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7.1 International Council for Science (ICSU)

7.1.1 International Geosphere-Biosphere Programme

International Geosphere-Biosphere Programme (IGBP) update for the SCOR Annual Meeting, Oct 2008

By Emily Brévière

IGBP networks scientists around the world to conduct interdisciplinary research into Earth System science. The development of the African Network for Earth System Science (AfricanNESS) is one of the recent valuable examples. Its science plan and implementation strategy was completed and officially launched at the 4th IGBP Congress in May 2008 in Cape Town, South Africa (<http://www.igbp.kva.se/page.php?pid=412>). For many years IGBP has collaborated with SCOR. Amongst the joint activities are the international research projects GLOBEC, IMBER and SOLAS. Currently, IGBP and SCOR have two additional activities, a Fast Track Initiative on *Past Ocean Acidification* and the 2nd Symposium on *The Ocean in a High-CO₂ World*.

IGBP Chair and Executive Director

Professor Carlos Nobre reaches the end of his first term (2005-2008) as Chair of IGBP and is to be reappointed for a second term. Professor Sybil Seitzinger will be the new IGBP Executive Director from September 2008. Sybil was Director of Rutgers/NOAA Cooperative Marine Education and Research Program at Rutgers University, New Brunswick, USA. Her fields of expertise are biogeochemistry, nutrient dynamics and land/atmosphere/ocean interactions. Sybil was an IGBP Scientific Committee member from 2003 to 2008.

IGBP 20th Anniversary Symposium

IGBP celebrated its 20th Anniversary with a symposium titled “Earth System Science and Society”, held at the Royal Swedish Academy of Sciences in Stockholm in September 2007. The symposium gathered about 80 participants and focused on the relationship between the scientific, policy and private sectors for eight issues of scientific and societal relevance – four of which were retrospective and four prospective. The general format of the sessions was to have presentations by representatives from each of the sectors interwoven around a topic, with a substantial moderated discussion sessions afterwards. The purpose of the discussions was to analyze the relationship between the different communities for the different issues, and to determine the reasons why some issues were successfully resolved and others remain on the scientific and political agenda. A book is planned (<http://www.igbp.kva.se/page.php?pid=396>).

4th IGBP Congress ‘Sustainable Livelihoods in a Changing Earth System’

The 4th IGBP Congress was held in Cape Town, South Africa in May 2008. About 380 participants from 65 countries were welcomed to share their research and knowledge of global environmental change science and contribute to the development of IGBP’s scientific agenda for

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the period 2008-2013. Many issues of direct relevance to civil society and the policy community were raised, identifying where IGBP work can better contribute towards developing sustainable pathways for mitigation, innovation and adaptation. The agenda encompassed a large spectrum of types of meetings in parallel (2-day Scientific Steering Committee meetings of the IGBP core projects and 2-day National Committee discussions involving 52 countries) and of modes of communication. These started with plenary talks during a one-day African symposium, a second day with 21 working groups sessions with oral presentations as well as expert and public posters, and concluded with a half day of presentations and an ‘Advisory Panel’ which reviewed and recommended priorities for IGBP future directions. A ‘Cape Town Declaration on Science for Environmental Sustainability’ was adopted on the last day.

Not only did the Congress allow specialists to come together in a very cross-cutting environment, but it created a venue for enhancing public outreach and impact. Local schools were invited to see a large display of public posters and interact with IGBP scientists.

ESSP

The Earth System Science Partnership is a partnership of four international global change research programmes (IGBP, DIVERSITAS, IHDP and WCRP) for the integrated study of the Earth System, the changes that are occurring to the system and the implications of these changes for global sustainability.

ESSP was under review by the International Council for Science (ICSU) and the International Group of Funding Agencies for Global Change Research (IGFA) in 2007. The focus of the review was to assist ESSP in identifying strategic options for its future development. The themes were science, governance, engagement with the wider community, capacity building, resources and scenarios. The review will be published soon on the ICSU website.

The ESSP review’s overall conclusions can be summarized as follows:

- 1) The Review Panel firmly believes that the subject of the Earth System Science deserves a strong and forward-looking ESSP.
- 2) Currently, the staffing and funding situations are too weak to give the ESSP a truly leading role.
- 3) Too often the partnership is unknown or considered marginal.
- 4) The scientific and policy communities, as well as the ESSP, are encouraged to reach out to the all-important communities—policymakers, academics of all disciplines, non-governmental and educational organisations—to bring to their attention the importance of an integrated Earth System approach to global environmental change.

An ESSP retreat took place in Germany, end of May 2008, to take stock of the review recommendations and draft a strategic plan.

SBSTA

The Subsidiary Body for Scientific and Technological Advice (SBSTA) organized a meeting during their 28th session in June 2008 at which the Earth System Science Partnership, the Inter-American Institute for Global Change Research (IAI) and the Asia-Pacific Network for Global Change Research (APN) were asked to give short presentations and engage in discussions with representatives from a number of parties to the United Nations Framework Convention on Climate Change (UNFCCC). All four of the ESSP partner Programmes were represented at this meeting, along with representatives from APN, IAI and IPCC. This meeting facilitated the establishment of a dialogue to keep the negotiators abreast of new scientific findings and the research community updated on what challenges the parties to the convention are facing. It was very successful. SBSTA agreed that these meetings should continue at the 30th and subsequent (even-numbered) sessions.

Learning from the IPCC Fourth Assessment Report

WCRP, IGBP, and GCOS (Global Climate Observing System Programme) convened a workshop in Sydney, Australia in early October 2007 to ensure that gaps and uncertainties identified by authors, reviewers and other involved in completing the Working Group I and II reports of the IPCC AR4 were adequately recorded and documented for consideration by the Programmes. A number of products followed from the workshop, among these a comprehensive workshop report (<http://www.igbp.kva.se/page.php?pid=222>), a journal article submitted to BAMS, and a conference summary published in EOS (Vol. 89, No. 11, 11 March 2008). Two fundamental classes of recommendations emerged from the symposium. First is the body of work needed to improve process-level understanding, climate models, and observational and climate monitoring systems. Second, the framework for climate research and observations must be re-designed with the specific goal of producing the information needed for decisions around impacts, adaptation and mitigation. At the intersection of these two are research and observational strategies specifically aimed at improving the predictability and understanding of impacts, adaptive capacity, and societal and ecosystem vulnerabilities.

7.1.2 World Climate Research Programme (WCRP)

Report to SCOR on World Climate Research Programme (WCRP)

The annual meeting of WCRP's Joint Scientific Committee was held in Arcachon, France, 31 March-4 April 2008. Progress in implementing the WCRP Strategic Framework 2005-2015 and its future directions were the major topics. The agenda for the meeting is posted at http://wcrp.ipsl.jussieu.fr/Workshops/JSC2008/Documents/WCRP_JSC29Agenda_March26.pdf.

Developments of note include:

1. Change in JSC leadership. Dr. John Church of Australia completed his eight-year service and stepped down from the chairmanship. Dr. Tony Busalacchi of the United States (University of Maryland) was elected the new chair of WCRP.
2. Change in leadership for WCRP Office: Dr. Ghassem Asrar, formerly of NASA, replaced Dr. Anne Henderson-Sellers as Director of the WCRP Office.
3. WCRP continued to work to increase its activities to address cross-cutting issues, including anthropogenic climate change, atmospheric chemistry and climate, monsoons, extreme events, seasonal prediction, sea-level rise, etc. There were reports from each of the cross-cutting programs, implementation of these activities in the WCRP strategic framework 2005-2015, and future directions beyond that time. Supporting documents describing the results of the various activities are posted at <http://wcrp.ipsl.jussieu.fr/Workshops/JSC2008/DocumentList.html>.

Subsequent to the JSC meeting, the WCRP, IGBP and World Weather Research Programme sponsored The World Modelling Summit for Climate Prediction, which met 6-9 May in Reading, UK. The Summit statement reported on the potential for progress that it was felt could be made and called for creation of The Climate Prediction Project, which would include formation of a coordinated international modeling program (and even a center for this). As the effort will also involve ocean modeling, a copy of their report is attached (and the call from the meeting did get covered by *Nature*).

Unfortunately, I was unable to attend the meeting this year, and this report is prepared from some of the available materials.

Submitted: Michael MacCracken

The Climate Prediction Project

Revolutionizing Global Climate Prediction for Regional Adaptation and Decision-Making in the 21st Century

The Challenge

The world recognizes that the consequences of global climate change constitute one of the most important threats facing humanity. The peoples, governments, and economies of the world must develop mitigation and adaptation strategies, which will require investments of trillions of dollars, to avoid the dire consequences of climate change. The development of reliable science-based adaptation and mitigation strategies will only be possible through a revolution in regional climate predictions supported by appropriate climate observations and assessment, and the delivery of this information to society.

The Summit

The World Modelling Summit for Climate Prediction, jointly organized by the World Climate Research Programme, World Weather Research Programme, and the International Geosphere-Biosphere Programme, was held at the European Centre for Medium-Range Weather Forecasts on 6-9 May 2008. The Summit was organized to develop a strategy to revolutionize prediction of the climate through the 21st century to help address the threat of global climate change, particularly at the regional level. The Summit brought together the world's leading scientists from a number of disciplines to discuss what must be done to address society's urgent needs.

The Summit concluded:

1. Considerably improved predictions of the changes in the statistics of regional climate, especially of extreme events and high-impact weather, are required to assess the impacts of climate change and variations, and to develop adaptive strategies to ameliorate their effects on water resources, food security, energy, transport, coastal integrity, environment and health. Investing today in climate science will lead to significantly reduced costs of coping with the consequences of climate change tomorrow.
2. Despite tremendous progress in climate modelling and the capability of high-end computers in the past 30 years, our ability to provide robust estimates of the risk to society, particularly from possible catastrophic changes in regional climate, is constrained by limitations in computer power and scientific understanding. There is also an urgent need to build a global scientific workforce that can provide the intellectual power required to address the scientific challenges of predicting climate change and assessing its impacts with the level of confidence required by society.
3. Climate prediction is among the most computationally demanding problems in science. It is both necessary and possible to revolutionize regional climate prediction: *necessary* because of the challenges posed by the changing climate, and *possible* by building on the past accomplishments of prediction of weather and climate. However, neither the necessary scientific expertise nor the computational capability is available in any single nation. A comprehensive international effort is essential.

4. The Summit strongly endorsed the initiation of a **Climate Prediction Project** coordinated by the World Climate Research Programme, in collaboration with the World Weather Research Programme and the International Geosphere-Biosphere Programme, and involving the national weather and climate centres, as well as the wider research community. The goal of the project is to provide improved global climate information to underpin global mitigation negotiations and for regional adaptation and decision-making in the 21st century.
5. The success of the **Climate Prediction Project** will critically depend on significantly enhancing the capacity of the world's existing weather and climate research centres for prediction of weather and climate variations including the prediction of changes in the probability of occurrence of regional high impact weather. This is particularly true for the developing countries whose national capabilities need to be increased substantially.
6. An important and urgent initiative of the **Climate Prediction Project** will be a world climate research facility for climate prediction that will enable the national centres to accelerate progress in improving operational climate prediction at all time scales, especially at decadal to multi-decadal lead times. This will be achieved by increasing understanding of the climate system, building global capacity, developing a trained scientific workforce, and engaging the global user community.
7. The central component of this world facility will be one or more dedicated high-end computing facilities that will enable climate prediction at the model resolutions and levels of complexity considered essential for the most advanced and reliable representations of the climate system that technology and our scientific understanding of the problem can deliver. This computing capability acceleration, leading to systems at least a thousand times more powerful than the currently available computers, will permit scientists to strive towards kilometer-scale modelling of the global climate system which is crucial to more reliable prediction of the change of convective precipitation especially in the tropics.
8. Access to significantly increased computing capacity will enable scientists across the world to advance understanding and representation of the physical processes responsible for climate variability and predictability, and provide a quantum leap in the exploration of the limits in our ability to reliably predict climate with a level of detail and complexity that is not possible now. It will also facilitate exploration of biogeochemical processes and feedbacks that currently represent a major impediment to our ability to make reliable climate projections for the 21st century.
9. Sustained, long-term, global observations are essential to initialize, constrain and evaluate the models. Well documented and sustained model data archives are also essential for enabling a comprehensive assessment of climate predictions. An important component of the **Climate Prediction Project** will therefore be an accessible archive of observations and model data with appropriate user interface and knowledge-discovery tools.
10. To estimate the quality of a climate prediction requires an assessment of how accurately we know and understand the current state of natural climate variability, with which

anthropogenic climate change interacts. All aspects of estimating the uncertainty in climate predictions pose an extreme burden on computing resources, on the availability of observational data and on the need for attribution studies. The **Climate Prediction Project** will enable the climate research community to make better estimates of model uncertainties and assess how they limit the skill of climate predictions.

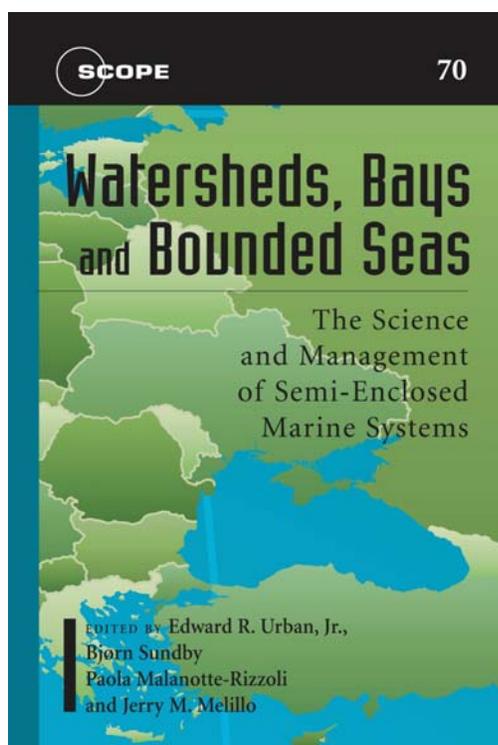
11. Advances in climate prediction will require close collaboration between the weather and climate prediction research communities. It is essential that decadal and multi-decadal climate prediction models accurately simulate the key modes of natural variability on the seasonal and sub-seasonal time scales. Climate models will need to be tested in sub-seasonal and multi-seasonal prediction mode also including use of the existing and improved data assimilation and ensemble prediction systems. This synergy between the weather and climate prediction efforts will motivate further the development of seamless prediction systems.
12. The **Climate Prediction Project** will help humanity's efforts to cope with the consequences of climate change. Because the intellectual challenge is so large, there is great excitement within the scientific community, especially among the young who want to contribute to make the world a better place. It is imperative that the world's corporations, foundations, and governments embrace the **Climate Prediction Project**. This project will help sustain the excitement of the young generation, to build global capacity, especially in developing countries, and to better prepare humanity to adapt to and mitigate the consequences of climate change.

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7.1.3 Scientific Committee on Antarctic Research (SCAR)

7.1.4 Scientific Committee on Problems of the Environment (SCOPE)

The major area of cooperation between SCOR and SCOPE currently is the project entitled: “PACKMEDS - Dynamics of semi-enclosed marine ecosystems: the integrated effects of changes in sediment and nutrient inputs from land.” (IAPSO also participated.) This activity will result in a book in the SCOPE report series (see cover below), published by Island Press. It is based on a workshop held in Delmenhorst, Germany on 2-5 April 2007. The workshop included short presentations of background material, but focused primarily on cross-cutting interdisciplinary discussions. The editors are Ed Urban and Bjørn Sundby (for SCOR), Paola Rizzoli (for IUGG/IAPSO), and Jerry Melillo (for SCOPE). The book is scheduled to be printed by the end of 2008. The outline follows:



Chapter 1	Introduction
Chapter 2	Vulnerability of Semi-Enclosed Marine Systems to Environmental Disturbances
Chapter 3	Threshold Effects In Semi-Enclosed Seas
Chapter 4	Governance and Management of Ecosystem Services in Semi-Enclosed Marine Systems
Chapter 5	Managing SEMS – New Tools for Integrating Information
Chapter 6	Physical Processes in Semi-Enclosed Marine Systems
Chapter 7	Cascading Filters of River Material from Headwaters to Regional Seas: The European Example
Chapter 8	Fluxes of Nutrients and Selected Organic Pollutants Carried by Rivers
Chapter 9	Biogeochemical cycling in semi-enclosed marine systems and continental margins
Chapter 10	Dynamics and Vulnerability of Marine Foodwebs in Semi-Enclosed Systems
Chapter 11	Distribution and Consequences of Hypoxia
Chapter 12	Ecosystem Services Of Semi-Enclosed Marine Systems

SCOPE has been working with UNESCO and UNEP in recent years to produce policy briefs using its reports as the basis. Heike Lokte, Michael Flitner, and Ed Urban assisted in the development of the policy brief based on this book; the brief should be available by the time of the General Meeting.

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7.2 Affiliated Organizations

7.2.1 International Association for Biological Oceanography (IABO)

7.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS)

International Association of Meteorology and Atmospheric Sciences 2008 Annual Report to SCOR 14 August 2008

The key IAMAS activities over the past year have been: 1) planning for the joint IAMAS/IAPSO/IACS scientific symposium to be held in Montreal, Canada from 19 to 29 July, 2008; 2) assumption of office by the new officers of IAMAS; 3) following up after the IUGG General Assembly in Perugia in July 2007; and 4) liaison of IAMAS representatives with other organizations; 5) improving communication via the Web and newsletters; and 6) the activities of the IAMAS commissions.

