space agencies meet and exchange ideas, information and data, as well as conduct hands-on research and implementation. Members of the Task Force often meet virtually or opportunistically to reduce travel expenses. Other task forces may be established as the need arises. In contrast, IOCCG scientific working groups are relatively short-lived (2-4 years), and generally publish an IOCCG report upon completion. The six active IOCCG working groups are in various stages of progress and their activities are summarised below.

- 1) [Earth Observations in Support of Global Water Quality Monitoring](#) (Chairs: Steven Greb, Wisconsin Department of Natural Resources, USA; Arnold Dekker, CSIRO, Australia; Paul DiGiacomo, NOAA/NESDIS, USA).

This working group was established to help develop a strategic plan for incorporation of Earth observation information into coastal and inland water quality monitoring efforts. Satellite remote sensing offers a unique perspective on inland and coastal waters, and it can help us assess water quality and understand biogeochemical processes. The group has completed its deliberations and has submitted a draft version of its report (almost complete), which is scheduled to be published this year. The report is partitioned into three sections,

focused on three different audiences (end users/managers, research community and space agencies). The overarching objectives are to assess current knowledge regarding coastal and inland water quality and associated use of remote sensing data, assess existing and identify new space-based and *in situ* observing capabilities, identify supporting research/development activities, and user engagement/outreach. The working group plans to have all the chapters internally reviewed by 1 July 2018, for delivery to the IOCCG in September 2018. The Second Institute of Oceanography, China has offered to print this report, which was gratefully accepted.

- 2) [Joint GlobalHAB/IOCCG WG on Harmful Algal Blooms](#) (Chair: Stewart Bernard, CSIR, South Africa).

This joint working group between the IOCCG and the GlobalHAB programme of IOC-SCOR was established several years ago, but the Chair of the group has been over-committed, so has hired a post-doc student to help bring the report to completion. The report consists of a short introduction, a background section on ocean colour and detecting harmful algal blooms (HABs), followed by several examples of HAB detection (dinoflagellates, diatoms, cyanobacteria, fish killing blooms, high biomass blooms, ecologically disruptive blooms). A new chapter on “Managing the transition from research to operational applications” examines examples of emerging systems from around the world (CSIR, NOAA, EPA, PML), paying special attention to the science and user development components. The last chapter deals with “Future Perspectives and Recommendations” and includes sensor characteristics (bands, spatial resolution and revisit, hyperspectral vs multi-spectral, SNR), atmospheric correction and in-water algorithms, science validation, user driven products, and policy and economics.

A draft report should be ready before the end of the year and will be presented to SCOR for review of the recommendations. The report will be recognised as an IOCCG/GlobalHAB report to acknowledge funding support from SCOR.

- 3) [Uncertainties in Ocean Colour Remote Sensing](#) (Chair: Frédéric Mélin, JRC, Italy).

This working group is reviewing the methods for quantifying uncertainties for remote sensing reflectance and derived products, and is developing a set of recommendations for the various sources of uncertainty in ocean-colour applications. A new chapter (2) has been added on *Terminology and Main Principles*. Chapter 3 provides an overview of uncertainty propagation: inherent/stochastic, structural/epistemic and uncertainty due to editing (Level-2-to-Level-3 averaging). Chapter 4 (uncertainty estimates) includes field observations, out-of-scope conditions, and a presentation of the various methods currently proposed to derive uncertainty estimates, and current knowledge on uncertainties. Chapter 5 includes representation and distribution of uncertainties (flags etc.), while Chapter 6 deals with requirements from different applications of ocean colour data. The last chapter provides recommendations (i.e., ensure traceability, terminology, comparison of methods etc.). The current draft report should be ready for review within a few months.

4) [Intercomparison of Atmospheric Correction Algorithms Over Optically-Complex Waters](#) (Cédric Jamet, LOG, Wimereux, France).

The goal of this working group is to inter-compare and evaluate existing atmospheric correction algorithms over turbid waters using nine atmospheric correction algorithms based on availability of MODIS-Aqua data. Most of the work has been completed (classic match-up analysis, simulated dataset for sensitivity studies, as well as inspection of satellite images over contrasted coastal regions). Two atmospheric correction algorithms were removed because researchers did not provide results, and the Polymer algorithm was added. The group aims to 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.

