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7.1 International Council for Science (ICSU)

No funds were sought for 2004 from ICSU because of a lack of good project ideas. Ideas for 2005 will be sought at the Executive Committee meeting and should be discussed with Ed Urban. ICSU grants could be one means to develop cooperative activities with SCOPE, SCAR, and other ICSU organizations.

Robert Duce made a presentation about SCOR in February 2002 for an ICSU Priority Area Assessment of its environmental organizations (see following written input). The SCOR Executive Committee contributed to and approved these two documents. The first document was submitted prior to the February meeting. The second document was prepared after the February meeting in response to follow-up questions that resulted from the meeting. The ICSU committee conducting this review of ICSU organizations that focus on environmental issues plans to issue its findings and recommendations in August 2003. This review replaces the "mini-review" that was previously planned for SCOR. Members of Review Panel are Robert Watson (USA), *Chairman*; Lourdes Arizpe (Mexico); Anne Buttimer (Ireland); Angela Cropper (Trinidad and Tobago); Partha Dasgupta (UK); Istvan Lang (Hungary); Gordon McBean (Canada); James McCarthy (USA); Uri Shamir (Israel); Crispin Tickell (UK); and Shem Wandiga (Kenya).

Terms of Reference

The Panel will:

- 1) Define an overarching "mission" and the role of ICSU in the area of the environment taking note of its relationship to sustainable development and taking into account relevant activities outside of ICSU;
- 2) Propose a strategic framework for ICSU to take this area forward for the next 5-10 years;
- 3) Examine current activities within the ICSU family, identify gaps, overlaps and synergies among existing activities and possibly propose new responsibilities for individual bodies;
- 4) Propose modalities for promoting collaboration and co-ordination within the ICSU family and when necessary and propose potential partnerships with bodies outside ICSU;
- 5) Examine and propose, if appropriate, changes either in the future direction of individual bodies and/or their activities, including relationships with other bodies/organisations.

An additional ToR for this specific review on the environment:

- 6) Identify potential inputs from the ICSU environment programmes to a science plan for a possible programme on science for sustainable development, the planning of which may be initiated during the course of this assessment;
- 7) Review the contributions of the ICSU Scientific Unions to the environment programmes and propose, if necessary, modalities for strengthening interaction between interdisciplinary bodies, joint initiatives and Scientific Unions in the area of the environment; and
- 8) Consider in view of the establishment of CSPR's for overall strategic planning and review of the ICSU programme, consider the potential future role of the Advisory Committee on the Environment (ACE).

PAA [Priority Area Assessment] on the Environment and its Relation to
Sustainable Development
Questions for the environmental review for ICSU's Interdisciplinary Bodies, Joint
Initiatives, and Union Members

Please respond concisely to the following questions regarding your organisation. Limit all text responses to a maximum of 200 words.

1.1 What keywords apply to your scientific activities?

water, agriculture & food security, biodiversity, climate change, capacity building, chemical pollution, ocean, carbon cycle, fisheries, coasts, harmful algal blooms

1.2 Describe your three primary results/key outcomes and actions taken to achieve them? (For research GEC programmes and ESSP, information should be provided relevant information for all major projects) [Maximum of 200 words per programme, and 200 words for each project]

1. SCOR has developed and supported large-scale research projects to study the ocean's role in global change. Examples include the Joint Global Ocean Flux Study (with IGBP; joint projects will be described in IGBP's response) and the Global Ocean Ecosystem Dynamics project (with IGBP and UNESCO's Intergovernmental Oceanographic Commission, IOC). The success of such projects (and the new Surface Ocean-Lower Atmosphere Study and Ocean Biogeochemistry and Ecosystems Analysis project) is a direct function of co-sponsors' scientific oversight and financial support. SCOR reviews the projects' progress annually and has provided them more than US\$2 million over the past 8 years for international planning and coordination.
2. SCOR working groups (121 so far) have produced books, and peer-reviewed journal articles and special issues, on important ocean science topics. SCOR working groups bring together international groups of scientists to address priority issues identified by national SCOR committees. Their products advance understanding of the ocean, highlight research priorities, and identify new methods for studying the ocean.
3. SCOR has supported the participation of more than one thousand scientists from developing nations to attend ocean science meetings over the past 18 years, through a continuing grant from the U.S. National Science Foundation.

1.3 What are new directions/emerging issues of your organisation?

SCOR works with other ICSU organizations on topics of mutual interest. Increased cooperation might include joint activities with SCOPE and DIVERSITAS on marine biodiversity, with SCAR on Southern Ocean research, with IUGG/IAPSO on physical oceanography, and with IGBP and IHDP on linking natural and social science research related to the ocean.

New SCOR directions are difficult to predict because much of SCOR's activity responds to requests from national members and sponsors. This approach has been valuable for setting new directions and identifying emerging issues. SCOR also seeks in each annual meeting to identify gaps in its portfolio of activities. The recent OCEANS Open Science Conference, co-sponsored

by SCOR and IGBP and funded partially with an ICSU grant, is an example of how research priorities can be set. About 400 scientists attended the conference.

SCOR has promoted ocean carbon observation and research activities since 1960 and is conducting several such activities with IOC. SCOR and IOC co-sponsor an Advisory Panel on Ocean Carbon Dioxide and are planning a symposium on the science of carbon sequestration in the ocean. SCOR and IOC also are developing a Memorandum of Understanding with the Global Carbon Project for cooperative activities.

1.4 What are your policy-relevant “deliverables”? (e.g., contributions to scientific assessments, international agreements, etc)

SCOR is the official scientific advisor to IOC, UNESCO’s ocean organization. The advisory relationship takes the form of cooperative activities, as well as providing direct advice about IOC’s structure and function. Working with IOC provides a ready audience for SCOR’s policy-relevant products and a conduit of information to governments. SCOR also helped review the UN Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), and has been identified as a scientific advisor for GESAMP and for the new marine environmental assessment activity being developed by the United Nations.

SCOR has not been asked specifically to contribute to scientific assessments or international agreements, but has focused on expanding the scientific understanding of ocean processes that could be affected by, contribute to, or mitigate global changes of various types (e.g., the Global Ecology and Oceanography of Harmful Algal Blooms project with IOC). Although not specifically requested by any intergovernmental body, the results of the planned SCOR- IOC symposium on the science related to sequestration of carbon in the ocean (potential effectiveness, risks, unknowns) may contribute to ongoing assessments of the Intergovernmental Panel on Climate Change (IPCC) and other national and intergovernmental organizations.

1.5 Do you address sustainable development? If so, describe how.

SCOR promotes the development of the scientific knowledge of the ocean needed to allow humankind to develop sustainably, as described in a vision created by IGBP and SCOR for shared research projects. Projects co-initiated and co-sponsored by SCOR have greatly improved our understanding of the role of the ocean in the global carbon cycle (Joint Global Ocean Flux Study) and how the variability of the physical environment and climate system affect marine organisms (Global Ocean Ecosystem Dynamics project).

Global change is broader than climate change and SCOR activities address other global change issues. For example, the GEOHAB program (co-sponsored by SCOR and IOC) will provide new information about how blooms of toxic phytoplankton are initiated and controlled by environmental conditions. SCOR is sponsoring two working groups that are helping to document current knowledge, priorities for future research, and new observation methods for studying the fluid flow through coastal sediments. Such knowledge is important for understanding and predicting how pollution will affect coastal areas.

On the topic of marine fisheries and marine biodiversity, SCOR sponsors GLOBEC and specialized working groups that will provide information that should help governments manage marine fisheries, as well as document and understand marine biodiversity.

1.6 Which are your major partner organisations within and outside of ICSU?

SCOR collaborates most closely within ICSU with IGBP in co-sponsoring four of its core projects (JGOFS, GLOBEC, SOLAS, OCEANS). In addition to the major ocean research projects co-sponsored with IGBP, SCOR has co-sponsored working groups with some of IGBP's other core projects, such as the Land-Ocean Interactions in the Coastal Zone (LOICZ) project and the Past Global Changes (PAGES) IMAGES project. SCOR currently has joint working groups with IUPAC and IAPSO. IAPSO, IAMAS, and IABO have ex-officio representation on the SCOR Executive Committee and participate actively.