1. Planning for the IAMAS/IAPSO/IACS

Planning is well along for the joint IAMAS/IAPSO/IACS scientific symposium to be held in Montreal, Canada from 19 to 29 July 2008 (see <http://www.moca-09.org/index.asp>). The Second Circular and Call for Abstracts have recently been released. Overall, there are 21 joint symposia among the associations, and 34 association symposia, of which IAMAS is responsible for just over half. Topics cover the full gamut of scientific research and the meeting promises to be very interesting and well attended. Scientists from around the world in the fields of atmospheric, oceanic, and cryospheric sciences are invited to give papers and to participate. [SCOR is co-sponsoring a session with IAPSO on ocean mixing.]

2. The New Officers of IAMAS

A new slate of officers was elected at the IAMAS General Assembly held in association with the IUGG General Assembly in Perugia in July 2007. The new officers are:

President:	Prof. Guoxiong Wu (China)
Secretary-General:	Dr. Hans Volkert (Germany)
Vice-President (2):	Dr. Anne Thompson (USA) Dr. M. A. F. da Silva Dias (Brazil)
Members at Large (4):	Prof. T. Yasunari (Japan) Dr. V. Kattsov (Russia) Prof. S. Stefan (Romania) Dr. E. H. Berbery (Argentina)

In addition, many commissions elected new officers, as listed on the commission Web pages at www.iamas.org.

3. Follow-up from IUGG 2007 General Assembly in Perugia

In addition to the extensive scientific programme of the IUGG General Assembly in Perugia, IUGG approved two resolutions put forward by IAMAS. One called for continuing efforts to improve understanding of the effects of aerosols on precipitation, and the second dealt with climate change, complimenting the IPCC and urging the scientific community to

increase its outreach and communication efforts, among other provisions. IUGG's next General Assembly will be held in Melbourne, Australia in 2011.

4. IAMAS Representation to Other Organizations

IAMAS scientists serve as liaisons to a number of groups, including SCOR, WCRP, WMO, and others. IAMAS President Dr. Guoxiong Wu is serving as IAMAS liaison to IUGG and the WCRP, which held its 29th session in Arcachon, France from 31 March to 4 April 2008. In addition to reviewing the progress of the many programmes and activities, Dr. Anthony (Tony) Busalacchi of the University of Maryland was elected as chair. Dr. Michael MacCracken, as IAMAS past-president, was appointed to serve as IUGG/IAMAS liaison to SCOR from 2007 to 2011.

One of the recent outreach efforts has been to the Intergovernmental Panel on Climate Change (IPCC) as it was completing its Fourth Assessment Report in 2007. A highlight of interactions with the IPCC this year was the opportunity of Dr. Michael MacCracken to attend, at the invitation of Al Gore, the awarding of the 2007 Nobel Peace Prize jointly to the IPCC and to Al Gore "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change" [see <http://nobelpeaceprize.org/>]. Also attending were 25 of the leaders and lead authors of the IPCC. Dr. Bert Bolin, who was the initial leader of the IPCC was ill and unable to attend the award ceremonies, but a number of those attending were able to speak by phone with him. Sadly, Bolin passed away shortly thereafter.

5. IAMAS Communications: Web site/Newsletter

Dr. John Turner continued as Deputy Secretary General with the primary assignment of continuing to upgrade the IAMAS Webpage (<http://www.iamas.org>) and to publish the biannual IAMAS newsletter.

6. Activities of the IAMAS Commissions

IAMAS has ten commissions, several of which are involved in activities that interact with SCOR-sponsored projects and activities. For example, the International Commission on Atmospheric Chemistry and Global Pollution (ICACGP) is active in a number of projects dealing with air-ocean exchanges that are of interest to SOLAS and is a co-sponsor of SOLAS. The International Commission on Climate (ICCL) received support from IUGG that was used to help a few young developing country scientists attend the very successful "Effects of Climate Change on the World's Ocean" symposium held in Gijon Spain from 19-23 May 2008

(http://www.pices.int/meetings/international_symposia/2008_symposia/Climate_change/climate_support.aspx). The International Commission on Clouds and Precipitation (ICCP) recently convened the 15th International Conference on Clouds and Precipitation in Cancun, Mexico, which drew about 400 participants, including 80 students and many new young scientists. The International Commission on the Middle Atmosphere (ICMA) is co-sponsoring the 5th IAGA/ICMA/CAWSES Workshop on Long-Term Changes and Trends in the Atmosphere, to be held on 8-12 September 2008 in St. Petersburg, Russia. The

International Ozone Commission (IOC) held the Quadrennial Ozone Symposium in Tromsø (Norway) on 30 June to 5 July 2008, with more than 350 scientists from various countries attending. The International Radiation Commission (IRC) held the International Radiation Symposium 2008 in Iguacu, Brazil on 3-8 August, and drew over 500 abstracts, making clear the importance of this area of research. To document the history of the IRC's activities, Dr. Hans-Jurgen Bolle published a history of the Commission entitled "International Radiation Commissions 1896 to 2008: Research Into Atmospheric Radiation from IMO to IAMAS."

Submitted by: Michael C. MacCracken, Past-President of IAMAS and IAMAS Liaison to SCOR

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



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

2007-08 IAPSO Activities -- Report to SCOR (August 2008)

IAPSO is a constituent Association of IUGG (International Union of Geodesy and Geophysics). Its main activity in 2007 was the General IUGG Assembly in Perugia, July 2007. This was reported to the SCOR meeting in Bergen, August 2007, where the IAPSO President Lawrence Mysak and Secretary General Johan Rodhe participated.

Every fourth year IUGG, together with its associations, arrange a General Assembly. Every fourth year, in between the General Assemblies, IAPSO arranges assemblies jointly with other organizations. The next assembly "MOCA-09 Our Warming Planet" is an IAMAS, IAPSO and IACS Joint Assembly which will take place in Montreal, Canada, on 19-24 July 2009. (IAMAS will continue in the second week until July 29.) IAMAS is the International Association of Meteorology and Atmospheric Sciences, IACS is the International Association of Cryospheric Sciences whereby the acronym MOCA-09 stands for IAMAS, IAPSO and IACS Joint Assembly. In November 2007 the IAPSO President and SG met with the National Organizing Committee (NOC) for the MOCA-09 together with the SG of IAMAS and the President of IACS. The localities were inspected and found to be well suited for the meeting. Also, the symposia were outlined together with a time schedule for the planning process before the Assembly. There will be a total of 55 symposia (sessions), consisting of 21 joint ones, 18 sponsored by IAMAS, 10 sponsored by IAPSO, and 6 sponsored by IACS. This was the starting point of an intense planning time. The call for abstracts was released in May 2008 (see http://www.moca-09.org/e/99-home_e.shtml).

IAPSO Commissions and Working Groups report every second year. The last reports were presented to SCOR at the meeting in Bergen.

Finally, a pamphlet presenting IAPSO was produced in December 2007. This was introduced and distributed at the AGU meeting in San Francisco in December and will be sent to the National Correspondents.

The IAPSO website has been modernized and transferred to the new Secretary General Johan Rodhe in Sweden (<http://iapso.sweweb.net/>).

Members of IAPSO EC (for 2007-2011):

President: Lawrence Mysak, Canada
Secretary General: Johan Rodhe, Sweden
Past President: Shiro Imawaki, Japan
Vice President: Denise Smythe-Wright, UK
Vice President: Eugene Morozov, Russia
Treasurer: Fred Camfield, USA

EC Members:

Isabelle Ansorge, South Africa
Silvia Blanc, Argentina
W. John Gould, UK
John Middleton, Australia
Temel Oguz, Turkey
Stefania Sparnocchia, Italy

Report prepared by
Johan Rodhe, SG of IAPSO

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 New Application: Program to Study Ocean Mixing Processes

Proposal for a SCOR-Affiliated Program to study Ocean Mixing Processes

Submitted August 2008

Background

Our understanding of deep ocean mixing continues to lag our grasp of large-scale ocean circulation. This gap in understanding contributes to ongoing difficulties with incorporation of crucial mixing-related processes into global-scale predictive models. Such models are used to assess climate change impacts, such as changes in the meridional overturning circulation (MOC), and to predict changes in the marine environment consequent to absorption and redistribution of heat and of dissolved gases such as oxygen and carbon dioxide. Such changes can be expected to impact biological as well as physical processes, with implications for the marine food web. The importance of mixing in the ocean environment has been recognized in the broader sense, as well as within relevant specialized groups within the oceanographic community (see *Nature*, Vol. 447, 32 May 2007, pp. 522-524).

IAPSO/SCOR Working Group 121 on Ocean Mixing was formed in late 2002 in response to the need for improved understanding of ocean mixing processes. This group held two working group meetings during its four-year existence, and organized a major international conference on ocean mixing in Victoria, Canada in October 2004. The group concluded its tenure with a final meeting at the summer 2007 IAPSO Assembly in Perugia. Its goals included assessment and documentation of the state of science in relation to ocean mixing, assessment of methods for inclusion of mixing into large-scale models, and recommendations for future research. Its members were responsible, in addition, for organizing sessions on ocean mixing at a number of large international oceanographic conferences.

Working Group 121 was highly successful in meeting its terms of reference and in providing a focus for international communication and coordination among researchers sharing an interest in ocean mixing. Group activities are reflected in the proceedings volume from the 2004 Conference on Ocean Mixing (*Deep-Sea Research II*, 2006, 53(1-2)). Additional information is available, in the form of annual and meeting reports, on the SCOR website (<http://www.scor-int.org/>). During the lifetime of the group, ocean mixing continued to attract greater and greater interest as needs became more apparent and the community attracted new researchers. Computational and instrumental capabilities increased markedly, also, during this period, and at least one relevant major international research program—DIMES—has been newly launched (<http://dimes.ucsd.edu/>).

Following is a brief summary, listed in no particular order, of several of the major research issues that were addressed by Working Group 121 and that continue to be of significant interest. This list is not all-inclusive but attempts, rather, to present examples that highlight the overarching motivation for continued, intensive research on ocean mixing. In a sense, then, each

issue reflects a combination of ignorance and importance that mandates continued research.

- Model parameterization: Diapycnal (approximately, vertical) ocean mixing is essential to adequately describe virtually any oceanic system. At time scales exceeding about 10 years, it is an essential controlling factor in the MOC. Its inclusion in ocean models, with particular reference to global circulation models (GCMs) is difficult because of the huge scale differences between processes at turbulent scales (cm) and those at meso and larger scales (tens to thousands of km). Accurate parameterization of turbulent mixing at unresolved scales requires (1) a better understanding of the dynamics and geographical distribution of processes that produce mixing; and (2) a concerted effort to accurately represent the net effects of these processes at model-resolved scales. Attempts to suitably replicate diapycnal mixing in large-scale models are ongoing and, while making progress, still have a ways to go. Solution of these issues through ongoing work is easily justifiable based on our need for reliable models of ocean response to climate change.

- Internal waves: The ocean is permeated by internal waves. These are generated by tidal currents interacting with topography, by surface winds, through eddy decay and current shear, and by other mechanisms. These waves break locally, or transport the energy over varying distances before they break, at which time the energy is released as turbulence. The mechanisms by which internal waves decay into turbulence and mixing are understood conceptually, and to some extent theoretically, but we lack a solid base of field data with which to test and improve our present understanding. Internal wave breaking supplies the vast majority of power needed to mix the deep ocean, hence any global understanding of deep turbulent mixing requires an understanding of global internal wave patterns and dynamics.

- The upper mixed layer: The ocean usually has, as a consequence of surface buoyancy loss or wind-generated turbulence, a so-called "surface mixed layer" that has weak vertical stratification when compared to the waters directly beneath. Our present ability to reproduce mixed layer processes in models relies on a number of *ad hoc* assumptions concerning diapycnal mixing, and requires tuning against density observations. There is no guarantee that such methods will work properly in all physical situations or that they will reliably predict balances in quantities such as nutrients. Continuing investigation of physical near-surface processes is justifiable on both scientific and practical grounds. In addition to comprising the greater volume of the biologically productive euphotic zone, the surface mixed layer mediates the transports of all dissolved gases (e.g., CO₂) and heat between the ocean and atmosphere. Understanding this significant two-way feedback process is essential to understanding our evolving climate.

- Lateral mixing processes: We have long known that mesoscale eddies and rings shed from major ocean currents transport heat and dissolved materials over great lateral distances in the ocean. Analyses of Lagrangian data returned from large numbers of drifters over the past decade has shown that much of the ocean contains a nearly continuous field of submesoscale eddies (size scales of ~1 km) that can play a significant—perhaps the dominant—role in lateral transport in the upper ocean through mixing from shear dispersion. Mechanisms posited for these

small eddies include baroclinic instability of lateral shears associated with spatially variable wind stress or surface buoyancy fluxes. We are just now starting to document their areal distribution and energetics. Continued efforts on these features are needed and, in particular, a synthesis of these and other processes, including means for their parameterization in models, are highly desirable.

- Dense overflows: Water which has been increased in density through surface cooling, freezing or evaporation flows down continental slopes or through narrow straits or channels before reaching the abyssal ocean. These flows, called dense overflows, undergo water mass modification through mixing derived primarily from the flow itself. These flows provide the North Atlantic Deep Water and Antarctic Bottom Water that are responsible for most of the MOC, and contribute as well to saline layers at intermediate depths. Mixing processes associated with dense overflows occur at scales that are small relative to basin scales. These processes, which include bottom boundary layer processes, interfacial shear and internal waves, dynamic instabilities, and interactions with small topographic features, are reasonably well understood. Tidal currents can be locally important as well, as can processes resulting from the seawater equation of state. Major efforts are currently being put into parameterization of these outflows within global ocean models and, while significant progress is being made, we have a considerable way yet to go. Accurate incorporation of these flows is essential to the success of any predictive global ocean model, and continuation of these ongoing efforts is felt to be essential.
- Mixing "hot spots": It has long been believed that some limited subareas of the ocean are mixed much more vigorously than other, larger regions and exert a dominant control over hydrographic properties throughout a much larger area. We now know, for instance, that enhanced mixing is associated with mid-ocean ridges such as the Atlantic Mid-Ocean and Hawaiian ridges. Another such area is associated with the Drake Passage and southern Scotia Sea region. Other such areas likely exist, but areal coverage for quantitative ocean mixing data is sparse indeed. In view of the potential importance of these areas on the large-scale ocean, their assessment is worthy of continuing efforts.
- Double Diffusion: Double diffusive mechanisms result from nonlinear terms in the seawater equation of state. These processes do not involve turbulence; however, they can contribute to significant diapycnal mixing in regions where turbulence is weak. They also play a major role in interleaving along frontal regions. These processes are difficult to assess from field observations. While we do have information on what oceanic regions are double-diffusive, quantitative assessment of the importance of these processes remains sketchy. It does seem highly likely that they play a significant role in diapycnal mixing in the weakly stratified polar oceans, and they will continue to be of interest.

We propose that this is an excellent time to form a SCOR-Affiliated Program on Ocean Mixing. The structure and affiliations that were formed in association with IAPSO/SCOR Working Group 121 remain intact. The issues addressed by the Working Group, some summarized above, remain highly pertinent. Progress over the past half decade has led to related new issues that need to be addressed. While the Working Group served as a catalyst and brought together different members of the international ocean mixing community, what is needed now is a similar but less structured group that can continue to serve as a scientific and organizational rallying point for this community. Details are provided in the below Goals and Terms of Reference.

Goal

It is proposed to establish a SCOR-Affiliated Program on Ocean Mixing in order to facilitate advances in our quantitative and dynamic understanding of ocean mixing processes and in our ability to depict these small-scale processes in large-scale models.

Terms of Reference

1. To provide a group mechanism that can contribute to development and coordination of international research programs related to ocean mixing.
2. To provide an ongoing, informal forum for the exchange of ideas related to advances in our understanding of ocean mixing and in our ability to incorporate mixing into large-scale models.
3. To participate in and assist with integration of ocean mixing research with large programs, for example, CLIVAR.
4. To advise SCOR on the development of new observational methods for study of ocean mixing and on new mechanisms for inclusion of ocean mixing in large-scale models.

Scheduling and Membership

1. Meetings: The Ocean Mixing Program will hold meetings every other year, the first to be held in conjunction with the summer 2009 IAPSO Assembly in Montreal, Canada. These meetings will have a workshop format, will serve as venues for informal presentation and discussion of research concepts and plans, and will foster cooperation among researchers. Working researchers with interests in ocean mixing processes will be invited to participate. Meeting reports will be distributed electronically to steering committee members, attendees, and others who express an interest. Communications during the periods between biennial meetings will take place via electronic correspondence and at small *ad hoc* meetings that might occur in conjunction with large conferences.

2. Steering Committee: A Steering Committee will consist of 15-20 members who will organize the biennial meetings, promote recommended actions, and foster cooperation between the meetings. Steering Committee memberships will carry a three-year tenure, staggered in order to promote continuity, and sufficiently brief to allow a cross-section of different people to serve on the committee. Some restructuring of the committee, as initially proposed below, is expected to take place at the summer 2009 inaugural meeting of the group.

3. Initial Steering Committee: An initial Steering Committee is proposed, in order to initiate the activities of this program, as follows.

<i>J. MacKinnon</i>	(USA) <u>CHAIR</u>	<i>E. Morozov</i>	(Russia)
<i>H. Burchard</i>	(Germany)	<i>R. Muench</i>	(USA)
<i>S. Drijfhout</i>	(Netherlands)	<i>R. Pinkel</i>	(USA)
<i>A. Gargett</i>	(USA)	<i>F. Qiao</i>	(China)
<i>C. Garrett</i>	(Canada)	<i>B. Ruddick</i>	(Canada)
<i>T. Gerkema</i>	(Netherlands)	<i>D. Salas de Leon</i>	(Mexico)
<i>T. Hibiya</i>	(Japan)	<i>L. St. Laurent</i>	(USA)
<i>S. Legg</i>	(USA)	<i>A. Stigebrandt</i>	(Sweden)
<i>T. McDougall</i>	(Australia)	<i>A.M. Treguier</i>	(France)
<i>M. Merrifield</i>	(USA)		

This committee is comprised of members from recently completed IAPSO/SCOR Working Group 121 on Ocean Mixing. This composition will help to ensure the forward continuity of ideas and research interests that were initiated during the tenure of the Working Group and that remained under development at the end of the four-year working group lifetime.

