

7.0 RELATIONS WITH NON-GOVERNMENTAL ORGANIZATIONS

- 7.1 International Council for Science** *Sundby, Urban*
- 7.1.1 International Polar Year, **p. 7-1**
 - 7.1.2 ICSU Regional Offices, **p. 7-3**
 - 7.1.3 International Geosphere-Biosphere Program (IGBP), **p. 7-8** *Balino*
 - 7.1.4 World Climate Research Programme (WCRP), **p. 7-16** *MacCracken*
 - 7.1.5 Scientific Committee on Antarctic Research (SCAR), **p. 7-30** *Hall*
 - 7.1.6 Scientific Committee on Problems of the Environment (SCOPE),
p. 7-46 *Sundby, Pierrot-Bults*
- 7.2 Affiliated Organizations**
- 7.2.1 International Association for Biological Oceanography (IABO), **p. 7-54**
Pierrot-Bults
 - 7.2.2 International Association for Meteorology and Atmospheric
Sciences (IAMAS), **p. 7-54** *MacCracken*
 - 7.2.3 International Association for the Physical Sciences of the Ocean
(IAPSO), **7-56** *Imawaki*
- 7.3 Affiliated Programs**
SCOR-Affiliated Programs, p. 7-57
- 7.3.1 Applications for New Affiliations: InterMARGINS, **p. 7-59** *Labeyrie*
 - 7.3.2 Census of Marine Life (CoML), **p. 7-64** *Taniguchi*
 - 7.3.3 International Antarctic Zone (iAnZone) Program, **p. 7-71** *Wainer*
 - 7.3.4 PAGES International Marine Global Changes Study (IMAGES), **p. 7-75**
Schneider, Labeyrie
 - 7.3.5 InterRidge - International, Interdisciplinary Ridge Studies, **p. 7-76**
Devey, Labeyrie
 - 7.3.6 International Ocean Colour Coordinating Group (IOCCG), **p. 7-87** *Sundby*
- 7.4 Other Organizations**
- 7.4.1 Partnership for Observation of the Global Ocean (POGO), **p. 7-96** *Hall, Urban*

7.1 International Council for Science (ICSU)

ICSU is celebrating its 75th anniversary this year with a number of different events and special publications:

ICSU Achievements: 1931- 2006

A number of new materials are now available online to help those Members wishing to join ICSU in celebrating its 75th anniversary, or simply for individuals who want to know a little bit more about ICSU. This includes brief summaries of some of the major areas of ICSU activity (climate change; polar research, sustainable development, universality) as well as more structured corporate presentations.

ICSU Brochure and Posters

Many readers should recently have received copies of the new ICSU brochure and posters to coincide with the 75th Anniversary celebration. Further copies are available from secretariat@icsu.org or can be downloaded from the web-site.

Anniversary Event, 4th July, Paris

Plans for the anniversary events in Paris on 4 July are moving ahead at full speed with a Scientific Symposium being organized in the afternoon by the French Academy of Sciences and a cocktail in the evening at the Paris Town Hall hosted jointly by the Mayor of Paris, ICSU and the Academy.

Young Scientists Conference

As part of the 75th anniversary celebrations, the planning is underway for an international conference for young scientists on “Global Scientific Challenges”. ICSU Members will be invited to sponsor attendees for this meeting, which will take place early in 2007. Further information and invitations for nominations, will be sent out as soon as the venue and meeting dates are confirmed.

7.1.1 International Polar Year

Planning for IPY continues. As reported last year, the expressions of interest have been clustered into themes:

7-2

Framework Themes and Clustering of Expressions of Interest

Version 1.0

The list given here illustrates how the clustering of Expressions of Intent maps onto the original six themes of IPY 2007-2008.

THEME 1 - Status

- Biodiversity of Polar Regions (Marine, Terrestrial, Lacustrine)
- Clouds, aerosols and atmospheric chemistry
- Hydrological cycle and freshwater budget
- Ocean circulation
- Space Snapshot
- Ice Caps, Ice Sheets, Glaciers and Permafrost
- Weather and Climate
- Biochemistry and Ecosystems
- Coasts and Margins
- Atmosphere ocean ice (THORPEX)

THEME 2 - Change

- Life Under Natural & Anthropogenic Changes: Stress, responses & adaptation
- Migration: Invasions, expansions reductions
- Paleoclimate (Glacier/Ice Core; Geosciences, Atmosphere & Climate)
- Adaptation and Vulnerability: coupled human environment systems
- Transitions and Border Zones
- Rapid Change Societal Responses
- Ecosystem Response to change and variability in the physical environment
- Evolution of Polar Glaciation

THEME 3 - Global

- Teleconnections between Pole and mid-latitude
- Plate tectonics and Polar Gateways

THEME 4 - Frontiers

- Exploration Beneath the Ice (traverses and earth history, sub-glacial lakes)

THEME 5 - Vantage Point – Observing System

- Life in the Polar Regions; Pattern evolution and adaptation
- Geophysical, Glaciological Atmospheric and Climate Observation Systems
- Local and indigenous visions
- ICESTAR
- Astronomy
- SPARC

THEME 6 - Human Issues

- Natural Resources Uses, Management and Conservation
- Northern Resources
- New Risks and Stresses (inc. contaminants)
- Resources – Geosciences

Outreach and Education

- Preservation of IPY Legacy

IPY has also put together a planning chart (see plastic folder). The most recent activity was an IPY Consultative Forum in conjunction with the SCAR meeting in Hobart, Tasmania, Australia, in July 2006:

“An IPY Consultative Forum will be held in Hobart, Australia on Saturday 8 July 2006, prior to the commencement of the XXIX Meeting of the Scientific Committee on Antarctic Research, the XVIII Meeting of the Council of Managers of National Antarctic Programmes, and the 2nd SCAR Open Science Conference.

The IPY advisory Consultative Forum has been established to provide the large numbers of IPY 2007-2008 stakeholders with a consultative platform for Polar Year development. The forum provides for dialogue among the various stakeholders, expressions of views on IPY 2007-2008, and a venue for exchange of information with the Joint Committee on IPY 2007-2008 development. The opinions and views expressed by stakeholders at this forum are considered by the Joint Committee in all aspects of planning, implementation and management of the IPY 2007-2008.

The Consultative Forum meets at least once per year and the first meeting of the Forum was held in the UNESCO Building, Paris on March 10-11, 2005. Participants are expected to fund their own attendance at the Consultative Forum. 1. Click here for the [Draft Agenda for the IPY Consultative Forum.](http://www.ipy.org/start/)” – From IPY Web site – <http://www.ipy.org/start/>

GEOTRACES investigators have cruises funded for IPY, through the Netherlands IPY program (IPY Full Proposal #35 - <http://www.ipy.org/development/eoi/proposal-details.php?id=35>). In addition the International Ocean Carbon Coordination Project (IOCCP) has compiled information about ocean carbon-related IPY proposals/activities (see <http://ioc.unesco.org/ioccp/Docs/Inventory%20of%20Ocean%20Carbon%20Relevant%20Research%20in%20Polar%20Regions.doc>).

7.1.2 ICSU Regional Offices

ICSU has continued its development of regional offices, in Africa, Southeast Asia, and South America so far. SCOR will send a representative (John Compton) to the Second Regional Consultative Forum of the African region, in September 2006. SCOR also was invited to send representatives to other regional meetings, but did not do so. The SCOR Executive Committee is discussing what level of involvement to pursue in relation to the regional centers.

From the ICSU Web site:

Regional Offices

A critical external review of ICSU's former Committee on Science and Technology for Developing Countries (COSTED) was published in 2002. As a result, four Regional Offices will be established in Africa, the Arab Region, Asia & the Pacific and Latin America & the Caribbean. Their goal is two-fold. Firstly they should enhance participation of scientists and scientific organizations from the

7-4

region in ICSU's research and policy activities. Secondly, they should enable ICSU to play a more effective role in strengthening science within the context of regional priorities and building capacity through South-South and North-South collaboration.

A decision has been taken to open a Regional Office for Africa in Pretoria, South Africa. The host will be the National Research Foundation ([NRF](#))

ICSU Regional Offices

The ICSU 27th General Assembly (September 2002) decided to establish four ICSU Regional Offices for Developing Countries to replace the ICSU Committee on Science and Technology in Developing Countries (COSTED). This decision was based on recommendations from a review of COSTED. The following description of the functions of the Regional Offices and their *modus operandi* was decided on by the ICSU Executive Board at its 86th meeting (February 2003).

Functions of the Regional Offices

The ICSU Regional Offices will promote the further development and strengthening of science in the context of regional priorities and bring the science of developing countries closer to ICSU. The Offices will support the work of ICSU and its Scientific Unions, National Members in the Region, Interdisciplinary Bodies and Joint Initiatives as well as its partners such as UNESCO and TWAS. The Offices must work in association with networks in the region and help to strengthen them where appropriate. Realistic plans should be developed for how a small Regional Office can further promote issues of importance to science and society taking the ICSU Mission Statement as a point of departure. Regional priority setting will be necessary for a successful launch of this new initiative.

The Regional Offices shall:

- Promote increased participation of developing country scientists and regional scientific organizations in ICSU programmes and activities; and
- Assist ICSU in strengthening science and capacity building in developing countries through South-South and North-South collaboration;

The Regions could consider that some of the following types of activities would also be appropriate functions for the Offices: (i) Collect information on locally developed strategies and priority needs, and scientific expertise within the regions and share this information with ICSU and its partners; (ii) Assist ICSU and its members in their strategic planning for activities in the regions and ensuring that their plans and activities are well linked to the science community in the regions, relevant networks and organizations and reflect regional priorities; (iii) Develop and maintain links with national and regional scientific institutions, societies, academies and governments, including current National Members, in order to strengthen ICSU collaboration with them; (iv) Help facilitate the adherence as ICSU National Members of institutions in countries of the region, where these do not yet exist. This would preferably be done in close collaboration with the InterAcademy Panel for International Affairs (IAP) and the Third World Academy of Sciences (TWAS); (v) Facilitate the free flow of scientists and scientific knowledge across borders; (vi) Provide support and help with co-ordination, if needed, to scientific networks in the region and initiate new networks, where this has been identified as a regional priority; (vii) Assist the ICSU family in identifying scientists for membership of committees and

participation in activities within the ICSU family through the establishment of a data base of experts; (viii) Upon request, act as focal point for regional programme activities of ICSU and its members; (ix) Ensure efficient information transfer from ICSU and its family members to the scientific community in the region; and (x) Share information and develop collaborative partnerships with UNESCO Regional Offices for Science as well as with other major ICSU partners such as TWAS, the Third World Network of Scientific Organizations (TWNSO) and the Third World Organization for Women in Science (TWOWS).

Priority setting will involve a consultative process of National Members and key organizations in non-member countries. As a first step, four regional workshops will be organized in 2003-2004. Regional Committees will then be established, and based on the results of the workshops, a five-year strategic plan should be established. A yearly workplan and budget will be decided on by the Regional Committee, which should properly reflect the priorities of the region. It is necessary that the workplans for the Regional Offices are both visionary and realistic. The core support from ICSU and the host institution/country should serve as a basis for the initiation of targeted activities and additional external support should be sought. However, it is essential that the workplans of the Regional Offices be developed primarily on the basis of a vision and strategy and not based primarily on the availability of external funds. Further suggestions can be found in the Report from the COSTED Review Panel.

Location

The Regional Offices should be located in prestigious and strong national or regional host institutions that can provide a scientific and administrative home, including some core financial contribution as well as a significant in-kind support. The ICSU Secretariat will contact all National Members in the regions, and possibly other institutions, soliciting offers to host the Regional Offices. It is important that they are located in countries/institutions acceptable to the science community of the region. Thus, the four regional workshops will be crucial in this respect. In addition, the ICSU Secretariat is using various opportunities to discuss this with countries/institutions, which may have a potential interest in hosting an ICSU Regional Office. The Regional Office for Asia is a special case, as the Executive Board and the General Assembly have agreed to propose to INSA and the Government of India that a Regional Office be established in Chennai, India. Such an establishment is contingent on the successful conclusion of ongoing discussions with the Indian National Science Academy and the Government of India and a formal decision by the Indian authorities.

Governance

The ICSU Executive Board will appoint Regional ICSU Committees based on nominations received from National Members in the regions and in close consultation with those members. EB may wish to add a few additional scientists from the region to ensure good coverage of the various disciplines as well as the representation also of scientists from countries without a National Member Organization. The Chair of each Regional Committee will be appointed by the Committee itself. The Executive Director of ICSU will serve as an *ex officio* member. The host country/institution will also be invited to appoint an *ex officio* member of the committee. The ICSU Regional Committees are responsible for promoting the objectives and functions of the Regional Offices. The Regional Committees will develop strategic plans and approve annual workplans and budget for the Offices. The Regional Committees shall report to the ICSU Executive Board annually before the end of March. At the same time, an annual budget and audited accounts for the previous year should be submitted. The Regional Offices will have a

7-6

Director appointed by the Executive Board in close consultation with the Regional Committees and she/he is responsible to the Regional Committee. The Regional Directors are responsible for keeping the ICSU Secretariat fully informed of the activities of the Offices. It is the responsibility of the ICSU Secretariat to help facilitate information flow between the ICSU family and the Regional Offices. It is important that the core financial support from ICSU and the host country/institution be primarily used to initiate activities in a catalytic fashion. A minimum of two full time staff will be necessary, and the funding for the salary of the Director will come from the ICSU core support. No size fits all, and the Regional Offices will develop differently as the regions have special characteristics and different needs.

The roles and responsibilities will be regulated in a Constitution for the Regional Committee, which will be approved by the ICSU Executive Board in consultation with the Regional Committee and the host government/institution. The four Chairs of the Regional Committees serve as *ex officio* members on the ICSU Policy Committee for Developing Countries, but the Policy Committee has no oversight function in relation to the Regional Offices. It can, however, decide to offer comments to the ICSU Executive Board on the functioning of the Regional Offices.

Funding

The Regional Offices will receive core funding of US\$25,000 per year from ICSU for the period 2003-2005. It is anticipated that this level of support will continue contingent on the successful development of the Offices and their programme of work. It is expected that the host country/institutions supports the Regional Offices by making staff and premises available to the Offices. Additional support for programme activities from the host country/institution should also be foreseen. It is expected that ICSU National Members outside the region will wish to contribute financially in a similar manners as they have done for COSTED. In addition, the Director is responsible for fund raising for additional activities and specific programmes.

Agreement with host country/institution

A formal agreement should be negotiated between the host country/institution and ICSU. It is anticipated that the Regional Offices will be based in existing scientific institutions in the host country and that they will not have their own legal identity. Thus, all staff except the Regional Director will be employed by the local institution and the terms of employment will be similar to other staff in that institution. The host country/institution is expected to contribute financially to the running of the Offices. They will have the possibility to nominate an *ex officio* member on the Regional Committee.

ICSU and its partners have many offices supported by national governments, but where the responsibility for the activities of the office rests with the ICSU body served by the office. It is important that the rights and responsibilities of the host government/ institution and ICSU be clearly defined in an agreement. These will vary between Offices and have to be negotiated on a case by case basis.

Regional Office for Africa

In the previous ICSU Insight, it was announced that the Second ICSU Consultative Forum for Africa would be arranged in Pretoria, South Africa on 4-6 September. Please note that the dates have been changed to 25-27 September 2006. The 4th meeting of the ICSU Regional Committee

for Africa will be arranged in Nairobi on 17-18 July, at which time the Committee will discuss the draft reports from the four Regional Scoping Groups on human health, energy, hazards and global change.

Regional Office for Asia and the Pacific

On the occasion of its 93rd meeting, the ICSU Executive Board appointed Professor Mohd Nordin Hasan as Director of the ICSU Regional Office for Asia and the Pacific. He took up office on 1 June. The programme for the earlier announced hazards symposium in conjunction with the inauguration of the ICSU Regional Office for Asia and the Pacific (19 September) is now available.

First ICSU Regional Meeting for Latin America and the Caribbean

It is anticipated that the ICSU Regional Office for Latin America and the Caribbean will be inaugurated later this year at the Brazilian Academy of Sciences in Rio de Janeiro. Invitations have been sent out to the First ICSU Regional Meeting for Latin America and the Caribbean, which will be hosted by Universidad de Panama on 16-17 October 2006.

Second Regional Consultative Forum ICSU Regional Office for Africa 25 – 27 September 2006 FIRST CIRCULAR

The ICSU Regional Office for Africa invites your participation at its 2nd Consultative Forum which will be held in Pretoria, South Africa from 25 to 27 September 2006. In keeping with the ICSU Strategic Plan of 2006 –11, and the needs of Africa, the ICSU Regional Committee for Africa identified four priority areas for its Regional Office. These are: (a) Health and Human Well-being; (b) Sustainable Energy; (c) Natural and Human-induced Hazards and Disasters; and (d) Global Change. Four Scoping Groups, composed of leading African scientists and engineers, are currently preparing science/work plans on each of these priority areas. Prior to the implementation stage; the drafts of these documents will have to be evaluated by a broad base of African science and engineering communities, the ICSU family and its partners (www.icsu.org; www.icsu-africa.org), and other key stakeholders. In this regard, the ICSU Regional Office for Africa invites you and your colleagues to participate in its forthcoming Regional Consultative Forum whose central theme is the evaluation of the workability of the four science/work plans (drafts) which will be mailed to you before the end of August 2006.

You are further requested to kindly complete the attached form and return to the Secretariat of the ICSU Regional Office for Africa. A second circular, with a tentative programme and logistics details, will be mailed to those who respond to this call before 25 June 2006.

7-8

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7.1.3 International Geosphere-Biosphere Programme

IGBP update for the SCOR Annual Meeting 2006, Concepción, Chile by Beatriz Balino

The International Geosphere-Biosphere Programme (IGBP) networks scientists around the world to conduct interdisciplinary Earth System science and global change research. IGBP also participates in the *Earth System Science Partnership* (ESSP), a joint venture on global change research together with the World Climate Research Programme (WCRP), the International Human Dimensions of Global Change Programme (IHDP) and DIVERSITAS (an international programme on biodiversity science).

IGBP and SCOR continued its fruitful collaboration during the past year, through the jointly sponsored projects -GLOBEC, IMBER and SOLAS- as well as the Fast-Track Initiatives *Iron cycle* (culminated) and *Ocean Acidification* (on-going) and in the planning and organization of the 2nd Symposium on *The Ocean in a High CO₂ World*.

New IGBP Chair

Prof. Carlos Nobre, from the National Space Research Institute in Brazil, is the new Chair of IGBP Scientific Committee for 2006-2008. Prof. Nobre, a meteorologist with a Ph.D. from MIT is well known in the IGBP community through his major role in the *Large Scale Biosphere-Atmosphere Experiment in Amazonia* (LBA), as SSC member of a number of IGBP and WCRP projects as well as in the Brazilian IGBP and IHDP National Committees. He has contributed to the 1st, 3rd and 4th IPCC assessments and has played a pivotal role in academic education and climate and environmental research in his native Brazil. For this long-standing work, he was awarded the Brazilian National Order of Scientific Merit Medal (1997).

IGBP-II Science Plan

The Science Plan and Implementation Strategy for Phase II of IGBP (2004-2013) was completed and approved by the Scientific Committee, and published in early 2006. The document outlines the strategic developments for the program over the next decade. Hard copies are available from the IGBP Secretariat and it can also be downloaded from <http://www.igbp.net/>

The 4th IGBP Congress

This event will be held in 4-9 May 2008 in Cape Town, South Africa, with the tentative title

Managing Change in the Earth System. The main goal of the event will be to review IGBP medium-term strategies (i) to broaden its outreach efforts toward agencies, industry and civil society, and (ii) to develop communication tools that deal with uncertainty, risk and vulnerability in global change. The Congress will build on efforts aimed at promoting Earth System science to the broader scientific community (namely scientific symposia and policy round-tables), informing policy makers on critical global change issues, influencing the next generation of global change scientists by targeting educational institutions and helping revamping National Committee activities worldwide. The congress will also contribute to the emerging African Network for Global Environmental change research by organizing an open session with invited speakers to discuss “Challenges of global change in Africa: from the regional to the global scale”, and “Hot spots of change in Africa: what are global change signals in Africa?”

IGBP INTEGRATION PROJECTS

AIMES (Earth System synthesis and integration): the project has developed a new structure and organization and is currently writing its science plan and implementation plan. The challenge for AIMES is to extend the Earth System Modeling approach, in terms of physical-chemical-biological coupling and the interactions with human processes. Recent results from the Carbon Cycle-Climate Model Intercomparison Project (C4MIP; an AIMES-WCRP Earth Systems Modelling activity) comparing coupled and uncoupled carbon-climate models highlighted significant differences in terrestrial and marine uptake of CO₂ (Friedlingstein et al., *in press*). The paper also points out key areas for further model improvement and development. AIMES also contributes to capacity building through its Young Scientists’ Network to better understand the role of humans in perturbing biogeochemistry and climate. A first workshop was held in Colorado, USA in 2005 and was attended by over fifty young researchers from 18 countries; a second meeting on *Urbanization Interactions with Biogeochemistry and Climate* is planned for September 2006, in Mexico City. Other products include a Dahlem book entitled *The Integrated History and Future of People on Earth* (in press), and the *Earth System Atlas* (originally started by IGBP-DIS and continued under GAIM) which consist of a series of global change-related digital maps and time series, with access to the underlying data, and text explanation of data collection, analysis, etc. It is being implemented under the umbrella of the Environment Initiative at Lehigh University (USA). The Atlas is a research tool to help identify gaps in our knowledge of the Earth System; it is fully supported, freely available resource. For more info visit <http://earthsystematlas.sr.unh.edu/>

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PAGES (Past Global Changes) continued in service-oriented coordinating mode, helping to develop coherent international collaborations in palaeo science. The research focus remained high-resolution studies of past climatic and environmental change in order to assess the natural and anthropogenic components of environmental variability, and to model future global change and its consequences. Since the last reporting period, PAGES proposed a new four-theme structure for its scientific

7-10

activities: (i) Past Climate Forcings; (ii) Reconstruction and Modeling of Regional Climates and Modes of Variability; (iii) Land-Ocean-Cryosphere Dynamics and Linkages; and (iv) Past Human-Climate-Environment Interactions. These will be complemented by four cross cutting themes: (i) Chronostratigraphy; (ii) proxy issues; (iii) data management; and (iv) dissemination and outreach. In August 2005, the second PAGES Open Science Meeting (Beijing, China) attracted over 370 scientists from 45 countries. Important PAGES-related research published in 2005 included the ground-breaking 650 ka Concordia Dome record of atmospheric composition from the European Project for Ice Coring in Antarctica published in *Science* (Spahni et al., 2005) and results on Northern Hemisphere temperature variability over recent millennia published in *Nature* (Moberg et al., 2005). The IPO continued to serve as the primary communication hub for the SSC, project activities and partner global change organizations. Communication and outreach activities included publication of the newsletter, maintenance of the website and researcher and product databases, and capacity-building efforts including integrating developing-country scientists into the international palaeo research community. PAGES SSC is currently drafting their Science and Implementation Plan that will reflect the revised scientific and organizational structure of the project.

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FAST-TRACK INITIATIVES

In 2003 the Scientific Committee of IGBP launched three 'Fast Track Initiatives' (FTIs) as a means to foster integration and synthesis of IGBP science. FTIs are short-lived activities designed to address cross-cutting topics of current interest in Earth System science. FTIs have a lifetime of maximum three years, and should result in a key product such as a review article, book, new activity or database. The *Iron* FTI culminated in 2005 (see below) while the FTI on *Atmospheric CO₂ and Ocean Biogeochemistry* (on-going), co-sponsored by SCOR, is dealt with elsewhere. Two new initiatives recently approved by the Scientific Committee are described.