SCOR and SCAR have agreed to closer cooperation in Southern Ocean research issues and SCOR has established an official liaison member to SCAR, to promote joint meetings and cooperative projects on topics of mutual interest to the two organizations. SCOR became a member of SCOPE this year and will send a SCOR representative to SCOPE meetings.

Outside of ICSU, SCOR cooperates most closely with IOC. Working with IOC gives SCOR a better reach into the intergovernmental sector and provides scientific input to policy discussions. As mentioned previously, SCOR recently played a key role in reviewing GESAMP and may continue to serve an advisory role to GESAMP.

1.7 How does your association with ICSU help and/or hinder your organisation?

The most direct aid from ICSU in achieving the successes mentioned above has been in providing small grants to the large-scale oceanographic programs through SCOR. These grants are especially important for new projects for which planning is still underway. ICSU support has been important for each of the large-scale ocean research projects that SCOR co-sponsors. It is important that ICSU interdisciplinary committees have continued access to grants to start new activities. Another important ICSU role is to encourage and catalyze positive interactions among ICSU organizations, both Unions and interdisciplinary committees.

Less tangible, but no less important, is the value that arises from ICSU as the preeminent international non-governmental science organization. Without a doubt, SCOR national committees in many countries are only able to make the case within their countries to participate in SCOR (including paying annual dues to SCOR) because SCOR is part of a reputable international organization like ICSU.

1.8 Click on all countries with which you have scientific collaboration.

All SCOR member nations were listed.

1.9 What are the major funding sources for your organisation/projects? Please differentiate between direct and ‘in-kind’ funding.

SCOR’s final income for 2002, including carryover from 2001, is projected to be about \$960,000. SCOR received about 25% of this income from dues from national SCOR committees, about 13% from other international organizations (ICSU and IOC), 55% from U.S. federal agencies, and 7% from private foundations and other U.S. non-profit organizations. SCOR applies most of its funding from U.S. agencies to the large-scale ocean research projects, and the remainder to the SCOR program of travel grants for scientists from developing nations and nations with economies in transition. In-kind contributions to the major projects, shared with IGBP, amount to about US\$500,000 (total) per year from institutions that host the projects’ international offices. A small additional amount of in-kind support is obtained each year from institutions and organizations that host SCOR-related meetings.

1.10 What do you see as the major environmental issues that ICSU should address over the coming 5-10 years?

Major environmental issues that have not received adequate research attention include (1) the global nitrogen cycle (important in the ocean, as well as the land and atmosphere); (2) effects of climate change on coral reefs, including temperature and pH effects; (3) potential effectiveness and environmental impacts of geoengineering, such as carbon sequestration; (4) impacts of climate change on global thermohaline circulation; and (5) dynamics of continental shelf and slope methane hydrates in a warming ocean and effects on global climate of methane releases from the ocean.

1.11 Do you have any specific recommendations on how ICSU can improve its performance in the environment area?

The current assessment of the existing environmental activities of ICSU is an important first step in improving ICSU’s performance on environmental issues. This should identify areas of potential cooperation among ICSU organizations and other international organizations. The next step should be to match the capabilities of ICSU organizations with priority environmental needs identified through the World Summit on Sustainable Development, IPCC, answers to the previous question, and other mechanisms. It would be useful for ICSU to help secure financial resources to stimulate the necessary interactions among ICSU organizations needed to address the priority environmental topics. Most ICSU organizations probably have few discretionary financial and human resources to apply to new cooperative work without securing additional funds. ICSU should consider its organizations as expert consultants that could be tapped to help with specific issues.

1.12 Do you have specific changes to suggest for the Mission statement? If so, please enter them below.

SCOR agrees with the draft mission statement.

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ICSU's mission in the area of the environment is to

- Catalyse and co-ordinate scientific research in the domain of the environment that:
 - Expands understanding of natural and social processes, and
 - Underpins environmental protection and addresses the need for economic and social development;
- Participate in the development of monitoring activities that are essential for documenting the state of the global systems and their components ;
- Contribute to environmental assessments and develop mechanisms to ensure that results from policy-relevant research benefits the public and private sectors;
- Stimulate collaboration among stakeholders in forming and executing environmental and sustainable development policies;
- Ensure that the relevant social sciences are fully integrated into ICSU's programmes;
- Promote the synthesis and communication of the policy-relevant work conducted by ICSU's Scientific Unions, National Members, Joint Initiatives and Interdisciplinary Bodies.

SCOR Input for Follow-up to ICSU Environment Priority Area Assessment

Preface – The Oceans and Human Society¹

It is useful to outline briefly the importance of the ocean to society and the impact of human activities on our global marine resources. More than 60% of humanity lives within 100km of the ocean. Humans depend on the coastal ocean and influence it directly and indirectly in many ways. Direct benefits include supplies of food and energy, transportation, recreation, and habitation in coastal areas. Indirectly, the ocean makes Earth habitable by regulating its climate and atmospheric composition. Human societies rely on the continued provision of “ecosystem goods and services” from the ocean and on being able to predict the future behavior of the ocean system. Ecosystem services from the coastal zone have been estimated to be as high as US\$18 trillion annually, and about 1 billion people depend on fish as a source of protein.

However, human activities, both on land and in the sea, influence the ocean system in negative ways and are doing so at an ever-increasing rate. Population growth and expansion of megacities in the coastal zone have increased pressure on marine ecosystems and have also made human society more vulnerable to changes in the ocean system. One of the largest human-induced changes in the ocean is the restructuring of marine food webs as a result of over-fishing. Increasing nutrient loading in river runoff, altered quantity of freshwater runoff, coastal pollution, destruction of marine habitats, changing marine ecosystems, and introduction of alien species are further examples of direct human impacts on the ocean. Human activities also indirectly influence the ocean via changes in the atmosphere. Increasing emissions of greenhouse gases and aerosols, lowering of surface-ocean pH due to increasing atmospheric CO₂, rising temperatures, and reduction of sea ice have already occurred or are likely to occur in the future. In fact, concern is growing that human-induced changes may threaten many marine ecosystem goods and services. Examples of such negative developments are the spreading of hypoxic “dead zones” in the Gulf of Mexico and other coastal areas, the destruction of coral reefs around the world, and the deterioration of water quality and ecosystems of the Caspian Sea and other enclosed seas. Other environmental issues that will require increasing research over the next decade include

- the global nitrogen cycle (important in the ocean, as well as the land and atmosphere);
- the effects of climate change on coral reefs, including temperature and pH effects;
- the potential effectiveness and environmental impacts of geoengineering, such as ocean carbon sequestration;
- the impacts of climate change on the global thermohaline circulation; and
- the dynamics of continental shelf and slope methane hydrates in a warming ocean and the effects on global climate of methane releases from the ocean.

Recognizing the interdependence between the well-being of the ocean and that of human society, we need to develop a clear understanding of the interaction of the ocean system with other components—including humans—of the Earth System. Humans are a driving force of change on a global scale that influences the Earth System out of proportion to our numbers or biomass. In

¹Parts of this document were derived from the document being developed by IGBP and SCOR, entitled *Ocean Vision: A Framework for Global Change in the Ocean*. The book entitled *Oceans 2020: Science, Trends, and the Challenge of Sustainability*, was developed jointly by SCOR, SCOPE, and the Intergovernmental Oceanographic Commission. This book provides more detailed information about present ocean conditions and likely future trends.

some cases, our existing knowledge has been insufficient to use our marine resources wisely, while sustaining the health and integrity of the ocean system. Future studies that integrate natural and social scientists will be needed to determine the impacts of our changing world on the ocean system and to address questions related to sustainability of goods and services provided by the ocean.

1. What scientific developments do you see taking place in your field over the next 5-10 years that could have a major impact on other disciplines on the one hand and which could serve the needs of society on the other?