7.3.2 Census of Marine Life (CoML) (affiliated in 2002)

Mission:

Assess and explain the changing diversity, distribution, and abundance of marine species from the past to the present, and project future marine life.

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D. James Baker	USA	Carlo Heip	NETHERLANDS
Patricio Bernal	FRANCE	Poul Holm	DENMARK
D. Chandramohan	INDIA	Yoshihisa Shirayama	JAPAN
David Farmer	USA	Michael Sinclair	CANADA
Serge Garcia	ITALY	Song Sun	CHINA-Beijing
J. Frederick Grassle	USA	Meryl J. Williams	MALAYSIA

Executive Committee Reporter: Peter Burkill

**Census of Marine Life
Annual Report to SCOR**

August 2008

The Census of Marine Life (CoML) was formally established in 2000 and became an Affiliated Program of SCOR in 2002. In 2010, this international research program will release its first report on the status of knowledge of marine biodiversity. In 2008, we are well on our way to reaching this goal. The Census' plans for synthesis and communication of its findings have been carefully developed and are now being implemented. The final results will cover information from 14 Ocean Realm Field Projects and three cross-cutting initiatives in historical studies (HMAP – History of Marine Animal Populations), modeling and prediction (FMAP – Future of Marine Animal Populations), and data management and accessibility (OBIS – Ocean Biogeographic Information System). The following report provides an update on the program's status and plans in 2008.

Scientific Accomplishments

This past year was a big year for field work, as much of the data must now be analyzed if it is to be included in the final reports. Some highlights from CoML expeditions and research analyses include the following.

Species discoveries

Scientists from the Census Abyssal Plains (CeDAMar) and Antarctic (CAML) projects teamed up in the Southern Ocean, where they discovered more than 700 new species of many types of organisms, including carnivorous sponges and giant sea spiders, in the deep Weddell Sea. This number of new species impressed even *Time* magazine, which cited it in its top ten scientific discoveries of 2007.

On the other end of the world, Census Arctic (ArcOD) researchers described a new species of polychaete worm (*Sigambra healyae*) from the Canadian Basin and a new species of hydrozoa (*Sympagohydra tuuli*). These were the first species descriptions from the International Polar Year expeditions in the Arctic.

Since 2003, the Census of Marine Life has discovered more than 5,300 marine animals that had not yet been described and named. Of these, only 111 have, as of yet, gone through the rigorous scientific review process required for designation as a new species. Collectively, the Census projects are discovering new species at a much faster rate than the capacity to describe them.

New insights into marine animal distribution and diversity

The Seamounts project (CenSeam), exploring seamounts off New Zealand, discovered a novel community of brittlestars atop a very tall peak, which they dubbed “Brittlestar City.” The brittlestars, tens of millions living arm tip to arm tip, owe their success to the seamount's shape

and oceanographic conditions. A swirling circumpolar current flowing over and around the seamount at roughly four kilometers per hour allows the brittlestars to capture passing food by simply raising their arms, while carrying away fish and other hovering would-be predators.

ArcOD researchers explored the prey preferences of a selection of Arctic marine mammals, the distribution patterns and abundance of prey species, and how these patterns may change as climate changes. Their results suggested that new feeding grounds may open up in pelagic environments of the Arctic, while nearshore habitats may yield less food, and that ice-dependant species, such as walrus, may become disadvantaged. Results also suggest that marine mammal species that are more opportunistic feeders may actually be advantaged as sea ice regimes shift.

The Future of Marine Animal Populations (FMAP) project used the approximately 2.1 million records of marine fishes available in OBIS to assess the completeness of taxonomic inventories for describing the global diversity and distribution of marine fish. When compared against various accumulation models, results suggested that approximately 20% of species remain to be described globally. CoML is considering similar analyses for different marine groups as part of its 2010 synthesis.

Technologies and other contributions to the community

OBIS is currently serving 14 million data records covering 78,000 species from 251 databases. This means that there are currently geo-referenced species points in OBIS for about 34 percent of the known marine species.

OBIS is a leading partner in a team of scientists working to consolidate the world databases of ocean organisms. In 2008, this team found that almost one-third of all names culled from 34 regional and highly specialized inventories are aliases. Thirty-two percent (56,400) of names reviewed were recognized as aliases for already validated species names—a discovery that could only have been made after combining these global inventories into a single registry—The World Register of Marine Species (or WoRMS). WoRMS now contains about 122,500 validated marine species names, as well as some 5,600 images, hyperlinks to taxonomic literature and other information. Marking the WoRMS' official inauguration, 55 researchers from 17 countries met in Belgium to plan its completion by 2010. Leading marine taxonomic experts independently estimate that about 230,000 marine species are known to science. They also believe there are three times as many unknown (unnamed) marine species as known, for a grand total on Earth that could surpass 1 million.

CoML worked with the Partnership for Observation of the Global Oceans (POGO) to produce two videos describing the need for and availability of technologies for global ocean observations. One video presents an overview of societal benefits derived from the oceans and the usefulness of ocean observations, highlighting some of the major technologies for ocean observing systems. The second video goes into further depth on the biological components of an ocean observing system that the Census of Marine Life can provide. Both videos are available on YouTube: <http://youtube.com/watch?v=Q5hnhNmGeh0> and <http://youtube.com/watch?v=kXXzvGJCVAc>.

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CoML and POGO continue to work to incorporate comprehensive ocean observations within the emerging Global Earth Observing System of Systems (GEOSS).

Sea turtle researchers from the Top Predators (TOPP) project published an analysis of the largest multi-year satellite tracking data set for leatherback turtles, whose numbers have declined in the eastern Pacific Ocean by over 90 percent in the last 20 years¹. Results from the tagging efforts show the leatherbacks from the beaches at Playa Grande consistently follow a relatively narrow corridor out into the sea, past the Galapagos Islands and across the equator to an area in the South Pacific where they linger at length. This predictability provides a biological rationale for the development of multi-scale conservation strategies that take into account this current-induced, cross-boundary movement and potential fisheries interactions. This work will provide existing management programs with directions for future efforts.

In June 2008, officials at the Convention for the Protection of the Marine Environment in the North-East Atlantic (OSPAR) announced their agreement to move forward on a proposal to designate the Charlie-Gibbs Fracture Zone, a 300,000 square km area of the Mid-Atlantic Ridge, and overlaying ocean as a Marine Protected Area (MPA). This is a significant advance for marine protection on the high seas, and much of the science behind the decision for this designation came from the Census's Mid-Atlantic Ridge (MAR-ECO) project expeditions to the area.

Education and Outreach

Editors of *Discover Magazine* cited the Census of Marine Life as one of the six most important experiments in the world in its December 2007 issue. The Census was chosen based on its potential to better protect the world's ocean resources, and through its discoveries, for the promise of developing new pharmaceuticals and industrial applications. It joined the ranks of other exciting initiatives such as a computer model that mimics the function of the human brain and a new way to manipulate genomes. This was perhaps one of the greatest recognitions of the Census' total efforts.

The TOPP project repeated the success of the 2007 Great Turtle Race with this year's Great Turtle Race II: The Olympiad. The race tracked eleven critically endangered Pacific leatherback turtles as they migrated from breeding grounds in Indonesia to foraging grounds out in the Pacific Ocean and from breeding sites along the California coast to Indonesia. Organized by TOPP, the Leatherback Trust, Drexel University, The Global Cause Foundation, and the Sea Turtle Restoration project and supported and sponsored by an international assemblage of conservation groups, public agencies, and educational institutions, the Great Turtle Race II educated the public about the life cycle, migrations and ecology of the leatherback sea turtle, as well as efforts to conserve this 100 million year old species.

¹[Persistent Leatherback Turtle Migrations Present Opportunities for Conservation](#) Shillinger GL, Palacios DM, Bailey H, Bograd SJ, Swithenbank AM, et al. *PLoS Biology* Vol. 6, No. 7, e171
doi:10.1371/journal.pbio.0060171

CoML continues to work closely with Galatée Films on production of *Oceans*. The film is currently scheduled to premier in Paris in November 2009.

Program Governance and Administration

The international CoML Scientific Steering Committee (SSC), the governing body of CoML, meets three times per year. It includes 16 members from around the world:

Dr. Ian Poiner (*Chair*), Australian Institute for Marine Science, Australia
 Dr. Victor Ariel Gallardo (*Vice Chair*), University of Concepcion, Chile
 Dr. Myriam Sibuet (*Vice Chair*), Ifremer (Retired), France
 Dr. Vera Alexander, University of Alaska Fairbanks, USA
 Dr. D. James Baker, Science and Management Consultant, USA
 Dr. Patricio Bernal, Intergovernmental Oceanographic Commission, France/Chile
 Dr. Dorairajasingam Chandramohan, National Institute of Oceanography (Retired), India
 Dr. David Farmer, University of Rhode Island, USA
 Dr. Serge Garcia, Food and Agriculture Organization (Retired), Italy
 Dr. J. Frederick Grassle, Rutgers University, USA
 Dr. Carlo Heip, Netherlands Institute of Ecology, The Netherlands/Belgium
 Dr. Poul Holm, Roskilde University, Denmark
 Dr. Yoshihisa Shirayama, Kyoto University, Japan
 Dr. Michael Sinclair, Bedford Institute of Oceanography, Canada
 Dr. Song Sun, Institute of Oceanology, China
 Dr. Meryl J. Williams, Future Harvest Alliance Office, Malaysia/Australia

In 2008, the SSC invited six ex-officio members to ensure strong links with important synthesis- and legacy-related program-wide efforts:

Dr. Daniel Costa, University of California Santa Cruz, USA (CoML Science Council – see under plans for 2009-2010)
 Dr. Patrick Halpin, Duke University, USA (CoML Mapping & Visualization)
 Ms. Sara Hickox, University of Rhode Island, USA (CoML Education & Outreach)
 Dr. Enric Sala, National Geographic Pristine Seas Project, USA/Spain
 Dr. Paul Snelgrove, Memorial University, Canada (CoML Synthesis)
 Dr. Edward Vanden Berghe, Rutgers University, USA/Belgium (OBIS)

The program has eleven formal National and Regional Implementation Committees (NRICs) that are building local programs that address national research priorities. The intention is that, after the first CoML report in 2010, the NRIC programs will contribute regional syntheses of the known, unknown and unknowable about marine biodiversity and continue to promote CoML's proven technologies and approaches to surveying marine biodiversity in research and monitoring programs and ocean and coastal observation systems. National committees are located in Australia, Canada, China, Indonesia, Japan and the United States. Regional committees are located in the Caribbean, Europe, the Indian Ocean, South America, and Sub-Saharan Africa. Though there is no formal committee at this time, South Korea has established an OBIS regional

node and has agreed to submit a regional synthesis report for 2010. In late 2007, an Arabian Sea biodiversity workshop was held in Oman, where they agreed to participate in OBIS.

CoML's international Secretariat is located at the Consortium for Ocean Leadership (formerly the Consortium for Oceanographic Research and Education) in Washington, DC. In April 2008, it received renewed funding to continue administering the program through its culmination in December 2010. The Secretariat supports two half-time Senior Scientists: Dr. Patricia Miloslavich (Universidad Simon Bolivar, Venezuela) and Dr. Ron O'Dor (Dalhousie University, Canada).

We estimate total commitments to the CoML, including ship-time and other contributions, to be about \$500 million. These funds come from traditional sources, including governments and private organizations, and support scientific research, outreach and education, and project management.

Plans for 2009-2010

In 2008, CoML established and funded a Synthesis Group, chaired by Paul Snelgrove (Memorial University, Canada). This group will lead the development of the primary 2010 products, including an integrative science book for a general audience, and oversee the full suite of products to be developed by the CoML projects, NRICs and community as a whole. The Synthesis Group will hold four meetings per year, three of which will be in conjunction with SSC meetings.

CoML will continue its partnerships with the Barcode of Life and the Encyclopedia of Life, both of which will play a significant role in the 2010 synthesis efforts. We are exploring new partnerships with Google and National Geographic, which we believe will benefit communication and visibility of our findings.

In conjunction with synthesis activities, CoML will be focusing on ensuring ongoing support for marine biodiversity research beyond 2010. The SSC is developing a plan to communicate our findings and their applied value to high-level international and intergovernmental organizations, agencies and conferences. CoML has also established a "2020 Science Council" to develop a strong science scope and explore funding for a follow-on program to CoML. SCOR Executive Director Ed Urban has agreed to serve on this committee, which will meet for the first time in November 2008 in Valencia, Spain.

Relationship to other SCOR activities

CoML has ongoing collaboration with the SCOR Panel on New Technologies for Observing Marine Life. Chaired by Alex Rogers (Institute of Zoology, London), this Panel makes recommendations to the CoML projects regarding technologies that are applicable to their research and more broadly communicates the benefits and potential of novel technologies for studying marine life. This year the Panel received renewed funding from the Census of Marine Life (Sloan Foundation) for ongoing support as well as the development of a 2010 publication documenting the observing technologies that CoML has used and advanced, as well as

discussing foreseeable technologies that could solve some of the constraints faced in studies of the distribution and abundance of marine organisms over the next 10-20 years.

The SSC is also actively promoting CoML methodologies and technologies to the ocean observing community, namely the Global Ocean Observing System (GOOS) and the Global Earth Observing System of Systems (GEOSS). We look to SCOR, specifically the Panel on New Technologies to support us, as appropriate, in these efforts.

CoML (Vice Chair Victor Gallardo and Jesse Ausubel) will participate in the SCOR 50th Anniversary meeting in October 2008. We also look forward to the forthcoming third Summit of Marine Programs, which SCOR will be organizing.

There is natural cross-over between CoML and SCOR through their vast networks of scientists. CoML shares active personnel with both SCOR-sponsored programs IMBER and GLOBEC. Ann Bucklin, Principal Investigator of the CoML Zooplankton project (CMarZ) and leader of CoML's integrative initiative in DNA barcoding, is a former member of the IMBER SSC. Mike Roman, a former member of the CoML U.S. Committee, is a current member of the IMBER SSC. Dave Karl, of the CoML ICoMM project, and Rory Wilson, of TOPP, are on the joint IMBER-GLOBEC working group for "end-to-end food webs." Ruben Escibano, former chair and current member of the CoML South American regional committee, and Jeff Runge, an advisor to the CoML Gulf of Maine project, are current members of the GLOBEC SSC. Additional personnel from CMarZ, TOPP, MAR-ECO, and the Gulf of Maine projects are active in GLOBEC regional and science activities. Senior Scientist Ron O'Dor participates in CLIOTOP meetings.

Additionally, many of the individual CoML projects have partnerships with other programs of interest to SCOR. The ChEss project collaborates with InterRidge, a SCOR-affiliated Program, on cruises, workshops and database development. The CoML projects in the Arctic and Antarctic, ArcOD and CAML, respectively, are the lead coordinating projects for marine biology in the International Polar Year. Through our efforts to integrate CoML technologies and data into GOOS and GEOSS, we work closely with POGO, which is also a close partner of SCOR in many activities.

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7.3.3 International Antarctic Zone Program - iAnZone (Affiliated in 1996)

Goal and Objectives:

The primary goal of the international Antarctic Zone (iAnZone) program is to advance our quantitative knowledge and modeling capability of the seasonal cycle and interannual variability of the ocean and its sea ice cover, with emphasis on climate-relevant fluxes that couple the Antarctic Zone to the atmosphere and to the global ocean. The iAnZone group has been involved in the development and coordination of three large Antarctic zone projects and also organizes meetings intended to inform others of national research and field programs for the purpose of “value-added” linkages among the participants.

Terms of Reference

- To identify, develop, and coordinate research projects meeting the iAnZone goal.
- To provide a forum for the exchange of iAnZone research plans, results, and data.
- To participate in and assist with the coordination between Antarctic Zone and global climate research programs, with other Southern Ocean programs, and with colleagues.
- To advise SCOR on the development of appropriate observing system (e.g., for GOOS, GCOS), data sets, and modeling strategies needed to understand the scales and mechanisms of climate variability within the Antarctic Zone.

For more detailed information on iAnZone’s scientific programs, see their Web site at <http://www.ldeo.columbia.edu/physocean/ianzone/>

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Vicky Lytle	NORWAY	Zhanhai Zhang	CHINA-Beijing
Mauricio Mata	BRAZIL		

Executive Committee Reporter: Jorma Kuparinen

**SCOR AFFILIATED PROGRAMME - International Antarctic Zone (iAnZone)
Report of Activities for 2007 - 2008
XXIXth General Meeting of SCOR
Woods Hole, Massachusetts, USA, October 2008**

Dr Alejandro H. Orsi and Dr. Andrea Bergamasco (co-Chairs of iAnZone)

Introduction

iAnZone was conceived in the late 1980s with the goal to advance our knowledge of Southern Ocean processes, with emphasis in ocean-ice-atmosphere interactions within the vast regions south of the Antarctic Circumpolar Current, their seasonal cycle, inter-annual and decadal variability, and the links between the Antarctic Zone and the global ocean and climate system. At formal biennial meetings iAnZone researchers, primarily physical oceanographers, develop and coordinate new observational and modelling programs. iAnZone was accorded SCOR Affiliated Programme status in early 1997, and SCAR affiliation started in 2004. The Chair of iAnZone represents the programme on the CLIVAR/CliC/SCAR Southern Ocean Panel, and on the SCAR/SCOR Expert Group in Oceanography.

iAnZone **objectives** are (i) to provide an active forum for Antarctic oceanographers to exchange ideas, plans, results and data; (ii) to identify, develop and coordinate research projects; (iii) to facilitate coordination among Antarctic and global climate programmes, and among other Southern Ocean programmes; and (iv) to advise on the development of appropriate observing systems, datasets and modelling strategies needed to assess the scales and mechanisms of climate variability in the Antarctic Zone.