The IOCCG Committee expressed concern that atmospheric correction procedures have changed a lot in last five years with new sensors coming onboard, so the report will not be forward looking. Specifically, the report focuses on MODIS-Aqua, which is near the end of its life and which cannot resolve the signal in coastal waters (much of the signal in coastal waters is from >667 nm, not included in the MODIS band set). A significant effort would be required to repeat the exercise for other sensors. The Committee recommended publishing the final report in the online IOCCG technical report series, providing a 3-month community review period for comments and suggestions.

5) [Role of Ocean Colour in Biogeochemical, Ecosystem and Climate Modelling](#) (Chaired by Stephanie Dutkiewicz, MIT, USA).

This working group is important for users of ocean colour data since there is limited dialogue between modellers and the ocean colour community. The report provides an introduction to the use of ocean colour data by the modelling and OC communities, and will include examples of different types of models (depending on the questions being asked). The report will also deal with the (mis)-match between model output and OC products, highlighting issues non-experts might not be aware of if they treat model products the same as OC products. Different pools of carbon determined from satellites (POC, DOC, PIC, C_{phy}) will also be examined as well as regional (coastal) sub-mesoscale and global (climate change) models. The group plans to hold another meeting of opportunity later this year, and hopes to have draft of all chapters completed by early next year.

6) [Long-Term Vicarious Adjustment of Ocean Colour Sensors](#) (Chaired by Christophe Lerebourg, ACRI-ST, France and Craig Donlon, ESA, Netherlands).

One of the major challenges in ocean colour radiometry is to ensure that the data obtained from different satellite sensors meets the accuracy requirements for satellite climate-quality data. An IOCCG working group was formed to define the best practices to reach a high standard of precision and accuracy for *in situ* measurements necessary to fulfill the system vicarious calibration (SVC) requirements. In this context, different projects were established, including the ESA FRM4SOC (Fiducial Reference Measurements for Satellite Ocean Colour) and the EUMETSAT OC-VCAL project, which defined detailed

requirements for an OC vicarious calibration infrastructure for the Copernicus Programme. However, the working group's activities are not just for Copernicus, but for any long-term mission. The WG is still new and members have not yet been solicited for report inputs, but co-chairs have started discussing the report content. Membership includes 15 institutions from the EU, USA, Korea, Japan and China.

2.0 IOCCG Technical Report Series

The IOCCG Technical Report Series was recently established to publish peer-reviewed Ocean Optics & Biogeochemistry Protocols online, as well as other technical documents and White Papers. Over the past few years, NASA has sponsored several international workshops with experts (including breakout workshops at the International Ocean Colour Science meetings), to update and develop new community consensus protocols for ocean colour sensor validation. These newly drafted protocols will be made available to the international user community for a period of time for testing, public comment, and review, before they are accepted as international reference standards and published by the IOCCG. Currently two documents are available for review:

- IOP Measurements and Protocols: Absorption Coefficient
- IOP Measurements and Protocols: Best Practices for the Collection and Processing of Ship-Based Underway Flow-Through Optical Data

Other protocols documents for CDOM and beam attenuation coefficient should be available for review later this year.

3.0 2017 International Ocean Colour Science (IOCS) Meeting

The IOCCG hosted the highly successful third International Ocean Colour Science (IOCS) meeting in Lisbon, Portugal (15-18 May 2017, see <http://iocs.ioccg.org/>) in partnership with, and thanks to sponsorship from, EUMETSAT, ESA, the European Commission, NASA, Thales Alenia Space and Airbus, and with local support from the Instituto Português do Mar e da Atmosfera (IPMA). The meeting served as a venue for the ocean colour community to discuss the state of the art in ocean colour remote sensing, and communicate their views, ideas, and concerns to the space agencies, thus building and reinforcing the voice of the global ocean colour community and also helping IOCCG in its oversight role with respect to high-level discussions with space agencies. A total of 344 researchers from 41 different countries participated in the four-day meeting, including ocean colour research scientists from around the world, as well as representatives from all the major space agencies with an interest in ocean-colour radiometry (CNES, CONAE, CSA, ESA, EUMETSAT, ISRO, JAXA, KIOST, NASA, NOAA and SOA).

The plenary programme included seven invited keynote lectures as well as agency presentations and special sessions on the Copernicus Programme, NOAA VIIRS Mission and NASA OCRT, although IOCS-2017 did not focus solely on presentations. Nine breakout workshops complemented the plenary sessions, allowing participants to discuss current critical challenges

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and provide community feedback to the agencies. In addition, there were three poster sessions and a Q&A session where the ocean colour community could directly address space agency representatives. There is much community interest in these biennial IOCS meetings, which are gathering momentum and provide important community feedback to the space agencies. All presentations, poster abstracts, and the full proceedings of the meeting (including recommendations from the breakout sessions), are available from the IOCS-2017 meeting website at <https://iocs.ioccg.org/iocs-2017-meeting/>.