Our efforts leading to a sustainable ocean must follow several pathways and have several goals. We need to observe the ocean system in much more detail, both geographically and temporally. We need to analyze its response to perturbations, and we must develop a predictive capability that will enable us to assess management options. These activities will require interactions with other disciplines to develop the kind of integrated understanding required. Achievement of these goals will be made possible by efforts to

- **identify, observe, and describe components of the ocean that cause or react to changes on a global scale, including feedbacks to the Earth System.** Large-scale ocean research projects underway, co-sponsored by SCOR, the International Geosphere-Biosphere Programme (IGBP), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, and other organizations will increase our understanding of (1) the role of the ocean in the global cycles of carbon and other important elements (Joint Global Ocean Flux Study and the Ocean Biogeochemistry and Ecosystems Analysis project), (2) how the variability of the physical environment and climate system affect marine organisms (Global Ocean Ecosystem Dynamics project), (3) how blooms of toxic phytoplankton are initiated and controlled by environmental conditions (Global Ecology and Oceanography of Harmful Algal Blooms program), (4) the processes, and their rates, that occur in the air-sea interface zone and affect the release and absorption of climate-relevant gases and particles (Surface Ocean – Lower Atmosphere Study), and (5) the role of the coastal ocean in global cycles (Land-Ocean Interaction in the Coastal Zone project). The conduct of these large-scale research projects and cooperation among them will lead to new understanding of the ocean, the sustainable use of ecosystem goods and services provided by the ocean, and the ocean's feedbacks to the Earth System. Unfortunately, no international research projects are planned to focus on coral reefs, geoengineering of the ocean, or methane hydrates. Enhanced collaborative efforts among physical, biogeochemical, ecological, paleoceanographic and societal studies will be necessary to achieve full understanding of ocean systems. Progress in these areas of ocean sciences will advance related scientific disciplines, such as fisheries science, marine ecology, atmospheric sciences, environmental chemistry, and public health.
- **make routine observations of the ocean for research and operational purposes.** Ocean observing systems will be needed to measure key parameters in key ocean regions and over long periods of time. These ocean observing systems must also be linked to terrestrial and climate observing systems. Satellites, time-series stations, drifters, and volunteer observing ships have significantly increased our ability to observe the ocean on a regular basis. Such observations are in the process of being expanded to provide data that are more dense in time and space, to help us understand global ocean processes and

conditions, including variability and trends over time. Particularly important will be careful sequencing of ocean-viewing satellite launches, expansion in the number of time-series sites (especially in areas that are important in global biogeochemical cycles), and enhanced capabilities for autonomous drifters such as Argo floats. Increased observations of past conditions from paleorecords also will be needed, so that present changes can be put into the context of natural variability. It is likely that our rapidly expanding observation capabilities will greatly enhance our understanding of ocean processes. The Global Ocean Observing System that is presently being developed to bring together diverse measurements will be very important for improving human health, safety, commerce, recreation, resource use, and environmental protection.

- **predict future ocean behavior in order to investigate pathways towards sustainability.** Models are being expanded in their capabilities and will be crucial in developing scenarios for sustainable use of the ocean, as has been the case for atmospheric changes predicted through the Intergovernmental Panel on Climate Change process. Our ability to make accurate predictions of the likelihood and extent of potential impacts will require continued model development as computing power increases, continued data collection and studies of ocean processes to fuel the models and specify model parameters, and new cooperation of the natural science and social science communities to understand human effects on the ocean system and how changes in human behavior affects ocean processes. Feedbacks between the different parts of the Earth System must receive special attention. Humans as drivers and as victims of a changing Earth should be considered explicitly, since one of the main goals of future research should be the assessment of impacts on society.

Where should we be at the end of the next decade of global research in the ocean? We know now that significant changes are already taking place in the ocean. By the end of the decade we should have a better understanding of the fundamental processes, drivers, and time scales for these changes. With this information will we be able to (1) develop the capability to forecast future changes to the ocean system and (2) begin to develop wise policies and perhaps mitigation efforts that will lead to sustainable marine ecosystem goods and services. Our progress by the end of the next decade will depend on our ability to conduct the activities described above and could be hastened by potential ICSU actions described below.

a. What are the compelling reasons for ICSU to take action (in the light of the mission and unique role ICSU can play)?

Global questions require global participation and integration among related scientific disciplines, and ICSU and its organizations are ideally poised to continue and expand their leadership role globally. This is particularly true for the ocean, with its complex system of interactions among physics, chemistry, biology, and geology. Many of the critical ocean regions are under-studied due to their remoteness or because the adjacent countries do not have the scientific capacities to collaborate as partners in this research. These are often the same areas most vulnerable to the impacts of a changing Earth. Therefore, ICSU can foster research in the ocean by helping to include developing countries in research programs. Joint research programs, scientific technology and technique transfer, and improved capacity building are needed and will be beneficial for all partners. Enhanced outreach to the public will be vital to increase the likelihood that the new knowledge results in changes in public attitude, policy, and legislation. ICSU can play a vital role in these areas.

b. What would be the consequences of ICSU not acting?

Lack of action by ICSU will diminish the speed and extent of the benefits described in sections 1a. and 3.

2. What kinds of collaboration or coordination are required at the international level in order to ensure these scientific advances are successfully implemented (see Annex for potential actions)?

The most important actions that ICSU and other international organizations must take to advance scientific knowledge needed to treat the ocean sustainably include

- continuing support for existing large-scale research projects, and for developing new ones, that provide fundamental scientific information about ocean processes and how the ocean interacts with the atmosphere and land. There are no international research projects yet that focus on corals in the context of global change, ocean geoengineering, or the positive feedbacks of methane hydrates on atmospheric methane concentrations, and thus, global warming;
- developing consensus about likely future ocean scenarios and communicating this information to policymakers; and
- maintaining and expanding observing systems. Databases for ocean observations must be increased substantially, with long-term systematic measurements, and ocean modeling must be advanced, before the present state of the ocean and of ocean-atmosphere interactions and climate can be portrayed accurately.

3. In the light of its mission, what is the unique role that ICSU can play in relation to these developments (see Annex for description of the unique role of ICSU)?

ICSU attention to these issues could help (1) increase the rate at which the necessary research communities are brought together to work on the ocean's role in the Earth System and human impacts on the ocean, (2) create new research activities to address important ocean science issues that are not yet the focus of major international projects, (3) build capacity for necessary scientific activity in developing nations, (4) assist in developing global datasets (5) communicate scientific results and issues to governments and policymakers, and (6) provide seed money to leverage funds from other sources.

Comet/Asteroid Impacts and Human Society

Date: Wed, 12 Mar 2003 18:41:32 +0100
From: Hans Rickman <hans@astro.uu.se>
Subject: preparation of ICSU project
To: secretariat@iubs.org, jjoselyn@cires.colorado.edu, iugs.secretariat@ngu.no,
pritchie@uottawa.ca, bhamilto@nas.edu, secretariat@icsu-scope.org,
sec@igbp.kva.se, shedlock@usgs.gov, scor@jhu.edu, cospar@cosparhq.org,
carson_d@gateway.wmo.ch, ihdp@uni-bonn.de, wwwhite@nas.edu,
ruth.cooper@royalsoc.ac.uk
Cc: secretariat@icsu.org, thomas.rosswall@icsu.org, Stefan.Michalowski@oecd.org

Dear colleague,

As you will have seen in the professional literature and the media, the realization that an asteroid, small or large, will impact Earth at some time in the future, is causing growing concern among the public. Reports by a variety of organizations describing some of the possible consequences of such impacts have been published, but no government has so far placed the asteroid hazard in its proper perspective among other natural hazards, such as earthquakes, floods, etc., and made appropriate preparations for such an event. This is not unnatural, given that no authoritative, international, interdisciplinary, and impartial report exists which describes all scientific and human aspects of the issue.

ICSU has recognised that this is an area in which it has a unique position to provide 'science for policy', by virtue of its complete range of involved natural sciences and its established links to the social sciences on closely related environmental issues through the IHDP. ICSU has also realized that the special nature of this problem makes it unsuitable for review through the standard grant application procedure. ICSU therefore intends to host a meeting in Paris among those Unions and other ICSU Members that have an interest in the project, in order to develop a mutual understanding and agreement on the proper way to proceed.

I am very grateful for this initiative and send you, as an attached .ps file, a brief outline of our current thoughts on the interdisciplinary study we envisage. Please regard this as a starting point for the discussions that I hope to have with your representatives in Paris.