A series of six coordinated, multi-investigator, international and highly successful iAnZone projects have been developed at previous iAnZone meetings. Among these programs are the Ice Station Weddell in 1992, AnzFlux in 1994, Dovetail in 1997-1998, AnSlope in 2003-2004 and ISPol-1 in 2004-2005, MaudNESS in 2005, and SASSI in 2007-2009.

Current Scientific Activities

iAnZone plays a major role during the **International Polar Year** by overseeing the Synoptic Antarctic Shelf-Slope Interactions Study (SASSI), a leading project for a cluster of proposals addressing scientific topics on the Antarctic coasts and margins. SASSI is the current major project coordinated by iAnZone as a contribution to the **International Polar Year**. Its sampling strategy includes a web of synoptic sections across the Antarctic continental slope and shelf. These would measure water mass properties and transports, deploy moorings, drifters and floats, and provide a resource for other measurements such as biogeochemical analyses. The scientific goal of SASSI is to monitor and understand the processes of water mass formation and transformation on the Antarctic continental shelf and slope. More information about this project can be found on the SASSI website: <http://sassi.tamu.edu>.

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The 10th iAnZone biennial meeting took place 27-28 August 2007, in Bergen, Norway, co-located with the Open Science Conference of the Polar Dynamics Meeting. It provided a valuable mechanism for coordinating ongoing research programs in the Southern Ocean, with a particular session dedicated to exchange plans for IPY-SASSI activities scheduled for the austral summer of 2008.

An informal discussion among Antarctic oceanographers took place in St. Petersburg, Russia during the SCAR/IASC/IPY Meeting of July 2008. The purpose of this meeting was to share and summarize progress on IPY-SASSI and IPY-CASO activities, both those undertaken already and those planned for the next couple of years.

Future Meetings

The 11th iAnZone biennial meeting is planned to take place in July 2009, co-located with the IAMAS/IAPSO/IACS Meeting in Montreal, Quebec, Canada. It provides a timely and effective venue for scientists from the international Antarctic community to intensify ongoing, and establish new, collaborations as the IPY fieldwork phase nears completion. A dedicated session will be held to materialize plans toward a joint and global analysis of datasets collected during the current SASSI and CASO programs.

Committee Membership

Alejandro Orsi (Co-Chair; USA)
Andrea Bergamasco (Co-Chair; Italy)
Karen Heywood (ex officio as past Chair; UK)
Shuki Ushio (Japan)
Zhanhai Zhang (China)
Mauricio Mata (Brazil)
Alexander Klepikov (Russia)
Timo Vihma (Finland)
Vicky Lytle (Norway; CliC)
Emanuelle Houssais (France)
Mike Schroeder (Germany)
Mar Flexas (Spain)
Guy Williams (Australia)

Information and opportunities in the Antarctic zone are open to all at the iAnZone website (<http://www.ldeo.columbia.edu/res/fac/physocean/ianzone>), and mailing list (ianzone@ldeo.columbia.edu).

7.3.4 International Marine Global Change Study (IMAGES) (affiliated in 1995)

IMAGES (International Marine Global Change Study) is a program of Past Global Changes (PAGES), a core project of the International Geosphere-Biosphere Programme (IGBP), and is affiliated with SCOR. IMAGES was initiated to respond to the challenge of understanding the mechanisms and consequences of climatic changes using oceanic sedimentary records. The overriding IMAGES science issue is to quantify climate and chemical variability of the ocean on time scales of oceanic and cryospheric processes; to determine its sensitivity to identified internal and external forcings, and to determine its role in controlling atmospheric CO₂. In order to achieve these scientific objectives, IMAGES proposes to coordinate a global program to collect and study marine sediment records to address three fundamental questions:

1. How have changes in surface ocean properties controlled the evolution of global heat transfer through the deep and surface ocean and thereby modified climate?
2. How have changes in ocean circulation, ocean chemistry, and biological activity interacted to generate the observed record of atmospheric pCO₂ over the past 300 kyr?
3. How closely has continental climate linked to ocean surface and deep-water properties?

Chair:

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J.A. Flores	SPAIN	C. Lange	CHILE
F. Florindo	ITALY	M.L. Machain-Castillo	MEXICO
B. Flower	USA	A. Mackensen	GERMANY
F. Grousset	FRANCE	H. Neil	NEW ZEALAND
I. Hall	UK	B. Opdyke	AUSTRALIA
E. Ivanova	RUSSIA	T. Pederson	CANADA
E. Jansen	NORWAY	V. Ramaswamy	INDIA
Z. Jian	CHINA	J. Rogers	SOUTH AFRICA
N. Kallel	TUNISIA	J. Sopaheluwakan	INDONESIA
H. Kawahata	JAPAN	T. Stocker	SWITZERLAND
K.L. Knudsen	DENMARK	A. Völker	PORTUGAL
D. Kroon	NETHERLANDS		

Director: Ralph Schneider

Executive Committee Reporter: Laurent Labeyrie

IMAGES (International Marine Global Change Study)
Marine program of IGBP-PAGES, affiliated to SCOR in 1995)

IMAGES (International Marine Global Change Study) is a core program of Past Global Changes (PAGES), a core project of the International Geosphere-Biosphere Programme (IGBP), and is affiliated with SCOR. IMAGES was initiated to respond to the challenge of understanding the mechanisms and consequences of climatic changes using oceanic sedimentary records. The overriding IMAGES science issue is to quantify climate and chemical variability of the ocean on time scales of oceanic and cryospheric processes; to determine its sensitivity to identified internal and external forcings, and to determine its role in controlling atmospheric CO₂. In order to achieve these scientific objectives, IMAGES coordinates a global program to collect and study marine sediment records to address three fundamental questions:

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3. How closely has continental climate linked to ocean surface and deep-water properties?

IMAGES accomplishes these objectives through (1) the planning and coordination of coring cruises to retrieve and exploit (in international collaboration) giant sediment cores from long, continuous time series in high sedimentation rate areas of the ocean, and (2) the support of symposia, working groups and their workshops.

IMAGES Administration

The program has a permanent office hosted at the University of Bremen in Germany. Our budget covers, in addition to the day-to-day expenses of the office:

- Full-time salary for a data manager.
- Three months of salary per year for an Assistant Director
- Funding or co-funding (with SCOR and PAGES, mainly) of working group meetings, travel support for participation in international conferences and symposia
- Support for training of young scientists (participation to symposia and oceanic cruises)

Chair

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Southampton University
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IMAGES Office

Ralph Schneider, Executive Director
MARUM, Fachbereich Geowissenschaften
Universitaet Bremen
28359 Bremen, Germany
(www.images-pages.org)

Membership

24 countries are members of IMAGES, with some countries represented by a single institute and others by national consortia of university or governmental research institutes.

B. Opdyke	AUSTRALIA	M.L. Machain-Castillo	MEXICO
M. Kienast	CANADA	U. Ninnemann	NORWAY
C. Lange	CHILE	N.N.	NETHERLANDS
Z. Jian	CHINA	H. Neil	NEW ZEALAND
K.L. Knudsen	DENMARK	A. Völker	PORTUGAL
F. Bassinot	FRANCE	E. Ivanova	RUSSIA
A. Holbourn	GERMANY	J.A. Flores	SPAIN
J. Eriksson	ICELAND	J. Rogers	SOUTH AFRICA
V. Ramaswamy	INDIA	T. Stocker	SWITZERLAND
J. Sopaheluwakan	INDONESIA	M.T. Chen	TAIWAN
F. Florindo	ITALY	N. Kallel	TUNISIA
H. Kawahata	JAPAN	I. Hall	UK
B. Suk	KOREA	B. Flower	USA

Data Archiving and Synthesis

Archiving of IMAGES data, including shipboard and laboratory data, is continuously performed on the WDC-MARE (PANGAEA) data archive at the Alfred Wegener Institute at Bremerhaven, Germany and accessible under the www.images-pages.org website.

Working Groups

In 2007 and 2008 IMAGES has supported the activity of several IMAGES and SCOR-IMAGES Working Groups (WGs). There are currently 2 active WGs, whose main task is to coordinate the acquisition of cores and laboratory data in key areas and to stimulate thematic discussion on specific topics related to paleoenvironmental oceanic conditions.

The following WG's were closed after successful activities.

PACE: Reconstruction of Past Ocean Circulation (SCOR 123)

LINKS: Present Oceanic Processes and Paleorecords (SCOR 124). Final report/synthesis papers pending

EPILOG: Re-evaluation of the LGM conditions, MARGO synthesis paper submitted Southern Ocean, closed after lack of cruise funding, parts of site proposal taken up in IPY activities

Ice-sheet-Ocean Interaction, closed, no further action

Holocene Climate Variability, closed, no further action

PEPD (Past Equatorial Pacific Dynamic), closed after a final workshop in 2006

The active working groups comprise:

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WG13: Iberian Margin (Leader A. Völker, F. Abrantes, Portugal),

Had its first workshop on *Circum-Iberia Paleoceanography and Paleoclimate – What do we know and what do we still need to study/verify?* in Peniche (Portugal) on January 15 to 18, 2007. 64 participants (27 PhD/PD students) come from Portugal, Spain, UK, France, USA, Germany, Tunisia, and Taiwan. Topics span from modern processes and modern/recent records to the palerecord including at least the last 2-3 glacial–interglacial cycles).

WG14: Indonesian Throughflow (ITF) Present and Past (Leader: W. Kuhnt, Germany, Y. Rosenthal, US), had no activities in 2007, held its MARCO POLO II post-cruise meeting in Paris in spring 2008, and will probably have another MARCO POLO cruise in 2009 with the French RV *Marion Dufresne*.

Recent IMAGES activities

New IMAGES Science Plan: A new IMAGES II Science Plan is under development. After several discussions during IMAGES SCICOM, SCOR and joint IMAGES-PAGES EXCOM meetings a draft for a new science plan for an IMAGES II phase is under consideration. The lead for this has been taken by E. Rohling, the active IMAGES chair and should be ready for final discussion by the end of 2008.

Cruises: In 2007 two giant piston corer (CALYPSO) coring cruises were executed to the South China Sea and Indonesian waters (Marco Polo II), to the southern Chile Margin (Pachyderme), including 2 coring sites in the Southern Ocean east of Drake Passage. In the framework of the European Science Foundation (ESF) Eurocores EuroMARC program funded by different European funding agencies, 2 IMAGES cruises to the subtropical and northern North Atlantic were executed in spring 2008 (RETRO and AMOCINT).

Workshops, Meetings: IMAGES financially supported several workshops and meetings in 2007, amongst the ICP IX, Paleoceanography Congress in Shanghai, the Trins (Austria) Workshop on “Ocean paleotemperatures and their relationship to the hydrological cycle”, the Urbino Summer School on “Past Climate Reconstruction and Modelling Techniques”, and the ESF conference on “Abrupt Climate Change” in Obergurgl (Austria).

New Activities: Close cooperation is now agreed between IMAGES and GEOTRACES, both programs will seek better coordinated efforts in joint proxy calibration and hopefully in joint cruise activities. New thematic activities proposed and supported by initial workshops in 2008 will be on sea-level variations and on climate records from evaporative basins Mediterranean and Red Sea.

More detailed information on the IMAGES activities are presented under www.images-pages.org

7.3.5 InterRidge - International Ridge Studies (affiliated in 1996)

Terms of reference:

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

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Co-chair: Chris German
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Members:

Fernando Barriga	PORTUGAL	Françoise Gaill	FRANCE
Donna Blackman	USA	Timothy Henstock	UK
John Chen	CHINA-Beijing	Sung-Hyun Park	KOREA
Paul R. Dando	UK	Rosario Lunar	SPAIN
Colin Devey	GERMANY	Rolf Pedersen	NORWAY
Nicole Dubilier	FRANCE	K.A. Kamesh Raju	INDIA
Jérôme Dymnt	USA	Nobukazu Seama	JAPAN
		Steve Scott	CANADA

Coordinator: Stace Beaulieu

Executive Committee Reporter: Laurent Labeyrie

2008 InterRidge Update for SCOR

The InterRidge (IR) program office is now in its second year at Woods Hole Oceanographic Institution (WHOI). The IR office will remain at WHOI through the end of 2009 and is led by a multi-disciplinary team: Jian Lin (IR Chair, marine geophysics/tectonics/geodynamics), Chris German (IR Co-Chair, geochemistry/hydrothermal activity), and Stace Beaulieu (IR Coordinator, deep-sea biology). In the past year, IR expanded from 28 to 30 regional and national memberships with the addition of Chile and Chinese Taipei. The 2475 individual members in IR now come from a total of 61 countries with this year's addition of members from Nepal and Vietnam. The biweekly "interridge-mail" e-news is sent to over 1600 IR members, and we also started an e-mailing list for job postings ("interridge-classifieds").

InterRidge (<http://www.interridge.org>) promotes interdisciplinary, international studies of oceanic spreading centers 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 is also dedicated to reaching out to the public, scientists and governments, and to providing a unified voice for ocean ridge researchers worldwide. Following are just a few examples of exciting progress in the past year.

Increasing contributions by countries with emerging economies

One important trend in the last few years is that emerging economies—such as India, China, and Korea—are developing national programs in ridge exploration and research, together with rapid increase in investments in deep-sea technology and strengthening of ties to the international community. In fall 2007, China officially became an InterRidge Principal Member. China is the first new IR Principal Member in almost a decade. China is also the first developing country and newly industrialized country to become an IR Principal Member.

In November 2007, the IR Steering Committee meeting was held in Rio de Janeiro, Brazil, thanks to the warm hosting of Dr. Sidney Mello and other Brazilian colleagues. Subsequently, a mid-ocean ridge special session was held at the 10th International Conference of the Brazilian Geophysical Society. These events are part of an effort to promote ocean ridge research and exploration in South American countries and to strengthen ties with the IR community. We are very pleased to see the synergy, enthusiasm, and vision of our colleagues in South American countries in general, and Brazil and Chile in particular, for increased ocean ridge and deep-sea research in the coming years.

New InterRidge Working Groups in 2008

The IR Working Groups (WGs) play an essential role in promoting, facilitating, and coordinating new research that follows a focused theme of emerging scientific promise, or is conducted in a

unique geographic setting along global ridge-crests where advances in science will benefit significantly from IR coordination. The WGs discuss issues related to focused science themes, convene group meetings and community-wide workshops, and promote and coordinate new international research cruises and related work. There are four established WGs continuing into 2008: Biogeochemical Interactions at Deep-Sea Vents (which held an IR Theoretical Institute in Sept. 2007 at WHOI), Deep Earth Sampling, Monitoring and Observatories, and Ultra-slow Spreading Ridges.

The IR Steering Committee recommended four new WGs for 2008:

- *Imaging crustal and mantle structure beneath mid-ocean ridges (Contact: Nobukazu Seama, Japan)*. This WG will lead a planning effort of the international community to 1) promote experiments to image the mantle structure at one or two ridge systems through pooling of international expertise, instruments, and resources; and 2) encourage scientists to link effectively for interpreting and using the high-quality images.
- *Vent ecology (Contact: Chuck Fisher, USA, and Stephane Hourdez, France)*. The primary goals of this WG are to foster international collaboration in cutting-edge research that will advance our understanding of the ecology of hydrothermal vents and to promote expanded collaborations between geologists, chemists and ecologists to understand changes in vent communities over time.
- *Seafloor mineralization (Contact: Maurice Tivey, USA)*. This WG will promote and coordinate international research on the science of seafloor mineral deposit formation, maturation, and evolution. The WG will promote development of techniques to locate such deposits, and to investigate the processes, including the biological roles, that are responsible for their formation and preservation.
- *Systematic long-range ridge exploration (Contact: Colin Devey, Germany)*. This WG will promote international collaboration and develop strategies for the use of cutting-edge AUV technology and state-of-the-art sensors in the systematic exploration of ridge hydrothermal and other processes on regional and ocean-basin scales.

New InterRidge Student Fellowship Program

In 2008 IR initiated the InterRidge Student Fellowship Program. In this first year of the program, two IR Student Fellowships of up to US\$3000 each will be awarded in May 2008. These new fellowships are designed to encourage international collaboration on any aspect of ridge-crest science by graduate students. In particular we encourage these awards to be used for international cruise participation, international laboratory use, and adding an international dimension to students' thesis work. The IR office is working to obtain external funding to support these fellowships for the long term, and we are excited to have obtained a strong set of

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applicants from several countries in the very first year of the program.

InterRidge Cruise Database

In January 2008 IR launched a revised online database of international cruises to mid-ocean ridges and back-arc basin spreading centers (<http://www.interridge.org/IRcruise>). The > 500 cruises in the database date back to 1982. IR members are able to enter their cruises directly to the database using an online form. IR also maintains an up-to-date list of upcoming ridge-crest cruises. If you would like your cruise to be featured on the IR website's "News from the Ridge Crest" page, please contact the IR office (coordinator@interridge.org).

The IR Coordinator is currently revising the global Hydrothermal Vents Database and will announce it to the community when it is updated.

InterRidge Outreach in 2008

The IR Coordinator Stace Beaulieu has resumed additional responsibilities for IR outreach after our former IR Outreach Coordinator Kristen Kusek took up a new position as director of public relations for the Earthwatch Institute in February 2008. The IR program expresses deep gratitude for Kristen's outstanding service to the InterRidge community.