The Global Iron Cycle (2003-2005)

The IGBP/SCOR Iron FTI successfully culminated in 2005, having produced a review paper published in *Science* (Jickells et al. 2005), as well as papers on the iron cycle (Boyd et al. 2005), one on the deposition of dust to the oceans (Mahowald et al., 2005) and one on the palaeo record of dust transport and deposition (An et al. 2006). The Iron FTI enhanced cooperation across a number of IGBP projects and was the promoter of the on-going FTI on Ocean Acidification (see below). The knowledge generated by this activity will contribute to modeling within AIMES.

NEW FTI: *Refining Plant Functional Classification for Earth System Modelling*

The FTI is a joint IGBP-DIVERSITAS project and will be carried out between 2006 and 2008. Plant functional classification is a tool to model vegetation dynamics and ecosystem functioning (esp. biogeochemical cycles) in response to climate and CO₂. The FTI will: (1) design a new basis for plant functional classifications to be used in the new generation of large-scale dynamic vegetation models, (2) identify existing data and data gaps for its implementation, (3) conduct a first test, at

least for one or a few regions where suitable data and models are currently available. Planned products are: (i) an outline of the structure, rules for implementation and data needs, for new plant functional classifications for large-scale dynamic vegetation models, to be published in a high-impact journal (ii) at least one paper presenting a test of the classification, e.g. in *Global Change Biology*, (iii) a compilation of links to databases and other sources for the regional implementation of classifications, to be made available on the Internet, and (iv) a strategy to fill data gaps, to be made available on the internet and published in an international journal.

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NEW FTI: *The Planet in 2030-2050: An ESSP Integrative Project*

The overall objective of this FTI is to analyse and describe what the Earth might be like in the 2030-2050 period based on expert knowledge from a wide range of disciplines. The intention is to complement the well-known IPCC, Millennium Assessment and other scenarios, by focusing on a range of specific aspects of the Earth System and describing their future trajectories individually. The idea is not to be internally consistent, but rather to use the wide range of views of experts to explore how different assumptions and world views colour the way we envisage the future. The main product of the FTI will be a book, organised around chapters for each of the themes considered as well as a concluding synthesis chapter. A short paper for a journal, synthesising the project as a whole, will be prepared if appropriate. The FTI will be implemented via a Dahlem-style workshop with up to 45 participants, the bulk of which will be experts in a particular aspect of the Earth System and the remainder will be generalists, with an interest in the integration of information and approaches. The timeframe of this FTI will be 2007-2008.

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EARTH SYSTEM SCIENCE PARTNERSHIP (ESSP)

The Earth System Science Partnership (ESSP) continues to evolve and pave the road to increased collaboration amongst the partners. A significant step in this regard has been the appointment of Martin Rice as ESSP Coordinator, based at the DIVERSITAS secretariat in Paris. ESSP provides an excellent conduit for better linking global environmental change research to stakeholder interest and needs. Bilateral collaborations between IGBP and ESSP partners are being established, through ongoing projects co-sponsored by IHDP and WCRP, and other collaborative efforts planned between IGBP and WCRP projects. Two examples are: (i) an activity on atmospheric chemistry and climate co-organized by IGBP's IGAC and WCRP's SPARC projects, and (ii) a workshop on aerosols, clouds, climate and health organized by IGBP's iLEAPS and IGAC projects together with WCRP's GEWEX project. Lastly, development of collaborative activities with DIVERSITAS is on the agenda for the coming year. These steps to enhance collaboration are important for strengthening ESSP and for developing a common vision for the future of global environmental change research. ESSP is organizing an Open Science Conference entitled *Global Environmental Change: Regional Challenges* in Beijing, on 9-12 November 2006. The event will present progress in our

7-12

understanding of the natural and social systems of global environmental change and will highlight the ESSP approach to the study of the Earth System. The conference is targeted at scientists, policy makers, practitioners, scholars, members of the private sector and journalists. The event will feature plenary sessions, 42 parallel and poster sessions, around the following topics: (i) Earth System Science Approach, (ii) Science for Sustainability, (iii) Integrated Regional Studies, and (iv) Global Change in Monsoon Asia.

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**IGBP/SCOR Fast Track Initiative on Atmospheric CO₂ and ocean biogeochemistry:
Modern observations and past experiences**

IGBP-SCOR Fast Track Initiative "Ocean Acidification"

first workshop

**First IGBP–SCOR FTI Workshop on
“Ocean Acidification - modern observations and past experiences”**

Location:

Lamont-Doherty Earth Observatory of Columbia University

Date:

28 September (morning) - 30 September (afternoon) 2006

Participants:

Up to 50 researchers working on ocean acidification on present and past timescales, covering a broad range of expertise on marine biogeochemistry.

Objectives:

The workshop will address specific questions that break down the overarching general question on the consequences of ongoing ocean acidification into manageable tasks. The objective will be to define state-of-the-art answers to these questions, to work out recommendations for the communities, to define deliverables for this particular Fast-Track Initiative (FTI) within the following year, and to outline group papers.

Scientific themes and questions:

- (1) What are the predicted changes (and uncertainties) in marine geochemistry (pH, seawater chemistry, CCD etc.) for various future CO₂ emission scenarios?
- (2) What were the amounts and rates of change in ocean geochemistry in response to changes in atmospheric CO₂ as inferred from the geological record?
- (3) What processes were responsible for past changes in ocean acidification?
- (4) What do present-day studies tell us about the response of biota to changes in ocean chemistry (biomineralization and other biological processes)?
- (5) What does the fossil record reveal about the adaptation of marine biota to changes in ocean acidification?

Workshop structure:

Days 1 and 2

(A) Overview presentations: State of the art related to the above questions.

(B) Breakout into two specialist working groups (according to key questions) consisting of a mix of present-day and paleoresearchers, observationalists and modelers. Groups

7-14

will try to answer the questions, identify the knowledge gaps limiting the answers, and work out what kind of synergistic research could produce better answers.

Day 3

Presentation and discussion of group results in plenary; synthesis; strategy for publishing, and planning of follow-up activities and a second workshop in 2007.



Caption: Brain coral and sea fan close-up.
Credit: Florida Keys National Marine Sanctuary

and PAGES.

Background

The atmospheric concentration of carbon dioxide is now higher than experienced on Earth for at least the last 400,000 years, and presumably the last several million years. Moreover, the current rate of CO₂ rise of 1.1 ppm/year exceeds even the relatively rapid increases at transitions from glacial to interglacial periods by about two orders of magnitude. As a direct effect of rising CO₂, global temperatures are predicted to increase by several degrees during this century. Another less-highlighted consequence will be increased surface ocean pCO₂ and a lowering of the pH of the surface ocean. For example, as atmospheric CO₂ levels double over their pre-industrial values by the middle of this century, the accompanying surface ocean pH changes are expected to be three times greater than those experienced during glacial to interglacial transitions.

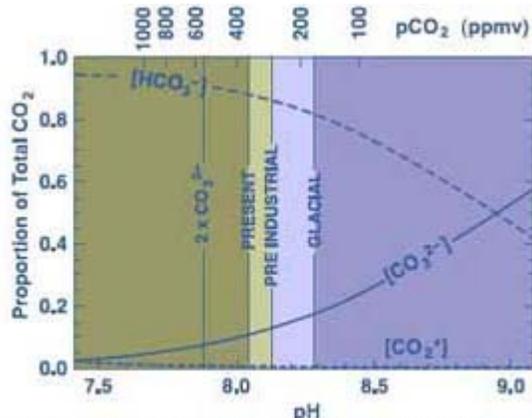
Many questions on the effect of increasing atmospheric CO₂ on ocean chemistry and marine life remain unanswered or cannot be answered quantitatively. These include a robust prediction of changes in ocean carbonate chemistry, the buffering effect of carbonate sediments, the effect of weathering rates and fluvial input, feedback with the

Publications on this particular workshop:

- EOS article(s) on workshop results and recommendations.
 - Reports in newsletters of the IGBP and SCOR networks.
- (A special issue or special section and higher profile publication are planned as a product of the entire FTI after the second workshop.)

Funding:

Funding has been granted from IGBP, SCOR

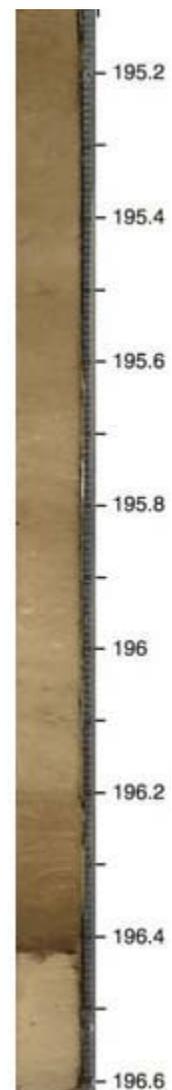


Changes in carbonate ion species and ocean pH in response to atmospheric CO₂ concentrations. From "Coral reefs & Global climate change", Pew Center on climate change, 2004.

plankton community, in particular carbonate producers, the effect on overall marine production, including fish, tolerance of corals to changing water chemistry, and others. There have been recent initiatives (e.g. SCOR-IOC symposium “The ocean in a high CO₂ world”, a Royal Society study on surface ocean acidification, and an NSF/NOAA/USGS-sponsored workshop on impacts of increasing CO₂ on marine calcifiers) to approach these questions, mainly on the basis of oceanographic observations and modeling. However, modern-day observations are fundamentally limited by the small range of CO₂ variations that can be observed naturally. On the other hand, laboratory experiments and model simulations are limited by the requirement to simplify the complexity of the atmosphere-ocean-biosphere system.

One way around this dilemma is to complement modern observations and modeling results with paleoenvironmental reconstructions from historic periods of major atmospheric CO₂ changes. It is clear that there is no perfect paleo-analog to the greenhouse scenario predicted for the next decades and centuries in terms of absolute CO₂ level and rate and magnitude of CO₂ rise. Nevertheless, the record of Earth’s history contains periods of rapidly rising and/or persistently high atmospheric CO₂ levels, which provide opportunities to observe Earth system responses in a range of scenarios. Therefore, the proposed FTI could address long- and short-term changes in past ocean biogeochemistry over the last 100 million years, with a focus on particular periods in Earth’s history, for example:

- (i) The seven glacial-interglacial transitions of the last 650,000 years, when atmospheric CO₂ repeatedly increased by up to 100 ppm (40%), accompanied by a surface ocean pH decrease of the order of 0.15 units.
- (ii) The Eocene change in carbonate compensation depth.
- (iii) The Paleocene Eocene Thermal Maximum 55 million years ago, where abrupt processes (e.g. massive release and oxidation of methane hydrates) resulted in a transient CO₂ increase of the order of several hundred ppm, presumably at a high rate that approximates the present situation. This event also provides the opportunity to observe recovery times of the Earth system to a CO₂ perturbation.
- (iv) The middle Cretaceous ~100-80 million years ago, as an example of an extreme and lasting greenhouse world, with estimated atmospheric CO₂ concentrations three to ten times higher than present.



7-16

Objectives

The main purpose of this cross-disciplinary IGBP-SCOR FTI is to apply insights gained from paleoenvironmental reconstruction and analysis to improve our understanding of the potential consequences for the marine environment of the chemical effects of future CO₂ emissions. This FTI will also help those working on paleoenvironmental studies to understand what kinds of research would have the greatest potential to improve our understanding of the future. Thus, this FTI will promote communication across disciplinary boundaries, allowing cross-fertilization to occur between those working on paleoenvironmental problems and those working on problems associated with the effects of human activities.

Leaders

Co-Chairs:

Harry Elderfield, Cambridge University, UK
Ulf Riebesell, IFM-GEOMAR, Kiel, Germany
Ken Caldeira, Carnegie Institution, Stanford, USA
Joanie Kleypas, NCAR, Boulder, USA
Wally Broecker, LDEO, Columbia University, USA
Franck Bassinot, LSCE, Gif-sur-Yvette, France

IGBP-SC liaison: Bob Duce, Texas A&M University, USA
Organisational lead: PAGES

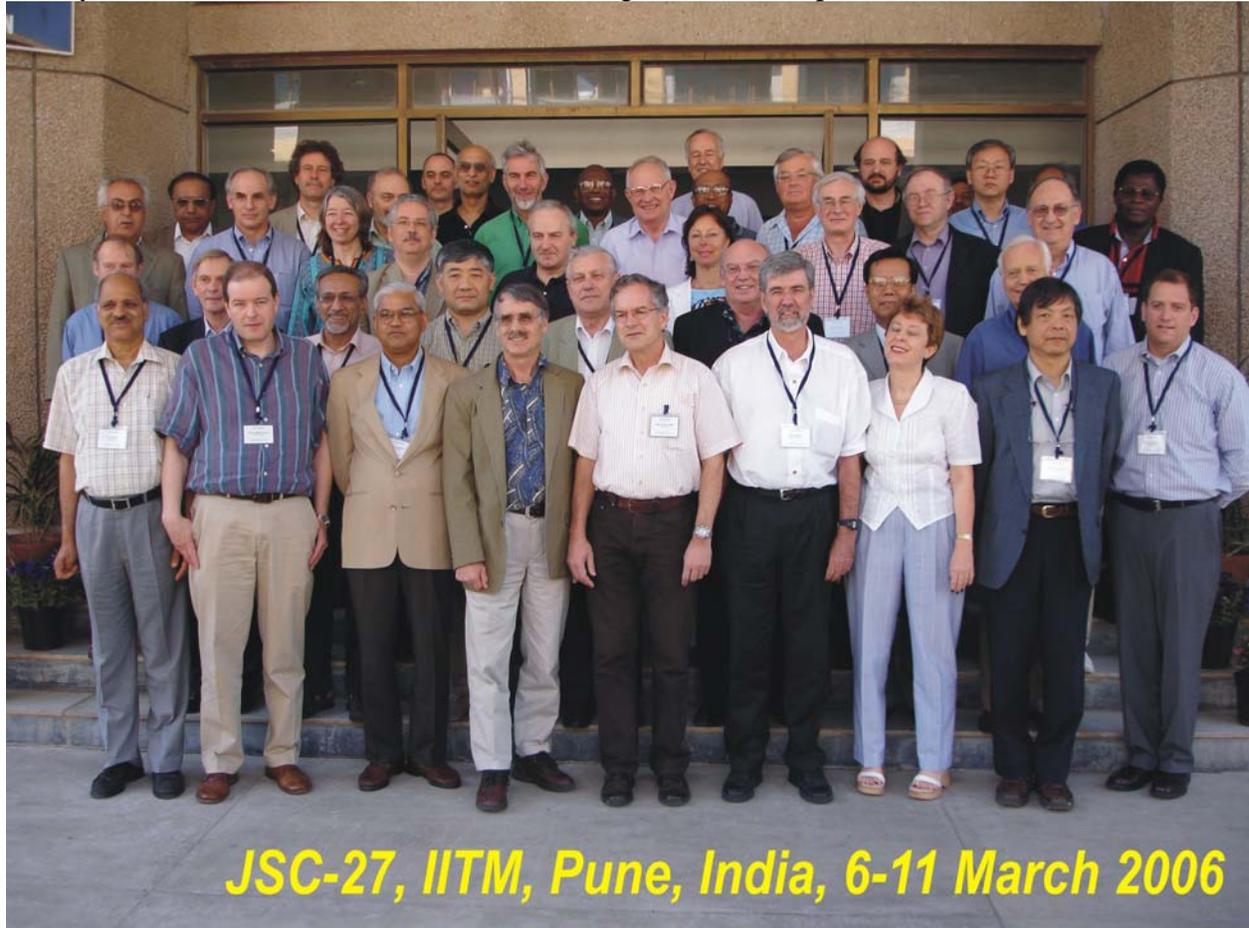
7.1.4 World Climate Research Programme (WCRP)

Liaison Report:

2006 Meeting of the Joint Scientific Committee of the World Climate Research Program

The Joint Scientific Committee (JSC), which is jointly sponsored by the WMO, ICSU and the IOC (Intergovernmental Oceanographic Commission of UNESCO) and is responsible for overseeing the World Climate Research Programme (WCRP), held its 27th session at the Indian Institute of Tropical Meteorology in Pune, India from 6-11 March 2006; their hosting was excellent and we were well connected to the Internet. Most of JSC's 18 members were able to attend. In addition, there were about 25 invited experts and observers, mainly representing the various WCRP project offices and several of the sponsoring and participating organizations, and a good sprinkling of scientist from various research organizations in India (see picture). I was able to attend the full meeting, officially representing SCOR, IUGG, and IAMAS; my luggage, unfortunately, was only present for the second half of the meeting due to problems arising due to

an apparently unusual snowstorm in Frankfurt, Germany for which they were totally unprepared; luckily, I was not one of those who stood waiting in line for help for 16 hours.



The WCRP meeting was chaired by Dr. Peter Lemke, who opened the meeting with a welcome to Ann Henderson-Sellers, who had recently assumed the position of director of the WCRP Office in Geneva. In his president's report, Peter related the WCRP's original objectives to the new COPEs framework, which is pursuing both objectives and also coordinating in requirements for observations, process studies, models, and data assimilation. He indicated the objectives for the week-long meeting were to strengthen the application of the framework and work toward an implementation plan, to hear about the progress and evolution of the projects, to consider the future structure of the WCRP, and to discuss collaborations of WCRP with other programmes, including IGBP, IHDP, and the ESSP. He indicated there was also growing recognition of important crosscutting themes (e.g., sea level rise, monsoons, atmospheric chemistry and climate, extreme events, etc.).

Dr. Ann Henderson-Sellers then gave her report as the new director for the WCRP. In her view, the key challenge is to develop the new strategic plan for the WCRP, covering 2006-2015, and she thought this would better portray the WCRP's set of activities and programs than the COPEs report, which had so recently been completed. In her view, the emerging questions about climate

7-18

have not to do with whether and how much it is changing, but about how near potential tipping points may be and whether the findings (and warnings) of the scientific community are sufficiently understood. She listed a number of major questions to be addressed:

- Is the extent of climate change past the point of no return? For example, has the disintegration of Greenland begun? What about the Amazon, amplified release of methane from peat bogs, disappearance of Arctic sea ice, malaria outbreaks, etc.?
- Why has research been unable to narrow the estimated range of climate sensitivity?
- Is the gravity of climate warnings (and assessments) adequately understood? Is it recognized what can happen as mangroves and reefs are lost and are not there to dampen coastal surges? Do leaders understand that there are already refugees from Pacific islands, and that mountain glaciers are drastically reduced?
- What about ocean acidification?
- What is a safe level of change?
- Is climate research honest? Questions are arising about the “hockey stick” and the debate is confusing the public.
- Is climate research being manipulated or censored? She cited instances regarding Jim Hansen and NASA in the United States and CSIRO in Australia. She also mentioned the dropping of satellite commitments by NASA to HYDROS as indicating that perhaps answers are not wanted.
- What and where are the tipping points?

With so many issues and questions, she then summarized her view of what the WCRP is supposed to do: facilitate research; promote seamless prediction from weather to climate change (so including THORPEX, hydrologic forecasting, etc.); provide tangible products for the public; and be responsive to the IPCC. She sees a need to reinvigorate sponsor enthusiasm.

Ann then raised the issue that WCRP is coming up on time for its next review (see below). Their last review was in 1995, so the review is overdue and it is time to get ready to respond about WCRP success indicators, visibility, high priorities, quality of research, input to policy, response and role in promoting fulfillment of the Millennium Development Goals, what to make of 2008 being the Year of Planet Earth, etc. The 1995 review had recommended more work on involving developing nations, publicizing benefits, planning for long-term observations, work on natural and human-induced change, and a WCRP newsletter (and she presented the first edition of the newsletter). She then offered some questions for the JSC to be asking itself: how to turn research into benefits; how to raise awareness and resources; how to work with stakeholders to manage the research; how to engage stakeholders; etc. And she noted that the JSC needs to provide SBSTA its list of research priorities by May 2006. Looking forward, she saw the need to: better define the goals; plan well; recognize success; establish performance metrics; increase visibility; etc. For 2006, she saw the office’s task to be to develop the WCRP strategy, build links to the ESSP partners; go from the COPES philosophy to an implementation plan; and for WCRP to look up and out, not down and in.

Her report generated a great deal of discussion, generally positive. Concerns that came up included: drawing attention to WCRP would take visibility away from the countries that have the money to actually do something; the challenge of making the WCRP objectives the top goal of leading scientists around the world; and the need to really find the optimal role for the WCRP amongst all the other things going on.

Dr. Thomas Rosswall of ICSU then offered their perspective as one of the WCRP sponsors. He reiterated the importance of being clearly focused on the science—and the really important scientific questions. He likes the hybrid set of sponsors—governments and non-government associations. He sees the need to grow WCRP efforts closer to the sustainability questions. He did indicate that there will indeed be a review coming, and its intent is to help the WCRP. He indicated that ICSU is also considering sponsoring THORPEX and coupling this to its developing hazards program. He also indicated that planning is beginning for the Third World Climate Conference, which will serve as a major political platform. He urged WCRP to actively participate in the 2008 International Year of Planet Earth.

Dr. B. Nyenzi, who is director of the World Climate Programme Department of WMO, then spoke regarding WMO's sponsorship. He complimented Dr. Henderson-Sellers and indicated that WMO would work to assist her. He indicated that WMO has expert teams working on a number of issues, one being detection and attribution that it cosponsors with CLIVAR. He encouraged WCRP to be working with the upcoming hazards assessment activity (being organized by Gordon McBean) and to work with other WMO activities, including IPCC, GCOS, WCP, etc.

John Church then made the report for Maria Hood of the IOC, who could not be there. The report covered a lot of potential climate impacts in the marine environment and how these were being coordinated across the programmes. These impacts included:

- Ocean and coastal circulation patterns (CLIVAR, CliC)
- Sea level rise and coastal erosion (CLIVAR, CliC, LOICZ)
- Natural hazards (CLIVAR, GCOS)
- Carbon sources and sinks (GCP, CLIVAR, SOLAS, IMBER)
- Ocean acidification (SOLAS, IMBER)
- Fisheries and ecosystems (GLOBEC, IMBER)
- Biodiversity (DIVERSITAS, GLOBEC, IMBER)

There are also efforts underway on three potential tipping point issues: impacts on the Arctic; impacts on small islands; and impacts on coral reef ecosystems. A comprehensive approach was urged, and IOC is trying to do this through a focus on "Climate of the Ocean." It was asked, but not answered, if this should become an ESSP joint project.

The WCRP Executive Committee meeting was held in Pune to slightly overlap the meeting of the IGBP Science Committee, and a joint meeting was held. The program for the joint meeting included going over a number of the WCRP activities, so they were reported on both to the

7-20

WCRP and jointly. In my write-up, I will, for clarity, combine coverage of topics and not cover everything.

Following Peter Lemke's overview of the WCRP, Dr. Carlos Nobre, as chair of the IGBP Science Committee, provided an overview of IGBP. He indicated they are working to better interface with the Millennium Development Goals and sustainability issues. In doing this, they believe it important to be empowering developing nations. He indicated that IGBP sees the potential for much more cooperation with IGBP.

Dr. Peter Liss presented an overview of SOLAS, describing its focus on biogeochemical processes, physical exchange processes, and exchange of GHGs (jointly with IMBER). SOLAS will be having an open science meeting in 2007 and sponsoring a meeting on the International Nitrogen Initiative in November 2006. Issues to determine how they interface with WCRP include: field programs, sulfur cycle, biogenic aerosols, etc. In terms of their highlights, he indicated progress on the global iron cycle, the effect of lower pH on the oceans, the flux of DMS to the atmosphere, and the CO₂ flux anomaly in the Southern Ocean.