The timing of the proposed study will be an important agenda item. Organising it will take some time, as all relevant partners should be included to give the resulting report the weight it deserves and needs. On the other hand, other developments are proceeding - e.g. the OECD Global Science Forum (GSF) has the matter under preliminary consideration, and the proposed ICSU study, if it occurs soon enough, would fit perfectly into the scheme that the GSF may envisage. The attached document can only give an idea of the time frame, but the actual start time and schedule need to be worked out.

Sincerely yours,

Hans Rickman
General Secretary of the IAU

Comet/Asteroid Impacts and Human Society

An international, multidisciplinary assessment

EXECUTIVE SUMMARY

The goal of the proposed work is to establish what is known, and what are the major unresolved questions, regarding how comet/asteroid impacts may influence human society in a near future. Recommendations for how to improve our knowledge will also be formulated. The requisite expertise will be sought not only within the Unions and Interdisciplinary Committees that have initiated the proposal, but also within the social and humanistic sciences like social geography, economics, psychology and risk management. A truly interdisciplinary approach is indeed essential.

The questions that should be addressed include:

- (1) What is the distribution of probability of impacts within the next 100 years (with respect to impactor size, structure and composition)?
- (2) What are the potential consequences of those impacts for humanity and its environment (including a wide range of both geographical scales and phenomena involved, e.g., climate, economy, politics, psychology, etc.)?
- (3) How should the acquired knowledge be handled in order to reduce, or mitigate, the possible negative effects?

The outcome of the work will be formulated in such a way that it will assist priority setting and decision-making by governments. It is hoped that the ICSU-sponsored project will encourage governments to engage in risk assessment exercises that will allow them to ensure that their response to the comet/asteroid hazards is appropriate and commensurate with existing responses to other, better known natural hazards. To achieve this goal, expertise in the areas of risk assessment and management will be sought and actively integrated into the project.

Funds are requested to support the preparation of a workshop, prepared through invited-commissioned papers by the leading experts, which will in turn serve to develop the necessary cross-communication between the various disciplines and identify the most important issues for further study by multidisciplinary task groups. This will involve support for an initial core group in charge of preparing the workshop and editing its submissions, and a special editorial group for the publication of the report.

The production of this report will be an essential part of this project, since we aim to develop and deliver a policy document in a language understood by the non-scientific professional audience. It will serve to communicate the scientific message to the general public and politicians alike.

RATIONALE

Comet/asteroid impacts have played a major role in shaping the planets and satellites in the Solar System. Research in several disciplines clearly shows that such impacts have also significantly influenced the evolution of biological species on Earth. Moreover, studies over the last decade have demonstrated that such events are not confined to the distant past, but are an ongoing phenomenon. In short, it is an established scientific fact that one or more of the existing asteroids and comets are headed for a collision with Earth sometime in the future. What remains unknown is when the next significant impact will occur and what are the consequences for humanity and life on Earth?

Known impacts cover an enormous range in size and frequency. At one end of the spectrum are the extremely rare impacts of multi-kilometre sized bodies that cause global ecological disasters and mass extinctions of species. This is well illustrated by the "Chicxulub" event some 65 million years ago that likely led to the demise of the dinosaurs. At the other end of the spectrum are the smallest bodies, 50-100 meters in size that penetrate the atmosphere with explosive powers in the range of tens of Megatons. Such impacts are typified by the 1908 Tunguska event that devastated a region in Siberia the size of Paris. Estimated impact intervals are 10-100 million years for the largest events to as little as a century for the smallest events.

Attention by the public, in the media, has thus far focused on the rare, but extremely calamitous events. Indeed, given the projected great number of casualties expected from a single great event, the total death from this cause greatly exceeds the estimated death toll from anthropogenic ally triggered disasters such as nuclear accidents, on the prevention of which huge sums are being spent. Regrettably, the extremely low frequency of the significant great impacts makes rational comparison with other natural hazards difficult. In contrast, Tunguska-type events that occur approximately once a century can, in terms of damage, be comparable with other hazards such as mega-earthquakes, volcanic eruptions and devastating landslides, which are often the subject of targeted scientific study and extensive civilian preparation. Yet, the enormous population of such smaller bodies remains poorly studied and poorly known, and the possible consequences of their impacts are surrounded by speculation rather than underpinned by scientific investigation.

The same state of affairs applies to the possible mitigation measures. Although the study of such measures is outside the scope of the present proposal, a background comment is warranted to place the urgency into perspective. It is clear that asteroids of the size (~1 km diameter or larger) that could threaten the survival of human civilization can, with known techniques and effort, be detected, charted, and their orbits predicted decades—even centuries—in advance. With more effort, the same is true for smaller asteroids—perhaps 200-300 meters in diameter—that, while not threatening the survival of the entire human race, could still cause catastrophic problems, for instance to coastal communities when ocean-wide tsunamis are generated from oceanic impacts. Finally, there is the unavoidable threat from the smallest asteroids, of "Tunguska" size or somewhat larger, that are virtually impossible to detect in time. As a result, their impacts are essentially impossible to predict, let alone prevent, given that they will happen with minimal advance warning. Evacuation of the threatened area is the only recourse, and time for planning will be unrealistic.

Comets and asteroids in the global environmental context

For a wise decision to be made on the commitment of resources, all governments require a comprehensive, independent, authoritative evaluation of the consequences to human life and society from asteroid impacts. This may be regarded as a prototype example of “Science for Policy” as defined by the Schmitt Panel in its 1996 assessment of ICSU's future mission. Among the key questions to be answered for a representative range of impact magnitudes: What would be the expected cost in lives and property damage? How would regional and global climate be affected, and for how long? How would the global ecosystem and biological populations and diversity respond? How would food production be affected? What is the ratio of risk of being caught in a region of direct devastation to that of being within a coastal area inundated by a large impact generated tsunami? How would humans and national/international communities react to an urgent need for evacuating millions of people from a populated area that might remain unusable for decades? What are plausible cost estimates for such scenarios?

However, concerns over the comet/asteroid threat are obviously not limited to the physical effects of an actual impact. The recent, more effective search programs have led to the detection of more asteroids passing so close to Earth that an impact in the foreseeable future cannot be excluded with total certainty. In an open scientific world, such cases are being noticed by the media and announced as “impact predictions”, often with great hype and subsequent criticism of “crying wolf” when additional observations have removed the residual uncertainties and thus deemed “the scientists were wrong again”. How are scientists, the media, and authorities to handle such issues in a manner that is both open and responsive to the need to avoid undue public alarm? What are the psychological effects on individuals to perceived annihilation? What are the moral implications of warning versus not warning society of a pending global disaster?

None of these cases has been of any real concern due to the very low probabilities of the impacts in relation to the damage they would cause, and the public alarm or scare has fortunately quickly abated. However, serious concern does, nonetheless, remain for the future. We must expect that as time proceeds, impact predictions will be made, with a level of probability and therefore severity that is much larger than in the previous cases. These may in fact be “near misses”, but even if a real impact were imminent, it would be very difficult to identify the event with certainty until just prior to impact. One is thus forced to deal with a realm of uncertainties even in the face of a very serious, upcoming event.

Still, despite the many reports on the impact problem that have been published by various organizations—and the many articles, news and media fictions that have dealt with this issue—a truly authoritative, interdisciplinary examination of the consequences of impacts for human society, and of the countermeasures that could be adopted to minimize the effects, is still blatantly lacking. Accordingly, only a few nations are giving the matter any serious consideration. Unfortunately and as a result, global society is not prepared at all to meet the severe problems that will arise when a real threat occurs.

The need for an authoritative science-based examination was identified at a recent workshop that was convened by the Organisation for Economic Co-operation and Development (OECD) and attended by representatives of the governments of fifteen countries. Among the conclusions of the workshop is a call for risk assessment exercises at the national level, supported by multi-disciplinary analysis from the relevant scientific communities (in fact, ICSU is explicitly cited as the possible convening body for such an analysis). Thus, there is a window of opportunity for ICSU to respond to a policy-level need from national administrations.