IR is planning for two major outreach efforts in summer 2008: the MATE International Student ROV Competition and the EuroScience Open Forum (ESOF). The MATE ROV Competition will be held at the University of California, San Diego, in June 2008. IR is sponsoring two awards for the event, and Coordinator Stace Beaulieu will attend the competition as a Judge. IR is co-sponsoring an exhibit at ESOF, taking place in Barcelona, Spain, in July 2008, with the ChEss (Chemosynthetic Ecosystems) program of the Census of Marine Life.

For more information about IR's recent activities as well as national updates, please check the IR website and most recent newsletter (<http://www.interridge.org/IRNewsletter>) or contact the IR office (coordinator@interridge.org) for a hard copy of the 2007 InterRidge News.

The thrust for the InterRidge program in the coming months will be to engage the full activities of the four established and four new working groups that cover a wide range of exciting research directions of major interest to the international community. As deep-sea research in various member nations is strengthening and becoming more coordinated, we also expect additional upgrades of InterRidge memberships of individual nations. We look forward to working with the international community to bring the InterRidge program to an exciting new level.

Jian Lin (InterRidge Chair), Chris German (InterRidge Co-Chair), Stace Beaulieu (InterRidge Coordinator)

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

IOCCG is an international group of experts in the field of satellite ocean colour that acts as a liaison and communication channel between users, managers, and agencies in the ocean colour arena.

Terms of Reference:

- To serve as a communication and coordination channel between data providers and the global user community of satellite ocean-colour data, and so to maximize the benefits that accumulate from international investments in ocean-colour science and technology.
- To construct a partnership, at the international level, between the space agencies and the users of satellite ocean-colour data to develop and coordinate data utilization.
- To work closely with the appropriate international bodies (including CEOS, IOC and SCOR), international scientific programs (such as IGBP and GOOS), satellite ocean-colour mission offices and other agencies (such as environmental and fishing agencies) to harmonize the international effort and advance ocean-colour science and its applications.
- To develop a collective voice for the community of users of ocean-colour data and to articulate this voice to the appropriate international bodies, international scientific programs and space agencies.
- To promote the long-term continuity of satellite ocean-colour data sets; the development of operational, ocean-colour data services and new generations of ocean-colour sensors; and the integration of data from complementary ocean sensors.

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David Antoine	FRANCE	Milton Kampel	BRAZIL/INPE
Stuart Bernard	SOUTH AFRICA	Srinivasa Kumar	INDIA/INCOIS
Paula Bontempi	USA/NASA	Samantha Lavender	UK
Yves Crevier	CANADA	Hiroshi Murakami	JAPAN
Curtiss Davis	USA/Naval Res. Lab	Rangnath Navalgund	INDIA
Pan Delu	CHINA-Beijing	Trevor Platt	CANADA
Paul DiGiacomo	USA	Peter Regner	ITALY
Roland Doerffer	GERMANY	Heidi Sosik	USA
Mark Dowel	ITALY/JRC	Eric Thouvenot	FRANCE/CNES
Nicolas Hoepffner	ITALY/JRC	Scarla Weeks	AUSTRALIA

Executive Committee Reporter: Jorma Kuparinen

SCOR AFFILIATED PROGRAM**International Ocean-Colour Co-ordinating Group (IOCCG)
Report of Activities 2007 - 2008****Venetia Stuart (IOCCG Project Scientist)*****1. Background***

The International Ocean-Colour Co-ordinating Group (IOCCG) was founded in 1996 under the auspices of the IOC (Intergovernmental Oceanographic Commission), and has been an Affiliated Program of SCOR since 1998. It is also an Associate Member of CEOS (Committee of Earth Observation Satellites). The group was established to encourage communication and international co-operation between the providers of ocean colour data (various space agencies that possess ocean-colour sensors), and the users of ocean-colour data (scientists, researchers and program managers). Information retrieved from ocean-colour remote sensing can contribute to our understanding of the planetary carbon cycle and climate research, as well as other biological and biogeochemical processes in the oceans. Ocean-colour data also has many other applications including management of marine resources and coastal zone management.

The IOCCG consists of a Committee of around 20 members, comprised of scientific members (selected experts in the field of satellite ocean colour) as well as agency members (representatives from various space agencies providing sponsorship). The group is chaired by Prof. James Yoder (Woods Hole Oceanographic Institution, USA) and the Project Office is located at the Bedford Institute of Oceanography (Canada), staffed by Project Scientist, Dr. Venetia Stuart.

2. Scientific Activities

Scientific issues related to various aspects of ocean-colour technology and its applications are traditionally addressed by relatively short-lived scientific working groups (WGs). The end product of these working groups is usually the publication of an IOCCG Report. To date, six such reports have been published by the IOCCG, and one is in press. These reports are always in high demand by scientists, managers and students from around the world (Reports 1 and 2 were recently reprinted for the third time!). Currently, six IOCCG WGs are in various stages of deliberation, and a new WG on ocean colour from a geostationary platform was proposed and accepted at the last IOCCG meeting. In addition, the IOCCG also supports and collaborates with the SAFARI Project, and has agreed to publish the report produced by this project. Information on all these working groups and projects is given below.

2.1 Operational Ocean-Colour WG

Co-Chairs: Trevor Platt (BIO, Canada) and Nicolas Hoepffner (JRC, Italy)

The objectives of this WG were to prepare a report aimed at policy makers interested in societal benefit areas, and to explain the important applications of ocean colour, both real and potential. The group was originally chaired by Christopher Brown of NOAA (USA), but he stepped down due to other work commitments, so Trevor Platt and Nicolas Hoepffner took over as co-chairs. A draft report prepared by the WG was recently submitted to the IOCCG Committee for review, and the final report is now in press. The Indian Space Organisation (ISRO) has agreed to sponsor and carry out the printing of this report, which is gratefully acknowledged. In addition, an 8-page brochure is being prepared to reflect the outcomes of the report in policy-making language. Both these documents will be distributed free of charge to subscribers on the IOCCG mailing list later this year.

2.2 Global Ecological Provinces WG

Chair: Mark Dowell (JRC, Italy)

The aim of this working group is to review the utility of ocean partitions as a tool for the interpretation and application of ocean-colour data, including applications dealing with the ocean carbon cycle, climate change and resource management. At the last IOCCG meeting the Chair of the WG reported that he had not made as much progress with the report as he had anticipated, due to other work commitments, but that most of the material was already in hand and just needed to be collated and edited. Members of working group have expressed an interest in continuing the task beyond the working group by establishing a dedicated website to present interpretations of various classification schemes. The report is scheduled to be published next year.

2.3 Bio-optical Sensors on Argo Floats WG

Chair: Hervé Claustre (Laboratoire d'Océanographie de Villefranche, France).

Ocean-colour radiometry is a powerful tool, but has some limitations (cloud cover, calibration problems, etc.), so to reach its full potential it must be complemented with other techniques, for example, making use of Argo-like floats. A network of ~ 3,000 Argo profiling floats currently samples the global ocean for temperature and salinity. Argo floats with optical/ biogeochemical sensors have the potential to provide high density, biogeochemical data at relatively low cost, and present a very promising avenue for synergistic applications with remote sensing of ocean colour, including calibration/validation activities.

This WG met for the first time in February 2008, and a number of preliminary recommendations were formulated: three types of Argo-like floats were recommended for bio-optical activities including VAL-Argo (validation only), BGC-ARGO (Biogeochemical and calibration) and C-Argo (for carbon). A pilot study was also recommended before developing large-scale applications. An outline of an IOCCG report on the topic was prepared, and preliminary text for some sections is expected to be submitted by mid-year. This working group is well on track and has made a lot of progress within a very short space of time. The next WG meeting is planned

for 19-20 November 2008, in Villefranche-sur-mer, France.

2.4 Atmospheric Correction Algorithm WG

Chair: Menghua Wang (University of Maryland, USA)

The objectives of this WG are to quantify the performance of the various atmospheric correction algorithms used by SeaWiFS, MODIS, OCTS, GLI and MERIS missions, so that derived products from these ocean-colour missions can be meaningfully compared and possibly merged.

Some progress has been made over the past year in that detailed evaluation results for algorithm comparisons from various sensors (based on common simulated data sets) have been shared within the WG. Draft text for various sections has been prepared, but there are still many chapters that needed to be finished. This WG was established several years ago, so the IOCCG Executive Committee recommended that unless a comprehensive draft report was received by the end of 2008, the WG would be disbanded.

2.5 Calibration of Ocean-Colour Sensors WG

Chair: Robert Frouin (Scripps, USA)

This WG examined the various approaches used for pre- and post-launch calibration of different ocean-colour sensors. Much of the material for the report (apart from material about on-board calibration devices) was provided after a WG meeting in Australia in 2004. After the workshop, there was a loss of interest and motivation, so Dr. Frouin has started writing the remaining chapters himself. Even though this WG was established several years ago, the report is still timely, and would be very useful as a reference. Calibration was also identified as one of the key areas by the IOCCG BIO-Argo working group. Because this WG has been in operation for such a long time, the IOCCG Executive Committee recommended that this WG also be disbanded unless a comprehensive draft report was received by the end of 2008.

2.6 Phytoplankton Functional Types (PFT) WG

Chair: Cyril Moulin (CEA/CNRS, France)

PFTs are conceptual groupings of phytoplankton species which have an ecological functionality in common *e.g.* nitrogen fixers or calcifiers. They are of interest to the biogeochemical community because they are relevant proxies of ecosystem function and can be potentially derived from ocean-colour remote sensing through direct or indirect effects. The WG recently requested that NASA include HPLC data with accompanying optical measurements in their NOMAD database. NASA has provided this service and the WG is using this database for validation of various PFT algorithms. In addition, CNES has funded a “PFT Inter-Comparison Project” and the results from this study will also be incorporated into the IOCCG report. About one-third of the contributions for the IOCCG report have been received to date, but the WG Chair could not devote much time to the report over the past year due to other work commitments, so progress has been slow. In the light of this, the IOCCG Executive Committee recommended that a new Chair be found for the WG to guide the report to completion. Shubha Sathyendranath (PML, UK) and Suzanne Craig (Dalhousie University, Canada) were

approached, and they have agreed to take over. It was hoped to get a draft report completed by the end of the year.

2.7 Proposed WG on Ocean Colour from a Geostationary Platform

Chair: David Antoine (LOV, France)

A proposal for a new IOCCG WG to address requirements, advocate for coordination, and foster collaboration of ocean-colour observations from a geostationary orbit was received at the last IOCCG Committee meeting. Advantages of a geostationary orbit for ocean-colour studies include better temporal coverage, the possibility of following episodic events at the scale of hours, and improving the match between the temporal scale of satellite observations and those of models. Several space agencies also have plans to develop a geostationary ocean colour sensor, so the WG would be very timely. The proposal was accepted at the IOCCG Executive meeting, and David Antoine agreed to act as Chair of the WG. Membership of the group would include representatives from USA, Korea, India, China, Japan and CNES. The terms of references for the group are currently being drafted and it is expected that the first WG meeting will take place before the end of the year – probably in South Korea, in conjunction with the Korean GOCI workshop (November 2008).

2.8 SAFARI Project

The Group on Earth Observations (GEO) established Task AG-06-02 to stimulate interest in the use of remote sensing as an important tool to address problems in fisheries research and management. An element of the Task is the SAFARI Project (Societal Applications in Fisheries and Aquaculture using Remote Sensing Imagery), directed by Trevor Platt and funded by the Canadian Space Agency and GEO. In-kind support is also provided by the IOCCG and the Bedford Institute of Oceanography.

An international workshop on the Use of Remotely-Sensed Data as an Aid to Fisheries Research and Fisheries Management was held at the Bedford Institute of Oceanography (26-28 March 2008) to gauge the current status of Earth observation (EO) as related to fisheries management, and to bring together EO and fisheries experts from a range of relevant space agencies, environmental agencies and other EO communities. Forty-four international participants from more than a dozen countries attended the workshop. Issues of mutual concern were discussed, and an outline for an IOCCG monograph on this topic was drafted at the end of the workshop, with input from all invited participants. Contributions are expected to be submitted by mid-2008 and the final report is expected to be published by the IOCCG by March 2009.

3. Capacity Building Initiatives

The IOCCG also has a strong interest in capacity building and has sponsored and coordinated numerous advanced training courses in many parts of the world.

3.1 Training Course in Mombassa (24 September – 5 October 2007)

Last year the IOCCG co-sponsored an intensive 2-week, ocean-colour training course in Mombasa, Kenya, in conjunction with the EC Joint Research Centre (Italy). A total of 18 participants from eleven different countries in Africa attended the course. The first week of training was dedicated to providing a theoretical basis of ocean colour through morning lectures and afternoon practical sessions, which familiarized students with BEAM and SeaDAS processing software. The second week was dedicated to applications of ocean colour and the execution of mini-projects, for which an impressive amount of work was done. Student presentations at the end of the course were of a very high standard and reflected the knowledge acquired during the course, and the enthusiasm and effort put in by the students.

3.2 Wikipedia Entry

Other capacity building initiatives included preparation of an IOCCG-approved entry for “ocean colour” in Wikipedia, the free on-line encyclopaedia. Draft text for the entry is currently being reviewed, and should be published in Wikipedia shortly. The approved definition for “ocean colour” is as follows: *“Ocean Colour is a technology, and discipline of research, concerning the study of the interaction of visible electromagnetic radiation with constituents in aquatic environments. In general the term is used in the context of remotely-sensed observations, often made from earth orbiting satellites”*.

3.3 Video: “The Science of Ocean Colour”.

Another capacity building initiative endorsed by the IOCCG is the preparation of a DVD on “The Science of Ocean Colour”. Roland Doerffer (GKSS, Germany) is working on a 45-min video covering several ocean-colour related topics including i) the determination of ocean colour, ii) techniques used on board a research vessel during an ocean optics cruise, iii) ocean colour from space, iv) processing satellite data, and v) the role of the IOCCG. A draft video was used for teaching purposes during the ocean-colour training course in Mombasa, and the final production and distribution of the DVD should be completed by mid-2008 (costs to be covered by GKSS).

4. Coordination and Liaison

4.1 Annual IOCCG meeting

The IOCCG Committee meets once a year to coordinate the activities of the group as a whole,

and to review the progress of the various working groups, discuss plans for the year ahead and propose new working groups and training initiatives. The last meeting of the IOCCG Committee took place at the UNESCO Headquarters in Paris, France on 12-14 February 2008. The meeting was attended by a total of 37 participants (22 Committee members plus 15 invited guests) and provided an excellent opportunity for all parties to come together to share ideas and discuss issues facing the ocean-colour community in various parts of the world, as well as to plan a number of new initiatives. The minutes of the meeting are available on the IOCCG website at http://www.ioccg.org/reports/ioccg_meeting13.html.

The Executive Committee also meets once a year to discuss the finances of the group and to make decisions on proposals for new IOCCG working groups, training initiatives, requests for funding, proposals for new members, and other issues. The next IOCCG Committee meeting will be hosted by the Second Institute of Oceanography, and is scheduled to take place in Hangzhou, China from 20 to 22 April 2009.

4.2 IOCCG's Contribution to GEO and CEOS

The role of CEOS is to coordinate Earth observation satellites and to act as the main implementation body for the space segment of GEOSS (Global Earth Observation System of Systems) through the Strategic Implementation Team (SIT). The Group on Earth Observations (GEO), in turn, coordinates international efforts to build a GEOSS, targeted at 9 societal benefit areas. Three GEO work plan tasks are related to IOCCG's remit:

- AG-06-02 (Data Utilization and Aquaculture) - IOCCG is playing major role in this task by enhancing utilization of Earth observations in fisheries and aquaculture through the SAFARI Project (see above).
- CI-06-06 (Global Ocean Observation System) – this task is led by GOOS to improve coordination of coastal and marine climate observations. The related Global Climate Observing System (GCOS) programme has specified ocean colour as one of its key measurements.
- EC-06-07 (Regional Networks for Ecosystems) - This Task is building upon existing initiatives (*e.g.* the ANTARES Programme, created under the auspices of the IOCCG) to develop a global network for ecosystems, and to coordinate activities to strengthen observing capacity in developing countries, which is also one of IOCCG's long-standing objectives.

CEOS has also developed the concept of virtual, space-based Constellations in support of GEO objectives. A CEOS Virtual Constellation is a set of space and ground segment capabilities operating together in a coordinated manner, in order to meet a combined and common set of Earth Observation requirements. GEO and GEOSS will benefit from these Virtual Constellations in that they can help agencies avoid duplication and overlap in Earth Observation efforts, and establish a globally sustained Earth Observation network. At the last SIT meeting (23 April 2008), the IOCCG submitted a pre-proposal for an Ocean Colour Radiometry Virtual Constellation (OCR-VC), with IOCCG as the lead. This pre-proposal was accepted, and IOCCG

was encouraged to submit a full proposal (due this summer). It is anticipated that all space agency representatives serving on the IOCCG Committee will take a leadership role in the OCR-VC activities.

5. Outreach

The IOCCG connects with the global user community through a variety of outreach information schemes including a website, newsletters, training courses, brochures, reports and information sessions at conferences and workshops. The comprehensive IOCCG website (see <http://www.ioccg.org>) provides a wealth of information on data sources, software, training opportunities, conferences, an extensive bibliography, employment opportunities and status of current and future ocean-colour sensors. In addition, the Project Office distributes a quarterly electronic newsletter to over 1,000 subscribers, keeping the ocean-colour user community informed of important events, research activities, training initiatives and mission status news. The IOCCG Reports are also distributed free of charge to the ocean-colour user community.