The fourth International Ocean Colour Science meeting will take place in Busan, South Korea in April 2019.

4.0 Capacity Building

The [fourth IOCCG Summer Lecture Series](#) will place at the Laboratoire d'Océanographie de Villefranche (LOV, France) from 25 June to 6 July 2018. This training course is dedicated to high-level training in bio-optics and ocean colour, and focusses specifically on current critical issues in ocean colour science. A total of 131 applications were received, of which 22 students from 15 different countries have been selected, a very difficult task considering the high standard of all applications. The majority of the trainees are PhD students and post-doctoral students, and come from a broad range of backgrounds. SCOR will sponsor three students to attend the training course (from South Africa, India and Nigeria), which is gratefully acknowledged. Thirteen prominent scientists will deliver a comprehensive program including lectures, discussions and hands-on tutorials. Because of the high demand for the course, all the lectures will be video recorded as in previous years and will be available for download from the IOCCG website, together with the PowerPoint presentations (see <http://ioccg.org/what-we-do/training-and-education/lectures/>). This material will provide a valuable teaching resource for all the students that were not selected to attend the course, as well as other researchers from around the world.

5.0 Project Management and Coordination

The IOCCG Committee meets once each year to coordinate the activities of the group as a whole, discuss plans for the year ahead, and review the progress of the various working groups. The Executive Committee also approves the budget for the coming year. The annual IOCCG-23 Committee meeting was hosted by CNR and took place in Rome, Italy (6-9 March 2018). The full minutes of the meeting are available on the IOCCG website at <http://ioccg.org/wp-content/uploads/2018/04/minutes-ioccg-23-final-1.pdf>. The 24th IOCCG Committee meeting is scheduled to take place in April 2019 at the University of Science & Technology (USTH) in Hanoi, Vietnam. The meeting will be hosted by the Vietnam Academy of Science and Technology (VAST).

6.0 IOCCG Membership (2018)

The IOCCG Committee consists of members drawn from space agencies as well as the scientific ocean-colour community. Rotation of members is being implemented according to a roster: five members marked with an asterisk (*) are new members for 2018. The IOCCG Executive

Committee consists of all representatives from the sponsoring agencies, plus the IOCCG Chair and past-Chair.

Bergeron, Martin	-	Canadian Space Agency, Canada
Bernard, Stewart (past Chair)	-	University of Cape Town, South Africa
Bontempi, Paula	-	NASA HQ, USA
Boss, Emmanuel	-	University of Maine, USA
Chauhan, Prakash	-	ISRO, India
Devred, Emmanuel *	-	Bedford Institute of Oceanography, Canada
Dogliotti, Ana*	-	IAFE/CONICET, Argentina
Donlon, Craig	-	ESA/ESTEC, The Netherlands
Dowell, Mark	-	EU JRC, Italy
Dutkiewicz, Stephanie	-	Massachusetts Institute of Technology, USA
LaRue de Tournemay, Amoury*	-	CNES, France
Franz, Bryan	-	NASA GSFC, USA
He, Xianqiang	-	Second Institute of Oceanography, China
Hu, Chuanmin	-	University of South Florida, USA
Kampel, Milton	-	INPE, Brazil
Kim, Wonkook	-	KIOST, South Korea
Kwiatkowska, Ewa	-	EUMETSAT, EU, Germany
Loisel, Hubert	-	Université du Littoral, France
Malthus, Tim*	-	CSIRO, Perth, Australia
Mélin, Frédéric	-	EU Joint Research Center, Italy
Murakami, Hiroshi	-	JAXA EORC, Japan
Park, Youngje	-	KIOST, South Korea
Santoleri, Rosalia	-	ISAC-CNR, Italy
Wang, Menghua*	-	NOAA/NESDIS, USA
Wilson, Cara (Chair)	-	NOAA/NMFS, USA

7.0 IOCCG Sponsors

The IOCCG is sponsored and supported by contributions from various national space agencies and other organisations listed below:

- Canadian Space Agency (CSA)
- Centre National d'Etudes Spatiales (CNES, France)
- Commonwealth Scientific and Industrial Research Organisation (CSIRO, Australia)
- Department of Fisheries and Oceans (Bedford Institute of Oceanography, Canada)
- European Space Agency (ESA)
- European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)
- National Institute for Space Research (INPE, Brazil)
- Indian Space Research Organisation (ISRO)
- Japan Aerospace Exploration Agency (JAXA),
- Joint Research Centre (JRC, EC)

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- Korea Institute of Ocean Science and Technology (KIOST)
- National Aeronautics and Space Administration (NASA, USA)
- National Oceanic and Atmospheric Administration (NOAA, USA)
- Scientific Committee on Oceanic Research (SCOR)

The Bedford Institute of Oceanography (Canada) provides in-kind support, providing office space and informatics support, while SCOR provides infrastructure support and manages the NASA funds. SCOR has also sponsored students from developing countries to attend IOCCG training courses or the IOCS meetings.