Dr. Pep Candell reported on the status of the Global Carbon Project, including its various themes. He indicated they are working on doing an annual update to the global carbon budget, and he then listed a number of areas of vulnerability of the global carbon cycle to climate change, including permafrost, peatlands, burning of vegetation, methane hydrates, the biological pump, and the solubility pump. This year, they are starting their permafrost effort (PEACE, for Permafrost And Carbon Emissions), which will be coordinated with IGY, and studies dealing with tropical peatlands, human interactions, vulnerability to drought and fire.

Both WCRP and IGBP are becoming very interested in studies dealing with effects on Africa. For example, GEWEX and CLIVAR are carrying out a study of the West African monsoon, and START has a program dealing with East African lake levels and monsoons.

Dr. Gilles Sommeria of the WMO's World Climate Programme Department reported on progress in observing programs, specifically of GEO (Group on Earth Observations). GEO is an intergovernmental group including 58 nations and 43 participating organizations. GEOSS is their single vision—a global, coordinated, comprehensive, sustained system. They have had 3 summits and have identified 9 benefit areas. Discussion focused on why is assimilation not included; whether there is adequate national commitment of funding; the effects and response to NASA cutbacks; tie-ins to GOOS and GTOS; the need for strong scientific interactions; and any special value of GEOSS as a result of politicians having become vested in it.

Thomas Rosswall then addressed both WCRP and IGBP about the upcoming review, which will cover them both. He indicated why it is felt that the review is timely (lots is happening), the need to identify the real benefits, how review of ESSP will take place, and the timetable. There was

lots of discussion about issues such as tie to funding, balancing needs at global and regional levels, the role of ESSP, etc.

Dr. Robbie Ravishankara of NOAA reported on the Atmospheric Chemistry and Climate activity of the WCRP. They are focused on getting at changes in atmospheric composition and in the radiative forcing causing climate change. WCRP's activities are generally within SPARC and they link to the IGBP's IGAC, and the efforts are working closely together—and may even merge, as is happening with the modeling efforts (AIMES), which will be initially focused on aerosols and deposition issues. Dr. Phil Rasch commented on the need to improve modeling of deposition processes, the role of observations, model comparison activities, etc. followed by a lot of discussion on how to make everything happen.

Peter Lemke provided an overview of the modeling efforts underway, including a general discussion of the key modeling tasks ahead and the emerging ESSP strategy, which has efforts in experiments with current GCMs; improvement and validation of current GCMs; development and testing of new process representations; extension of the models to cover the entire Earth system; development of more holistic models; linkages with human systems; and development of simple models. Dr. J. Shukla then reported for the WCRP Modeling Panel and how models are advancing to treat the whole climate system. They are looking toward seamless prediction of weather and climate (weather, 1-10 days; intra-seasonal, 1-30 days; seasonal, 1-100 days; interannual, 1-1000 days; decadal, 1-10,000 days (30 years); and climate change, 1-100,000 years), and doing all while getting at the statistics of variability, etc. So, there are both initialization and boundary condition components. Deficiencies at the moment concern both model predictive skill and computing power (which he said had risen by 10^6 in the last 30 years, and they need as much more—and prospects at moment are for 3 orders more in magnitude). Dr. John Mitchell of the WCRP WG on Coupled Models continued with a review of what is going on in development, evaluating, use of models, and in reducing uncertainties. For IGBP, Dr. David Schimel reported on modeling in AIMES, including the coupled carbon cycle-crop model intercomparison project (C*MIP), the global emissions inventory activity (GEIA), and Earth system modeling. They are also working toward a broadened Earth system data assimilation effort and have already begun planning for what they hope to accomplish for IPCC's fifth assessment report. Discussion of the modeling presentations focused on uncertainties in representing the terrestrial biosphere, on coupling to human dimensions, on historic land-cover change, on inadequacy of funding for modeling, etc.

Presentations then shifted to reporting on the joint WCRP-IGBP activities, including GEWEX-iLEAPS (Integrated Land Ecosystem-Atmosphere Processes Study) that is integrating across a number of projects (e.g., BAHC, IGAC, GCTE, GAIM, etc.) and CLIVAR-PAGES, which is looking at decadal-to-centennial variability. There then followed a brainstorming session on what more the two programmes could be doing (e.g., intercomparisons, focusing on livelihoods instead of just human health, the possibility there are too many projects, etc.).

Finally, joint WCRP-IGBP discussion occurred about the upcoming ESSP meeting in Beijing on 9-12 November. The overall theme is “regional changes” and the call to participate has been distributed widely.

The next day, the JSC returned to reviewing their activities. Dr. Kevin Trenberth reported for the WCRP panel on observations and their analysis, indicating there is major effort going on in areas of reanalysis, data assimilation, and data management. Shukla then reported on the questions being addressed by the WCRP modeling panel, including such issues as seamless prediction, initialization, getting to cyclone-resolving models (the Japanese have run a model at T-2047, which is very fine scale), complexity versus realism, computing requirements, tropical precipitation and deep convection, etc. He indicated that to promote progress in making available computing power, they are preparing a white paper for consideration by the G-8, seeking a really major increment in funding. To really make progress, they hope to encourage the organization of three major coordinated modeling centers covering the Americas, Europe and Africa, and Asia.

Dr. Ben Kirtman of the Center for Ocean-Land-Atmosphere Studies in Maryland presented a very interesting report on the progress of the COPEs Task Force for Seasonal Prediction. What they have done is to finalize a protocol for an “experiment” that will compare the accuracy of various modeling approaches to seasonal prediction, looking both globally and regionally. The protocol involves all of the participating models (some being models focused on seasonal forecasts and some being GCMs, with some of these also including a dynamic ocean) running 10-member ensembles of 7-month predictions (with no cheating—changes in SST must also be predicted) starting at 4 times for each year from 1979 (or some from 1960) to the present. A number of the projects (including GEWEX, SPARC, CliC—since results will be global and include high latitudes, etc.—but not yet THORPEX, and CLIVAR connection in progress) and working groups have agreed on the data to be saved and archived, and they are working to also link with the seasonal prediction applications groups. Results are due beginning in 2007. While this will be a very interesting test of forecast skill, it seems to me that the sets of model results will offer a treasure trove of additional possibilities in that they will provide plausible values for a much wider set of variables and on a finer scale grid than is available from observations, so, for example, I would think those who have been developing empirical and analog prediction techniques would be able to mine the data set for correlations of various types, including for tropical cyclone number and intensity, tornado likelihood, regional drought and heavy precipitation, etc.

Prof T. Yasunari of Nagoya University reported on the PAN-WCRP Monsoon Workshop held in June 2005. He indicated that large uncertainties remain in monsoon simulations, and CLIVAR is working to improve representations of atmosphere-ocean interactions and GEWEX is working to improve representations of atmosphere-land interactions. Other areas of work are on inclusion of aerosol effects and better representing the diurnal cycle of precipitation.

Dr. Kevin Trenberth led a discussion on the status of working with the IPCC, which will issue its Fourth Assessment Report in early 2007. Principal areas with quite limited understanding include radiative forcing by aerosols, mass balance of ice (in all its forms) for the Earth, finer

scale models, etc. In more generally discussing anthropogenic climate change (ACC), Dr. John Mitchell indicated they were moving toward presenting likely changes in terms of their probability density function (pdf). The next IPCC assessment seems likely to be called for by 2013, which would mean freezing the science in 2011-12, and having modeling runs ready by 2010 or so, which means agreeing on them in next year or so. It would very much help the modeling efforts if only a few limiting case scenarios were requested, with finer variations done by interpolation. There was discussion about whether CLIVAR is devoting sufficient attention to ACC. For the SPARC ACC program, their major focus is on stratospheric ozone depletion and recovery, and on attribution of stratospheric changes in all of the many variables.

Another major issue was the simulation of extreme events, including heat waves, frost, growing season length, precipitation (including runoff) and floods, tropical cyclones, and so on. Limits to the data sets present a major problem. CLIVAR, GEWEX, and CliC are all undertaking efforts in this area. The EU's ENSEMBLES project is also working on this. Linkages to the hazards studies are also being developed.

Dr. Tim Palmer next provided an overview of CLIVAR activities, mentioning in particular their increasing focus on regional studies, their efforts on improving models, efforts to look at sea level rise and the factors contributing to it, extreme events, synthesis of observations, status of observation programs (e.g., tropical moored buoys), efforts to improve ocean models, progress in seasonal-to-interannual forecasting, progress of panels for each of the ocean basins, etc. At the urging of Ann Henderson-Sellers, he also suggested some metrics for measuring their progress. Discussion concerned, among other topics, 20th century simulations, problems in monitoring ocean overturning, status of the Argo system, etc.

Dr. Soroosh Soorooshian reviewed GEWEX activities, including the problems created by NASA's delay or canceling of some key satellites. He provided an evaluation of their success in meeting a number of key goals relating to simulating precipitation and the diurnal cycle, indicating there is still a ways to go. They have recently developed a new plan and organized efforts around a few key topics, and are now planning an enhanced observing period. Rick Lawford, GEWEX office director, summarized the key GEWEX objectives as focusing on generating high quality data sets, understanding energy-water cycle linkages, characterizing predictability, improving seasonal forecasts and working more closely with the hydrometeorological services.

Dr. Alan O'Neill summarized progress on SPARC, indicating their efforts to link dynamics and chemistry, detect and attribute changes, and examine stratosphere-troposphere coupling. He showed some interesting results from models, indicating both strengths and weaknesses that will be explored in a focused model intercomparison.

Dr. Barry Goodison reported on CliC, indicating that this project should be of interest to many countries as 95 countries have at least occasional incidence of snow. There are currently several efforts underway to prioritize needs for polar research, and some of the key areas emerging are freshwater fluxes into the Arctic Ocean, changes in snow cover duration, changes in permafrost,

7-24

changes in the Greenland and West Antarctic ice sheets, retreat of the sea ice, etc. They are also working with the IPY on organizing key efforts.

Dr. John Mitchell summarized the extensive work under the purview of the Working Group on Coupled Models, ranging from model testing and improvement to applications to ACC and detection of change. Discussion focused on the move toward regional modeling and its validity, seamless forecasting—or should it be called unified forecasting, the excess number of IPCC scenarios causing problems for modeling groups, etc.

Dr. Martin Miller reported on THORPEX on behalf of Dr. David Burridge. The goal is being set to improve the information enough to be able to reduce by 50% the loss of life due to extreme weather; their plans have been approved and a workshop on the Madden-Julian Oscillation (MJO) is coming up. They intend to work on a number of forecast demonstration projects that focus on particular events, and will be undertaking some observing system experiments to see where Earth's weather is most being stimulated and observing can be most productive (an effort said to be equivalent to "finding the Earth's erogenous zones").

Martin Miller also reported on the activities of the Working Group on Numerical Experimentation, which has membership mainly from the weather services and actually predates the WCRP. They have a Workshop on Model Systematic Errors coming up (12-16 February 2007 in San Francisco). WGNE has a major effort looking at the performance of the global operational forecast models, and they have found that: skill in Southern Hemisphere predictability has virtually caught up with Northern Hemisphere skill; skill in the tropics has improved more than for the extratropics; skill is greatest for large fields; skill is a good deal lower for precipitation than for temperature; ensemble forecasts are improving more rapidly than deterministic forecasts; etc. They also have a number of intercomparison projects underway, including with stretched model grids to see if can improve regional forecasts, on coupled model simulations and the MJO, and a transpose model intercomparison seeking to determine the causes of the differences in the results. They are recommending that model resolution be at least T-85 (about a 1.5 degree grid, or 150 km) in general and better still to have T-255 to represent winter storms effectively. Much attention in the modeling community continues to be on cloud parameterizations (stratocumulus, deep convection, etc.), improving summertime simulations (models tend to "dive toward the dry state"), model verification, extreme events, etc. At the NWP centers, most global models continue to be at about 40 km resolution, but UK is now at 12 km and headed to 4 km, which they believe will really help in representing extreme events. There are also other experimental or regional efforts being undertaken with resolution of a few kilometers, and the Canadian model run at 1 km resolution on Japan's Earth Simulator represented a hurricane quite well. So, there is a push to get to very fine resolutions for forecasts, or even out to 30 days (an effort planned by ECMWF).

Dr. John Zilman provided an overview of GCOS, which is really a coupling together of a number of systems. They have a plan that has been endorsed by the UNFCCC Conference of the Parties and the G-8 group. Their proposals are designed to get at monitoring climate change, and they would be part of GEOSS. Dr. Michael Manton then reported for the GCOS Atmospheric

Panel, indicating that about 80% of present observations are coming in quickly, that there are still large amounts of past observations to incorporate, that the upper air network needs continuing attention, etc. Dr. Ed Harrison reported on behalf of the Ocean Panel of GOOS, indicating again challenges in getting all the data in and then describing some of the variability evident in the record. There were then further reports on efforts for precipitation and the cryosphere indicating that lists of desired variables are agreed to—the challenge is getting all of them.

There was then an extended brainstorming discussion on the issue of partnerships, sponsorships, and visibility of WCRP. Ann Henderson-Sellers asked me to offer some opening comments, and I mentioned the importance of paying attention to linkages to the various associations and societies and to various stakeholder efforts in addition to IPCC. Discussion covered a wide range of topics: problems arising due to separating out climate from weather; the potential impacts of trying to claim more visibility when WCRP really has no money and all the efforts are really funded by others; linkages to societies and national academies, etc.; getting stakeholders to come to meetings and participate; improving the Web site (organizationally and in terms of content about the changing climate); improving communications with sponsors; WCRP office staff being contacts versus leaders of programmes; on WCRP's role as a facilitator of efforts; interactions with media; keeping focus on providing the best possible science; etc. There was thus a lot raised to think about.

There were over the course of the meeting a number of interesting presentations by Indian scientists (I unfortunately missed a number of them). P. S. Goel of the Indian Department of Ocean Development provided an overview of India (40% under cultivation, 23% forested) and its climate (they are seeing increased intensity of extreme events, glaciers melting, rain systems changing, etc.). With the Himalayas blocking heat flow to the north over Asia, India's climate is dominated by the state of the Indian Ocean. He indicated that India will be expanding its research efforts and likely launching their own satellites. Dr. Rupa Kumar Kolli provided an overview of climate research in India, indicating that 6-7 agencies and councils are funding 20 major research organizations to conduct 10 major research programs, insisting on significant collaboration. Among the topics are the monsoons and their variability, coupling to the land surface, improving the paleoclimatic record, etc.

The next JSC meeting in March 2007 is to be held in Tanzania, with attention devoted to eastern Africa and their persistent drought—we'll have to see if the growing correlation of meteorological meetings being associated with unusual rain events can be continued.

Following the meeting, I joined with two of the JSC staff on a two-day tour to the extraordinary "cave" temples (actually, elaborate rooms and even buildings carved out of rock outcrops in the Deccan Plateau) at Ajanta and Ellora—truly remarkable creations of Buddhist monks and of artisans, respectively, working about 1500-2000 years ago. The photo is from Ellora, where a building and courtyard larger than the Parthenon were carved out a single mass of rock—pillars and all.



Report by: Michael MacCracken, 2 August 2006

Report to SCOR Annual Meeting

CLIVAR's ocean activities

(extract from the CLIVAR Report to the JSC for WCRP, February 2006)

1. CLIVAR's Ocean Basin Panels

CLIVAR's ocean basin panels oversee the implementation of CLIVAR in their respective oceanic regions. Particular foci are on atmosphere-ocean regional modes of variability and the status of the sustained observing system in relation to requirements for CLIVAR research. These requirements feed into OOPC which both ocean basin panel and GSOP representatives attend. In addition, the basin panels maintain an overview of current process study activities and seek to facilitate and encourage plans to develop such activities. Following the direction set by CLIVAR's SSG-13, a number of links are developing between the basin panels and CLIVAR's global activities. In particular, sets of metrics appropriate to each ocean basin have been specified for GSOP reanalysis assessment efforts and analysis

of the Working Group on Ocean Model Development (WGOMD) Coordinated Ocean Reference Experiments (COREs). Panels are also seeking to specify appropriate indices to input to GSOP and OOPC. To link with IOC's International Ocean Carbon Coordination Project (IOCCP) and other ocean carbon activities, membership of each of the panels includes a carbon representative agreed with IOCCP. CLIVAR is also seeking to develop its interactions with IGBP IMBER (Dr W Hazeleger, CLIVAR Atlantic Panel co-chair is also a member of the IMBER SSG). Further the IOC/SCOR/IIGBP GLOBEC Programme has, through the Atlantic Panel provided CLIVAR with a number of challenging questions linked to applications in ecosystem research.

Atlantic Panel and MedCLIVAR

- The concept of the Tropical Atlantic Climate Experiment (TACE), to advance understanding of coupled ocean-atmosphere processes and improve climate prediction for the eastern tropical Atlantic region, has been under development by CLIVAR's Atlantic Panel. A TACE "white paper" setting out the concept of TACE has been developed and feedback provided by the CLIVAR SSG. TACE will provide coordinated observational, modelling and synthesis studies of the region in the 2006-2011 timeframe with primary focus on the ocean. A key component of TACE is extension of the observational network in the region, including the PIRATA array. TACE complements plans both for an Atlantic Marine ITCZ programme and the currently underway AMMA experiment.
- A Tropical Atlantic Climate Variability Experiment in the south-western Atlantic is being promoted as a joint VAMOS/Atlantic Panel activity
- The Atlantic Panel and US NOAA co-sponsored a Atlantic Ocean Dynamics Workshop (Venice, Italy, 17-19 October 2005) aimed at taking stock of our understanding of the ocean's role in tropical Atlantic variability and to compare state of the art ocean and climate models with observations in the region.
- The Atlantic Panel have maintained an overview of a wide range of observational studies in the Atlantic region, including the Arctic-SubArctic Ocean Flux Study and the RAPID Climate Change programme. CLIVAR will co-sponsor the RAPID Climate Change Conference to be held in Birmingham from October 2006.
- The Mediterranean CLIVAR activity (MedCLIVAR) which seeks to provide opportunities for regional engagement in CLIVAR has received approval as a European Science Foundation programme. MedCLIVAR (<http://clima.casaccia.enea.it/MedCLIVAR/>) is seeking to develop and integrate CLIVAR-relevant activities in regional observations, paleoclimatic studies, prediction and synthesis.

Pacific Panel

- The scope and membership of CLIVAR's Pacific Panel has been reviewed. The reconstituted panel will have its first meeting from 15-17 February 2006. An update on planned activities will be provided as part of the CLIVAR presentation to the JSC.
- The Panel organised a joint CLIVAR/OOPC/GOOS/Argo/CPPS Workshop on the South Pacific, held at the University of Concepción, Chile, on 11-14 October 2005. It was aimed in particular at assessing the status of both modelling and monitoring of the region and at seeking ways to supplement its observing networks.
- Key CLIVAR-related Pacific observational studies in progress are SAMFLOC (Sub-Antarctic Mixed layers, Fluxes and Overturning Circulation) which contributes to Southern Ocean Panel

objectives also and KESS, the 2-year US-funded Kuroshio Extension System Study. Planning for PUMP, the Pacific Upwelling and Mixing Physics experiment is continuing under US CLIVAR.

CLIVAR/GOOS Indian Ocean Panel

- The key focus of the joint CLIVAR/GOOS Indian Ocean Panel has been the development of an implementation plan for sustained observations in the region. This has been carried out in cooperation with the Tropical Buoy Implementation Panel (TIP). The Plan, entitled “The role of the Indian Ocean in the climate system – implementation plan for sustained observations” is currently in press. Part 1 identifies the research issues that call for observations. Part 2 provides the technical implementation issues. The plan was presented to OOPC-9. The Panel convened a review of the plan by the 3rd meeting of the Indian GOOS Regional alliance, carried out by high level agency representatives.
- Potential synergies between the CLIVAR/GOOS IOP activity and the Indian Ocean Tsunami Warning and Mitigation System were identified at the first meeting of the Intergovernmental Coordination Group.
- Enhancement of the Indian Ocean observing system continues. In collaboration with the TIP, there are 9 surface and 3 deep equatorial moorings. These have provided new data and information on the dynamics of the upper ocean including the mixed layer. When fully implemented meteorological measurements will provide valuable input to initialisation of weather forecasting models. The Indian Ocean XBT network has been enhanced and Argo advised of special needs for the Indian Ocean. Data management issues for Indian Ocean oceanographic data are currently being addressed.
- Two key research-based process studies on the role of ocean-atmosphere interaction for intra-seasonal variability in the Indian Ocean are the Japanese Mirai Indian Ocean Cruise for the study of MJO convection (MISMO), to take place in the eastern part of the basin in late 2006, and the French VASCO-CIRENE campaign in the western Indian Ocean. The Indian Ocean Panel will hold a workshop on MISMO/CIRENE as part of its 3rd meeting (La Reunion, 1-4 March 2006).

Southern Ocean Panel

- The Southern Ocean Panel held a workshop on Modes of Southern Hemisphere Climate Variability in Cambridge, UK on 27-28 June 2005. This resulted in a CLIVAR Exchanges special issue (October 2005) with 33 contributed papers. The workshop was followed by the 3rd meeting of the panel. A major focus of the meeting was planning for the International Polar Year, especially the CASO (Climate of Antarctica and the Southern Ocean) umbrella programme which the panel is coordinating. Other themes covered included sustained observations and interactions with OOPC/GSOP, Southern Ocean Argo, Southern Ocean process studies (of which a number are proposed under the IPY umbrella) and Antarctic/Southern Ocean reanalysis.
- The panel is involved in a number of other studies proposed under the IPY umbrella such as SAMFLOC (see above) and DIMES ((Diapycnal and Isopycnal Mixing Experiment in the Southern Ocean). The IPY provides a special opportunity for enhancing CLIVAR Southern Ocean activities in the coming years
- A new focus for the panel for its next meeting (Buenos Aires, November 2006) is a review or assessment of IPCC models in the Southern Ocean region articles on which were published in the October 2005 Exchanges issue. This activity will link to available WGCM modelling datasets.

2. CLIVAR's Working Group on Ocean Model Development (WGOMD) and Global Synthesis and Observations Panel (GSOP)
 - WGOMD held a workshop on Southern Ocean Modelling in Hobart Australia from 9-10 November 2005 in conjunction with its last meeting held on either side of the workshop. Progress with the concept of Coordinate Ocean Reference Experiments and review of the current status of global ocean modelling formed key foci for the Working Group meeting.
 - A key focus of GSOP activity has been ocean reanalysis, in particular the development of an "white paper" setting out the basis for a CLIVAR/GODAE reanalysis evaluation framework with inputs on standard outputs needed for evaluation from CLIVAR's ocean basin panels. A Workshop on a Pilot Evaluation Effort of Global Ocean Reanalyses is being held at ECMWF, Reading, UK from 31 Aug to 1 Sep 2006.
 - An International Repeat Hydrography and Carbon Workshop was held in Japan from 14-16 November 2005, co-sponsored by GSOP, IOC's International Ocean Carbon Coordination Project (IOCCP), SCOR and JAMSTEC.

7.1.5 Scientific Committee on Antarctic Research (SCAR)

REPORT OF THE JOINT SCAR/SCOR OCEANOGRAPHY EXPERT GROUP MEETING

Venice, Italy

October 7-8, 2005

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Attendees:

Eberhard Fahrback (Chair), Eileen Hofmann (Co-Chair)(SO-GLOBEC/ICED), Hein de Baar (GEOTRACES), Karen Heywood (iAnZone/SASSI), Alexander Klepikov, Mike Meredith (ICED/SO-GLOBEC), Christine Provost, Manfred Reinke, Steve Rintoul (CLIVAR/CliC/SCAR SO-Implementation Panel), Hans-Werner Schenke, Mike Sparrow (CLIVAR/CliC/SCAR SO-Implementation Panel), Richard Bellerby (SOLAS), Marzena Kaczmarska (SCAR Secretariat), Andrea Bergamasco (CNR, host).