6. Current Membership of the IOCCG

The IOCCG Committee consists of about 20 members drawn from Space Agencies and the ocean-colour community, selected to reflect a balance of both providers and users of ocean-colour data, as well as geographical location. The term of service is usually three years, except where the members' participation is governed by a Space Agency nomination. Rotation of members is being implemented according to a roster (four members marked with an asterisk are expected to step down after the next Committee meeting). The group is currently chaired by Prof. James Yoder (Woods Hole Oceanographic Institution, USA).

IOCCG Committee Members (2007/2008)

Ahn, Yu-Hwan	-	Korea Ocean Research and Development Institute, Korea
Antoine, David	-	Laboratoire de Physique et Chimie Marines, France
Bernard, Stewart	-	University of Cape Town, South Africa
Bontempi, Paula	-	NASA HQ, USA
Crevier, Yves	-	Canadian Space Agency, Canada
Davis, Curtiss	-	Naval Research Lab, USA
Delu, Pan*	-	Second Institute of Oceanography, China
DiGiacomo, Paul	-	NOAA, USA
Doerffer, Roland*	-	GKSS, Germany
Dowell, Mark	-	JRC, Italy
Hoepffner, Nicolas	-	Joint Research Centre, Italy
Ishizaka, Joji	-	Representing JAXA, Japan
Kampel, Milton	-	INPE, Brazil

Kumar, Srinivasa*	-	INCOIS, India
Lavender, Samantha	-	University of Plymouth, UK
Murakami, Hiroshi	-	JAXA EORC, Japan
Navalgund, Rangnath	-	ISRO, India
Platt, Trevor (past Chair)	-	Bedford Institute of Oceanography, Canada
Regner, Peter	-	ESA/ESRIN, Italy
Sosik, Heidi*	-	Woods Hole Oceanographic Institution, USA
Thouvenot, Eric	-	CNES, France
Weeks, Scarla	-	University of Queensland, Australia
Yoder, James (Chairman)	-	Woods Hole Oceanographic Institution, USA

7. List of Sponsors

Activities of the IOCCG are dependent upon financial contributions from national Space Agencies and other organisations, and upon infrastructure support from SCOR. Representatives from the funding agencies form the Executive Committee. This year the IOCCG received new sponsorship from the Indian Space Research Organisation (ISRO).

- BIO (Bedford Institute of Oceanography, DFO, Canada)
- CNES (Centre National d'Etudes Spatiales, France)
- CSA (Canadian Space Agency)
- ESA (European Space Agency)
- GKSS (Germany)
- ISRO (Indian Space Research Organisation)
- JAXA (Japan Aerospace Exploration Agency)
- JRC (Joint Research Centre, EC)
- KORDI (Korean Oceanographic Research Institute)
- NASA (National Aeronautics Space Administration)
- NOAA (National Oceanic and Atmospheric Administration)

The Bedford Institute of Oceanography has been providing in-kind support since the project's inception (office space, computer, informatics support, fax, phone and postage). SCOR provides logistic support and also manages the NASA and NOAA funds (no NOAA funds were received for FY 2007/2008, although they may provide travel support). The IOCCG has benefited from the efficient and professional manner in which its funds have been managed by SCOR, and it has also been strengthened by having visible links with one of the major international nongovernmental organizations in the marine sphere.

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7.4 Other Organizations

7.4.1 Partnership for Observation of the Global Ocean (POGO)



POGO Activities – 2007

POGO-8 Meeting

The eighth meeting of POGO was held in Qingdao, China on 17-19 January 2007, hosted by the Institute of Oceanology, Chinese Academy of Sciences. Some 55 delegates from 16 countries attended the meeting. The delegates included POGO members and representatives of international organizations. Most of the presentations and discussions focused on improving the links between the ocean community and GEO (Group on Earth Observations) and on strengthening the ocean components of GEOSS (Global Earth Observation System of Systems). The meeting was highly successful, especially with regard to identifying many common strands on which GEO and the ocean community (Ocean United) could work together to mutual benefit. Progress on new plans to develop an International Research Cruise Information Database were discussed. Various capacity-building activities of POGO were presented. It was also decided to proceed with plans to establish a Nippon Foundation – POGO Centre of Excellence. The presentations at the meeting are posted on the POGO website (http://www.ocean-partners.org/meetings/P8_agendapresentations.htm). Our hosts IOCAS, led by Dr. Sun Song and Prof. J-H. Xiang and their colleagues, welcomed the participants to Xingdao with warm Chinese hospitality. The participants were also invited to a banquet by the First Institute of Oceanography. All in all, our Chinese colleagues were most helpful and welcoming hosts.

POGO activities with GEO during 2007

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Howard Roe

Introduction

This last year has been the most active and productive with respect to GEO since we became a participating organisation in GEO in 2003. Activities began with the POGO 8 meeting in Qingdao where we were delighted to welcome Jose Achache, Director of GEO and Michael Rast, GEO Secretariat, to a POGO meeting for the first time. The discussions at the POGO 8 meeting are summarised in the minutes of the meeting and these lead led to a range of activities

culminating in the successful GEO IV meeting in Cape Town from November 28-30. The various POGO/GEO interactions during the year are summarised below.

GEO discussions at POGO 8 Meeting

POGO heard directly from Jose Achache of the need to develop further the vital importance of oceans and ocean observations within GEO by direct participation in the GEO working groups and task forces; by concerted media and PR activities; and by developing examples of ocean activities that could be used to promote the importance of the oceans within GEO. David Farmer – who had acted as an ocean ambassador to GEO in the previous year – also stressed the importance of direct engagement and participation with GEO.

As a follow up, Tony Haymet wrote a letter to GEO dated 16/02/07 in which he stated POGO's intention to work closely with GEO, referenced Argo and CoML as ocean examples; agreed to develop outreach; and provided a list of POGO members as members of GEO Task Teams. Subsequently Howard Roe, Chris Reid and Jim Baker were nominated to represent POGO and Ocean United in the GEO Task Force 2 charged with developing the GEO Report on Progress for the GEO IV meeting. In parallel, Shubha Sathyendranath represented POGO on the GEO Capacity Building Committee.

GEO Task Force 2

This met twice in Geneva, on 11/12 April and 4/5 June; Howard Roe attended with Chris Reid at the first meeting and with Jim Baker at the second. Boram Lee from IOC attended both meetings and we worked together as Ocean United throughout the work of the Task Force. From our perspective, we successfully made the case for the importance of the oceans at the meetings and in the various draft reports that circulated. We ensured the inclusion of both Argo and the CoML programmes as outstanding exemplars of ocean activities within GEO. The result was the Report on Progress and the accompanying Annex that was delivered to both the GEO plenary and to the Ministerial Summit. Both can be found on the GEO web site

<ftp://ftp.wmo.int./Projects/GEO/GEO-IV>

Coastal Initiatives

During POGO 8 there were discussions as to how best POGO could develop links and activities with coastal observing systems. Chris Reid visited Paris to discuss this with representatives of GEO and IOC, and these discussions were carried forward within the GEO Task Force 2 meetings and at the IOC Assembly (19-28 June) by Howard Roe and Jim Baker. This resulted in a letter developed by the two of us (Roe and Baker) with help from Tom Malone and Paul DiGiacomo that Tony Haymet sent to Jose Achache on behalf of POGO. Essentially the letter suggests that there is no need for new groups to get involved in the details of coastal issues as these are already well served by existing fora. The letter suggests that GEO has an important role in raising awareness and attracting resources to this crucial area. Jose Achache replied on 23/7/07 agreeing with the views in the letter.

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Outreach

In the run up to GEO IV POGO engaged in the most dynamic media blitz that we have ever had. This was facilitated by the involvement of Terry Collins, who was recommended to us by Jesse Ausubel of the Sloan Foundation. Under Terry's guidance a Press Release was distributed and interviews with national and international media were arranged through Terry and his network of links. Tony Haymet, Shubha Sathyendranath, Jesse Ausubel, Jim Baker and Howard Roe gave several interviews in the run up to Cape Town, and these continued during the meeting with additional media activities organised locally by John Field. Members of the POGO News and Information Group (led by Cindy Clark) were extremely helpful in many of the GEO-related outreach activities. Summaries of the media coverage are available on the POGO website; but certainly the GEO meeting was aware of the ocean media campaign and it was very pleasing (and astonishing!) to read that on 26/11/07 POGO was amongst the top twenty science stories on Google science sites in the UK, Ireland, S. Africa, Canada, Australia and New Zealand. Maintaining this level of interest will be a challenge to us during the coming year!

Less frenetic but very important both for the GEO meeting and for longer term PR was the production of a DVD "Observing the Water Planet". This was produced with funding from the Sloan Foundation, to whom we are extremely grateful. The DVD has two components – an overview of Ocean Observations by POGO (developed primarily by Shubha) and Biodiversity by the CoML (primarily by Kristen Yarincik). It was extremely well received on the Ocean stand in Cape Town where we distributed ca 300 copies, and it will be important for both POGO and CoML in the future. Copies of this DVD are being distributed at POGO-9.

Also in the run up to GEO IV was the production of a book "The Full Picture" which can be downloaded from: <http://www.earthobservations.org/index.html> There are a number of chapters in this directly on the oceans and ocean observations:

- "Argo-a global observing system for the 21st century" by Howard Freeland, Dean Roemmich, John Gould and Mathieu Belbeoch;
- "The blue planet-observations of the global ocean" by Jim Baker, Tom Gross and Howard Roe;
- "Why the world needs a Global Ocean Observing System" by Keith Alverson;
- "New marine observing systems around Africa" by Geoff Brundrit and Stewart Bernard;
- "European Marine Core Service; global and regional ocean monitoring and forecasting, a service to society" by Yves Desaubies;
- "Sea- level rise and vulnerable coastal populations" by John Church, Throkild Aarup, Stan Wilson, and Philip Woodworth;
- "Applications of remote sensing in fisheries and aquaculture" by Trevor Platt, Shubha Sathyendranath and Venetia Stuart;
- "Satellite-based fishery service in India" by Shailesh Nayak, T. Srinivaskumar and M. Nagarajakumar; and

- “The green planet-observations of marine biodiversity” by Jim Baker, David Farmer and Kristen Yarincik.

There are some 97 contributions in all.

For the GEO IV ocean stand we printed or reprinted copies of a new POGO flyer (prepared by Cindy Clark), an updated POGO brochure, the Yokohama Declaration (courtesy JAMSTEC), the São Paulo Declaration, and the Beagle Cruise leaflet. Again these are available for future use.

GEO IV Meeting

The meeting was in three parts, the plenary from 28/29 November; the Ministerial Summit on 30 November; and the accompanying exhibition held during all three days. Howard Roe led the POGO delegation ably supported by David Farmer. The Ocean exhibit was coordinated and led by Chris Reid and Astrid Fischer – to whom we all owe a huge thank you, and the various stands were manned by Tom Gross (IOC), Howard Freeland and colleagues (Argo), John Field and colleagues (Chlorogin), Peter Burkill and colleagues (SAHFOS), David Farmer, Howard Roe and Venetia Stuart (POGO and CoML). My thanks to everyone (and many others) for their help in manning, putting up and taking down the exhibit.

Ocean Exhibit: This was outstanding and attracted extremely favourable comment during the meeting and subsequently. The various poster stands were grouped together in a star shape with plasma screens at the corners showing video loops of the various programmes/activities. Two magic planets were in play, one for Argo, the other for more general ocean material – these were also very successful. The real importance of the exhibit was two-fold; we were there and we were very conspicuous; and we were there as a unified ocean exhibit bringing together different aspects of ocean observations. Both elements were appreciated by visitors, by other delegations and by GEO. Everyone agreed that oceans generally and the specific programmes that were represented benefited materially from the exhibit. We certainly had our fair share of visitors – the school parties were great – and various attempts to simulate an elephant seal with a transducer on its head were well regarded! The exhibit is now in the UK – and is available for use. Please take it up!

GEO Plenary: Essentially this was taken up with reviewing the year’s activities – in particular the Progress Report and Annex, and in finalising the Declaration for the Ministerial Summit. It was a work in progress-type meeting which did not produce specific new actions other than to take material to the Ministerial for approval. During the plenary Howard Roe drew attention to the ongoing ocean observation programmes being carried out by Ocean United and others, to our media blitz, and to our unified ocean exhibition.

Ministerial Summit: The Declaration was accepted by acclamation (see Declaration on GEO web site: http://earthobservations.org/05_Cape%20Town%20Declaration.pdf), and you will see that oceans are well embedded in this together with statements on the importance of

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continuity and sustainability. We now await results from the various national delegations that were present! A press comment from South Africa is attached with the outreach material. Outstanding contribution was made by the USA Secretary of the Interior who spoke strongly of the USA's continuing commitment to GEO. Participating organisations were allowed to speak and Howard Roe delivered the following impromptu statement which seemed to go down pretty well.

“Mr Chairman, Ministers, Delegates, Ladies and Gentlemen, The Partnership for Observation of the Global Ocean (POGO), and our sister organisations within Ocean United, welcome the opportunity to participate in GEO and to speak today. The oceans cover 71% of the surface of our planet and contain 97% of our available water. Oceans impact directly on every one of the nine GEO societal benefit areas and are a fundamental part of our earth system. To understand the way our world works we must observe and understand the oceans.

But our existing global coverage is incomplete. These systems provide data, products and warnings on areas as diverse as climate and climate change; of El Niño and hurricanes; of tsunamis, rising sea levels and coastal flooding; on ecosystem and human health; on biodiversity, and on energy, food and other resources.

Our observing arrays need completing; but it is equally important to maintain existing and developing systems with appropriate commitments to sustain these into the future. Mr Chairman, the oceans are vital to us all – we must observe them and continue to observe them. Thank you.”

Overall I believe the GEO meeting was successful both for GEO and its continuation and for ocean activities. The challenge now is to maintain the head of steam that has been built up during the year!

GEO and Iridium

POGO (Howard Roe and Shubha Sathyendranath) have been contacted by Iridium Satellite LLC regarding the Iridium NEXT satellite constellation for Earth Observations. Iridium is organising a one-day symposium on the role that the Iridium NEXT satellite constellation could play in Earth observations. The symposium will take place at the Royal Society in London on Tuesday, 22 January. The objective of the symposium is to provide a detailed overview of the payload candidates, which could be flown on the Iridium NEXT mission and underlying science and applications. In addition, the symposium will provide an opportunity for GEO Members and Participating Organizations to discuss their own plans and perspectives and how this Iridium NEXT opportunity may complement their existing or planned international programmes. POGO is looking into suitable representation at the meeting.

POGO expresses grateful thanks to everyone who has contributed to these activities.

Howard Roe 14/12/07

Activities of the POGO News and Information Group

Cindy Clark

Strong attendance by POGO News and Information (N&I) members at POGO-8 resulted in a year of increased activity. As stated at previous POGO meetings, N&I members meeting in person, especially at POGO annual meetings, remains key to effective participation and productivity. It has not been feasible, due to time, travel, and budget constraints, for N&I members to meet outside the regularly scheduled POGO meetings.

With input from Chris Reid, the N&I communications plan for 2007 was completed in January and included a revamp of the POGO website, a communiqué, and a video project on ocean observations and societal relevance. In addition, N&I committed to publicizing the Argo 3,000th float milestone and to contributing to the POGO Ocean News web site. Early in 2007, following recommendations made at POGO-8 and in view of POGO's increasing focus on the GEO Ministerial Summit in November, N&I shifted its efforts to GEO and as advisors and contributors for the POGO video project led by Tony Haymet, Jesse Ausubel and Shubha. The N&I key contribution to the POGO-GEO effort was the creation and design of a two-page document, highlighting POGO contributions to GEO's societal benefits and distributed at the GEO Summit. In addition, a revision of the original POGO brochure was completed and used at GEO. As a complement to POGO's efforts, CSIRO and Scripps Oceanography contributed broadcast-quality animations of ocean currents, Argo, and Spray animations to Media Consultant International Holding AG for the European Commission's video on earth observation science projects. Finally, for POGO-GEO, N&I assisted Terry Collins, who was hired to highlight the need for ocean observations in the context of the GEO ministerial meeting, in distributing a news release and in promoting media contacts and interviews leading up to the GEO Summit.

In autumn, many N&I members contributed to highlighting the international collaboration leading to the Argo program's milestone of full initial operational capacity of 3,000 floats. Argo was the focus of POGO's earliest successful efforts in encouraging international collaboration for global ocean observations. The Argo Steering Committee, POGO, CSIRO, NOAA, Scripps, and others produced news releases and media pitches in English and in French (thanks to Howard Freeland). In addition, CSIRO provided video content for an Argo presentation for Stan Wilson at NOAA. As a result of these international collaborative publicity efforts, Argo made news around the world with the strong message promoting the ongoing need for comprehensive global ocean data from the Argo array.

Throughout the year, N&I helped populate the Ocean News section on the POGO web site, most notably by CSIRO and AWI. POGO has grown and expanded its activities tremendously since its inception almost 10 years ago. The N&I Group feel that it is time for a new design "look" for POGO, which will reflect its current role and vision. Efforts to redesign the look of POGO materials, web and communiqué was initiated this year, and will be pursued as a priority for the N&I Group in 2008.

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N&I would like to repeat its recommendation that POGO hire a part-time communications person to coordinate and implement its N&I efforts, in view of POGO's enhanced role in promoting awareness of the need for ocean observations to the general public, government officials, and policy makers.

At the same time, as POGO's activities on public awareness grow, the rewards are also reaped by the POGO member institutions and its communication group, in the sense that they can also use POGO products for their own publicity work: notable in this context are the new videos on ocean observation (Overview and Biodiversity) created by POGO and CoML, which now find pride of place on the home web sites of POGO member institutes. This enhanced synergy will, in turn, facilitate the activities of the N&I group within POGO.