Aim of the study

Indeed it is urgent that the relevant scientific bodies undertake an effort to study the negative effects that a severe impact prediction will have on an unprepared society, as well as identify what measures should be included in a preparation that aims to reduce those effects. Necessary criteria for such a study must include the following:

- (a) the effort must encompass all fields of science which have a primary concern; and,
- (b) the study must involve elements from the social sciences to also address the human dimensions of the problem.

The lead discipline in pursuing such a study is clearly astronomy, but critical contributions also come from the physical record of prehistoric impacts (cratering and geological traces of paleotsunamis in coastal sediments), the evidence for past effects on biological organisms (extinction events), the geochemistry of sediments and polar ices, the modeling scenarios of tsunami extent and run-up damages, earth surface responses, etc., which necessitates the participation of both geology and geophysics including oceanic research. Climatic and agricultural consequences of impacts are of key importance and require input from climatology, biology and agronomy. Unique to this proposal is the relevance and contribution of the humanities to the study, relying on disciplines such as sociology, history, psychology and economics. Risk assessment, insurance issues, public communication, human adjustment, disaster recovery and other relevant topics must be considered in a holistic approach to the problem. Finally, expert advice is needed on how to judge the political consequences of information flow regarding imminent hazards, as well as how best to guide this flow of information.

Accordingly, we propose to critically examine the issue of comet/asteroid impacts and their impact on human society by holding an intensive multi-disciplinary workshop, which includes contributions from all the above-mentioned fields of science as well as concerned activities like journalism and politics. The primary purpose of this workshop will be to produce a ‘policy position paper’ for ICSU reflecting a global, multi-disciplinary consensus on the mentioned issue.

For such an effort to lead to a trustworthy assessment, no single scientific body can match the breadth of expertise and the internationally respected authority that are the hallmarks of ICSU. Accordingly, a number of ICSU Unions, Committees, and National Members have agreed to collaborate in the proposed study and coordinate input from UNESCO, UN/ISDR (Inter-Agency Secretariat of the International Strategy for Disaster Reduction), INQUA (International Union for Quaternary Research), FAO (UN Food and Agriculture Organization), Centre for Catastrophic Loss Reduction and several other organizations. We propose a one-year interdisciplinary study to prepare a report which may serve as the international scientific reference for the policy deliberations of the future.

Strengths of the Study

The proposed activity is in the core of one of the ICSU Priority Themes, namely, *Science/Policy Interface*. By providing the financial support for the procurement of the envisaged report, ICSU will act as the main advisory body from the scientific perspective to policy/decision-makers in all the nations of the world, and it will enable science to take the lead in facing the future challenge of pending comet/asteroid impacts. A properly prepared report may become a model of how scientific authority can succeed in constructively influencing governments to act responsibly, and how leveraging of funds—large by the standards of scientific programmes, modest in the world of natural

and man-made disasters—will contribute to addressing this issue effectively.

The activity must of course be international, and since the impact hazard is global by nature, it is very adequate to locate the discussions of the science goals related to countermeasures within international fora *as far as possible*. While building on knowledge already acquired within the realms of the different contributing disciplines, the combined results and conclusions from this pioneering, interdisciplinary effort will by definition be innovative.

The association of young scientists to the proposed activity is especially important in view of the fact that the grounds of policies for the future are going to be a paramount point of discussion. We therefore aim to target some of the funding to support the participation of young scientists in particular, though not principally as an educational effort.

The product of the work will form the science case for important policy decisions within a field that concerns people and is highly visible in the media. Such decisions, or the further studies triggered by the conclusions reached, will measure the importance of the work.

IMPLEMENTATION PLAN

As already mentioned, the key features are the *Workshop* and the *Report*. In preparation for the Workshop, several concerned Unions, Interdisciplinary Committees and other organizations will be asked to propose and nominate candidates who can best address the issues related to our multi-disciplinary effort. Participants will be required to submit written contributions to the organizers from their respective disciplines well in advance of the Workshop. We expect to publish this collection of papers beforehand and distribute to the attendees, thereby providing ample opportunity for all to familiarize themselves with the issues to be discussed at the Workshop. An initial core group, or Program Committee, comprising representatives of all the organizations contributing to this proposal, plus a few expert members at large, will be in charge of organizing the workshop and inviting the contributions.

The Workshop structure will focus on a series of key questions and comprise a number of splinter groups related to these questions. As an introductory part, plenary summaries will be given based on the commissioned papers and highlighting the inputs of the various disciplines to the study. We expect that as a result of the Workshop, several working groups, or task groups, will be created. These will continue to operate independently, partly to support the writing of the Report, but they may well continue to operate beyond the life of the project.

A sample set of questions that the Workshop could focus upon:

- (1) What is the distribution of probability of impacts within the next 100 years (with respect to impactor size, structure and composition)?
- (2) What are the potential consequences of those impacts for humanity and its environment (including a wide range of both geographical scales and phenomena involved, e.g., climate, economy, politics, psychology, etc.)?
- (3) How should the acquired knowledge be handled in order to reduce, or mitigate, the possible negative effects?

A special Editorial Group will be assigned the task of producing the Report on the basis of the conclusions of the Workshop, and the input from the task groups. Publication of the Report is

foreseen to be handled under the aegis of ICSU.

Finally, a few persons will need to be given the task to make sure that all the actions are taken, i.e., to write and update the Action Sheet of the project. In particular, they will oversee that papers are written and submitted in time, that the work of task groups is properly coordinated, and that the Program Committee and Editorial Group get their requisite support in order to fulfill their duties.

Budget Plan

Item	ICSU	Others
Coordination, administration, information activities	20,000 USD	
Travel support and logistics for Workshop	50,000 USD	40,000 USD
Targeted support to young scientists	10,000 USD	
Preparation, printing, and distribution of report	20,000 USD	
Total expenses	100,000 USD	40,000 USD

7.1.1 International Geosphere-Biosphere Programme

Introduction

IGBP and SCOR have continued to have a strong and positive interaction, particularly on our jointly-sponsored projects (JGOFS, GLOBEC, IMBER and SOLAS). In addition there is good collaboration on a number of other projects such as the activities of LOICZ, activities of the Global Carbon Project (e.g., the International Ocean Carbon Coordination Project) and the Fast Track Fast Track Initiative on Iron (Appendix and see **p. 4-27**).

IGBP II

There has been a strong change in emphasis in IGBP over the last couple of years as the first set of projects concludes and a second generation of projects develops. The emphasis has shifted from the individual compartments of the Earth System, such as terrestrial ecosystems, oceans, atmosphere, to the Earth System itself as an integrated whole. This is a significant shift that implies that the ‘culture’ of IGBP is changing from being an umbrella organisation for a set of largely independent projects focused on their own science to a more connected, cohesive programme where all projects are working more closely together with common objectives. For a full report on the IGBP structure and project developments, the Annual Report can be downloaded from www.igbp.kva.se. The Third IGBP Congress, held in Banff, Canada in June 2003 was an important event in developing the integrative cross-project work of IGBP II, including the implementation of new activities. Presentations and reports from the Congress can be downloaded from www.igbp.kva.se/congress/.

Ocean Projects and the Interface projects

The Ocean compartment of IGBP II is composed of several projects, all developed and implemented in collaboration with SCOR. They are the ongoing GLOBEC project (also co-sponsored by IOC), and a new project under development, Integrated Marine Biogeochemistry and Ecosystem Research (IMBER). JGOFS will complete its work at the end of 2003. In addition, there are two projects on the interfaces between the ocean and atmosphere (SOLAS, co-sponsored by SCOR) and land (LOICZ) which are also described below.

Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)

The first stages of developing the new project began in 2000 and a “Draft framework on chemical and biological aspects of global change in the ocean” was reviewed and completed in early 2002. Much of this report will be used as the basis for developing the new project. A Transition Team was formed in April 2002 under the leadership of Julie Hall (New Zealand) with the task of designing an Open Science Conference (January 2003) that gathered community input to the developing Science Plan and Implementation Strategy for the new project. The new project (originally called Ocean Biogeochemistry and Ecosystems Analysis, OCEANS) will be designed to carry out research in close collaboration with GLOBEC.