Apologies for Absence: Julie Hall (IMBER), Ilana Wainer (SCOR), Isabel Ansorge, Enrico Zambianchi (IPAB), Steve Nicol, Philippe Pondaven, Colin Summerhayes (SCAR).

1. Introduction.

The Scientific Committee on Antarctic Research (SCAR) together with the Scientific Committee on Oceanic Research (SCOR) convened the first formal meeting of the joint Expert Group on Oceanography (EG-Ocean) on 7-8 October 2005 in Venice, Italy. The meeting was chaired jointly by Eberhard Fahrback and Eileen Hofmann. The meeting was opened by Eberhard Fahrback, who welcomed the participants and introduced Andrea Bergamasco, the local organizer, who joined the Group for the meeting.

The meeting started with a short introduction from each attendee. The Chairman gave a brief introduction on behalf of absent Members of the Group. The Chair presented the short history of the Group, described the process of its creation, explained its terms of reference and expressed the hope that the Group would provide a means to encourage and promote collaboration between the parent organizations, SCAR and SCOR. He emphasised that the Group should focus initially on issues concerning physical oceanography, and subsequently should enlarge its scope to consider interdisciplinary issues. The Group should also focus on getting in touch with other organizations (e.g. operational agencies) which might contribute to the success of the Group's work. The Chairman then presented the agenda and established a schedule for the meeting. He suggested that the conclusions from the meeting should take the form of recommendations to

SCAR and SCOR, and noted with appreciation the assistance of the Executive Director of SCAR, Colin Summerhayes, in preparing the ground for the meeting.

2. Overview of available physical oceanographic data

The key topics on the agenda for this first session were as follows:

2.1 To develop ways to identify activities which are NOT covered by large ongoing programmes and to provide an overview.

2.2 To help to coordinate those activities if needed.

2.3 To identify regional gaps.

2.4 What studies are vulnerable (i.e. may be lost for lack of future funding)?

A first step towards identifying activities that are not covered by global or basin-scale ocean programmes is to obtain an overview of what is covered. The CLIVAR/CliC/SCAR Southern Ocean Region-Implementation Panel (hereafter referred to as the SO-Panel) already collects information on planned and ongoing activities relevant to climate studies. Steve Rintoul presented an overview of the SO-Panel's current activities, its plans for the future and information available on the SO-Panel web site:

<http://www.clivar.org/organization/southern/index.htm>. The goal of the EG-Ocean Group would be to create a similar information source for all other current programmes, first including their physical oceanography components and then progressively expanding the database to include other disciplines, so as to provide an interdisciplinary emphasis. Members of the EG-Ocean Group are asked to provide information on the projects they know about. Information on climate-related cruises and projects will be added to the SO Panel web site. Information on interdisciplinary related studies and cruises will be recorded on a new web site http://www.clivar.org/organization/southern/SCAR_SCOR/index.htm. A number of actions were identified (below) to take this process forward.

The Group agreed that effort should be put into minimising the overlap of effort between different coordination projects/panels (for instance between the CLIVAR/CliC/SCAR SO-Panel and the SO-Panel of GLOBEC). The CLIVAR/CliC/SCAR SO-Panel has the leading role in collecting metadata (data description) particularly for the physical oceanographic data sets. Such data may also be useful to SO-GLOBEC. Accordingly, it is necessary to spread more widely through the scientific community (e.g., to the SO-GLOBEC community) information about the CLIVAR/CliC/SCAR SO-Panel data services. In addition, information about relevant GLOBEC data sets should appear on the CLIVAR/CliC/SCAR web site.

The Group felt that it was highly desirable that there should be just one window into the metadata describing all of the many possible data sets, and that this could be provided by the proposed new EG-Ocean web site. This site would include information about ongoing and future projects, as well as about historical data. A gap has been identified in collecting historical data. For instance there is little on the SO-Panel web site, which only covers historical metadata from the creation of the website (around 2001).

7-32

The Group identified several options for active searching for data, including:

- direct approaches within the oceanographic community (through the large programme offices but also at the individual level);
- SCAR and SCOR could gather information through their internal systems (e.g., through their National Committees);
- Contacting ATS and IPY Secretariats to ask for information on ongoing projects carried out under their banner. The ATS Office should have information on announced and reported expeditions. In the framework of ATS the submission of data descriptions (cruise summary reports, metadata) should be required as soon as the expedition is over. The IPY Office could provide an overview on expeditions occurring during IPY.
- COMNAP could also be a useful source of information about national activities.

The question of identification of regional gaps in the available data sets and future plans was left for the future, when the full overview will be available.

ACTIONS

- ✓ SCAR and SCOR Secretariats should get in touch with the national contacts to gather information from each country about the ongoing and future projects of existing oceanography centres.
- ✓ Mike Sparrow will contact Steve Diggs (Scripps) about the National DAC's needs and what kind of data would they accept .
- ✓ Eberhard Fahrback will get in touch with the IPY office to advertise the data collecting effort of EG-Ocean and to find out the potential for support in reference to the IPY data policy.
- ✓ SCAR Secretariat will contact ATS Secretariat to work out its potential role in improving data availability (e.g., by gathering information about ongoing projects in the Southern Ocean, providing lists of permitted expeditions and reports from them, including contact persons for each fieldwork/cruise, the area covered, information about the activity, type of data collected, whether or not data submitted to data centres, and if so where, and so on).
- ✓ Data on current (relevant) projects shall be sent to Mike Sparrow as soon as possible.

Mike Sparrow will list the metadata for each activity on either the SO-Panel web site, or the EG-Ocean web site (both are linked to each other), sending updates to members of EG Ocean and the SCAR and SCOR Secretariats every few months.

After point 2 on the agenda was completed, Andrea Bergamasco gave a short presentation to the Group about planned Italian oceanographic activities in the Southern Ocean.

3. How can interdisciplinary research be promoted in the Southern Ocean?

3.1 What are ICED's plans, and what do they NOT cover?

Co-Chair Eileen Hofmann introduced this topic. ICED (International analysis of Circumpolar Climate interactions and Ecosystem Dynamics in the Southern Ocean) is a joint initiative between IMBER and GLOBEC, and, like SO-GLOBEC, is co-sponsored by SCAR. ICED held a workshop on 24-26 May 2005 at BAS, Cambridge, UK. The workshop brought together ~30 participants and it was international in scope. The main objective of the workshop was to put together a science plan for ICED and coordinate upcoming ICED-related SO programmes. ICED was created to make a link between the atmosphere-ocean-ice system and the ecosystem in the Southern Ocean. The ICED proposal to the IPY Steering Committee has been accepted as a Leading Project, coordinating nine projects.

ICED has 4 Science Themes: (i) SO climate-ice-ocean connections, (ii) circumpolar biogeochemistry and ecosystem structure, (iii) circumpolar ecosystem structure and (iv) dynamics, sustainable management and ecosystem structure. The project aims to rescue older data and do some data mining. It will also try to generate the funding for data rescue. ICED will combine biogeochemical and food web models, provide guidance for global models that include top predators (and krill in biogeochemical models), and will focus on the circumpolar scale. It is currently in its start-up phase and working on establishing its science plan; a Scientific Steering Group will be established at its next meeting. ICED is expected to be active for the next 10-20 years and will include repeat studies.

3.2 What are the gaps and how may they be filled?

- The Group identified a gap in the physical oceanographic work needed in water shallower than 500m. These data are needed to meet the objectives of ICED (and other biogeochemical projects). Until now only a few physical oceanographic projects focusing on shallow waters have been successful in getting sufficient funding (usually small projects).
- ICED lacks connections to fulfil its 1st Science Theme (SO climate-ice-ocean interactions) – these connections can be made by linking ICED to SOLAS and to the CLIVAR/CliC/SCAR SO-Panel.
- The Group identified a general lack of physical process studies in high-latitude ecosystem variability, and in the circumpolar context.

3.3 How can the EG-Ocean work best to complement ICED (which will subsume SO-GLOBEC in due course)?

EG-Ocean members should become actively involved in implementing ICED and shaping its science and implementation plan. GEOTRACES (an International Study of the Biogeochemical Cycles of Trace Elements and Isotopes) could be linked through EG-Ocean to ICED if needed.

RECOMMENDATIONS TO ICED:

- EG-Ocean appreciates the data mining and data rescue plan of ICED and recommends taking care of all the new data collected within the project and making them available as soon as possible.
- ICED metadata should be accessible through the EG-ocean web site.
- Physical oceanographic process studies in shallower, shelf/coastal waters should be given high priority since that is where the largest gaps are evident.
- SOLAS and ICED should develop close links in order to fill the atmosphere-ocean interaction gap identified in ICED science/implementation plans.
- Physical oceanographic process studies are needed in the area of high (ecosystem) variability in the circumpolar context. The 1st theme of ICED requires active links to the CLIVAR/CliC/SCAR SO-Panel.
- ICED plans should address the issue of sustainability.

ACTIONS:

- ✓ The SCAR/SCOR Secretariats should work to find ways to make the funding agencies aware of the importance of data recovery projects, which serve to increase the value of original data for subsequent scientific projects. The goal is to increase the prospects for funding data rescue projects.
- ✓ Data rescue should be recommended as a necessary activity in the starting phase of global/large projects (EG-Ocean Members, SCAR, SCOR).
- ✓ Establish links between SOLAS and ICED (Richard Bellerby and Eileen Hofmann).
- ✓ EG-Ocean Members will read and provide comments on the draft of the ICED Implementation Plan as soon as it is prepared.
- ✓ EG-Ocean will send a representative to the ICED Implementation Meeting (possibly in Hobart, July 2006).
- ✓ Along with collecting metadata on physical oceanographic datasets, EG-Ocean will also begin collecting metadata on biological and chemical oceanographic datasets and posting them on the EG web site.

3.4 What useful pointers emerged from the IAPSO/IABO Dynamic Planet meeting in Cairns in August?

[As noted by Members of the EG meeting informally in Cairns in August: “Research in a number of areas over the last decades has developed to the point where it would be possible to formulate a number of hypotheses which address the functioning of various large elements of the Antarctic ecosystem (including the physical components). The EG-Ocean Group could assist by spelling out these hypotheses and questions.”]

The EG-Ocean Group felt that this is a longer-term issue and that substantial results can only be achieved when the Group has developed its fully interdisciplinary expertise.

RECOMMENDATIONS

- Merging information about the partial coverage of datasets is needed on the EG-Ocean web site in order to see where there is overlap (or lack of overlap) between major projects like CLIVAR/CLiC/SCAR, SO-GLOBEC, ICED, SOLAS and GEOTRACES).
- High priority should be given to maintaining existing key sections by including them in the plans of all the relevant projects (e.g., GEOTRACES, SOLAS, CLIVAR/CLiC/SCAR, and ICED).

ACTIONS

- ✓ The representatives of new programmes relevant to the work of the EG-Ocean will be asked for input and invited to the meetings of the Group if needed.

4. How are observing systems for the Southern Ocean developing?

4.1 What elements are required for a sustained Southern Ocean observing system (a Southern Ocean contribution to GOOS) which will not be covered by the envisaged climate related observing system for (a) the open ocean, and (b) coastal seas?

4.2 Which of these elements are currently covered, and by which organisation?

Steve Rintoul presented an overview of current and planned observing systems in the context of the SO-Panel, one of the main foci of which is on the role of the Southern Ocean in the climate system. In the sea ice zone enhancements are needed in (i) sea ice volume/thickness observations, and (ii) ocean properties (a) under the ice shelves and (b) in the coastal zone under the sea ice. The meteorological buoy network should be expanded, and enhanced studies of the onshore-offshore exchange in the coastal margin zone are needed. The coastal zone focus of iAnZone and SASSI (IPY) may help to counter the tendency for research programmes to focus on climate issues and to work in the open ocean. Instrumenting ships to a better degree is also recommended (e.g., IMET on supply vessels). The flow of satellite data must be maintained (altimeter, gravity, ice, sea surface temperature, wind). The CLIVAR hydrography and carbon data centres collect data from repeat hydrographic sections. *Missing are data from process studies, physical data from biology experiments, and underway data (e.g., TSG).*

Several opportunities were outlined to fill the gaps mentioned:

- IPY (e.g., quasi-synoptic circumpolar survey, monitoring of Antarctic Slope Front, under-ice Argo floats – SASSI project, ice thickness and enhanced ice drifter array).
- SO regional reanalysis project (present air-sea flux estimates are poor, more data should help but often data are rejected by assimilation. A dedicated regional reanalysis project is needed. This is a major focus of the SO-Panel).

Hans-Werner Schenke told the Group about SSPARR - a new American bathymetry programme that will be launched within the next 2 years. It will establish a network of drifting buoys also in polar regions and will make it possible to obtain bathymetric data from missing areas. Hans-Werner Schenke is the EG-Ocean contact person with SSPARR. He will notify the Group if

7-36

other ocean data can be obtained from the buoys, and, if not, if the buoys can be modified to provide such data.

Christine Provost raised the issue of the potential loss of satellite altimetric data due to technical problems with the sensors. The Space Agencies should be informed that missing altimetric data would generate a major problem; their attention is needed to provide replacements in time.

No plan yet exists for sustained physical, biological, ecological and biogeochemical measurements in the coastal ocean and shelf seas, areas that will not be covered by the SO-Panel. The EG-Ocean Group should facilitate the development of such plans by, in the first instance, working with existing groups (e.g., iAnZone, ICED, GLOBEC), and collating existing plans and documents.

Hein de Baar made a presentation on GEOTRACES, which is a longer-term project having a strong component in the IPY. He noted that Japan is heavily involved in the SO programmes (GEOTRACES has already included collaboration with Japan). He pointed out that there is very little geochemical data from the sea ice zone (e.g., for iron studies) and it was suggested to promote routine underway measurements by pumping (a cheap and easy activity that might be easily implemented on all supplying vessels).

RECOMMENDATION

- Realisation of underway measurements of relevant biogeochemical data by pumping systems should be recommended to all oceanographic groups and should be performed on as many ships as possible.

ACTION

- ✓ Christine Provost will provide a document that could be used by the SCAR/SCOR Secretariats to contact ESA and other space agencies to raise the issue of losing oceanographic data as a result of satellite equipment failure, with particular reference to the potential loss of critical altimetric data.
- ✓ Hein de Baar will establish contact with a Japanese scientist with biological or geochemical background to include this expertise in the Group.

4.3 What are the gaps in technology or geography or timing, and how might they be addressed?

Several types of measurements are difficult to perform, and development work is underway or needed. The real-time data topic was also discussed. Karen Heywood reported that iAnZone is aiming to provide a plan for optimized measurements in the marginal and coastal zones. Designing the sustained observation system requires a list of the required observations and an evaluation of what science or operational questions they can answer. The EG-Ocean could assist in this task, in cooperation with the other relevant panels.

5. Improve the bathymetric database

Recognising that all ocean sciences in the Southern Ocean require improved bathymetric data:

5.1 What are the main shortcomings in available bathymetric data - regional gaps, quality, and availability?

5.2 What advice can the EG-Ocean provide to the SCAR Expert Group on the International Bathymetric Chart for the Southern Ocean IBCSO?

Hans-Werner Schenke gave a presentation on IBCSO (the SCAR International Bathymetry Chart of the Southern Ocean) project and POBACE (Polar Ocean Bathymetry Coordination Effort), a project submitted as a contribution to IPY. The IBCSO aim is to produce a high-resolution bathymetry map of the Southern Ocean, which would correspond to the existing Arctic Ocean map. Improved bathymetry is needed for (i) improved interpretation of geological processes; (ii) improved knowledge of topography as a key element in defining ecosystems; and (iii) improvements in the bathymetry used as the bottom bounding layer in ocean circulation models and GCMs. Science and safe navigation are main arguments for implementation. Sub-glacial bathymetry will be included.

There are areas of sparse bathymetric data in the polar regions (particularly in the Southern Pacific). In addition, older data need quality control, and ice-covered areas have to be taken into account. A GEBCO digital atlas has been produced, but covers mostly the Antarctic Peninsula surroundings (Weddell Sea), the Atlantic sector and the Ross Sea. The Indian Ocean is not fully covered by digital data, but analogue data exist for this part of the SO. The existing bathymetric map of the Ross Sea based on satellite altimetry, is reliable only for large features (20-30km across). Additional data from other countries and other sources are being made available too slowly for the IBCSO time frame (until 2008) to be implemented. The implementation plan for IBCSO includes active data collection and digitization. IBCSO is a joint project of SCAR, IHO, and AHC.

Efforts are needed to keep echo-sounders and multibeam sensors on ships running for the long term. Each ship should carry a person responsible for the echo-sounding equipment on the ships to ensure useful data quality. All data should be submitted to NGDC in Boulder, Colorado, since all the data submitted there are available to the others.

RECOMMENDATIONS:

- A standard procedure/protocol should be advised for multibeam sensor operation on ships during cruises. There is no regulation/protocol at the moment.
- Multibeam measurements should become an ideal goal for every ship and every cruise.
- If possible, repeated ship routes should be slightly modified from one cruise to another, not following exactly the same line every time, to provide new bathymetry data.
- Hans-Werner Schenke provides a liaison between the EG-Ocean and the SCAR SSG-GS.

7-38

- EG-Ocean should ask the IPY Steering Committee to better coordinate bathymetric efforts and to establish a bathymetry policy, starting within the IPY frame but continuing beyond the IPY.
- A closer collaboration is required between the EG-Ocean and the SCOR working group on global data (data exchange and coordination issues). EG-Ocean should emphasise the value of data and information exchange between different groups.

ACTIONS

- ✓ Hans-Werner Schenke will re-submit the PROBACE proposal to IPY (Dec 05).
- ✓ EG-Ocean will provide support for this project and will bring the issue covered in this project to the attention of the IPY Steering Committee (stressing that it is essential to establish a bathymetric data policy already for the IPY).
- ✓ Hans-Werner Schenke will provide a brief summary of the SSPARR project to the SCAR Secretariat.

6. Facilitate links into data management and data exchange.

6.1 What has been done already to bring together metadata for the SO-Panel?

6.2 What is being done to create national datasets available to all, and what more needs doing, and by what countries?

6.3 How can we ensure that collected SO data are made available via NODCs or NADCs and the WDCs?

Manfred Reinke presented an overview of data and metadata submission possibilities:

- a. The Antarctic Master Directory (a part of the Global Change Master Directory, GCMD) is expected to be a main source of Antarctic Data information.
- b. The CliC data information system (DISC) provides another source;
- c. PANGAEA is an information system for environmental sciences, and a data publishing network (contains data descriptions and directions to data itself). PANGAEA is working on bringing its data collections closer to GCMD to link these two together.
- d. The International DOI Foundation, which collects data information in the sense of publications. The idea behind it is **to give credit to scientists for data work and data submissions**. It is advised to treat this work as equally important as the publication record.

The Joint Committee on Antarctica Data Management (JCADM) is a joint committee of SCAR and the Council of Managers of National Antarctic Programmes (COMNAP). Its purpose is to advise SCAR and COMNAP on the management of Antarctic data. One of its key roles is to advise on the development of the Antarctic Data Management System including the recruitment of National Antarctic Data Centres (NADCs) and the encouragement of scientists to submit metadata (data set descriptions) to NADCs. The issue of NADC recruitment is being addressed

by developing a communications network and running regional "capacity-building" workshops. The Committee is also examining national approaches to addressing freedom of access to scientific information. JCADM must play a significant role in realizing the EG-Ocean task to identify and provide data sets.

There is a general need, worldwide, to make it more attractive to scientists to submit their data to data centres and to provide meta-data. One way to make the process more attractive would be by giving more credit to such efforts. Data systems can only be successful if the scientists are willing to spend more time on such activities. Another way to get data sets into data centres is for funding agencies (as in Australia for instance) to make it mandatory that if data are not forthcoming, funding is shut off.

The Group agreed that the process would be a lot smoother if there was more support at the institutional level for data managers, as well clear information about where the particular data set should be submitted and what descriptions are needed for metadata submission.

The Group obtained the impression that there is poor exchange of information between the data centres. It has to be made clear that the same data set has to be sent to only one data centre, which must then be responsible for further distribution. There is a need for a unified data submission policy. EG-Ocean supports the idea that National Data Centres should collect data sets, and that JCADM should become the metadata manager. The AMD should be the ultimate source of information on available multi-disciplinary data sets.

RECOMMENDATIONS

- Cruise reports (data set descriptions/metadata) should be ready for submission at the end of each cruise and sent to one data centre (e.g., JCADM for Antarctic and SO) as soon as the cruise is finished.
- JCADM should take the responsibility for checking with Project Leaders if the metadata has been submitted to their system, and for informing other data centres.
- Open access protocol (a software/service) should be adopted by data centres so that the content of one data centre can be easily seen by another, to avoid sending the same data to several data centres.

ACTIONS

- ✓ To encourage DISC to link to GCMD.
- ✓ Projects identified by EG-Ocean are encouraged to send metadata to JCADM to be inserted into the AMD/GCMD.

6.4. Can we create a pan-Antarctic oceanographic database like the meteorological READER database (see <http://www.antarctica.ac.uk/met/READER/>) to improve understanding and to support modelling activities?

Mike Meredith briefly explained the idea of READER to the Group. The point of OCEAN READER is that it would gather all historical data as well as all current data; all collected data

7-40

would be stored in one place and would be kept in the same format. The scientific motivation for creating OCEAN READER came through SCAR's AGCS (Antarctica in the Global Climate System) programme, and the primary scientific guidance for OCEAN READER (along with ICE READER) will come from there, albeit in consultation with the Expert Group in Oceanography. JCADM offered help with the maintenance of an OCEAN READER if one is created. It should be decided if a READER-like effort is needed and feasible for the ocean, and, if it is, what parameters should be stored in it. The Group noted that at the moment there is no platform similar to READER for the oceanographic community to use to keep both historical data and updated new data in one place, in the same format. It was agreed that an OCEAN READER would be beneficial for the whole oceanographic community. A READER type of data set will have to be restricted to a few parameters only (starting with temperature and salinity), but more multidisciplinary parameters could be added in the future. All available historical data have to be quality controlled and all new data should be added (CLIVAR responsibility). The historical data set compiled by Alexander Orsi should be considered to be a major contribution. Updating READER will be a long-term activity, and both SCAR and SCOR should promote the CLIVAR infrastructure and keep it running for this reason.

ACTIONS

- ✓ Groups/individuals such as CLIVAR (Mike Sparrow), Scripps (Steve Diggs) and JCADM could merge all the data available from all big projects (like GLOBEC) to build up an OCEAN READER (this requires further discussion).
- ✓ EG-Ocean will decide which parameters should be fed into an OCEAN READER in the starting phase (temperature and salinity) and what parameters should be gradually added to it with time (multidisciplinary parameters recommended).
- ✓ JCADM will be asked to act as a link between EG-Ocean/CLIVAR/Steve Diggs and is expected to play active role in creating the data links (SCAR Secretariat will contact JCADM to start work on OCEAN READER).
- ✓ SCAR/SCOR Secretariats should be asked to help to maintain the CLIVAR data structures in the long term, with more parameters added (mooring data sets) so that these data in the future could be added to the OCEAN READER.

6.5 How can we identify and access the already existing large interdisciplinary datasets, which are almost circumpolar in scope, as the basis for hypothesis testing?