Active POGO N&I members in 2007:

Jan Boon, NIOZ (The Netherlands)
Kim Marshall-Brown, National Oceanography Centre, Southampton (UK)
Cindy Clark, Scripps Institution of Oceanography (USA)
Jana Goldman, NOAA (USA)
Craig Macaulay, CSIRO (Australia)
Margarete Pauls, Alfred Wegener Institute, (Germany)
Jan Seys, Flanders Marine Institute (Belgium)

POGO Capacity Building Activities

Shubha Sathyendranath

In 2007, POGO capacity building efforts were devoted to the following activities:

1. POGO-SCOR Fellowship Programme

This is an on-going programme initiated in 2001. Day-to-day management of the fellowship was handled by Tony Payzant, until her departure from the POGO Secretariat in July. Marie-Hélène Forget, who picked up the strings from Tony in September during the transition phase of operations from Canada to the UK, has now been looking after the programme without missing a step.

2. NF-POGO Visiting Professorship Programme

This programme, initiated in partnership with the Nippon Foundation in 2004, was completed in 2007 successfully, after six Visiting Professorships were executed.

3. NF-POGO Centre of Excellence

This is a new initiative, begun in 2007 in partnership with the Nippon Foundation.

4. POGO Training Course in INCO, Iran

POGO was the sponsor of a training course at the Iranian National Centre for Oceanography, on “Coastal oceanography of southern Caspian Sea: Forcing and Structure” on 1-15 December 2007. Dr. Charitha Pattiaratchi from the School of Environmental Systems Engineering, The University of Western Australia was the main professor at the training course.

5. Committee on International Capacity Building for the Protection and Sustainable Use of Oceans and Coasts

The committee was co-chaired by Professor Silvio Pantoja, a stalwart of the Austral Summer Institute run out of University of Concepción and an active participant in POGO capacity building efforts and by Dr. Missy Feeley, of ExxonMobil Exploration Company, Houston, Texas. Shubha Sathyendranath was a member of the committee. The report of the committee, entitled “Increasing Capacity for Stewardship of Oceans and Coasts: A Priority for the 21st Century” was published towards the end of 2007.

6. The Austral Summer Institute of the University of Chile COPAS

As in previous years, POGO was a co-sponsor of the Austral Summer Institute of the University of Concepción in Chile.

7. SEREAD project

SEREAD is an educational program and resource that provides regionally relevant and focused ocean science in a format that fits directly into existing curricula of Pacific Island schools. SEREAD teaches basic scientific fundamentals in a hands-on approach using examples that build on Pacific students' everyday observations and experiences. The program facilitates interactions and discussions between today's ocean and climate scientists, teachers and students, and tomorrow's leaders on the important connections between the ocean, land and climate of the Pacific Island Region. This year, POGO cosponsored a teacher-training workshop in the Cook Islands, in which some 20 science teachers from Rarotonga, Aitutaki, and Manai were expected to participate. The workshop was completed in November.

In addition, Shubha Sathyendranath served on the GEO Capacity Building Committee, and is also a member of the newly constituted SCOR Capacity Building Committee.

These activities are described below.

Report on the 2007 POGO-SCOR Fellowship Programme

This year the fellowship programme was implemented using POGO funds with supplementary financial support from SCOR. February's announcement opened the competition for two months. Some 40 applications were received. Applicants wrote from Argentina, Bangladesh, Brazil,

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Bulgaria, China, Colombia, Egypt, India, Indonesia, Iran, Jordan, Lithuania, Mexico, Morocco, Peru, Philippines, Russia, Tunisia, Turkey and Ukraine. The applications were screened independently by a committee of three, with representation from SCOR and POGO. In making their selection, the committee considered the following factors:

- quality of the application
- relevance of the application to the priority areas identified in the fellowship announcement
- justification that the training would lead to capacity-building with potential lasting impact on regional observations
- the need to maximise regional distribution of the awards

This year, thirteen fellowships were offered to oceanographers from developing countries and economies in transition. The host institutions were in France, Italy, Spain, the UK, and the USA. POGO and SCOR commend the efforts from all the supervisors and colleagues at the various host institutions who agreed to devote time and energy required for the training. The programme would not have been viable without such efforts from prominent scientists and their teams.

All the people involved in each fellowship (the fellowship holder, the supervisor at the parent institute and the supervisor at the host institute) were requested to submit short reports at the end of the training period. So far, the reports received have been enthusiastic. They indicate that these exchanges should lead to effective capacity building in the host institute and facilitate longer-term collaborations between the institutes concerned. All conclude that the programme serves a useful purpose.

There is enormous interest in the fellowship programme at all levels, both in the oceanographic institutions of the developing nations, as well as among leading scientists who are eager to contribute to this initiative. It is seen to be filling a niche in capacity building through specialised training that is not filled by intensive courses or by participation in scientific meetings. It helps improve the *esprit de corps* among oceanographic institutions around the world, and serves as a stepping stone to building collaborations.

Day-to-day management of the fellowship was handled by Tony Payzant until her departure from the POGO Secretariat in July. Marie-Hélène Forget, who picked up the strings from Tony in September during the transition phase of operations from Canada to the UK, has now been looking after the programme without missing a step.

Over the years, this fellowship programme has sponsored some 88 fellows. It is proposed to continue the fellowship programme in 2008, in partnership with SCOR.

Nippon Foundation -POGO Visiting Professorship Programme: Final Report

The Nippon Foundation-POGO Visiting Professorship Programme was initiated in January 2004 as a partnership between POGO and the Nippon Foundation. The Nippon Foundation supports various philanthropic activities in over 100 countries in areas such as overseas cooperative assistance,

maritime development (including international capacity and network building projects) and social welfare.

The primary goal of the NF-POGO Visiting Professorship programme was to contribute to long-term, sustained, capacity building through the facilitation and interpretation of ocean observations in developing countries. The visibility and prestige of the Nippon Foundation would also be enhanced on an international scale. The programme allowed for extended visits of an experienced oceanographer to visit a developing country to provide training and mentoring to young ocean scientists. Enhancement of networking among oceanographic institutes was also an objective.

Funding from the Nippon Foundation allowed for two Visiting Professors per year, over a period of three years (total of six Visiting Professors), to provide training in their own area of speciality. The programme was completed at the end of 2007. Each professor spent from three to six months with local scientists and students, giving lectures, advising them on purchase, maintenance and operation of instrumentation, performing hands-on field work, participating in the analysis and interpretation of collected data and generating added value for national management and international needs.

The programme covered all expenses including the travel and living expenses of visiting professor and supporting team, the travel and living expenses of the participating students and scientists, and the purchase of specialised equipment when essential for maintaining the integrity of the programme.

Year One of the NF-POGO Visiting Professorship Programme

In the first year of the programme eight applications were received in response to the announcement of opportunity and the committee unanimously selected the following two proposals:

Title of Project: Calculation of Regional-Scale Primary Production for Indian Waters and Application to Ecosystem Dynamics
Host Institution: National Institute of Oceanography, Kochi (India)
Visiting Professor: Dr. Trevor Platt, FRS, FRSC (Canada)
Period of Training: November 2004 – March 2005
Total Cost: \$152,027

Title of Project: Capacity Building in the Marine Sectors of South Pacific Small Island Countries
Host Institution: University of South Pacific (Fiji)
Visiting Professor: Dr. Motoyasu Miyata (Japan)
Period of Training: December 2004 – July 2005
Total Cost: \$168,078

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Year Two of the NF-POGO Visiting Professorship Programme

In the second year of the programme, six applications were received in response to the announcement of opportunity and the committee selected the following two proposals:

Title of Project: Training Program in Coastal physical oceanography of Indian Ocean Waters
Host Institution: National Aquatic Resources Research and Development Agency (NARA), Sri Lanka
Visiting Professor: Dr. Charitha Pattiaratchi (Australia)
Period of Training: 26 January - 23 June 2006
Total Cost: \$94,232

Title of Project: Evaluation of satellite ocean-colour algorithms and products in coastal regions of Central and South America
Host Institution: National Institute for Space Research (INPE), Brazil
Visiting Professor: Dr. Robert Frouin (USA)
Period of Training: 17 April – 25 August 2006
Total Cost: \$107,806

Year Three of the NF-POGO Visiting Professorship Programme

In the third and final year of the NF-POGO Visiting Professorship Programme nine applications were received in response to the announcement of opportunity. Two projects were initially selected, one from Vietnam and one from the Iranian National Center for Oceanography (INCO). However, when the formal contract was drawn up between the proposed visiting professor, Dr. Miroslav Gacic (Italy) and INCO, it was discovered that he could not participate in the course for the period of time required in the contract (minimum of three months). After unsuccessfully trying to find another visiting professor at very short notice, it was decided to award the visiting professorship to the next highest ranking application, which was INSTM in Tunisia. The following two projects were thus selected for year three:

Title of Project: The application of ocean colour remote sensing for detecting Chlorophyll-a, colour dissolved organic materials, suspended solids and light attenuation coefficient in coastal water of Binh Thuan province, Vietnam.
Host Institution: Institute of Oceanography, Nha Trang, Vietnam
Visiting Professor: Dr. Satsuki Matsumura (Japan)
Period of Training: 7 May - 7 August 2007
Total Cost: \$121,581

Title of Project: Towards operational oceanography training and development in Tunisia
Host Institution: Institut National des Sciences et Technologies de la Mer (INSTM)
Visiting Professor: Prof. Vladimir G. Koutitonsky (Canada)
Period of Training: May - November 2007
Total Cost: \$113,379.31

Conclusion

By all accounts the Nippon Foundation-POGO Visiting Professorship Programme has been an outstanding success. All the Visiting Professors have been unanimous in the praise of the programme and place a very high value on it. It has allowed many young scientists to interact with the best oceanographers in the world, helping to build their confidence and forge professional contacts that are invaluable for the development of their scientific careers. Many of the students, in turn, are now able to pass on their newly gained expertise as teachers. In this way, the legacy of the Visiting Professor is long term. It is clear that the three years of the visiting professor programme have left a clear and positive imprint on the development of operational oceanography in a number of developing nations. POGO continues the visiting professorship programme in a small way: In 2006 it sponsored the visit of experts from Japan and the USA to Vietnam for a training course, and in 2007 it has sponsored the visit of an expert from Australia to Iran. Such efforts are expected to continue.

NF-POGO Visiting Professorship Budget Summary

		Income	Expenses	Balance
Year 1 of NF Grant				
Grant received in 2004		\$381,000		
Expenses:				
Visiting Professorship to Kochi, India			\$152,027	
Visiting Professorship to Fiji			\$168,078	
Net Secretariat Expenses Year 1			\$23,628	
			\$343,733	
Balance				\$37,267
Year 2 of NF Grant				
Grant received in 2005		\$241,000		
Expenses:				
Visiting Professorship to Sri Lanka			\$94,232	
Visiting Professorship to Brazil			\$107,806	
Net Secretariat Expenses Year 2			\$35,180	

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			\$237,218	
Balance				\$3,782
Year 3 of NF Grant				
Grant received in 2006		\$281,000		
Expenses:				
Visiting Professorship to Vietnam			\$121,581	
Visiting Professorship to Tunisia			\$113,359	
Net Secretariat Expenses Year 3			\$33,247	
			\$268,187	
Balance				\$12,813
Total NF funds remaining				\$53,862

NF-POGO Centre of Excellence

The decision was taken at POGO-8 to proceed with the development of this new project with the Nippon Foundation. Accordingly, a full proposal was prepared by Shubha Sathyendranath and submitted to the Nippon Foundation in January 2007. The proposal was duly approved, for the full requested amount of US \$ 495,000. An announcement and call for submission of proposals was prepared and sent to POGO members in April 2007.

The response from members was excellent and the proposals received, 7 in number, were of an exceedingly high standard, each one having its own outstanding merits. The evaluation committee, which met in London in September, was set a very difficult task.

The final choice for successful proponent fell on the Bermuda Institute of Biological Studies. The decision was announced in November. A key factor in this proposal was the availability of a research vessel making regular observations at an oceanic station, combined with the expertise available at the Institute from making ocean observations over several years at the Bermuda Time Series Station and previous experience at the Institute in providing related training to oceanographers. The trainees will be involved in this regular observation program, thus being provided with an excellent opportunity for professional development.

All POGO members and associates are requested to assist Tony Knap, as Director of BIOS, in making a success of this initiative. At the same time, the evaluation committee recommends those POGO members whose proposals were not successful this time to seek alternative funding for making the proposed training a reality: they were of too high a standard to be discarded lightly.

The project is well on its track. Tony Knap and his colleagues, especially Gerry Pumley, the course coordinator for the Centre, are working hard on making sure that all the preparations are in place for receiving the first batch of trainees at Bermuda Biological Station in August 2008.

International Cruise Information Database and Web-site

A Joint POGO-CoML Initiative

Dick Schaap and Lesley Rickards

Status: December 2007

Introduction

The members of the Partnership for Observation of the Global Oceans (POGO) are operating a fleet of ocean-going research vessels to undertake scientific cruises in the world's oceans. They recognised the need to improve on information sharing on planned, current and past cruises and on details of ocean-going research vessels to enhance awareness of opportunities, and to improve cost-effectiveness of cruises. Therefore POGO, together with Census of Marine Life (CoML), undertook the initiative to set-up an International Cruise Information Database and related website from the perspective of international programmes and initiatives. For co-funding of the initiative grants were acquired from the Alfred P. Sloan Foundation and NOAA.

Many potential benefits were identified:

- Helps scientists from different countries coordinate future funded research through information about research vessels of opportunity
- Aids in retrospective ability to find data in regions of interest
- Makes it possible for projects to conduct joint work and to fill empty berths
- Creates capacity-building and training opportunities
- Would aid in tracking and distributing data
- Would provide information to evaluate the benefit of observations from ships as part of GOOS
- Would make it possible for scientists and operational users from other projects to get instruments deployed and/or samples taken in hard-to-reach areas of the ocean (e.g. drifters, profiling floats, moored buoy servicing)
- Would allow cost sharing among institutions, projects, and nations
- Would make possible intercomparisons, intercalibrations, validation among different data types (e.g. CTD vs. Argo, in situ vs. remote sensing)

Accordingly, POGO-CoML invited proposals from interested parties to set up an international cruise information database and the applications were evaluated by a team of experts selected from CoML, NOAA (National Oceanic and Atmospheric Administration), POGO, IOC/IODE (the International Oceanographic Data and Information Exchange programme of the Intergovernmental Oceanographic Commission) and SCOR (Scientific Committee on Oceanic Research). This resulted in mid-2006 in

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a choice for the proposal, submitted by a subgroup of the SeaDataNet consortium. SeaDataNet (www.seadatanet.org) is a five-year EU-funded project, which began in April 2006, and aims at a further development of the Pan-European infrastructure for marine and ocean data management. Partners in SeaDataNet are National Oceanographic Data Centres (NODCs) from 35 countries that are part of major marine and oceanographic institutes, well experienced and engaged in many national and international data management projects and programmes, and also active in international organizations, such as IOC/IODE and ICES.

Research vessels and research cruises are included in the scope of SeaDataNet and are covered by maintaining a Cruise Summary Reports (CSRs) database and a Directory of European Research Vessels, in cooperation with EurOcean. Expanding these meta databases to a global dimension and upgrading their entry and retrieval systems to support both the requirements of SeaDataNet and POGO-CoML sounded attractive and efficient, so the challenge was accepted.

International Cruise Information Database and web-site

POGO-CoML's requirement is to have an operational and well-maintained database and web-site for Research Vessels of length > 60 metres, certified for open ocean research. This comprises ca. 150 - 200 research vessels, operated by ca. 50 institutes worldwide. Most of these institutes are represented in POGO and/or ISOM. This is effected by implementing a dedicated International Research Cruise

(www.pogo-oceancruises.org) website, giving access to the following interrelated Information modules, specifically for open ocean Research Vessels:

- Research Vessel Cruise Programme database, containing planned cruises per research vessel and owner / operator
- Research Vessel Directory database, containing characteristics of each research vessel, owner/operator contact details and, if available, a link to the ship's web page
- Cruise Summary Report (CSR) database, containing details of completed cruises and providing a first level inventory of oceanographic measurements made and samples taken.

Note: The subgroup of SeaDataNet partners (BODC (UK), BSH (DE), MARIS (NL) and EurOcean (PT)) are primarily responsible for the technical operation and facilitating the maintenance of the website and databases. The provision of new information (i.e. content) and updates of that information is a task of the POGO members, vessel operators, NODCs and Chief Scientists, making use of the mechanisms provided.

Present status

The website www.pogo-oceancruises.org was launched in May 2007 and gradually each of the 3 planned databases is becoming available. The SeaDataNet partners are actively developing the applications for adding new entries, updating existing entries AND for searching and retrieving information. In parallel active surveys are underway to populate each of the 3 databases with entries of all RV's worldwide > 60 metres.

The **International Research Vessel Cruise Programmes** database has been operational since May 2007 and provides the facility to search and present an increasing number of planned cruises. The compilation of this database is coordinated by the British Oceanographic Data Centre (BODC). A survey format has been defined, which forms the basis of the database. Users can retrieve information from the database using the versatile User Interface, which supports combined geographical – alpha numerical searching, that has been developed by MARIS. Between March and August BODC has contacted all ISOM members and selected NODC contacts with a guidance note and an Excel survey form to collect information on the planned cruises for 2007. This request has been repeated a number of times. This has resulted in a return of 431 cruise programmes by 18 operators, operating 24 Research Vessels from 10 countries. More recently the same request was sent out again to all involved to collect the cruise programmes for 2008. This request has been supported by an e-mail letter from the POGO Secretariat to all POGO Directors of research institutes to give priority to responding to the request by BODC. Without contributions by RV operators the cruise programme database cannot function as required. So far only a few countries have responded to BODC with their 2008 programmes; these will be included on the website soon. One of the problems experienced is that RV operators often do not have some of the information requested in their own files and databases and thus forward incomplete records, for example, with geographical coordinates missing which are mandatory for the geographical search and display. Where possible, BODC has added this information. Some operators have agreed to include this information in their own systems in the future. The collected information is compiled, finally edited by BODC and published at the website. In February 2008 an online Content Management System, developed by MARIS, will become operational for RV operators to enter and to update their entries in the planning database. Operators with a local system or large fleet may still decide to send their contributions in bulk to BODC by using the agreed Excel spreadsheet.