Global Ocean Ecosystem Dynamics (GLOBEC)

One of the highlights of 2002 for GLOBEC was its 2nd Open Science Meeting, held in Qingdao P.R. China and attended by approximately 250 scientists from 30 countries. Meetings of the GLOBEC Scientific Steering Committee and of three working groups were held adjacent to the OSM, as were meetings with the North Pacific Marine Science Organisation (PICES) and the

Census of Marine Life (CoML). The GLOBEC national and regional studies have continued to be very productive in 2002 and new national programmes were initiated in Germany, Spain, Italy and Mexico. There were also significant developments in the GLOBEC regional studies and working groups, in particular the Southern Ocean GLOBEC, initiated field activities in 2001 on the integrated study of society and marine food webs, entitled Feedbacks from Changes in Marine Ecosystem Structure. GLOBEC has actively participated in the development of the IMBER and the two projects are planning joint activities.

Joint Global Ocean Flux Study (JGOFS)

In its last year of operation, JGOFS is still very active, with the completion of the final Springer Synthesis Volume for the project and its Final Open Science Conference in Washington in May 2003. Synthesis and modelling work has continued in all areas of JGOFS study, and synthesis books are also in preparation for the Continental Margins (in collaboration with LOICZ) and the Indian Ocean. The JGOFS Data Management Task Team (DMTT) was also extremely active in gathering the many datasets collected during JGOFS and archiving them at the appropriate data centres. The DMTT also documented the lessons learned from JGOFS concerning data management and made recommendations to funding agencies and future ocean projects.

Surface Ocean - Lower Atmosphere Study (SOLAS)

2002 was a very active first full year of operation for SOLAS. A meeting of National Representatives was held in June in Amsterdam to exchange ideas, gather information on national activities and to obtain contributions for developing the SOLAS Implementation Strategy. The World Climate Research Programme joined IGBP, the Scientific Committee on Oceanic Research (SCOR) and the Commission on Atmospheric Chemistry and Global Pollution as co-sponsors of SOLAS, and a workshop was held to develop Focus 2, "Exchange Processes at the Air-Sea Interface and the Role of Transport and Transformation in the Atmospheric and Oceanic Boundary Layers". The second SOLAS SSC meeting further developed the Science Plan and Implementation Strategy, which has now been reviewed by the sponsors. Decisions were made to form four Working Groups to implement the scientific foci of SOLAS and to develop a management approach for data and modelling. SOLAS is planning an Open Science Conference for October 2004.

Land-Ocean Interactions in the Coastal Zone (LOICZ)

LOICZ has been fully engaged in completing its Phase I (1993-2002) commitments and developing a new plan and appropriate operational structure for Phase II (2003+) that fits the evolving Earth System Science Partnership. A number of regional assessments of changes in the coastal zone were completed throughout the year and published in the LOICZ R&S Series. Special journal publications and thematic publications attracted considerable attention from international agencies with interests in river catchment management and led to further opportunities for research support at national and regional levels. The LOICZ synthesis book is under development, involving a large number of scientists from many countries organised in writing teams and led by a chapter author. While the synthesis has considerable focus at regional levels, the research also supports global assessments and delivery of findings stated in the five LOICZ objectives. Throughout 2002, LOICZ SSC consulted widely in the development of a comprehensive discussion document aimed at identifying the key issues for LOICZ Phase II. Recognising the crucial human dimensions that influence the global coastal zone, the traditional physical-chemical-biological community of LOICZ has increasingly engaged with the human dimension community (notably within IHDP) in developing the discussion document and identifying five core themes for LOICZ II. A major international Synthesis and Futures meeting

held in Miami (May 2002) provided a crucial forum for discussion of both the LOICZ synthesis findings and consideration of outcomes, and a lively forum for debate and concurrence towards the LOICZ II research themes.

Earth System Science Partnership

Introduction

The Earth System Science Partnership (ESSP) is a partnership of four international global change research programmes (DIVERSITAS, IGBP, IHDP and WCRP) for the integrated study of the Earth System, the changes that are occurring to the System and the implications of these changes for global sustainability. The governance of the ESSP is provided through the annual meetings of the Chairs and Directors of the four constituent programmes. However, the ultimate authority resides with the three scientific committees (DIVERSITAS, IGBP, IHDP) and the joint scientific committee of the WCRP, on whose behalf the Chairs and Directors act.

The ESSP undertakes five types of activities:

- Earth System analysis and modelling, via collaboration among existing projects/activities of the four constituent programmes.
- Joint projects on issues of global sustainability, designed to address the global change aspects of a small number of critical issues for human well-being: carbon cycle/energy systems, food systems, and water resources. A fourth joint project on human health is under development.
- Regional activities, including capacity building, networking and integrated regional studies.
- Global Change Open Science Conferences, the first of which was “Challenges of a Changing Earth,” held in Amsterdam in July 2001. The second Open Science Conference is scheduled for 2006.
- Communication activities, currently under development. These will include an ESSP website, a report series, a common design profile for the joint projects and a proposed biannual newsletter.

Joint Projects

Global Carbon Project (GCP)

The GCP has completed its first full year of operation in a strong position, having virtually completed its science plan/implementation strategy, established a global network of support infrastructure, and delivered its first fast-track products. The international project office in Canberra, Australia, which previously supported the GCTE project of IGBP, has successfully completed the transition to supporting the GCP. In addition, a second international project office has been established in Tsukuba, Japan, to support the GCP flagship activity of integrating the human and biophysical aspects of the carbon cycle as well as to help coordinate carbon cycle research in Asia. A small linking node between the GCP and the European Commission’s CarboEurope project has been established in Jena, Germany; an affiliate office on ocean carbon research has been established with the Intergovernmental Oceanographic Commission (UNESCO), Paris, France, and a supporting office in the USA is under development. In addition, the GCP has built an excellent working relationship with the Integrated Global Carbon Observation (IGCO) of the Integrated Global Observing Strategy Partnership. This is crucial to meet the joint GCP/IGCO objective of determining the pattern of carbon sources and sinks in

space and time to a much higher accuracy than at present. Beyond the very fast and effective establishment of the necessary infrastructure and scientific planning, the GCP has also delivered a number of fast-track products. The first summer institute on Data Assimilation for Carbon Cycle Research was held in June 2002 in Boulder, Colorado, with outputs published soon after the institute on <http://dataportal.ucar.edu/CDAS/>. A workshop “Terrestrial Carbon Sinks: Science, Technology and Policy,” held in Wengen, Switzerland in September, provided a fast-track product aimed at one of the GCP’s most important goals - to improve the knowledge base required to manage the carbon cycle more effectively.

The first of many national workshops on carbon cycle research was held jointly by the GCP and the German Committee on Global Environmental Change in the second half of 2002. Collaboration with the many national-level carbon cycle research programmes is a key implementation strategy for the GCP. The International Ocean Carbon Coordination Project (SCOR-IOC CO₂ Panel and GCP) had been an important activity, carrying out much-needed coordination of ocean carbon observations.

Global Environmental Change and Food Systems (GECAFS)

GECAFS developed rapidly during 2002, particularly regarding regional project planning for research on the Global Environmental Change (GEC) and the food systems of (i) the Indo-Gangetic Plain and (ii) the Caribbean. GECAFS planning workshops concentrated on establishing the key GEC research issues of interest to regional scientists, managers and policymakers. Plans are now also underway for research in Eastern Pacific Coastal Fisheries, and Southern Africa.

The planning process for regional projects started by identifying the nature of the questions that need to be researched to aid local and regional policy formulation. The next step has been to establish methodologies and research approaches that can be developed to best address the research priorities. Working to the specific questions identified in the 2002 regional planning meetings, workshops involving representatives from IGBP, IHDP and WCRP Core and Joint Projects (and other groups, e.g., CGIAR) have since been held to establish research strategies and to identify relevant ongoing and immanent work within the Programmes so that research proposals can be jointly developed. Regional research needs to be underpinned by improved understanding on the nature of vulnerability, especially in relation to food systems, and the development of comprehensive scenarios within which research is set. Research plans in both areas are now underway, and an initial work programme for vulnerability research is already funded.