This topic needs to be reconsidered in the context of the further development of the Group to comprise fully interdisciplinary representation.

7. Development of a web site to provide overview and basis for coordination

7.1 Presentation of the existing plan

Mike Sparrow presented the first draft of the Interdisciplinary Observations Webpage from the EG-Ocean web page. He stressed the need for input from the community to feed this web site. The web site should be useful from the beginning, without the need to wait for the advances suggested in Section 6, above. Much of the discussion on the need for this web site and its

content was anticipated in the context of earlier topics and is reported above.

7.2 Which additional elements would be useful and feasible?

The presented draft web site included elements that have been proved to be useful through the experience of the SO-Panel web site. Further additions will be made following the discussions in previous sections.

7.3 Do we need web links (perhaps through JCADM) for marine data and/or metadata?

The web site has to be linked to the data information systems indicated in Section 6 (above).

7.4 Do we need comparable links for Southern Ocean data products? If so, for what products?

Links to data products are desirable. However, a compromise is needed to provide as many links as possible and yet to remain feasible and focussed enough to be useable. Therefore, a list of products has to be worked out and discussed with the Group by e-mail after the meeting.

ACTIONS

- ✓ Feedback will be sent to Mike Sparrow from the EG-Ocean members about the relevant projects, and products (e.g., SO Atlas, bathymetric links); links to other web sites, programmes and groups will be provided.
- ✓ Mike Sparrow will update the page as new information arrives.
- ✓ The SCAR Secretariat will help in providing information.

8. Housekeeping

8.1 Do we need other members in the group to cover the scope of our task?

It was noted that although the Group has a reasonably interdisciplinary character at present, its full interdisciplinary character could not be expressed at this meeting because of the unavoidable absence of certain key members.

The Group felt that Steve Diggs, as CLIVAR data manager and a data manager from JCADM, should be invited to attend the next EG-Ocean meeting.

The group should invite an additional oceanographer with biological or geochemical background to become a member (an Asian representative would be favourable).

SOLAS and GEOTRACES will be present at the EG-Ocean meetings in the future.

Other members are needed to provide the multidisciplinary expertise required. They should come through rotation of members after the next meeting.

ACTIONS

- ✓ Hein de Baar and Eileen Hofmann will propose some scientists' names (with biology oceanography/chemistry background) as potential candidates to join the group.

7-42

- ✓ SOLAS and GEOTRACES will be invited to all the meetings of the EG-Ocean in the future and will become members of the EG-Ocean once the Group evolves to be more interdisciplinary.
- ✓ The SCAR Secretariat will contact JCADM in order to propose JCADM membership in the EG-Ocean and to select a JCADM representative (with a strong background in oceanography) who would become a member of the Group.

8.2 Next meeting:

EG-Ocean plans to arrange the next meeting back to back with the SCAR Open Science Conference in Hobart July 9th – 14th 2006.

ACTIONS

- ✓ The Group members will send information about their various obligations to the SCAR Secretariat before 8th November 2005.
- ✓ SCAR Secretariat will check the suitable time frame for the next EG-Ocean meeting (1.5 days needed) in Hobart.
- ✓ SCAR Secretariat will check the procedure for the abstract submission to the SCAR Open Science Conference in 2006 in Hobart, and how the session topics will be selected, and will inform the Members of the Group.

The Chairman thanked all the EG-Ocean members for their participation and fruitful discussions, appreciated help from the local hosts and praised the unusual settings of the meeting in historical buildings of Venice. The SCAR Executive Officer invited all EG-Ocean members to submit abstracts to the SCAR Open Science Conference in Hobart, in July 2006.

The meeting closed at 16:45.

ANNEX I

List of participants and their address details, including the members unable to attend.

	NAME	COUNTRY	ADDRESS
1	Eberhard Fahrback	Germany	Alfred-Wegener-Institut für Polar und Meeresforschung in der Helmholtz-Gemeinschaft, Fachbereich Klimawissenschaften, Sektion Messende Ozeanographie, Postfach 120161, D-27515 Bremerhaven, Germany
2	Eileen Hofmann	USA	Center for Coastal Physical Oceanography, Crittenton Hall, Old Dominion University, Norfolk, VA 23529, United States
3	Richard Bellerby	Norway	BCCR, University of Bergen, Allegaten 55, 5007 Bergen, Norway
4	Hein de Baar	The	Marine Chemistry, Royal NIOZ, PO Box

5	Karen Heywood	Netherlands UK	59, 1790 AB Den Burg, The Netherlands Chair of iAnZone, School of Environmental Sciences, University of East Anglia, Norwich, NR4 7TJ, United Kingdom
6	Alexander Klepikov	Russia	Arctic and Antarctic Research Institute, Bering Street 38, St. Petersburg, 199397, Russia
7	Mike Meredith	UK	Head of Atmosphere and Ocean Group, British Antarctic Survey, High Cross, Madingley Road, Cambridge CB3 0ET, United Kingdom
8	Christine Provost	France	LODYC UMR 121 CNRS, Université P. et M. Curie, Tour 14 2E case 100, 4 place Jussieu, 75253 Paris, Cedex 05, France
9	Manfred Reinke	Germany	Alfred-Wegener-Institut für Polar- und Meeresforschung, Postfach 12 01 61, D- 27515, Bremerhaven, Germany
10	Steve Rintoul	Australia	CSIRO Marine Research and the Antarctic Climate and Ecosystems, Cooperative Research Centre, GPO Box 1538, Hobart, Tasmania 7000, Australia
11	Hans-Werner Schenke	Germany	Alfred Wegener Institute for Polar & Marine Research, POB 120161, D-27515 Bremerhaven, Germany
12	Mike Sparrow	UK	NOC, Waterfront Campus, Empress Dock, European Way, Southampton, SO14 3ZH, United Kingdom
13	Marzena Kaczmarska	SCAR	SPRI, Lensfield Rd., Cambridge, CB2 1ER, United Kingdom

MEMBERS OF THE EG-OCEAN WHO COULD NOT ATTEND THE
MEETING

14	Isabel Ansorge	South Africa	Oceanography Department, University of Cape Town, Rondebosch 7700, South Africa
15	Julie Hall	New Zealand	National Institute of Water and Atmospheric Research, P O Box 11115, Hamilton, Gate 10 Silverdale Road, Hillcrest, Hamilton, New Zealand
16	Steve Nicol	Australia	Australian Antarctic Division, Channel Highway, Kingston, Tasmania, 7050, Australia

17	Philippe Pondaven	France	UMR CNRS 6539, Institut Universitaire European de la Mer, Technopole Brest-Iroise, Place Copernic, 29280 Plouzane, France
18	Ilana Wainer	Brazil	University of São Paulo, Dept. of Physical Oceanography, Praca do Oceanografico 191, 05508-900 São Paulo, Brazil
19	Enrico Zambianchi	Italy	Istituto di Meteorologia e Oceanografia, Universita' "Parthenope", Via Acton 38, 80133 Napoli, Italy
20	Colin Summerhayes	SCAR	Scott Polar Research Institute, Lensfield Rd., Cambridge, CB2 1ER, UK

ANNEX 2

LIST OF ACRONYMS

AGCS	Antarctica in the Global Climate System
AHC	Antarctic Hydrographic Committee
AMD	Antarctic Master Directory
ATS	Antarctic Treaty System
BAS	British Antarctic Survey
CLiC	Climate and Cryosphere programme
CLIVAR	Climate Variability programme
CNR	Consiglio Nazionale delle Ricerche
COMNAP	Council of Managers of National Antarctic Programmes
DISC	Data and Information System for CliC
DOI	Digital Object Identifier
EG-OCEAN	Expert Group on Oceanography
ESA	European Space Agency
GCM	General Circulation Model
GCMD	Global Change Master Directory
GEOTRACES	An international study of the global marine biogeochemical cycles of trace elements and their isotopes.
GLOBEC	Global Ecosystems dynamics programme
IBCSO	International Bathymetric Chart of the Southern Ocean
ICED	International analysis of Circumpolar climate interactions and Ecosystem Dynamics in the Southern Ocean
IABO	International Association for Biological Oceanography
IANZone	International Antarctic Zone project
IAPSO	International Association for the Physical Sciences of the Ocean
IHO	International Hydrographic Organization
IMBER	Integrated Marine Biogeochemistry and Ecosystem Research

IMET	Improved METeorological Instruments
IPAB	International Programme for Antarctic Buoys
IPY	International Polar Year
JCADM	Joint SCAR/COMNAP Committee on Antarctic Data Management
NADC	National Antarctic Data Centre
NGDC	National Geophysical Data Centre
NODC	National Oceanographic Data Centre
POBACE	Polar Ocean Bathymetry Coordination Effort
SASSI	Synoptic Antarctic Shelf-Slope Interactions study
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Oceanic Research
SO	Southern Ocean
SOLAS	Surface Ocean – Lower Atmosphere Study
SSG-GS	Standing Scientific Group for the Geosciences
SSPARR	Seafloor Sounding in Polar and Remote Regions
TSG	Thermosalinograph (data)
WDC	World Data Centre

Action Items to SCOR from Expert Group Meeting in Venice

- SCAR and SCOR Secretariats should get in touch with the national contacts to gather information from each country about the ongoing and future projects of existing oceanography centres.
- The SCAR/SCOR Secretariats should work to find ways to make the funding agencies aware of the importance of data recovery projects, which serve to increase the value of original data for subsequent scientific projects. The goal is to increase the prospects for funding data rescue projects.
- Data rescue should be recommended as a necessary activity in the starting phase of global/large projects (EG-Ocean Members, SCAR, SCOR).
- Christine Provost will provide a document that could be used by the SCAR/SCOR Secretariats to contact ESA and other space agencies to raise the issue of losing oceanographic data as a result of satellite equipment failure, with particular reference to the potential loss of critical altimetric data.
- SCAR/SCOR Secretariats should be asked to help to maintain the CLIVAR data structures in the long term, with more parameters added (mooring data sets) so that these data in the future could be added to the OCEAN READER.

7.1.4 Scientific Committee on Problems of the Environment (SCOPE)

Dynamics of semi-enclosed marine systems:
The integrated effects of changes in sediment and nutrient input from land

A joint project of IUGG, SCOPE and SCOR

Background

A large part of the human populations living in coastal zones are bordering semi-enclosed seas, and depend for a large part on resources from these adjacent seas. At the same time, semi-enclosed marine systems are heavily impacted by the whole range of human activities. While there have been significant scientific advances to understand how humans modify the complex dynamics and biogeochemical cycling at work in semi-enclosed marine systems, it is now time to synthesise and review this knowledge in an integrated manner, identify the major gaps in our understanding, and highlight the most urgent priorities both for further research and for a more sound management of the coastal zones.

The project focuses on the dynamics of semi-enclosed marine ecosystems, especially the integrated effects of changes in sediment and nutrient inputs from land, in the context of ocean physics and biogeochemistry. Three international scientific networks, the International Union for Geodesy and Geophysics (IUGG), the Scientific Committee on Problems of the Environment (SCOPE) and the Scientific Committee on Oceanic Research (SCOR) are forming a partnership, in liaison with the Intergovernmental Oceanographic Commission (IOC) to synthesise and review the current understanding on potential powerful linkages between the terrestrial and marine research communities in an assessment activity that focuses on the world's great semi-enclosed seas. A number of these marine systems and their surrounding lands have been studied in sufficient depth to provide a firm foundation for a set of case studies from which general principles can be drawn.

The partners propose to conduct an assessment of how the structure and dynamics of semi-enclosed seas are controlled by complex interactions among physical and biogeochemical processes, including the added complexity of land-water interactions. In the assessment activity, international experts will review the basic science related to this wide-ranging issue, identify key scientific uncertainties, and set out options for better ways to manage the semi-enclosed seas and their surrounding landscapes.

Contents

The project will address the following aspects:

The oceans can be conceptualized as a highly diverse and variable set of ecosystems. The most complex ocean ecosystems are arguably the semi-enclosed seas because they can be dramatically

affected by anthropogenic disturbances such as increased inputs of nutrients associated with land-cover and land-use changes on their perimeters. Examples are the Black Sea, often referred to as a “eutrophic soup”: the Northern Adriatic Sea; the Baltic Sea; the Bay of Bengal; the Arabian Sea; the Seas of Japan and China; and the Gulf of Mexico. The growing populations around these seas make heavy use of these parts of the ocean and we need to better understand how to manage their structure and dynamics as we transition to the sustainable use of planet Earth

The structure and dynamics of these semi-enclosed seas are controlled by complex interactions among physical and biogeochemical processes. For example, in waters along the land margins, wind stress, the thermal regime and fresh water inputs combine to generate turbulence that vertically mixes the physical and chemical properties of surface waters. The intensity of vertical mixing and mixed-layer depth, along with nutrient inputs from human activities on land, are crucially important to the biology of these systems.

The interactions among the physics and chemistry of the semi-enclosed marine systems and microbiological activity are of particular importance. These interactions combine to control many aspects of the structure and function of the ecosystems, including oxygen gradients from the surface to depth and the products of organic matter decay such as CO_2 under aerobic conditions and CH_4 under anaerobic conditions. In the anaerobic zones of the systems, a complex set of biogeochemical reactions involve nitrate and sulfate as electron acceptors.

In recent years, the international oceanographic community has developed a set of research programmes to assess, quantify and model the role of physical and chemical processes on various aspects of the biology of marine waters. These programs include the Joint Global Ocean Flux Study (JGOFS), the Global Ocean Ecosystem Dynamics (GLOBEC) project and the new Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) and Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) projects. At the same time, regional- and global-scale efforts have been developed to consider the impacts of land-cover and land-use changes in terrestrial basins that drain into coastal waters. For example, in these programs, changes in sediment and nutrient inputs have been linked to phenomena such as marine “dead zones.” While there has been progress made in connecting land and ocean ecosystems through international programs such as the Land-Ocean Interactions in the Coastal Zone (LOICZ) project, the time appears right to further these connections in the context of semi-enclosed seas.

At the same time, new methodologies have emerged in the field of biogeochemistry (stable and radioactive isotopes, gas and liquid chromatography), molecular biology and genetics that have gained wide acceptance. Joint research by microbiologists, soil scientists, oceanographers, atmospheric chemists and geologists allow not only the description of important geochemical processes carried out by specific groups of micro-organisms, but also the evaluation of these processes quantitatively, at ecosystem and global scales.

The project addresses directly or has implications for all 5 components of the WEHAB framework adopted by the World Summit on Sustainable Development in Johannesburg in 2002.

7-48

While the project deals principally with issues related to water and environment, the dynamics of marine systems have direct consequences for marine biodiversity. The health and well-being of human populations is in turn affected by the state of these marine systems, whether as regards water or air pollution, fisheries or aquaculture resources. Agriculture and aquaculture are major human activities whose effluents modify considerably biogeochemical processes in semi-enclosed seas.

The project calls on the participation of a wide range of disciplines within the bio- and geo-sciences. It is also the first attempt to look at the complex interactions at work in coastal seas in an integrated manner and to synthesize what we know and understand about it.

Workplan

The project will be organized around a set of case studies of regional seas. For each case study, international experts will consider the nature and magnitude of inputs to the semi-enclosed seas and their causes (e.g., land-cover changes, industrial inputs), the interactions between these inputs and the physics of these systems that affect their biology, and the consequences of these effects on water-column exchanges with the atmosphere and the sediments. Microbiological processes will be compared among systems to look for both common patterns and unique aspects.

The partner organisations will bring together an interdisciplinary team of terrestrial and marine scientists who will interact using the format of the SCOPE Rapid Assessment Projects (RAP). They seek also the participation of IGBP in the project.

A SCOPE RAP includes:

- (a) the writing of a set of (10-12) background papers that are available and reviewed internally one month before the synthesis workshop;
- (b) the writing of four synthesis papers at an international workshop that summarize the deliberations of four working groups, each of which considers one cross-cutting issue;
- (c) the writing of an overview paper that summarizes the background papers and the synthesis papers and points to new research directions.

The project is co-chaired by Professor Paola Rizzoli, Professor Bjørn Sundby, and Dr. Jerry Melillo, representing the partner organisations. A scientific advisory committee (SAC) is being appointed jointly by IUGG, SCOR and SCOPE to conduct the project. At their first planning meeting in March 2006, the SAC will

- finalize the contents of the project and the list of topics for the background and synthesis papers,
- identify possible authors and other participants to the workshop and
- decide on the workshop programme.

The main workshop will be held towards the end of 2006. It will convene about 45 people for a 6-day meeting, by the end of which the first drafts of all chapters except the overview chapter will have been compiled

Results of the analysis will be published as a synthesis volume, and other products will probably be directed towards policy planners and management.

Schedule

- March 25-26 2006 - planning meeting of the Scientific Steering Committee in Bremen, Germany
- May-September 2006 - contributing authors submit a first draft of their background chapters; internal review process
- end 2006 - international workshop in Europe or China
- end 2006/early 2007 - editing of the chapters; external review process and finalisation of manuscript
- March 2007 - manuscript submitted to publisher
- September 2007 - book is published

Proposed steering committee

Chairpersons:

Jerry Melillo (SCOPE, USA)

Paola Rizzoli (IUGG, USA)

Bjørn Sundby (SCOR, Canada)

Other Committee Members:

Venu Ittekkot (Germany)

Mihail Ivanov (Russia)

Jack Middleburgh (the Netherlands)

Wahji Naqvi (India)

Temel Oguz (Turkey),

Jing Zhang (China)

Representatives of SCOPE, SCOR, IOC secretariats, *ex officio*

Financial and support status

The objective is to raise circa \$160,000 in total, which is the standard budget for a RAP, and a realistic estimate according to SCOPE's experience with former RAPs.

7-50

Expenditure estimates can be summarized as follows:

Planning meeting \$15,000

Workshop (45 participants for 5-6 days) \$90,000

Assistance from the Secretariat and coordination costs \$30,000

Production costs for the synthesis volume \$15,000

Purchase and mailing of complimentary copies of the book \$10,000

Estimated income

- ICSU/UNESCO approved a grant of US\$ 50,000 in 2006 to PACKMEDS.
- €10,000 have been obtained from the German Ministry of Research for the planning meeting in Bremen.
- €10,000 are being promised from funding agencies in the Netherlands
- Ed Urban from SCOR has agreed to approach GLOBEC, IMBER, LOICZ for \$5K each

PACKAMEDS OUTLINE

Introduction

Melillo

This is about how changes in inputs from land combine with the internal dynamics of semi-enclosed coastal basins to bring about changes in the dynamics and the structure of ecosystems, and the services they provide for human populations.

Examples of coastal systems (see list).

Nature of exchange

Generalities, compare and contrast, range of systems covering conditions from ice-covered systems to arid systems

(Issues, importance of systems, uniqueness through physics, human driven inputs, examples (Baltic Sea, Black Sea, changes, effects, historical records, categories of basins according to inputs, physics, ecosystem structure, services)

I. Background

1. Physics (3000 words + 8 fig/tables)

Wolfgang Fennel & Su Jian

(Basin configuration, water balance, and physical dynamics of the basins, mesoscale processes, control on circulation, self-sustaining systems, erosion-deposition regimes)

II: Land-Water Linkages

2. Freshwater and Sediments (5000 words + 10 fig/tables) (Bjørn Sundby)

Syvitsky, Vorosmarty & Meybeck

(Drainage basin morphology, climate and vegetation cover, physical and chemical weathering, land use changes, hydrological alterations, seasonal and interannual dynamics, extreme hydrological events, synergies)

3. Nutrients & Other Chemicals (3000 words + 8 fig/tables) (Ittekkot)

Josette Garnier, Sybil Seitzinger

(stoichiometry hotspots, river inputs (atmospheric, dust, inputs relevant?), preferential loss of nutrients and other elements, trace gas production, long-term changes, C:N:P:S, compare and contrast, micronutrients, (man-made chemicals, POPs), autotrophy versus heterotrophy)

III: Marine Ecosystem Responses

4. Changing Physics (3000 words + 8 fig/tables) (Temel Oguz)

Gary Shaffer, Denis Gilbert

(Stratification, residence time, salinity, ventilation, basin configuration, mesoscale variability of circulation, climate variability, ecosystem structure, dispersal of freshwater, sediment transport)

5. Element Cycling/Microbiology (3000 words + 8 fig/tables) (Jack Middleburg)

Joergensen, Sigman

(Redoxiclines in water column and sediments, changes in microbial community, activity and rates, macro-benthos, element interactions and non-linearity, feedbacks to climate system, greenhouse gases)

6. Foodweb structure (3000 words + 8 fig/tables) (Wajih Naqvi)

Rabelais, Lancelot

(Shifts in structures, fisheries, feedbacks, bottom-up, top-down controls, changes in the physical and chemical environment)

7. Distribution and Consequences of Hypoxia (3000 words + 8 fig/tables) (Ittekkot)

SCOR WG on Hypoxia

(Patterns, sources-natural & anthropogenic, distribution, seasonality and consequences in semi-enclosed basins)

8. Ecosystem services (3000 words + 8 fig/tables) (Melillo)

Carl Folke, Gretchen Daly

(Provisioning of food, energy, sites for recreation and fishing, tourism, navigation and transport, carbon storage, (products??))

7-52

Cross-cutting Themes

I. Climate Change/Variability (Temel Oguz)

Nick McCave (C), Francisco Chavez (R)
(include extreme events, biodiversity)

II. Threshold responses to perturbations (Temel Oguz)

Duarte (C), van der Koppel (R)
(Abrupt change/resistance, resilience, switches, reversibility, multiple stable states, extreme events, biodiversity, autotrophy versus heterotrophy)

III. Managing semi-enclosed marine systems to protect (sustain) and enhance ecosystem services (Melillo)

Don Scavia (C), Paul Snellgrove (R)
(What is being done? Conventions and treaties. Are interventions possible?)