The **Global directory of ocean-going Research Vessels** has been operational since early July 2007. It has been developed by EurOcean with support of MARIS and it contains characteristics, owners and operators' information for ocean-going research vessels. The content format is in conformance to the Oceanic database that was operated and kept up-to-date until 2005 by the University of Delaware. EurOcean previously developed an online RV Directory for all European vessels, which can be found at the EurOcean portal (www.eurocean.org). The global directory has been developed as a special version on behalf of the POGO-CoML initiative. It contains up-to-date information on ocean-going Research Vessels, operated worldwide, and is now accessible from the www.pogo-oceancruises.org website. In cooperation with ISOM, BODC, MARIS and the University of Delaware, by searching the internet and using the position paper of the ESF Marine Board on European Ocean Research Fleets, an initial list and database was composed of known existing ocean-going RVs, their operators and specifications. Major effort was spent on identifying the right operator contacts, using ISOM lists and checking against vessel/operator websites. The Directory software has been upgraded: operators of the RVs are now able to maintain the vessel information themselves by an online Content Management System. At the end of June 2007 European operators were invited by EurOcean to validate and

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improve the entries for their vessels. Numerous operators already responded and have updated their information online. The University of Delaware provided an export from Oceanic, giving details of ocean-going RVs outside of Europe. After a first-level validation these RVs are now also included in the online global directory of ocean-going Research Vessels. Gradually the identified operators of these non-European vessel operators are also being invited to validate and update their entries, using the online Content Management System. The RV Directory now contains facts and figures of 156 Research Vessels. The RVs are provided with a ship code, identifying a unique hull, in a cooperation between ICES, US NODC and BODC. These ICES ship codes are used in each of the 3 databases in the full POGO system as linking pin. It enables a user to jump from a Cruise Programme record to the details page of the Research Vessel. Also a user can jump from a Cruise Programme record to the organisation profiles of the RV operator and scientific organisation and then to retrieve the Cruise Summary Reports for those organisations.

The **Cruise Summary Report (CSR) database** for the POGO-CoML initiative is being developed by BSH/DOD, Germany. It focuses on details of completed cruises and providing a first level inventory of oceanographic measurements made and samples taken. The ROSCOP (Report of Observations/ Samples Collected by Oceanographic Programmes) was conceived by IOC/IODE in the late 1960s in order to provide a low-level inventory for tracking oceanographic data collected on Research Vessels. The ROSCOP form was extensively revised in 1990, and was renamed the Cruise Summary Report (CSR). Most marine disciplines are represented in the CSR, including physical, chemical, and biological oceanography, fisheries, marine contamination/pollution, and marine meteorology. Traditionally, it is the Chief Scientist's obligation to submit a CSR to his/her National Oceanographic Data Centre (NODC) not later than two weeks after the cruise. These have been periodically transmitted to the World Data Centres for Oceanography and to ICES. In the late 1980s ICES led the effort to digitise the ROSCOP/CSR information and pioneered the development of a database for this information, and, in collaboration with IOC/IODE, developed and maintained a PC-based CSR entry tool and search facility. The emphasis for this was on ICES member countries, but extended to other countries who wished to submit their information. The CSR activity gained new momentum in Europe during the EU-funded EURONODIM/Sea-Search projects under the lead of BSH/DOD, Germany. The combined ICES and Sea-Search/SeaDataNet CSR database now comprises details of over 35000 oceanographic research cruises primarily from Europe and North America, some information extending back over the last 40 years. This ongoing CSR database can be found *via* the POGO research cruises website at www.sea-search.net/roscop. However, as part of the POGO-CoML initiative BSH/DOD is developing a special version of the CSR database, that will give access to Cruise Summary Reports of all ocean-going vessels worldwide larger than 60 metres and that will be directly accessible from the www.pogo-oceancruises.org website. BSH/DOD is making good progress in arranging the set-up of this special version and will be able to invite Chief Scientists and NODCs of countries outside Europe around mid-March 2008 to prepare and deliver their Cruise Summary Reports by the online content management system or in an agreed XML format. Also at the same time a renewed POGO CSR User Interface will

become operational, that will *inter alia* support the ICES ship code as unique identifier for the research vessels.

Contract issues:

Phase 1 of the contract of POGO with the SeaDataNet consortium involved the set-up of the basic system. This was successfully completed in August 2007 and after negotiations followed by Phase 2, which runs until the end March 2008. Phase 2 includes the finalisation of the set-up of the Cruise Summary Reports part, operations of the website and updating of databases through processing of contributions of RV operators and further fine tuning of the website and included systems. This Phase 2 is well underway. POGO and the contractors will discuss the further maintenance of the system. In principle, provided Phase 2 is completed satisfactorily, POGO plans to cover the annual costs to maintain the 3 linked database components of the I-CID in operational service and will consider progressing to a third phase of the development. Annual operating costs have been estimated by the SeaDataNet consortium as \$12.500 per year.

EUROFLEET:

RV operators from Europe, lead by IFREMER, France, are planning to prepare and to submit to the European Commission a EUROFLEET proposal for optimising the logistics around running Research Vessels and optimising the exchange of data, acquired during cruises, to data centre infrastructures, such as SeaDataNet. The proposal plans to make use of the underlying infrastructure of the POGO research cruise system to make it also fit for entering all research vessels in Europe (not only ocean going) and to prevent duplication efforts. If successful this project will strengthen the organisational basis for maintenance of the databases and also provide opportunities for development of further functionalities of the system, which will also benefit POGO.

POGO Members

- Bedford Institute of Oceanography (Canada)
- Bermuda Biological Research Station (Bermuda)
- British Antarctic Survey (BAS) (UK)
- Chilean Consortium Consisting of
 - SHOA (Servicio Hidrográfico y Oceanográfico de la Armada)
 - Universidad de Concepción
- Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Australia)
- Dalhousie University (Canada)
- First Institute of Oceanography (FIO), State Oceanic Administration (FIO) (China)
- Flanders Marine Institute (Belgium)
- French Consortium Consisting of
 - IFREMER (Institut Français de Recherche pour l'Exploitation de la MER)
 - INSU (L'Institut National des Sciences de l'Univers du CNRS)
- German Consortium consisting of:

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AWI (Alfred-Wegener-Institute), Bremerhaven

Leibniz-Institut für Meereswissenschaften an der Universität Kiel (IFM-GEOMAR)

- Indian National Centre for Ocean Information Services (INCOIS) (India)
- Institute of Oceanology, Chinese Academy of Sciences (IOCAS) (China)
- Institute of Marine Research (Norway)
- J. Craig Venter Institute (USA)
- Japan Agency for Marine-Earth Science and Technology (JAMSTEC) (Japan)
- Korea Ocean Research and Development Institute (KORDI) (Korea)
- Marine Research Institute (MA-RE), South Africa
- National Institute of Oceanography (India)
- National Oceanic and Atmospheric Administration (NOAA)
- Royal Netherlands Institute for Sea Research (the Netherlands)
- Scripps Institution of Oceanography (USA)
- P.P. Shirshov Institute of Oceanology (Russia)
- UK Consortium Consisting of
 - National Oceanography Centre (NOC)
 - Plymouth Marine Laboratory (PML)
 - Proudman Oceanographic Laboratory (POL)
 - Scottish Association of Marine Sciences (SAMS)
 - Sir Alister Hardy Foundation for Ocean Science (SAHFOS)
 - UK Met Office
- Woods Hole Oceanographic Institution (USA)

POGO Executive Committee

Chair: Prof. Tony Haymet, Scripps Institute of Oceanography, USA

Past Chair: Prof. Jan de Leeuw, Royal NIOZ, the Netherlands

Incoming Chair: Dr. Kiyoshi Suyehiro, JAMSTEC, Japan

Member and Host of POGO-9: Dr. Tony Knap

Member and Host of POGO-10: Dr. Carina Lange

Dr. Shubha Sathyendranath, Executive Director, POGO

POGO Secretariat:

Bedford Institute of Oceanography & at Plymouth Marine Laboratory

1 Challenger Drive, Dartmouth, Nova Scotia Prospect Place

B2Y 4A2, CANADA The Hoe

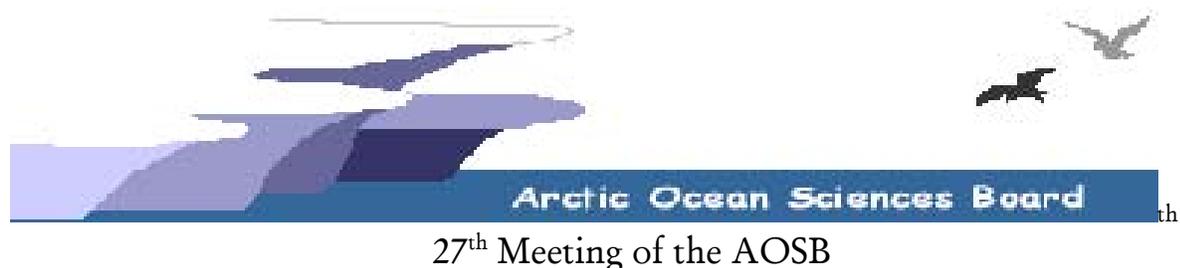
Phone: 902-426-8044 Plymouth

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e-mail: shubha@dal.ca web: <http://ocean-partners.org>

Note : The POGO Secretariat is moving in 2008 to Plymouth, UK.

7.4.2 Arctic Ocean Sciences Board



The 27th meeting of the AOSB was held March 30 in Syktyvkar, Komi Republic, Russia. The meeting was chaired by Dr. Harald Loeng.

The full AOSB report, national reports and PowerPoint presentations are available on the AOSB web site at www.aosb.org.

Integrated Arctic Ocean Observing System (iAOOS), an IPY Project

The integrated Arctic Ocean Observing system is an IPY program of the Arctic Ocean Sciences Board designed to optimize the cohesion and coverage of Arctic Ocean and surrounding seas during the IPY. It is a pan-Arctic framework designed to achieve optimal coordination of funded projects during the IPY, the elements of which are funded nationally. The main scientific focus of iAOOS is Arctic change, including all aspects of the role of Northern Seas in climate. In particular it focuses on the present and future fate of Arctic perennial sea ice.

In the fall of 2007, AOSB commissioned a report by Dr. Robert Dickson to summarize the efforts undertaken during the 2007 field season, as well as to provide some insight into first results. In addition, the report written by Dr. Dickson, with the assistance of the many PIs involved in iAOOS, also highlights new technologies used in monitoring the Arctic, includes a summary of additional work being planned for 2008, and suggests ways in which iAOOS may be sustained over the longer term.

Figure 1 demonstrates the extent to which monitoring is taking place under the IPY in the Arctic and sub-Arctic. Compiled by Humfrey Melling, with additional input from Bob Dickson, it is the distribution of all 156 current meter moorings and arrays across the iAOOS domain in 2007.

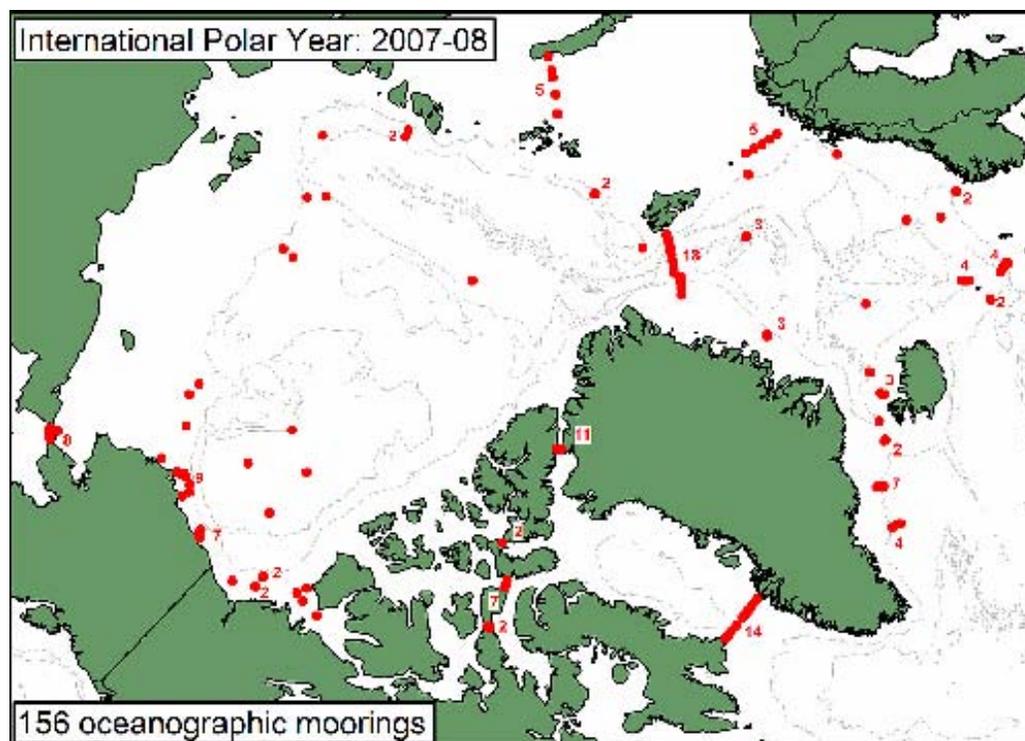


Figure 1

The full iAOOS report is available from the AOSB secretariat. The report along with the accompanying PowerPoint presentation may also be viewed on the AOSB web site.

During the AOSB meeting, the report was summarized by Dr. Loeng and additional comments were made by representatives from Canada, Iceland, the U.S. and Norway.

The Board praised the report as a comprehensive and worthwhile contribution to the IPY. It successfully brought together the many national and international activities which are part of iAOOS but are seldom seen as one entity. The difficulty of integrating so many elements was noted, but the many national efforts under way to manage data emanating from the IPY were mentioned. The Board was unanimously in favor of a second report at the end of the 2008 season but suggested that the next report include not only physical oceanography but also hydrochemistry and biology. Efforts are underway to produce such a report in early 2010.

The International Study on Arctic Change (ISAC) and Sustaining Arctic Observing Networks (SAON)

The AOSB has actively supported the establishment of ISAC and worked with other organizations to establish a secretariat in Stockholm in 2007. The ISAC science plan should be ready in the summer 2008 and AOSB will undertake a review and provide advice on the plan when it is available. AOSB has also played an active role in SAON. Sustaining Arctic observing networks such as iAOOS is critical to the AOSB, and members of the Board have been active in the marine components of the SAON process.

New AOSB Initiatives

During the 2007 meeting, AOSB initiated three new activities. First, AOSB is working in collaboration with the International Ocean Drilling Program (IODP) to host a series of workshops to develop plans for scientific drilling in the Arctic Ocean. Dr. Coakley, the chair of this effort, noted that the first workshop will be held in Bremerhaven, Germany November 3-5, 2008 and is entitled “Arctic Ocean History: From Speculation to Reality.” The workshop aims to bring together approximately 80 researchers to develop five to ten new IODP proposals for scientific drilling in the Arctic.

During the AOSB meeting in March 2007, the Board adopted a recommendation to create a small program to support the ongoing involvement of early career scientists in marine science planning activities. In March 2008, AOSB announced the availability of 10,000 USD to support early career scientists wishing to participate in planning meetings over the period June 2008-March 2009. Applications are now being received. More information is available on the AOSB web site.

Last year, the Board created the ICARP II Marine Roundtable to promote the implementation of the ICARP II recommendations dealing with marine sciences. The first meeting of the roundtable will take place in St. Petersburg, Russia on July 7, 2008.

Other Programs

The Board heard reports about the International Arctic Polynya Program (IAPP), the very active Pacific Arctic Group (PAG), and agreed to endorse an international effort to produce an Atlas of Submarine Glacial Bedforms.

Future of AOSB

The Board agreed on plans for AOSB to merge with International Arctic Science Committee (IASC) in order to strengthen both organizations. With the merger, IASC will gain the expertise of a strong organization with membership from 15 countries, active and ongoing programs, and a long history of contributions to Arctic science. AOSB, on the other hand, will become part of an organization with strong outreach to disciplines beyond the marine system as well as excellent links to the larger policy community in the Arctic. The AOSB Steering Group will work with IASC over the coming months to implement the merger.

Next Meeting

The 28th meeting of the Arctic Ocean Sciences Board will take place during ASSW 2009 in Bergen, Norway on March 23-28. The ASSW 2009 will incorporate a different format which will include a three-day workshop entitled “Arctic Connects: Results of 150 Years of Research.” For more information visit: <http://www.imr.no/assw2009>

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The Arctic Ocean Sciences Board (AOSB) was established in May 1984 to coordinate the priorities and programs of countries and institutions engaged research in the Arctic. It is a non-governmental body that includes members from research and government institutions from 15 countries. The mission of AOSB is to facilitate Arctic Ocean research by supporting multinational and cross-disciplinary natural science and engineering programs in marine research in the Arctic Ocean and adjacent seas.

For more information please go to www.aosb.org or contact the AOSB secretariat at sbowden@ucar.edu.