The GECAFS Scientific Advisory Committee (SAC) was inaugurated in April 2002, with members drawn from a wide range of scientific disciplines. The SAC also includes representatives from GECAFS’ strategic partners (the CGIAR, FAO and WMO), together with liaison members from a number of types of donor agency. The GECAFS IPO is now well established in the UK-Natural Environment Research Council’s Centre for Ecology and Hydrology, in Wallingford, UK.

The first major GECAFS science product is a paper “Global Environmental Change and Food Provision: A New Role for Science” requested by ICSU (International Council for Science), for the World Summit on Sustainable Development (WSSD) in August 2002. The paper, published in the ICSU Series on Science for Sustainable Development, was widely distributed in Johannesburg. Authorship included all three sponsors’ science and also included contributions

from members of the FAO Inter-Departmental Working Group on Climate Change in Relation to Agriculture and Food Security. GECAFS was also asked by ICSU to co-convene a Special Session “Science for Food Security in Africa ” as part of the WSSD Science Forum. A synthesis paper (Ingram & Jaeger) has since been published as part of the ICSU Series. A 20-page GECAFS Prospectus also has been published and is being widely circulated.

Appendix - Fast Track Initiatives

In 2002, the SC-IGBP initiated several Fast Track Initiatives, short-lived initiatives (1-2 years) that to tackle synthetic and integration activities across the programme.

- The Iron Cycle in the Earth System, in collaboration with SCOR
- Fire
- The Global Nitrogen Cycle, in collaboration with SCOPE
- Mercury and Contaminants, in collaboration with SCOPE

SCOR and IGBP successfully received \$40,000 USD from ICSU in 2004 to initiate the Iron FTI (see proposal on **p. 4-27**).

7.1.2 Scientific Committee on Antarctic Research (SCAR)

As reported at the 2001 Executive Committee meeting, SCOR and SCAR agreed to cooperate on issues related to research in the Southern Ocean region. The SCAR President (Prof. Robert Rutherford) attended the Executive Committee meeting and Robert Duce attending the 2002 SCAR Assembly and the following agreement was developed by the SCOR and SCAR presidents in 2001:

The Presidents of SCAR (Robert Rutherford) and SCOR (Robert Duce) met at Texas A&M University on 6 April 2001 to discuss:

- (1) A possible joint response to the request from IOC for comments about the ways in which there could be increased coordination between SCAR, SCOR, IOC, and WMO concerning research in the Southern Ocean, and
- (2) Areas where there could be increased cooperation and coordination between SCAR and SCOR in general.

Relative to the first area, we support strongly increased cooperation and coordination between SCAR, SCOR, IOC, IGBP, WCRP, and WMO in the Southern Ocean Region. The scientific community is increasingly recognizing the importance of the Southern Ocean relative to possible climate change, air/sea exchange of carbon dioxide, nutrient and biological community dynamics, etc., as evidenced by new research efforts planned or underway in such programs as GLOBEC, SOLAS, WCRP, and others. If such a coordinating effort were to take place, it would need to reach across a wide range of disciplines in both the ocean and atmospheric sciences. This has never happened before, but we believe that if all the organizations above approached this issue jointly, the likelihood of meaningful results could be high.

We suggest that a relatively small (perhaps 6 to 8 individuals) working group of experts—representing the necessary disciplines in the ocean and atmospheric sciences and supported by the organizations above—meet to develop a strategy, goals, etc. for the development of a somewhat larger coordinating and advisory panel. One possible location for such an initial meeting might be the Joint IAPSO/IABO (International Association of the Physical Sciences of the Ocean/ International Association of Biological Oceanography) General Assembly to be held in Mar del Plata, Argentina from October 21-28, 2001. It is likely that a number of the individuals who would be involved in such a joint group would already be at that meeting.

Relative to the second topic, we agreed that increased coordination between SCAR and SCOR is important and could be beneficial to both organizations. We agreed to approach our respective Executive Committees to discuss the possibility of appointing liaisons to attend each other's General and Executive meetings, perhaps an officer or the Executive Director/Secretary. We also agreed that some time in the future it would be beneficial for SCAR and SCOR to hold at least part of an annual meeting jointly, recognizing that the already scheduled meetings make a joint meeting unlikely for the next several years.

Robert Rutherford, President, SCAR
Robert Duce, President, SCOR

IAPSO, SCOR, and SCAR co-sponsored a session on Southern Ocean Research at the International Union of Geodesy and Geophysics' General Assembly in 2003:

1. P06: The Southern Ocean

2. Sponsoring association(s): IAPSO/SCOR/SCAR

3. Scope: Recent research programs have focused on observations and modeling of the physical, chemical, and biological oceanography of the Southern Ocean. We encourage presentation of these results to increase understanding of the linkages between circulation and biological processes, and the roles of summer and winter processes, sea ice, topography, nutrient limitation, and ocean-ice-atmospheric interactions in the Southern Ocean. The session will discuss processes associated with Southern Ocean food webs, sea ice dynamics, water mass formation, export from the Antarctic to the global ocean, and dynamics of the Antarctic Circumpolar Current and Antarctic Circumpolar Wave. We invite discussion of seasonal, interannual and decadal variability. This forum will foster continued multidisciplinary research into Antarctic oceanographic processes.

4. Code(s) for related sessions: None

5. Convener: Karen Heywood (IAPSO), School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, United Kingdom; phone: 44-1603-592555, fax: 44-1603-507719, email: k.heywood@uea.ac.uk

6. Co-Conveners: Eileen Hofmann (SCOR), Center for Coastal Physical, Oceanography, Crittenton Hall, Old Dominion University, Norfolk, VA 23529 USA, phone: 757-683-5334, fax: 757-683-5550, email: hofmann@ccpo.odu.edu;

Zhaoqian Dong (SCAR), Polar Research Institute of China, 451 Jinqiao Road, Shanghai 200129, China, phone: 86-21-58713648, fax: 86-21-58711663, email: Zhaoqian@stn.sh.cn

Contributions of the Scientific Committee on Oceanic Research (SCOR) to Polar Ocean Science

The Scientific Committee on Oceanic Research (SCOR) was created by ICSU in 1957 as the first of its interdisciplinary bodies, partially as a result of the first International Geophysical Year. SCOR is charged with promoting international cooperation in ocean sciences, which it does primarily through two types of activities. First, the traditional mechanism by which SCOR has operated since 1960 is the small, short-lived Working Group, formed to address specific ocean science topics. Second, SCOR has also taken the lead in planning longer-term, large-scale international research programs in ocean sciences designed to address issues of the role of the ocean in global climate change. SCOR also serves as an official scientific advisor to the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

SCOR working groups related to polar areas have included:

- WG 38 Ocean Processes in the Antarctic
- WG 54 Southern Ocean Ecosystems and their Living Resources (with SCAR)—This working group was a part of the BIOMASS Programme. This program resulted in many informal reports, but a notable summary is

El-Sayed, S.Z. 1994. *Southern Ocean Ecology: The BIOMASS Perspective*. Cambridge University Press.

- WG 58 Arctic Ocean Heat Budget—This working group’s report was an informal one:

SCOR Working Group 58. 1983. Arctic Ocean Modelling Meeting. Report No. 57 of the Geophysical Institute, University of Bergen, Norway.

- WG 74 General Circulation of the Southern Ocean—This working group’s major product was:

SCOR Working Group 74. 1985. *General Circulation of the Southern Ocean: Status and Recommendations for Research*. World Climate Programme Report 108.

- WG 82 Polar Deep Sea Paleoenvironments—The working group’s major product was:

Bleil, U., and J. Thiede. 1990. *Geological History of the Polar Oceans: Arctic versus Antarctic*. Kluwer Academic Publishers.

According to the working group chair, Prof. Jörn Thiede, “In terms of opening new areas of research the deliberation of this working group had substantial consequences for research programs, which last until today. Examples are the efforts of the Ocean Drilling Program in the Southern Ocean, the development of the Southern Ocean IMAGES work plan, the execution of the CAPE ROBERTS project (CRP) and the drilling plans for the Arctic Ocean initiated through the Nansen Arctic Drilling Program (NAD).”