IV. Integrated (Integrating) tools (Melillo)

Wolfgang Kremer (C), Uta Berger (R)
(Coupled watershed-ecosystem models, Remote sensing, monitoring, GIS)

Black Sea

N. Adriatic

Baltic Sea

Bay of Bengal

East China Sea

Gulf of Thailand

Sea of Okhotsk

Gulf of Mexico

Gulf of St. Lawrence

Kara Sea

Laptev Sea

Yellow Sea

Cariaco Trench

Patagonian Shelf

Hudson Bay

Workshop Participants

- Bakun, Andrew (Fisheries) (USA)
 Balzer, Wolfgang (Marine Chemistry) (Germany)
 Boesch, Don (Estuarine ecologist) (USA)
 Brian Fry (isotope chemistry) (USA)
 Burkill, Peter (boil. ocean) (UK)
 Burnett, Bill (sub. groundwater) (USA)
 Caraco, Nina (limnologist) (USA)
 Chou, Lei (Estuarine elemental cycling) (Belgium)
 Curry, Philip (Fisheries) (France)
 Cray, Cathy (Physical Oceanography) (USA)
Daly Gretchen (A) (Ecosystem services) (USA)
 Dillip Kumar (Geochemist) (India)
 Field, John (Fisheries) (South Africa)
Folke, Carl (A) (Systems ecologist) (Sweden)
 Folley, John (System modeller) (USA)
Garnier, Josette (A)(Nutrient fluxes) (France)
 Gilbert, Allison (coastal management) (The Netherlands)
Gilbert, Denis (A) (Phys. Oce) (Canada)
 Gordeev (Geochemist) (Russia)
 Gregoire, Marie (Black Sea) (Belgium)
 Howarth, B (Biogeochemistry) (USA)
 Hopkinson, Charles (land-water interactions) (USA)
 Jennerjahn (Coastal Biogeochemistry) (Germany)
Joergensen, Bo (A) (Microbiol.) Germany
 Kideys, A (Biologist) (Turkey)
 Kimball (IUCN)
 Koike, I (Microbiology) (Japan)
 Konovalov, Sergei (Nutrient cycles) (Ukraine)
 Korataev, Gennady (Ukraine)
Lancelot Chistianne (A) (Marine Biology) (Belgium)
 Lein, Alla (Biogeochemistry) (Russia)
 Liu, K.K. (Nitrogen isotopes) (Taiwan)
 McManus, John (Sediment transport) (Scotland)
Meybeck , Michel (A) (C:N:P) (France)
 Milliman, John (Sediments) (USA)
 Moloney, Coleen (Fisheries modelling) (South Africa)
 Mucci, Alfonso (Carbonate/sediment chemistry) (Canada)
 Ommer, Rosemary (Sociologist, anthropologist) (Canada)
 Paerl, Hans (Atmospheric loading) (USA)
 Penjai (Trace metals) (Thailand)
 Perillo, Gerardo (Estuarine sediments) (Argentina)
 Peterson, Bruce (Biogeochemist) (USA)
Rabelais (A) (Biologist) (USA)
 Ramankutty, Navin (Remote sensing, land cover, land use) (USA)
 Reid, Chris (Zooplankton) (UK)
 Richey, Jeff (Land-sea fluxes) (USA)
SCOR WG on hypoxia (A)
 Scranton, Mary (Hypoxia) (USA)
Seitzinger, Sybil (A) (Nutrients-N) (USA)
Shaffer, Gary (A) (Denmark)
 Shevtchenko, Vladimir (atmos. inputs) (Russia)
 Shum, K. T. (fluid dynamics) (USA)
 Slump, Caroline (Land-ocean models, P,Si) (The Netherlands)
Sigman (A) (Isotopes, nitrogen cycle) (USA)
 Stanev, Emil (Phys. Oceanography) (Bulgaria/Germany)
Su Jilan (A) (Phys. oceanography) (China)
Syvitsky, James (A) (Sedimentologist) (USA)
Vorosmarty, Charlie (A) (USA)
 Voss, Maren (Nitrogen biogeochemistry) (Germany)
 Ward, Bess (Molecular Biol., Nitrogen) (USA)
Wolfgang Fennel (A) (Germany)
 Yang S. L (sediment inputs) (China)
 Yuwono, Edy (Coastal ecologist) (Indonesia)

7-54

7.2 Affiliated Organizations

7.2.1 International Association for Biological Oceanography (IABO)

7.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS)

IAMAS Report for SCOR--2006

Although there will not be an IAMAS Scientific Assembly in 2006, significant efforts have been underway to plan activities in 2007 and beyond. A number of additional activities have also been underway.

IUGG General Assembly in 2007

Secretary General Roland List and his deputy John Turner have led the effort to organize scientific symposia for the IUGG General Assembly to be held in Perugia, Italy on 2-13 July 2007. At the IUGG EC meeting in Perugia in September 2005, we were provided a tour of the facilities that will be provided by the university, which will be celebrating its 700th anniversary. We also were able to tour the wonderful mountaintop town that looks out over the Umbrian valley to Assisi. This will be a really wonderful spot for the assembly and should draw over 4000 scientists from many disciplines and countries

The Program Committee for this assembly, under the leadership of Dr. Paola Malanotte Rizzoli, met following the IUGG Executive Committee meeting to plan for the wide variety of inter-association and intra-association/commission symposia. The Assembly will have 12 Union symposia, over 40 inter-association symposia, and about 150 association symposia. Several special symposia are also being planned, including one on the results of the Fourth Assessment Report of the IPCC, which by that time is to have been approved by the three working groups. Conveners have been selected and planning is well along so that the first call for papers for the assembly can be issued in the next few months. The Second Circular (Call for Papers) is posted on the General Assembly website (<http://www.iugg2007perugia.it/>).

Representatives of the 65 (or so) member nations of IUGG will also be meeting in Perugia. Among the actions that they are expected to take will be to approve formation of the International Association of Cryospheric Sciences (a proposal that has been considered several times since the 1930s, but now seems particularly appropriate), selection of the site for the 2011 General Assembly, and election of officers.

IAMAS/IAPSO Scientific Assembly in 2009

IAMAS and IAPSO have agreed to hold a joint scientific assembly in Montreal, Canada from 20-29 July 2009. The national steering committee is being led by Dr. Michel Béland, and is working closely with Dr. Lawrence Mysak, who is currently VP of IAPSO, and Dr. Roland List, who is the SG of IAMAS. The leaders of what is now the IUGG Commission on Cryospheric Sciences

and what seems likely to become the International Association of Cryospheric Sciences are already discussion organizing a number of symposia at this joint scientific assembly.

The meeting will be held at the Palais des Congrès de Montréal. IAMAS and IAPSO have previously met jointly, including in Melbourne in 1974, Hawaii in 1985, Reading in 1989, and Melbourne again in 1997; each of the meetings was very successful at focusing on multi-disciplinary research topics and progress. With the results of IPY studies at least starting to become available, this joint assembly should provide a very significant opportunity for reviewing research on the Earth system and climate. This assembly might well also provide a good opportunity for several of the WCRP research programmes to present their latest results (proposals for symposia to be organized will need to be submitted by the time of the Perugia meeting in 2007 so that a program can be developed over the ensuing several months).

Meetings of Other IUGG Associations in 2009

Four of the other IUGG Associations will also be holding scientific assemblies in 2009. These include:

- IAGA – Sopron, Hungary
- IAHS – Hyderabad, India
- IASPEI – Cape Town, South Africa
- IAVCEI – Reykjavik, Iceland

WMO/IUGG Assessment of Aerosol Effects on Precipitation

At their meetings in 2003, the Congress of the World Meteorological Organization and the General Assembly of the IUGG approved guidelines for an assessment of the effects of pollution and biomass burning on precipitation. Subsequently, the International Aerosol-Precipitation Science Assessment Group (IAPSAG) was formed under the leadership of the late Prof. Peter Hobbs of the University of Washington. This group, with a membership of about a dozen leading scientists from around the world, is now under the leadership of Prof. Zev Levin of Tel Aviv University, who is also president of the IAMAS Commission on Clouds and Precipitation. The panel's report will address the different scientific aspects of possible interactions and the degree of confidence that can be assigned to the results. The draft version of the report is now undergoing an independent technical peer review, after which it will be revised. The major findings of this report are expected to be presented at the IUGG Assembly in Perugia.

Activities of the IAMAS Commissions

The ten IAMAS disciplinary commissions continue to be quite active (see <http://www.iamas.org>), issuing newsletters and planning their own meetings in addition to their participation in the scientific assemblies. Upcoming meetings include:

- International Commission on Atmospheric Chemistry and Global Pollution (ICACGP): Quadrennial symposium in cooperation with IGAC will be held in Cape Town, South Africa on 17-23 September 2006.

- International Commission on Atmospheric Electricity (ICAE): The 13th International Conference on Atmospheric Electricity on 13-17 August 2007 in Beijing.
- International Radiation Commission (IRC): The IRC's next International Radiation Symposium will be held in Matera, Italy in August 2008.
- International Commission on Clouds and Precipitation (ICCP): The 15th International Conference on Clouds and Precipitation will be held in 2008.
- International Ozone Commission (IOC): The 21st Quadrennial Symposium on Atmospheric Ozone will be held in 2008.

Submitted by:

Michael MacCracken, IUGG and IAMAS liaison to the WCRP/JSC
3 August 2006 (for presentation at SCOR meeting)

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

2005–2006 IAPSO Activities

During 2005–2006, IAPSO's main activity was the Joint IAG/IAPSO/IABO Assembly in Cairns, Australia in August 2005. IAPSO participated in 17 symposia including 7 IAPSO only, 7 Joint IAPSO/IABO, and 3 Joint IAG/IAPSO symposia. The Joint Assembly drew a total of 724 delegates from 62 countries. IAPSO presented a best student poster award and the Eugene LaFond Medal for oceanography in a developing country, as well as the biannual Prince Albert I Medal for career achievements in oceanography. The "2005 Eugene LaFond Medal" went to Dr. Carmen Grados of IMARPE, Peru. The "2005 Prince Albert I Medal" went to Prof. Dr. Friedrich Schott of Kiel University, Germany.

In addition to two IAPSO Executive Committee meetings, IAPSO held a general business meeting of representatives from adhering bodies during the Joint Assembly in Cairns. That was a productive meeting providing input/discussion from the adhering bodies. While proposed changes to the IAPSO Statutes and By-Laws had been given tentative approval by a majority of members, two additional issues were raised for consideration. A decision was made to hold general business meetings at all IAPSO Assemblies or Joint Assemblies held during interim periods between IUGG General Assemblies.

Initial planning was carried out for the IAPSO Scientific Program at the IUGG2007 General Assembly, including input from IAG, IAMAS, and UCCS. IAPSO was represented by its President and Past-President at the IUGG Scientific Program Committee meeting in Perugia,

Italy, in September 2005. That planning continued into early 2007 via email, and input was added where appropriate to other IUGG Associations.

Work of the Permanent Service for Mean Sea Level (PSMSL) and the associated IAPSO Commission on Mean Sea Level and Tides continued during 2005. A report on the complete activities of PSMSL was received. One significant activity was the planning, in cooperation with other organizations, of the upcoming WCRP Workshop, "Understanding Sea Level Rise and Variability," scheduled to be held during the summer 2006 in Paris, France. IAPSO is serving as a co-sponsor of the workshop.

In administrative actions, the IAPSO Executive Committee approved holding a Joint Assembly with IAMAS and UCCS in July 20–29, 2009 in Montreal, Canada. The IAPSO Executive Committee also approved discontinuing the Commission on Groundwater-Seawater Interaction (CGSI) with a recommendation to CGSI that they continue activities in a different organizational format.

The IAPSO Secretary General continued maintenance of the Web page including posting the program book from the 2005 Joint Assembly on the Web page; and continued handling general correspondence received by the Association.

Prepared by

Fred Camfield, IAPSO Secretary General, and
Shiro Imawaki, IAPSO President

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.

7-58

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 Status of InterMARGINS application

Date: Thu, 10 Aug 2006 15:39:39 +0900

From: soh@jamstec.go.jp

Subject: Re: Affiliation of InterMARGINS to SCOR

To: Ed Urban <ed.urban@jhu.edu>, Kazutoshi Horiuchi <horiuchi@jamstec.go.jp>

Cc: "Chisa NISHIMORI, JAMSTEC" <nishimoric@jamstec.go.jp>

Dear Dr. Ed;

I am so sorry for my slow response.

My understanding is that your requests to make the affiliation with SCOR are

1) encouragement of developing country: settlement of new membership fee for the development countries. See our homepage (<http://www.intermargins.org/constitution.php>).

- 2.5 Assistant Membership will be presented to the developing countries with economies in transition.

- 2.6 Membership will automatically cease when a due annual subscription remains unpaid for more than 6 months, unless deferment for a single fixed term is agreed by a majority of the Steering Committee.

- 2.7 The level of annual subscription for founding Principal Members (Japan, UK and USA) is US \$15,000. The level of annual subscription for all other Principal Members is US \$10,000. The level of annual subscription for Associate Members is US \$5,000 and Assistant Members is US\$1,000. According to the needs of InterMARGINS, subscriptions will be reviewed annually with the ultimate aim of all Principal Members paying the same rate.

2) Outreach and education issue

InterMARGINS is going to make cooperation with Interridge. We did discuss on this issue with J. Jin of the chair of Interridge. Because it is still small to conduct O/E only by InterMARGINS, and few of the participation member.

3) annual report to SCOR

We can make a annual report to you. Principal our action is published by our home page. Transparency is important characteristic of our program.

7-60

Therefore, we can accept your request at present. Last steering committee at Vienna decided to make affiliation with SCOR.

I will appreciate you so much if you give us additional info to make affiliation with us.

With best regards,

Wonn Soh
Chair person
InterMARGINS

Constitution

1. Aims.

InterMARGINS is an international and interdisciplinary initiative concerned with all aspects of continental margins research into the solid earth. It aims to encourage scientific and logistical coordination, with particular focus on problems that cannot be addressed as efficiently by nations or national institutions acting alone or in limited partnerships.

2. Membership.

2.1 In each country, the member of InterMARGINS shall be the national organisation or national grouping of researchers that pays the annual InterMARGINS membership subscription.

2.2 Members shall be composed of Principal Members, Associate and Assistant Members.

2.3 Principal Membership will offer the following advantages: guaranteed one designated voting member of the Steering Committee, opportunity to host the InterMARGINS Office and to provide the Steering Committee Chairman, guaranteed membership of all Working Groups including Chairs of such Groups, priority entitlement to InterMARGINS sponsorship of conference and workshop costs, entitlement to receive all information, newsletters and data catalogues.

2.4 Associate and Assistant Memberships will offer the following advantages: guaranteed one designated non-voting member of the Steering Committee, guaranteed membership of all Working Groups, limited entitlement to InterMARGINS sponsorship of conference and workshop costs, entitlement to receive all information, newsletters and data catalogues.

2.5 Assistant Membership will be presented to the developing countries with economies in transition.

2.6 Membership will automatically cease when a due annual subscription remains unpaid for more than 6 months, unless deferment for a single fixed term is agreed by a majority of the Steering Committee.

2.7 The level of annual subscription for founding Principal Members (Japan, UK and USA) is US \$15,000. The level of annual subscription for all other Principal Members is US \$10,000. The level of annual subscription for Associate Members is US \$5,000 and Assistant Members is US \$1,000. According to the needs of InterMARGINS, subscriptions will be reviewed annually with the ultimate aim of all Principal Members paying the same rate.

3. Steering Committee

3.1 InterMARGINS shall be directed by a Steering Committee that consists of the designated representatives of the Principal and Associate Members and is normally chaired by the Director of the InterMARGINS Office. The Steering Committee will normally meet twice a year at times and places to be mutually agreed.

3.2 The Steering Committee will normally operate by consensus.

3.3 In the absence of the designated Chairman the Committee shall elect a temporary Chairman, for the duration of the meeting, from among the Members present.

3.4 In the case of a vote being taken only those designated members who represent Principal Members and who are present may vote. In the event of a tie the Chairman shall retain a casting vote.

3.5 Guests from candidate member countries, and others as appropriate on an ad hoc basis, may be invited by the Chairman to attend Steering Committee meetings in an observer capacity.

3.6 The InterMARGINS Steering Committee will co-ordinate and promote InterMARGINS activities. In addition it will,

3.6.1 Accept or decline applications to membership of InterMARGINS.

3.6.2 Define, and from time to time re-assess and, if necessary, update revise, the Programme Plan.

3.6.3 Propose, oversee and, if necessary, financially support specific activities that fall within the Programme Plan.

3.6.4 Consider and prioritise proposals for new Programme Plan elements, sponsorship, workshops and other appropriate activities.

3.6.5 Set up, and close down, Sub-Committees and Working Groups determine the membership of InterMARGINS and, approve their Terms of Reference and membership.

3.6.6 Approve the InterMARGINS budget.

3.6.7 Oversee the operation of the InterMARGINS Office.

3.6.8 Select the Chairman and host institution for the InterMARGINS Office.

7-62

4. *InterMARGINS Office*

4.1 The InterMARGINS Office will normally be sited at the workplace of the Chairman of the Steering Committee, who will have day-to-day responsibility for running the Office, subject to the overall approval of the Steering Committee. Personnel will be appointed to the Office according to the workload and available budget and subject to the agreement of the Steering Committee.

4.2 The functions of the InterMARGINS Office are to,

4.2.1 Encourage international scientific and logistical co-ordination of all aspects of continental margins research into the solid earth.

4.2.2 Seek new members of InterMARGINS

4.2.3 Communicate and exchange information with Steering Committee members and National Correspondents.

4.2.4 Regularly service and update the InterMARGINS web site.

4.2.5 Compile and keep a directory of interested margins scientists.

4.2.6 Prepare and publish the InterMARGINS Newsletter twice a year.

4.2.7 Set up and operate meetings of the Steering Committee twice a year.

4.2.8 Respond to Actions agreed by the Steering Committee.

4.2.9 Manage, and account to the Steering Committee for, the Programme budget.

4.2.10 Report regularly to the Steering Committee on Office activities.

4.2.11 Provide and circulate Minutes of Steering Committee meetings to all meeting attendees.

4.3 The InterMARGINS Office and Chairmanship will normally rotate among the Principal Members every three years. The Steering Committee will normally choose the next host country and the Chairman on the basis of offers made by the Principal Members.

5. *National Correspondents.*

5.1 Non-member countries that send observers to Steering Committee meetings will be invited to appoint an InterMARGINS National Correspondent to provide the principal point of contact, on a day-to-day basis, between researchers in that country and the InterMARGINS Office.

5.2 Steering Committee members are expected to maintain appropriate formal relationships with agencies and individual researchers in their countries through whatever mechanisms are determined at national level.

6. Changes to the Constitution.

Proposed changes to the Constitution, including Section 2.7, must be received from Steering Committee members by the Chairman in writing or by email at least 2 months in advance of a Steering Committee meeting and can only be approved by a majority vote of the Steering Committee.

7. Termination.

In the event that the Steering Committee decides by a majority vote to terminate the InterMARGINS Programme the balance of any funds remaining will be spent, as determined by a majority of the Steering Committee present when the termination vote takes place, to further margins research internationally and will not be returned to member countries.

7-64

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.

Chair:

J. Frederick Grassle
Director and Professor
Institute of Marine and
Coastal Sciences
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Vice-Chair:

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Vice-Chair:

Ian Poiner
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Other Members:

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

Executive Committee Reporter: Annelies Pierrot-Bults

Census of Marine Life Annual Report to SCOR

July 2006

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, so 2006 marked an important transition toward integration, synthesis and visualization of the information now actively being collected by our 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 2006.

Scientific Accomplishments

The last of the global-scale Realm Projects were initiated in 2005. By the end of 2006, all of them will have begun work in the field. Some highlights from CoML expeditions and research analyses include the following.

Species discoveries

On a cruise to New Zealand's Graveyard seamount complex in May 2006, the CoML seamounts project (CenSeam) used a combination of video/still photography, as well as sample collection; they examined seamount community composition at depths in excess of 1km. Discoveries include a potentially new species of carnivorous sponge.

CenSeam scientist Bertrand Richer de Forges published the discovery of a new species of shrimp. Its name is *Neoglyphea neocaledonica*. The Glypheides were well known from the Jurassic and Cretaceous periods and were supposed to be extinct at the Eocene (about 50 million years ago). Bertrand compares this discovery, for invertebrate scientists, to that of the second species of coelacanth in Indonesia some years ago. That species was also thought to be extinct 50 million years ago.

A cruise associated with both the continental margins (COMARGE) and chemosynthetic ecosystems (ChEss) projects led to the discovery a new species of crab. Described by Enrique MacPherson, William Jones and Michel Segonzac, the crab *Kiwa hirsuta* *Kiwa* belongs to the new family Kiwaidae and was found during an expedition to the Easter Island Microplate.

New insights into marine animal distribution and diversity

An international team of researchers, led by Monty Priede (University of Aberdeen), from the CoML Mid-Atlantic Ridge project (MAR-ECO), revealed in a paper to the *Proceedings of the Royal Society* that sharks have failed to colonize at depths greater than 3,000 meters. These

7-66

findings means that the deepest oceans of the world appear to be shark free, though scientists do not yet know why. One possible reason may be lack of food.

The International Census of Marine Microbes (ICoMM) initiated an experiment to determine whether or not extensive sampling of orthologous microbial genes would provide more accurate estimates of microbial diversity and relative representations of different phylotypes in the deep oceans. They collected ~120,000 tag sequences for samples isolated from the North Atlantic Deep Waters (NADW) and the oxygen minimum zone (OMZ) at the same coordinates, as well as diffuse flow samples from Axial Seamount off the coast of Oregon, and discovered that bacterial diversity in the sea is orders of magnitude greater than anyone has ever expected, much greater than previous estimates based upon conventional molecular techniques.

A case study from the History of Marine Animal Populations (HMAP) project tracked human impact on coastal marine ecosystems from Roman time to the present and reported in *Science* that the decline of global estuaries and coastal seas has accelerated in the last 150-300 years. The study quantified the magnitude and causes of ecological change in 12 estuaries and coastal seas, including Massachusetts Bay, Delaware Bay, Chesapeake Bay, Pamlico Sound, Galveston Bay, Francisco Bay, Western Baltic Sea, Wadden Sea, Northern Adriatic Sea, Southern Gulf of St. Lawrence, Outer Bay of Fundy, and Moreton Bay. The researchers, led by Heike Lotze (Dalhousie University), combined palaeontological, archaeological, historical, and ecological records tracing changes in important species, habitats, water quality parameters, and species invasions. To date, this is the most comprehensive quantitative assessment of the state of estuaries and coastal ecosystems ever conducted.

Novel technologies and approaches

The CoML zooplankton project (CMarZ) completed a 20-day cruise to the deep Sargasso Sea. Scientists trawled rarely explored tropical ocean depths between the southeast U.S. coast and the Mid-Atlantic Ridge to survey and record the variety and abundance of zooplankton. Though relatively few in number compared with the uppermost ocean layer, scientists were amazed by the variety of tiny animals found at depths of 1 to 5 km. Among thousands of specimens captured, 220 were DNA sequenced at sea, revealing a number of new species. The scientists, who have spent decades learning to distinguish species within a particular group, sorted through samples in a kind of assembly line. DNA sequencing at this scale had not before been attempted at sea.

A partnership between CoML and the U.S. National Oceanographic Partnership Program (NOPP) has funded work to further test and develop a ground-breaking new technology to view fish populations under water at the shelf-scale. Gulf of Maine Area program (GoMA) researchers, led by Nicholas Makris (MIT), have developed a remote sensor system that makes it possible to track large fish populations over a 10,000 square kilometer area. This new technology can track shoal movements to lead to new insights in behavior and could also help determine whether fish populations are shrinking.

The CoML tagging and tracking technologies developed in the Pacific through the Tagging of Pacific Pelagics (TOPP) and Pacific Ocean Shelf Tracking (POST) projects are being expanded to other global oceans under the newly established Ocean Tracking Network. The OTN is planning a highly interconnected network spanning 14 ocean regions, including the Arctic and Southern Oceans, the Indian Ocean (East, West), the Atlantic (NE, NW, SE, SW), the Mediterranean, and the Pacific (NE, NW, SE, SW and Mid-ocean), giving scientists and resource managers a highly detailed picture of marine conditions and the migrations of fish and ocean animals throughout the world.

Contributions to the community

The Ocean Biogeographic Information System (OBIS) is currently serving 9.7 million data records covering 67,000 species from 122 databases. Five new geographical searches are available, including Exclusive Economic Zones (EEZs), International Hydrographic Organization (IHO) Seas, Large Marine Ecosystem (LME) provinces, Longhurst maps, and United Nations Food and Agriculture (FAO) fishing grounds. OBIS is the flagship project and a leader of a new interdisciplinary area of research called "Ocean Biodiversity Informatics" (OBI), which is subject of a recent nine-article theme session in the *Marine Ecology Progress Series*.

Researchers from the ChEss project published the second edition of *Handbook of Deep-Sea Hydrothermal Vent Fauna* (Desbruyères, Segonzac & Bright, Eds.). This extensively expanded edition gives an overview of our current knowledge on the animals living at hydrothermal vents.