7.3.3 Global Alliance of CPR Surveys (GACS)

Burkill

7.4 Other Organizations

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

Partnership for Observation of the Global Oceans (POGO) Report to SCOR Annual General Meeting 2018

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, and in particular ocean observations. 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.

POGO's vision is to have by 2030, world-wide cooperation for a sustainable, state-of-the-art global ocean observing system that serves the needs of science and society.

POGO's mission is

1. Lead innovation and development of the crucial components of the ocean observing system.
2. Identify and contribute to the development of the key skills, capabilities and capacities needed to achieve the vision.
3. Work with governments, foundations and industry, to articulate the benefits to society and required funding to build and sustain the system.

More information on POGO can be found at www.ocean-partners.org and <http://ocean-partners.org/pogo-publications>.

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).
- Since 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 have been analysing the data obtained for inclusion in joint publications on the POGO-SCOR fellowship and professorship programmes, the latter of which is almost ready for submission to *Oceanography*.
- 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 has been working on getting one of its members to host an International Project Office (IPO) for the programme, and the Alfred Wegener Institute is interested in pursuing this.
- 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 2018

Since 2015, POGO has been providing funding for Working Groups and new training initiatives proposed by its members. Two calls for proposals were issued for funding in 2018, and in total six proposals were successful.

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Projects

OpenMODs

In 2017, POGO issued a call to its members for a collaborative ocean observing project to be funded to the level of 50K USD. The successful proposal was “Open Access Marine Observation Devices (OpenMODs). The goal of this project is to conceive OpenMODs: an “easy-to-use” flexible and affordable oceanographic class of equipment and to prepare an international realization programme through a series of concerted workshops. The proposal is to start from the experiences and expertise brought in by the members of the consortium but to be underpinned and enhanced by interaction with potential users (to be found also among POGO Alumni) and private companies/consortia (e.g., 4H-JENA engineering GmbH) and institutions (e.g., UNESCO/ICTP) interested in this activity. The proposed approach will be cost-effective, flexible and modular and the equipment will be tailored to meet with diverse user needs and deployment purpose.

Lounsbery Foundation-funded project on biological observations

In September 2017, a proposal was submitted to the Lounsbery Foundation and approved for funding. The funding will be used for a workshop on biological observations, focussing on the following questions:

- Can we foster key integration sites at which new biological technologies could be linked with each other and with existing long term records to groundtruth the capabilities of these technologies?
- How can POGO foster intercalibration, intercomparison and linkage between new technologies and existing time series of biological observation (e.g., Continuous Plankton Recorder)?

Working Groups

- WG on “Planning the implementation of a global long-term observing and data sharing strategy for macroalgal communities”, led by Craig Johnson, Institute for Marine and Antarctic Studies, University of Tasmania.
- WG on “Biological Observations”, led by Margaret Leinen, Scripps Institution of Oceanography, USA.
- WG on “Earth Observations for Ecology and Epidemiology of Water-associated Diseases”, led by Marie-Fanny Racault, Plymouth Marine Laboratory, UK.

In addition, POGO has endorsed the “SMART Subsea Cables” initiative –a Joint Task Force sponsored by 3 UN agencies (IOC, ITU, WMO) that aims to integrate sensors into the repeaters of future trans-oceanic telecommunications cable systems. Sensors would “piggyback” on the existing power and communications infrastructure, with the potential for global coverage at modest incremental cost. Initial sensors would be temperature, pressure, and acceleration.

Training initiatives

- Support for the Austral Summer Institute XIX (ASI XIX) – Harmful Algal Blooms: Optical and Oceanographic Approaches
- Introduction to observational physical oceanography to students from tropical West Africa (support for a module of the Masters programme at ICPMA, Cotonou, Benin)
- Accessing and working with state of the art satellite data for marine applications (training course alongside PEMSEA conference in the Philippines).