Members of the Future of Marine Animal Populations (FMAP) team, led by Camilo Mora and Ransom Myers (Dalhousie University) worked with OBIS and other sources to build a database of Marine Protected Areas (MPAs) for coral reefs in 102 countries, including satellite imagery of reefs worldwide. They then surveyed more than 1,000 MPA managers and scientists to determine the conservation performance of MPAs, taking into account such factors as MPA size and distances to neighboring protected areas. Their analysis assessed protection afforded to coral reefs from such threats as resource extraction, poaching, pollution, coastal development and overfishing. They found that less than 2% of coral reefs worldwide are within MPAs that have adequate regulations on extraction, poaching and other major threats to these ecosystems.

Program Governance and Administration

With the addition of Dr. Song Sun of China in December 2005, the international CoML Scientific Steering Committee (SSC) now has 16 members:

- Dr. J. Frederick Grassle (*Chair*), Rutgers University, USA
- Dr. Victor Ariel Gallardo (*Vice Chair*), University of Concepción, Chile
- Dr. Ian Poiner (*Vice Chair*), Australian Institute for Marine Science, Australia
- Dr. Vera Alexander, University of Alaska Fairbanks, USA
- Dr. D. James Baker, Academy of Natural Sciences (Retired), USA
- Dr. Patricio Bernal, Intergovernmental Oceanographic Commission, France
- Dr. Dorairajasingam Chandramohan, National Institute of Oceanography (Retired), India

Dr. David Farmer, University of Rhode Island, USA
Dr. Serge Garcia, Food and Agriculture Organization, Italy
Dr. Carlo Heip, Netherlands Institute of Ecology, The Netherlands
Dr. Poul Holm, Roskilde University, Denmark
Dr. Yoshihisa Shirayama, Kyoto University, Japan
Dr. Myriam Sibuet, Ifremer (Retired), France
Dr. Michael Sinclair, Bedford Institute of Oceanography, Canada
Dr. Song Sun, Institute of Oceanology, China
Dr. Meryl J. Williams, Future Harvest Alliance Office, Malaysia

The program also has ten 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 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, Japan, and the United States. Regional committees are located in the Caribbean, Europe, the Indian Ocean, South America, and Sub-Saharan Africa.

CoML's international Secretariat is located at the Consortium for Oceanographic Research and Education in Washington, DC. In April 2006, it received renewed funding to continue administering the program for another two years.

The program, to date, has secured approximately \$164 million for scientific research, outreach and education, and project management. These funds come from traditional sources, including both governments and private organizations. This amount, however, does not reflect the crucial resources received through ship-time, personnel and other in-kind support.

Plans for 2007-2009

The CoML, under the guidance of its SSC, has now successfully established and implemented its complete suite of international projects and other planned activities. Most of these projects are already sampling in the field and, by the end of 2006, all of them will have embarked on at least one cruise. These projects will continue to perform research in the field through 2008, after which time focus will transition to analysis and synthesis of information.

For the SSC and Secretariat, the work plan for the next few years emphasizes program growth through increased participation and partnerships, globalization of the field program to achieve representative global coverage, information integration and synthesis, and identification of the key questions to be addressed in the 2010 report. Much of this work will be done through the increased involvement of the NRICs, as their success is the key to sustained research for marine biodiversity after the culmination of the "first" census. The strategy will also involve increased partnerships with a variety of stakeholders and potential user groups that need marine biodiversity information for resource management, conservation, industry practices, and education.

Recognizing the breadth of potential user groups in both government and private realms, the SSC wishes to ensure that the information and insights of CoML will address a variety of needs and issues. It has established a working group, led by Paul Snelgrove (Memorial University of Newfoundland), to develop the framework of the 2010 report in consultation with CoML projects and the user community. This report will also recommend a plan for future research by identifying remaining knowable gaps in information.

Relationship to other SCOR activities

CoML has ongoing collaboration with the SCOR Panel on New Technologies for Observing Marine Life. 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 committee next meets in October in Japan, in conjunction with meetings of the CoML SSC and near-shore biodiversity (NaGISA) project.

In December of this year, CoML will participate in the SCOR-organized meeting to build synergy between major international ocean research and observation projects and programs. This is a follow-up meeting to the one held in September 2004, in which CoML also participated. CoML is a supporter of these forums for communication between the large ocean science programs because it reduces redundancy in activities and increases the spirit of and knowledge of opportunities about collaboration, thus making more efficient use of limited resources. CoML endorses efforts to strengthen the community through better data management and interoperability between systems, ocean observing technologies, and the development of a cruise database. In July 2006, several CoML projects with ongoing work in the Southern Ocean participated in a meeting on coordination of a Southern Ocean Observing System, in conjunction with the SCAR annual meeting. This was a result of the recommendations made at the 2004 SCOR meeting of ocean research programs.

CoML hopes to have a strong presence at the SCOR 50th Anniversary meeting in 2008. Fred Grassle, Chair of the CoML International SSC, is a member of the planning committee. In 2007 the SSC will establish a new committee on “biodiversity 2020,” comprised of young, innovative scientists who will likely play large roles in ocean sciences in the next decade. A member of this committee might be a good spokesperson for a creative, cutting-edge theme session on where ocean sciences are heading in the future.

There is natural cross-over between CoML’s and SCOR’s activities 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 member of the IMBER SSC. Dave Karl, a member of the CoML marine microbes (ICoMM) project, is on the joint IMBER-GLOBEC working group for “end-to-end food webs.” The former chair and current member of the CoML South American regional committee, Ruben Escribano, is a member of the GLOBEC SSC. Additional personnel from CMarZ, MAR-ECO, and the Gulf of Maine projects are active in GLOBEC activities. GLOBEC’s CLIOTOP program has expressed interest in collaboration with CoML’s CMarZ, TOPP, OBIS-SEAMAP, MAR-ECO and FMAP projects.

7-70

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 leading projects for biology in the upcoming International Polar Year (IPY). CoML as a whole is seeking greater participation and input into GOOS, particularly through OBIS, POST, TOPP, and the Gulf of Maine project.

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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Shuki Ushio	JAPAN
Timo Vihma	FINLAND
Guy Williams	AUSTRALIA
Zhanhai Zhang	CHINA-Beijing

Executive Committee Reporter: Ilana Wainer

SCOR AFFILIATED PROGRAMME - International Antarctic Zone (iAnZone)
Report of Activities for 2005 - 2006
39th Executive Committee Meeting of SCOR
Concepción, Chile, October 2006

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

Introduction

iAnZone was conceived in the late 1980s as a sequence of informal biennial meetings with Antarctic researchers, primarily physical oceanographers, interested in understanding the Southern Ocean and its role in climate. It was accorded SCOR Affiliated Programme status in early 1997, with a main **mission** to advance our understanding of climate-relevant processes in the Southern Ocean region poleward of the Antarctic Circumpolar Current. Since 2004 iAnZone is also affiliated to SCAR. 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. Highly successful iAnZone projects completed in recent years include AnzFlux and DOVETAIL.

Exciting continued developments took place during this past year of iAnZone's tenure in anticipation to the forthcoming **International Polar Year (IPY) 2007-2009**. On October 9th of 2005 we held the 9th biennial iAnZone coordination meeting in Venice, Italy. It provided a valuable venue to present ongoing and planned national programs by representatives from Australia, Brazil, Finland, France, Germany, Italy, Japan, Norway, Russia, Spain, UK and USA. The IPY committee endorsed Synoptic Antarctic Shelf-Slope Interactions Study (SASSI) in November 2005 as the leading project for a cluster of proposals addressing scientific topics on the Antarctic coasts and margins. During the SCAR Open Science Conference of July 2006 in Hobart, Australia we held a SASSI meeting to further strategic plans among the attending participants of Brazil, France, Germany, Italy, Japan, Russia, Spain, UK and USA.

Current Scientific Activities

AnSlope

Three cruises between 2003 and 2004 and a 2-year deployment of a moorings array were part of the Antarctic Slope (ANSLOPE) field program in the Ross Sea, the 4th under iAnZone. This U.S.-led programme is closely coordinated with the Italian CLIMA programme to define the roles of the Antarctic Slope Front in the exchanges of mass, heat and freshwater between the shelf and oceanic regimes. This project is now in the final publication phase.

ISPOL-1

The Ice Station Polarstern (ISPOL-1) field programme took place during austral spring-summer of 2004-2005. This Germany-led programme with international collaborations is the 5th iAnZone project. It used the concept of a manned drifting station to study spring to early summer ocean and sea ice conditions along the western Weddell Sea outer continental shelf and upper slope region.

MaudNESS

As part of the U.S.-led Maud Rise Nonlinear Equation of State Study (MaudNESS), a cruise in the winter of 2005 collected extensive data to study the conditions that could potentially trigger deep mixing events in the interior of the Weddell Sea.

Future Scientific Activities

SASSI is the next (6th) major project coordinated by iAnZone, scheduled for 2007-2008 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://woceatlas.tamu.edu/sassi>. Participation by countries new to iAnZone, or new to Antarctic research, is warmly welcomed. SCOR, through this report, may be able to extend our invitation to such scientists to join our research cruises where appropriate.

Future Meetings

The 10th iAnZone biennial coordination meeting is planned to take place in August 2007, collated with the Open Science Conference of the Polar Dynamics meeting in Bergen, Norway. This will be particularly exciting meeting given to the imminent launch of IPY field work, and will provide an effective ground for international collaboration in as much the same fashion as seen during the previous biennial meeting of October 2005 held in Venice, Italy.

Committee Membership

Following the 9th iAnZone meeting in Venice, Italy in October 2005, the Steering Committee membership was revised according to the 3-year rotations intended for this group. We are very grateful to Karen Heywood for her dedication and excellence leading our group and to the three members listed below, who are rotating off the committee after years of commendable service:

Robin Muench (US)
Hartmut Hellmer (Germany)
Russell Frew (New Zealand)

The current steering committee members are as follows:

Alejandro Orsi (Co-Chair; USA)
Andrea Bergamasco (Co-Chair; Italy)
Karen Heywood (ex officio as past Chair; UK)

7-74

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)

The iAnZone website, <http://www.ldeo.columbia.edu/res/fac/physocean/ianzone>, and mailing list, ianzone@ldeo.columbia.edu, are open to all for the exchange of information regarding projects and opportunities in the Antarctic Zone. We are very grateful to Bruce Huber (LDEO) for maintaining them on our behalf.

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?

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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

7-76

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.

Chair:

Colin Devey

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Coordinators: Valérie Epplé (program), Kristen Kusek (education outreach)



InterRidge Report 2006

By Katja Freitag

InterRidge Coordinator until May 2006

InterRidge office activities – update since the 2005 report

Since the last report, InterRidge's Biology working group drafted a "Statement of commitment to responsible research practices at deep-sea hydrothermal vents" (see appended) which the InterRidge chair, Colin Devey, presented at the American Association for the Advancement of Science meeting in St. Louis, MO, USA in February 2006. InterRidge has placed a strong focus on education outreach initiatives. The highlight in 2005 was a pilot test of the writer-at-sea program that took place in July – August 2005 on a cruise co-led by Rolf Pedersen (Norway). The program as well as the cruise were extremely successful and details can be found on the Science Writer-at-Sea website

(<http://www.interridge.org/sciencewriteratsea/norway2005/index.html>).

All InterRidge publications (IR workshop reports, meeting abstract volumes, IR News, etc) are available at no cost to scientists and students as downloadable PDFs from the IR website

(http://www.interridge.org/Downloads_junction.html).

INTERRIDGE EDUCATION OUTREACH INITIATIVES

For more information on InterRidge's E&O plans please contact Kristen Kusek (kristenkusek@aol.com).

Public and media outreach

Science Writer-at-Sea

- Pilot project completed (Mohns Ridge, Norwegian research cruise, Thanks again to Rolf Pedersen and Ingunn Thorseth!) in summer 2005
 - Joins marine scientists and future journalists (graduate level)

7-78

- Provides at-sea ‘boot camp’ experience for science journalists and accomplishes education outreach objectives for scientists
- Please visit www.interridge.org/sciencewriteratsea/norway2005/index.html for more information and to see the results of the pilot test project
- Oral presentation at AGU; Dec. 2005
- Two publications on the project have been published in teacher magazines
- Have formally invited participation of other graduate-level science writing programs (Columbia, Michigan State University, Johns Hopkins writing program, Boston University, University of South Florida, University of Wisconsin, University of Colorado at Boulder). Have also attracted the interest of the international museum audience headed by Wit Ostrenko, current president of The International Association of Science and Technology Centers (ASTC).
- Have outlined plans for the project’s expansion
- Currently writing proposal to seek long-term funding

AAAS (American Association for the Advancement of Science) – see *InterRidge Activities* (workshops, meetings, field trip)

Science community outreach

Oceanography Magazine

- IR is sponsoring an entire issue of *Oceanography* magazine (www.tos.org)
- Publication date: March 2007
- Current sponsors: InterRidge, NSF, NOAA, ChEss, DeRidge
- International suite of authors invited to participate to reflect the diverse IR community
- Topic outline for IR *Oceanography* magazine, in no particular order:
 - Introduction
 - Mid-ocean ridge ecosystems
 - Biogeography
 - Origin of life
 - Mineralization and fluid chemistry at vents
 - Deep Earth sampling
 - Investigating the source region- patterns of mantle flow and magma production
 - Slow and ultraslow spreading ridges
 - Hot spot interactions
 - Back-arc spreading systems / basins
 - Monitoring and observatories
 - 2007: In honor of 30th anniversary of vent discovery

- Involving the public in deep sea research: Challenges and solutions
- Vent research technology
- Policy: Code of conduct, MPAs (marine protected areas)

Video projects

IR has teamed up with an excellent video production company called Future Vision Educational Media Programming. Currently, the team is working with IR's French colleagues to produce an interactive DVD based on a cruise in 2002 (to be used as a teaching tool / outreach tool)

Outreach to schools (formal education)

IR is a major partner in the Ridge 2000 "GLOBE" outreach initiative. Called FLEXE (From Local to EXtreme Environments - Deepening Earth Systems Science Understanding with GLOBE), the proposal was recently submitted to the National Science Foundation. Other major partners in the FLEXE proposal include ChESS and the Pennsylvania State University College of Education. The initiative will bring important concepts of deep-ocean science as well as educational innovations that promote scientific inquiry to tens of thousands of students worldwide through the GLOBE program. http://www.globe.gov/iessp_info/ngg.html

InterRidge Activities (workshops, meetings, field trip)

InterRidge Meeting - 3rd International Symposium on Seep and Hydrothermal Vent Biology, La Jolla, Scripps, CA, USA, September 2005.

The *Third International Symposium on Hydrothermal Vent and Seep Biology* was held in La Jolla, California from September 12-16, 2005. With sunny southern California and the eastern Pacific Ocean as a back drop, over 200 scientists from 19 countries congregated to discuss recent advances in the ecology, physiology, host-symbiont biology, microbiology, biogeography, biogeochemistry and paleobiology of vents and seeps. These interactions were stimulated during slide and poster presentations and social activities on the campus of Scripps Institution of Oceanography, as well as during excursions off campus to Catalina Island, the Wild Animal Park, the Anza Borrego desert and the old mining town of Julian. Funding was provided by RIDGE 2000, the Scripps Institution of Oceanography, the Census of Marine Life ChESS program, the US DOE Minerals Management Services, the US NOAA West Coast Undersea Research Program and Office of Exploration, InterRidge, and New England Biolabs.

There were two winners of the InterRidge outstanding student award: Stephanie Markert (Germany; "Functional Genome Analysis of the Bacterial Endosymbiont from the Deep Sea Tube Worm *Riftia pachyptila*") and Dijanna Figueroa (USA, "Protein synthesis and expression patterns in Deep Sea *Bathymodiolus* Mussels") presented excellent posters of their research. Due to the high level of student contributions, four honorable mentions were made as well: Mathis Stoeckle (Canada), Diane Poehls (USA), Carol Logan (USA), and Julius Csotonyi (Canada).

Proceedings of the Symposium will be published by Cahiers de Biologie Marine. 23 contributions

7-80

provide a taste of what is known, what is known to be unknown and what would be desirable to be known, in the fields of vent and seep biology. Topics include a description of new vent fields and new methods for sampling and modeling hydrothermal vent fluids, descriptions of nematode, jelly fish, gastropod, mussel, copepod and barnacle diversity, methods for rearing tube worms, analyses of diverse free-living and symbiotic microorganisms, and community-level investigations of invertebrate recruitment and habitat controls. The environments also extend beyond hydrothermal vents and cold-seeps to include wood and whale falls.

Conveners: Horst Felbeck, Lisa Levin, Doug Bartlett

InterRidge Symposium at the AAAS (advancing science, serving society) meeting, St. Louis, Missouri, USA, February 2006.

InterRidge held a 90-minute symposium on 19 February 2006 entitled: Latest Ocean Ridge Research: Microbes, Mining, Management, and More. The symposium was very successful despite being up against a huge evolution session. Speakers were Colin Devey "Writing the Code of Conduct: The Future of Ridge Research"; Chuck Fisher "Life at the Edge: Real Animals in Extreme Environments", Ed T. Baker "Unseen Volcanoes: Recycling on a Planetary Scale" and Steven Scott "Mining Deep Ocean Metallic Sulfides Is Closer Than You Think". Abstracts of these talks are linked from the Education Outreach page of the InterRidge website.

Colin Devey's presentation on InterRidge's "Statement of commitment to responsible research practices at deep-sea hydrothermal vents" marked the unveiling of this InterRidge statement. A copy can be downloaded from the IR website, along with a press release that IR did with Penn State University - "Shining a Light on Deep-Sea Vents: Science Meets Policy - InterRidge to Unveil Responsible Research Statement at Upcoming AAAS Session".

Upcoming meetings 2006-2007

14-16 June 2006 – InterRidge Steering Committee meeting, Moscow, Russia.

15-19 July 2006 – InterRidge Outreach Activity and Science Session at the 2nd EuroScience Open Forum (ESOF), Munich, Germany

6-9 September 2006 - Mission MOHO -Understanding the Formation and Evolution of the Oceanic Lithosphere

20-22 September 2006 – Polar Ridges meeting and workshop, Sestri Levante, Italy;

Summary of 2005-2006 Publications

Abstract Volume - *IR Workshop Tectonic and Oceanic Processes along the Indian Ridge System, January 2005*;

Meeting Report - *IR Workshop Tectonic and Oceanic Processes along the Indian Ridge System, February 2005*;

Abstract Volume – *III MOMAR Workshop, April 2005*;

Meeting Report - *Long-Term Monitoring of the Mid-Atlantic Ridge Proceedings of the III MOMAR Workshop, May 2005*;

InterRidge News, Vol. 14, October 2005;

Brief Deep Earth Sampling Working Group Meeting Report - *San Francisco, December 2005*;

InterRidge statement of commitment to responsible research practices at deep-sea hydrothermal vents, 19 February 2006.

Publications planned for 2006

InterRidge Steering Committee Report, July 2006;

InterRidge News, Vol. 15, October 2006;

Proceedings of the Symposium on Seep and Hydrothermal Vent Biology Meeting will be published by Cahiers de Biologie Marine;

Abstract volume for the Polar Ridges meeting and workshop, September 2006.

Summary of 2005-2006 Education Outreach Presentations and Publications

"Shining a light on deep-sea vents: Science meets policy", AAAS (advancing science, serving society) meeting, St. Louis, Missouri, USA. Joint press release InterRidge and Penn State University, 19 February, 2006.

"Science Writer-at-Sea: A New Education Outreach Project - Unleashing the Power of the Deepest Story on Earth" article in Teaching Earth Sciences Magazine of the EARTH SCIENCE TEACHERS' ASSOCIATION Volume 31 Number 1, 2006 ISSN 0957-8005 by Kristen M. Kusek

"Science Writer-At-Sea: A New InterRidge Education Outreach Project: Joining Scientists and Future Journalists" AGU presentation, San Francisco, CA, USA, Kristen M. Kusek (presenter), Katja Freitag, Colin W. Devey, 5 December, 2005.

InterRidge contacts with other programs

IR has links with the following programs:

- SCOR (Scientific Committee on Oceanic Research) – the InterRidge Chair attended the SCOR executive committee meeting, Australia, August 2005.
- ISA (International Seabed Authority) – Dr. Adam Cook, Scientific Affairs Officer, attended the 3rd Hydrothermal Seep and Vent Biology meeting.
- SOPAC (South Pacific Geosciences Applied Commission) – no recent contacts.

- IODP (International Ocean Drilling Program) – one of the InterRidge working groups (Deep Earth Sampling) works closely with IODP.
- ILP (International Lithosphere Program) – no recent contacts.

Benefits of affiliation to SCOR

The prime objectives of InterRidge are 1) to facilitate collaborative research at an international level and thereby maximize the use of resources and the exchange of ideas and 2) to promote ridge-related science to the general public and policy makers.

There are many benefits that InterRidge gains through its affiliation to SCOR and vice versa. At present, InterRidge has no resources to provide financial support to scientists, so support from SCOR to assist scientists from developing nations to participate in InterRidge meetings is enormously important to help our efforts to reach and involve these nations. Also, the advice provided by the SCOR Executive Committee about the possible liaisons of InterRidge to other international projects such as IODP is invaluable.

The success of InterRidge is measured by the benefit of the program to the international ridge community. InterRidge therefore benefits from an affiliation with SCOR in that the international profile and impact of InterRidge on ridge research worldwide is increased. This enhances its support and the facilitation of international collaborations and development of new research projects. Closer ties between InterRidge and SCOR on a scientific level as well as potentially collaborating on education outreach initiatives will definitely be beneficial to both programs. InterRidge can benefit by receiving support and advice from SCOR, and SCOR will definitely benefit by giving a boost to this internationally successful program.

InterRidge statement of commitment to responsible research practices at deep-sea hydrothermal vents

OVERVIEW:

As marine research scientists we especially appreciate the uniqueness and complexity of the deep-sea hydrothermal vent fauna and environments, and are particularly interested in preserving vents for their scientific, aesthetic, ecological, and potential economic values. In fact, because of the specialized nature of the equipment required to work at deep-sea hydrothermal vents, such as occupied and unoccupied research submersibles, scientists are the primary group of people who have the opportunity to visit these extraordinary environments.

The potential for significant impact of scientific activities on a single vent site or a population of vent animals pales in comparison to the potential for disturbance by volcanic/tectonic events or industrial mining/harvesting activities. Nonetheless, we recognize that some scientific activities could adversely affect individual sites or impact communities more than is necessary, if research activities are not carefully planned and executed. In addition, because only a limited number of sites are currently known and scientists from a wide variety of disciplines frequently work at

single locations, we recognize the potential for use conflicts among scientists, at sites where scientific activity is intense.

The sustainable use and protection of the oceans is best served by a fundamental understanding of complex marine systems. This understanding is only attainable through scientific research. As a result, detailed research on the oceans is an integral and necessary part of effective resource management and environmental protection. Most forms of observation and investigation of natural systems involve some disturbance of the systems being studied. In the interest of environmental stewardship, it must be the goal of research scientists to minimize disturbances as much as possible, while still gathering the information necessary both to understand the systems and to form a basis for sustainable use strategies. Therefore, marine scientists should always evaluate their research plans from a conservative standpoint, and choose the most environmentally friendly research approach.

BACKGROUND:

Why are hydrothermal vent ecosystems important and different?

Hydrothermal vents are present in all of the world's oceans in areas associated with tectonic and/or volcanic activity. The most abundant and widely distributed of these are hydrothermal vents associated with deep-sea spreading centers, areas where the plates that make up the surface of the Earth are moving apart and new sea-floor is being formed. Understanding this process of plate tectonics is central to understanding the dynamics of our planet, including extreme geological events such as tsunamis, earthquakes, and volcanic eruptions. Furthermore, this process results in extreme environments that are home to high densities of specialized microbes and animals, the study of which may lead to exciting new discoveries applicable to societal needs.

Hydrothermal-vent environments are extreme for life because of the chemistry and temperature of the hydrothermal fluid, the rapid temporal changes in the fluid properties, and the extreme gradients that characterize the environments the organisms inhabit. Hydrothermal-vent environments are also very productive because of the chemical energy in the vent fluid, energy that microbes can harvest and use to reproduce, grow and thrive. As a result, hydrothermal vents are characterized by dense communities of remarkable animals, that are specially adapted for life at the vents and are different from the fauna found in the surrounding deep sea. The specialized microbes that form the basis of the biological productivity at all hydrothermal vents include groups that can live in truly extreme conditions of temperature and chemistry. These include some of the most primitive forms of life on Earth. Deep-sea hydrothermal vent communities were discovered in the late 1970's and we have only begun to unravel the potential of scientific discovery contained in the fluids, microbes, and animals of these exciting, but remote, environments. Furthermore, hydrothermal vents in different areas of the world are home to different communities of animals, in the same way that the different continents are home to different groups of animals and plants. There are currently six biogeographic provinces of hydrothermal vent fauna spread around the Pacific, Atlantic, and Indian Oceans that are recognized by hydrothermal vent biologists. It is likely that additional biogeographic provinces will be discovered as additional spreading systems are explored in more remote areas of the

deep sea (e.g., in the Arctic Ocean). The potential for continuing fundamental discoveries of biotechnological and perhaps medical importance is high in the fauna of these extreme environments. Continuing study of these environments is essential to developing an understanding of the ecology of the deep sea, the limits to life, and perhaps even the origin of life.

Because of the tight coupling between the biological activity and the hydrothermal fluid, high density communities are only found in areas of active venting of hydrothermal fluid. However, active vent sites are distributed very patchily along oceanic spreading centers. Distances between active vents can be as little as a few tens of meters, but sites are often separated by as much as 100 km or more. We do not fully understand how the animals that live at vents have adapted to the long-range dispersal and colonization challenges that lead to rapid community development as soon as new vents are formed. However, their dispersal and colonization abilities contribute to a high degree of homogeneity between communities within a biogeographic province.

The presence of hydrothermal vents can be very erratic over time as well. Hydrothermal vents are a direct result of dynamic and often ephemeral tectonic and volcanic activity. Individual vents can form and then cease to be active on time scales of years. Consequently, the microbial and animal communities that the vents sustain can develop and die out on very short time scales.

Over the first three decades of study after their discovery, numerous vent systems and their biological communities have been seen to develop and then cease to exist. Metapopulations of vent animals must be adapted to extreme geological events, including events that may cover a vent site in hot lava, topple a 75m tall hydrothermal chimney, or result in complete cessation of venting at a site.

RESPONSIBLE RESEARCH PRACTICES:

The Primary purpose of this document is to affirm our commitment to responsible research activity at hydrothermal vents. As members of an international research community we encourage all scientists to abide by the following guidelines:

- 1) Avoid, in the conduct of scientific research, activities that will have deleterious impacts on the sustainability of populations of hydrothermal vent organisms.
- 2) Avoid, in the conduct of scientific research, activities that lead to long lasting and significant alteration and/or visual degradation of vent sites.
- 3) Avoid collections that are not essential to the conduct of scientific research.
- 4) Avoid, in the conduct of scientific research, transplanting biota or geological material between sites.
- 5) Familiarize yourself with the status of current and planned research in an area and avoid activities that will compromise experiments or observations of other researchers. Assure that your own research activities and plans are known to the rest of the international research community through InterRidge and other public domain data bases.

- 6) Facilitate the fullest possible use of all biological, chemical and geological samples collected through collaborations and cooperation amongst the global community of scientists.

We also reaffirm our commitment to open international sharing of data, ideas and samples in order to avoid unnecessary re-sampling and impact on hydrothermal vents, and to further our global understanding of these habitats for the good of all people on Earth.

For example, the international community through the Census of Marine Life program and InterRidge are developing open databases with detailed information on all available vent biological samples preserved in laboratories and museums around the globe as a resource to minimize repeat sampling of vent fauna. In addition, many national ridge programs are hosting open-access databases of geological, chemical, and biological hydrothermal vent data.

INTERRIDGE:

InterRidge is a non-profit organization concerned with promoting all aspects of mid-ocean ridge research for the benefit of all people of the world. InterRidge members realize that research on this globally distributed but remote system can only be achieved by international collaboration and cooperation.

The InterRidge mandate has four principal components:

- 1) To build and maintain an interactive international ridge research community.
- 2) 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.
- 3) To act as a representative body for international ridge scientists in policy discussions.
- 4) Through education and outreach, to communicate the importance and excitement of ridge research to the general public and decision makers worldwide.

At present InterRidge is directed by a steering committee made up of representatives from 11 member nations, representing not only their own national scientists but also those from an additional 17 corresponding nations.

CONCENSUS:

The Steering committee of InterRidge and the chairs of all InterRidge working groups unanimously support this statement of commitment to responsible research practices at hydrothermal vents and urge scientists of all nations to follow the guidelines outlined when planning and executing their research expeditions.

Signed on 17 Feb. 2006 at IFM-GEOMAR, Kiel, Germany

By Prof. Colin Devey,

InterRidge Chair

on behalf of InterRidge and specifically in the name of:

Colin Devey, IFM-GEOMAR, Germany, Chair InterRidge

7-86

Charles Fisher, Penn State University, USA, Co- chair of the InterRidge Biology Working Group

Nicole Dublier, Germany, Co-chair of the InterRidge Biology Working Group

Kim Juniper, Universite de Montreal, Canada, Chief Scientist NEPTUNE Canada

Stéphane Hourdez, France, member InterRidge Biology Working Group

Francoise Gaill, Universite de Paris, France, Past-chair, InterRidge Biology Working Group

Tim Shank, Woods Hole Oceanographic Institution, USA, member InterRidge Biology Working Group

Ken Takai, JAMSTEC, Japan, member InterRidge Biology Working Group

Anna Metaxas, Dalhousie University, Canada, member InterRidge Biology Working Group

Donna Blackman, Scripps Institute of Oceanography, USA, Chair Ridge 2000 program

John Chen, Dept. of Geophysics, Peking University, InterRidge Steering Committee member for China

Jérôme Dymont, Institut de Physique du Globe de Paris, InterRidge Steering Committee member and National representative for France, Co-Chair of Working Group - Hotspot-ridge interactions

K.A. Kamesh Raju, National Institute of Oceanography, Goa, India, InterRidge Steering Committee member for India

Nobukazu Seama, Kobe University, Japan, InterRidge Steering Committee member for Japan

Rolf Pedersen, University of Bergen, Norway, InterRidge Steering Committee member for Norway

Paul Dando, University of Wales-Bangor, InterRidge Steering Committee member for United Kingdom

Tim Henstock, National Oceanography Centre, Southampton, InterRidge Steering Committee member for United Kingdom

Jonathan Snow, University of Houston, USA, Chair of Working Group “Ultraslow-spreading ridges”

Javier Escartin, University Paris VI, France, Co-Chair of Working Group “Monitoring and Observatories”

Ricardo Santos, University of Azores, Portugal, Co-Chair of Working Group “Monitoring and Observatories”

Benoit Ildefonse, University of Montpellier, France, Chair of Working Group “Deep Earth Sampling”

Nadine le Bris, IFREMER, France, Chair of Working Group “Biogeochemical interactions at deep-sea vents”

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.

Chair:

James Yoder
Woods Hole Oceanographic Institution
Woods Hole, MA MA 02543-1050, USA

Tel: +1-508-289-2252
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E-mail: jyoder@whoi.edu

Membership:

Huang Ahn	KOREA	Joji Ishizaka	JAPAN/JAXA
David Antoine	FRANCE	Milton Kampel	BRAZIL/INPE
Ray Barlow	SOUTH AFRICA	Samantha Lavender	UK
Marten Bergeron	CANADA	Mervyn Lynch	AUSTRALIA
Paula Bontempi	USA/NASA	Hiroshi Murakami	JAPAN
Christopher Brown	USA/NOAA	Trevor Platt	CANADA
Curtiss Davis	USA/Naval Res. Lab	Heidi Sosik	USA
Pan Delu	CHINA	Srinivasa Kumar	INDIA/INCOIS
Roland Doerffer	GERMANY	Eric Thouvenot	FRANCE/CNES
Mark Dowel	ITALY/JRC		
Nicolas Hoepffner	ITALY/JRC		

Executive Committee Reporter: Bjørn Sundby

SCOR AFFILIATED PROGRAM**International Ocean-Colour Co-ordinating Group (IOCCG)
Report of Activities for 2005 - 2006****Venetia Stuart (IOCCG Project Scientist)*****1. Introduction***

This report provides an overview of IOCCG activities over the past year. The IOCCG was first established in 1996 and has been an Affiliated Program of SCOR since 1998. The group was established to encourage communication and international co-operation between the 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 Committee is comprised of experts in the field of satellite ocean colour, with representatives from various space agencies as well as the scientific user community. The group is currently chaired by Dr. James Yoder (Woods Hole Oceanographic Institution, USA) and the Secretariat is staffed by Project Scientist, Dr. Venetia Stuart, at the Bedford Institute of Oceanography (Canada). The IOCCG is also an Associate Member of the Committee on Earth Observation Satellites (CEOS).

The IOCCG aims to promote the long-term continuity of ocean-colour data sets by encouraging the establishment of a multi-sensor, multi-year ocean-colour archive to examine mid- to long-term changes in phytoplankton biomass. Issues that need to be addressed before this can be done (calibration of the sensors, algorithm differences, data-binning issues), as well as other issues of importance to the ocean colour community, are addressed by scientific working groups established by the IOCCG. The IOCCG also has a strong interest in capacity building, and has conducted and sponsored a number of training courses on applications of ocean-colour data in many developing countries. These courses have helped to broaden the ocean-colour user community as well as advocate the importance of ocean-colour data. And lastly, the IOCCG also encourages liaison with other international groups to promote the use of ocean-colour data (e.g. GlobCOLOUR Project, IOCCP – the International Ocean Carbon Coordination Project and CEOS).

2. IOCCG Scientific Working Groups

Over the past year, two IOCCG scientific working groups have completed their deliberations, and submitted monographs for publication by the IOCCG. Significant progress has also been made by many of the other working groups, including the newly formed PFT working group.

i) IOCCG Working Group on Ocean-Colour Algorithms (Chair: Dr. ZhongPing Lee, Naval Research Laboratory, USA)

This working group set out to test the performance of a number of empirical and semi-analytical algorithms used to process ocean-colour data. After carrying out intercomparisons using synthetic and *in situ* datasets, the group concluded that the most stable and robust properties obtained from ocean-colour data, regardless of the algorithm used, were the total absorption and backscattering coefficients. They suggested that because there are more unknown factors that affect the retrieval of chlorophyll-a concentration from ocean-colour data than there are for absorption and backscattering coefficients, we should revisit the issue of chlorophyll-a remaining the primary product of ocean-colour remote sensing, rather than the inherent optical properties (IOPs) of the water or the optical properties of phytoplankton. These optical properties, similar to sea surface temperature, could serve as climatology data records to study long-term changes of the global oceans. The group also strongly advocated the use of algorithms based on the fundamentals of hydrological optics rather than simple empirical relationships. They concluded that inherent optical properties provide important indices for our water environments and open new doors for oceanographic studies. The final monograph (IOCCG Report Number 5) entitled: **“Remote Sensing of Inherent Optical Properties: Fundamentals, Tests of Algorithms, and Applications”** is currently being printed by the GKSS Research Centre in Geesthacht, Germany, which is gratefully acknowledged. The report will be distributed free of charge to subscribers on the IOCCG mailing list.

ii) IOCCG Working Group on Co-ordination of Merged Data-Sets (Co-chairs: Watson Gregg and Paula Bontempi, NASA HQ, USA).

The objectives of this working group were to develop a procedure to be used by space agencies to merge ocean-colour data from various ocean-colour sensors in order to produce a self-consistent, long-term time series of satellite-derived ocean biogeochemical observations. Significant improvements in spatial coverage and temporal resolution can be achieved by combining data from several missions. Currently there are nine functioning ocean colour missions, but only five are global in scope. Data merging from this suite of missions is not yet routine. In this context, the IOCCG formed a working group to examine the issues surrounding merging of ocean-colour data. A panel of leading experts in the field from a number of different space agencies convened a workshop and drafted a monograph entitled: **“Ocean-Colour Data Merging”** (IOCCG Report Number 6). This monograph is currently being edited by the IOCCG, and will be printed later this year. Recommendations by the group leading to high

7-90

quality, public archives of merged ocean-colour data include: production of Level-3 data by all ocean-colour missions, establishment of international *in situ* datasets for validation of merged data, knowledge of sensor characteristics and data performance, using a comprehensive set of merger evaluation criteria to evaluate merged products in a consistent and objective fashion, and defining the source data (sensor and processing version).

iii) IOCCG Working Group on Global Ecological Provinces (Co-Chairs: Mark Dowell, JRC, Italy and Trevor Platt, BIO, Canada).

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. Over the past year, working group members have revised contributions for various chapters, given a presentation on biogeochemical provinces at the ASLO summer meeting (June 2005), convened a small working group meeting during the ocean-colour training course at Ispra (October 2005) and Mark Dowell and Trevor Platt chaired a special session on “Ecological and Biogeochemical Provinces of the Ocean” at the Ocean Sciences meeting in Hawaii (Feb. 2006). The report entitled “**Using Ocean Colour to Elucidate the Functional Structure of Marine Ecosystems**” has been edited and should be submitted to the IOCCG for review later this year. A number of recommendations to space agencies and the scientific community will be made in the report, for example, a commitment to a sustained, long-term time series of ocean-colour data, and a requirement for continued investment in developing ocean-colour data merging methods. There was some interest in continuing the discussions on ecological provinces after completion of the report. One possibility was to obtain endorsement through the IMBER Research Project, which will be followed up.

iv) IOCCG Working Group on Operational Ocean-Colour (Chair: Dr. Christopher Brown, NOAA)

The aims of this working group are to promote the use of near-real-time, ocean-colour products, to justify the societal benefit for the investment in ocean colour, and to assist in the exchange of approaches among agencies that currently possess operational ocean-colour missions. Two successful workshops were held over the past year: one at the University of Rhode Island, USA (September 2005), and the other at JRC, Ispra, Italy (November 2005). The current focus of the group is on writing an IOCCG report, the final draft of which should be ready for review by the end of 2006. The final report will describe what we can learn from ocean-colour science, both from the perspective of research applications as well as aspects of a more direct interest to society at large (e.g., climate change).

v) IOCCG Working Group on Comparison of Atmospheric Correction Algorithms

(Chair: Dr. Menghua Wang, University of Maryland, USA)

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

Due to unforeseen circumstances the group was taking longer than expected to complete the report. At the January 2006 IOCCG meeting, Committee members expressed concern about the timing of the working group, since many of the tests were done with old versions of the algorithms, which were not necessarily consistent with what was being done today. The Committee proposed that a scientific paper be published in lieu of a report/monograph. The IOCCG has not committed funds to this working group for several years but Committee members would nevertheless like to see a tangible outcome.

vi) IOCCG Working Group on Radiometric Calibration of Satellite Ocean-Colour Sensors

(Chair: Dr. Robert Frouin, Scripps Institution of Oceanography, USA)

The aims of this working group are to examine the various approaches used for pre- and post-launch calibration of different ocean-colour sensors. No funds were allocated to this working group over the past year, although they nevertheless made some progress: writing assignments had been allocated and most chapters had been completed. The draft report will be reviewed by the IOCCG Committee when it is finalized.

vii) IOCCG Working Group on Requirements for an Ocean-Colour Sensor in the Coastal Zone
(Co-chairs: Curtiss Davis, NRL, USA and Arnold Dekker, CSIRO, Australia).

This working group was formed a year ago, but due to medical and other problems, the group had not yet held their first workshop. The goals of the group are to assess current sensors and define the optimal sensor, or suite of sensors, to characterize the coastal ocean for oceanographic and societal applications. The group proposes to form an international committee with experts on all key topics (sensor design, calibration, atmospheric correction, applications, products and product validation), and they intend to hold a workshop this year (2006) to create the outline of an IOCCG monograph/report. A range of coastal ocean problems including bathymetry, wetlands, coastal morphology will be addressed and the group will propose a geostationary imager for higher temporal resolution. The IOCCG Committee reconfirmed their approval of the plan of action for the working group, and agreed to appoint Arnold Dekker (CSIRO) as new co-chair. Funding for the workshop was also approved.

viii) IOCCG working group on Phytoplankton Functional Types (PFTs) (Chair: Cyril Moulin, CEA/CNRS, France).

A proposal for this new working group was accepted at the most recent IOCCG Committee meeting (January 2006). PFTs are conceptual groupings of phytoplankton species which have an ecological functionality in common, for example, nitrogen fixers or calcifiers. The groupings are

7-92

based on functionality and are often related to size (pico-, nano- and microphytoplankton). PFTs are of interest to the biogeochemical community because they are relevant proxies of ecosystem function. Potentially, they can be derived from ocean-colour remote sensing through direct effects (changes in absorption and backscattering coefficients of the cells) or indirect effects (changes in the reflectance spectra caused by changes in associated particles). The group held its first meeting on 6-7 July 2006 at the CNES Headquarters in France, where they exchanged ideas and agreed upon the outline for the report. A second meeting is scheduled for October 2006, just after the Ocean Optics conference in Montreal.

3. Capacity-Building Initiatives

IOCCG was one of the co-sponsors for an EC-organised training course on ocean-colour remote sensing, conducted by the Joint Research Centre (Italy) in October 2005. It was a very successful event with over 130 applications. Eighteen students were selected, two of which were supported by IOCCG, as well as one of the lecturers. The course covered theoretical lectures in the morning and practical sessions for image processing (SeaDAS, MatLab) in the afternoons and received excellent reviews from all the students and visiting lecturers.

The IOCCG also offered three travel scholarships to students from Estonia, Malaysia and South Korea to attend the AMRS remote sensing conference in Halifax (May 2005). In addition, five IOCCG Fellowships were awarded during 2005 to students from China, Uruguay, Argentina, Brazil and Spain to receive training at a foreign institute. Reports from Fellowship students, as well as their host supervisors, were all very positive, and suggested that these exchanges could facilitate longer term collaborations between the institutes involved. The host supervisor of a student who travelled to the USA indicated that the IOCCG Fellowship was insufficient to cover reasonable living expenses, and he offered to supplement the Fellowship. This was gratefully acknowledged, and it was noted that in future, the funding allowance for students travelling to the USA should be reviewed.

IOCCG capacity-building activities are traditionally funded by support from the IOC. Unfortunately, the IOC had to discontinue its financial contributions to IOCCG starting January 2006, due to budgetary reductions. This may have repercussions on capacity-building initiatives in the next fiscal year.

4. Liaison with Other Organisations and the Ocean Colour Community

i) ESA's GlobCOLOUR Project

The IOCCG is currently working closely with European Space Agency on the "GlobColour Project", which is tasked to develop a 10-year dataset of consistently calibrated global ocean colour information to support global ocean carbon cycle research. Information from four ocean colour satellite sensors will be merged to produce this demonstration dataset: SeaWiFS, MODIS/AQUA, MERIS and Parasol/POLDER. The IOCCG is providing input into the

development of the data products to ensure they are useful for the ocean-colour community. The first meeting of the GlobColour science team was held in January 2006 at UNESCO to review System Requirements and Validation Protocols. Next, a Critical Design Review meeting took place in July 2006 to update the Validation Protocols and Design Justification files. The IOCCG representatives for these two activities were Eric Thouvenot (CNES, France) and Peter Regner (ESA). A GlobColour user workshop will take place in December 2006 to get feedback from a wider community. The time line and milestones for the project are provided on the GlobColour web-site.

ii) CEOS and GEO (Group on Earth Observations)

IOCCG is an associate member of CEOS, which has the role of coordinating earth observation satellites. CEOS has agreed to be responsible for the satellite component of GEOSS (Global Earth Observation Systems of Systems) through the SIT team, chaired by Dr. Volker Liebig from ESA. As far as IOCCG is concerned, the highest priority for GEOSS is the Global Climate Observing System (GCOS), which specified ocean colour as one of its key measurements. Climate is one of the seven societal benefit areas defined by GEOSS, and this gives IOCCG an opportunity to promote continuity of ocean-colour satellite missions. The IOCCG is trying to use its membership in CEOS to advocate for the ocean-colour component of GCOS. This could help to focus the attention of agency representatives of GEOSS to get missions launched and data available. A major concern about the GEOSS initiative is that the scientific community is not yet being fully engaged in the process. IOCCG has had representation at various SIT and GCOS meetings over the past year.

iii) IOCCG Newsletters

The IOCCG keeps the ocean colour community informed about the latest research, important events, training initiatives and conferences. etc., through a newsletter which is distributed to over 1,000 subscribers every 2-3 months. The IOCCG also advocates the importance of ocean-colour data to the global community through its comprehensive web page (<http://www.ioccg.org>), which provides a wealth of information on many aspects of ocean colour.

5. IOCCG Committee Meetings

The IOCCG Committee meets once a year to co-ordinate the activities of the group as a whole and to plan and discuss future activities. The Executive Committee also meets once a year to discuss financial matters. The next Committee meeting is scheduled to take place in Swakopmund, Namibia on 16-18 January 2007.

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. The group is currently chaired by Dr, James Yoder (Woods Hole Oceanographic Institution, USA). After the next Committee meeting, two members (marked with an asterisk) would have completed their terms of service while a third member (Ichio Asanuma) has already been replaced by Joji Ishizaka.

IOCCG Committee Members (2006/2007)

Ahn, Yu-Hwan	-	Korea Ocean Research and Development Institute, Korea
Antoine, David*	-	Laboratoire de Physique et Chimie Marines, France
Barlow, Ray*	-	MCM, Cape Town, South Africa
Bergeron, Martin	-	Canadian Space Agency, Canada
Bontempi, Paula	-	NASA HQ, USA
Brown, Chris	-	NOAA/NESDIS, USA
Davis, Curtiss	-	Naval Research Lab, USA
Delu, Pan	-	Second Institute of Oceanography, China
Doerffer, Roland	-	GKSS, Germany
Dowel, Mark	-	JRC, Italy
Hoepffner, Nicolas	-	Joint Research Centre, Italy
Ishizaka, Joji	-	Representing JAXA, Japan
Kampel, Milton	-	INPE, Brazil
Kumar, Srinivasa	-	INCOIS, India
Lavender, Samantha	-	Univ. Plymouth, UK
Lynch, Mervyn	-	Curtin University, Australia
Murakami, Hiroshi	-	JAXA EORC, Japan
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
Yoder, James (Chairman)	-	Woods Hole Oceanographic Institution, USA

Activities of the IOCCG are dependent upon financial contributions from national Space Agencies and other organisations, and upon infrastructure support from SCOR.

7. List of Current Sponsors

- BIO (Bedford Institute of Oceanography, Canada)
- CNES (Centre National d'Etudes Spatiales, France)
- CSA (Canadian Space Agency)
- ESA (European Space Agency)
- IOC (Intergovernmental Oceanographic Commission) for 2005
- JAXA (Japanese Aerospace Exploration Agency)
- JRC (Joint Research Centre, EC)
- NASA (National Aeronautics and Space Administration)
- NOAA (National Oceanic and Atmospheric Administration)

The Bedford Institute of Oceanography provides in-kind support for the IOCCG in the form of office space, computers, informatics support, fax, phone and postage.

7-96

7.4 Other Organizations

7.4.1 Partnership for Observation of the Global Ocean (POGO)