- WG 86 Ecology of Sea Ice—This working group published two collective papers:

Horner, R., S.F. Ackley, G.S. Dieckmann, B. Gulliksen, T. Hoshiai, L. Legendre, I.A. Melnikov, W.S. Reeburgh, M. Spindler, and C.W. Sullivan. 1992. Ecology of sea ice biota. 1. Habitat, terminology, and methodology. *Polar Biology* 12:417-427.

Legendre, L., S.F. Ackley, G.S. Dieckmann, B. Gulliksen, R. Horner, T. Hoshiai, I.A. Melnikov, W.S. Reeburgh, M. Spindler, and C.W. Sullivan. 1992. Ecology of sea ice biota. 2. Global significance. *Polar Biology* 12:429-444.

According to a member of the working group, Prof. Louis Legendre, “these papers were and are still much cited. They were quite influential in the field of polar oceanography...The permanent legacy of WG 86 was the creation of the *Gordon Research Conference on Polar Marine Science*.”

SCOR also sponsors large-scale ocean research projects, several of which have had major Southern Ocean and/or Arctic components:

- Joint Global Ocean Flux Study (JGOFS)—This project included a series of major field efforts in the Southern Ocean from 1991 to 1999. The goals of the project were to study “the role of the Southern Ocean in the global carbon balance, the reasons for spatial variability of production, the persistence of high nitrate levels, and the possible role of iron as a limiting element.”² JGOFS was initiated by SCOR and later co-sponsored by IGBP.
- Global Ocean Ecosystem Dynamics (GLOBEC) project—This project currently has a major field effort continuing, including some of the first year-round observations of marine ecosystems near the West Antarctic Peninsula. GLOBEC is in the planning stages for a potential new regional study called “Ecosystem Studies of Sub-Arctic Seas (ESSAS). GLOBEC was initiated by SCOR and IOC, and later co-sponsored by IGBP.

Two new projects co-sponsored by SCOR are also planning research in polar areas, given the expectation that high-latitude areas will be the most susceptible to global change and are known to influence global change:

- Surface Ocean – Lower Atmosphere Study (SOLAS)—This project is just completing its Science Plan/Implementation Strategy (see <http://www.uea.ac.uk/env/solas/SPIS/SPIS1.html>). A major focus of SOLAS research in polar areas will be the flux through ice-covered ocean areas of gases that affect global climate. SOLAS was initiated by SCOR and IGBP and is now also co-sponsored by the World Climate Research Programme (WCRP) and the Commission on Atmospheric Chemistry and Global Pollution (CACGP) of the International Association of Meteorology and Atmospheric Sciences (IAMAS).

²Fasham, M.J.R (ed.). 2003. *Ocean Biogeochemistry: The Role of the Ocean Carbon Cycle in Global Change*. The IGBP Series. Springer-Verlag. Berlin, Germany.

- Integrated Marine Biogeochemistry and Ecosystem Research (IMBER)—This project will build on the foundation of JGOFS, as well as develop new cooperative activities with GLOBEC on end-to-end marine food web studies. In particular, an activity being developed presently is the Integrated analysis of Circumpolar Climate interactions and Ecosystem Dynamics in the Southern Ocean (ICCED) project, which is likely to be co-sponsored by IMBER and GLOBEC. IMBER is being initiated by SCOR and IGBP.

SCOR has a continuing interest in polar oceanography and will be starting discussions at its Sept. 2003 in Moscow, Russia about possible contributions of SCOR to the Third International Polar Year in 2007.

7-28

7.1.3 World Climate Research Program (WCRP)

No written report.

7.1.4 International Union of Pure and Applied Chemistry (IUPAC)

No written report

7.1.5 Scientific Committee on Problems of the Environment (SCOPE)

SCOR applied for membership in SCOPE (see letter below), which was approved. Membership in SCOPE requires that we send a representative to SCOPE's triennial meeting. A member of the SCOR Executive Committee needs to be appointed to be our official liaison with SCOPE. Annelies Pierrot-Bults attended the SCOPE Executive Committee Meeting in June 2003 and her report follows on p. 7-30.

Letter to SCOPE Regarding Membership

Dr. Jerry M. Melillo
Ecosystems Center
Marine Biological Laboratory
Woods Hole, MA 02543

Dear Dr. Mellilo:

At the Executive Committee meeting of the Scientific Committee on Oceanic Research (SCOR) held in Mar del Plata in October 2001, the Executive Committee discussed the importance of working more closely with related organizations within the International Council for Science. The Scientific Committee on Problems of the Environment (SCOPE) was one organization that was specifically identified as having the potential for cooperative activities. Of course, SCOR and SCOPE have cooperated in various activities in the past, most recently the Oceans 2020 activity, but the Executive Committee thinks that a more sustained and regular interaction would be more useful and might result in new activities where our interests overlap.

The Executive Committee identified two actions that it believes would be a good way to begin improving SCOR's interaction with SCOPE. First, we appointed an individual from the Executive Committee to serve as a liaison to SCOPE. Dr. Maria Cintia Piccolo (Argentina) volunteered to serve as the first liaison. We will ask her to handle the annual SCOPE report to SCOR at our General Meeting in October 2002, since Veronique Plocq-Fichelet cannot attend the meeting due to scheduling conflicts. Unfortunately, Dr. Piccolo's membership on the SCOR Executive Committee will expire in October, so we will need to identify a new liaison at that time.

Second, we hereby request for SCOR to become a member in SCOPE. Our understanding is that our membership will obligate us to send a representative to SCOPE General Assemblies, which we will do. Please let me know if we need to do anything more to apply for membership in SCOPE. We look forward to working with your organization.

Best regards,
[signature on original]
Prof. Robert A. Duce
President

Date: Mon, 30 Sep 2002 09:09:15 +0200
From: Veronique Plocq Fichelet <vpf@icsu-scope.org>
Subject: Re: SCOR Membership in SCOPE?
To: Ed Urban <scor@jhu.edu>

Dear Ed,

Thank you for your message, and sorry for the delay. Yes, I did organise a mail, or rather e-mail ballot on SCOR membership in SCOPE...the end result is that, with eight very positive answers, we are extremely glad to welcome SCOR as a new Member of SCOPE. Please forward this message to your annual meeting.

With best wishes for a successful annual meeting,

Regards, Veronique

Veronique Plocq Fichelet
SCOPE - 51 bd Montmorency
75016 Paris, France
tel +33 1 45 25 04 98
fax +33 1 42 88 14 66
vpf@icsu-scope.org

REPORT to SCOR
SCOPE meeting Granada Spain 9-13 May 2003

There were about 60 people present from 26 countries including 9 people from Granada.

General remarks.

Traditionally, SCOPE has directed most of its activities to terrestrial and near-coastal zones. However, there are a number of ways for interaction between SCOR and SCOPE, either in complementing each other or in exploring avenues for more integrated cooperation where areas of interest overlap. These areas are SOLAS, GEOHAB, and IMBER, as well as in the planned activity with UNEP and IOC on marine environmental assessment. The latter activity is of much interest to SCOPE. To facilitate these interactions, the flow of information between SCOPE and SCOR is necessary.

In general, SCOPE has two types of activities: (1) longer-term projects lasting from two to more years and (2) since 2001, the rapid assessment projects (RAPs), which are supposed to last about one and a half years, from a SCOPE meeting decision to a publication.

Scientific Symposium

Bridging the gap between environmental scientists and policy planners.

Review of ongoing scientific activities.

Most of the activities of potential interest to SCOR are in cluster II .

Cluster I: Managing societal and natural resources (Risser and Adipe)

- Web-based learning system for environmental issues in coastal zone development (Ittekkot)

Cluster II: Ecosystem Processes and Biodiversity (Heip)

- Earth surface processes, material use and urban development (ESPRMUD) (Douglas)
an interesting remark here was that deliberate shifting of the Earth's surface (e.g., mining, construction) has about 3 times more impact on the environment than natural disasters
- land-ocean nutrient fluxes: silica cycle (Ittekkot)
The last workshop will be in December in Bremen, which should result in a SCOPE publication
- interaction of major geochemical cycles (Melillo, Field, Moldan)
- environmental sciences in the age of genomics (Heip)
- international programme on ecosystem changes (IPEC) (Carpenter)
is at the same the scenario working group of the Millennium Ecosystem assessment (MA)
4 working groups
- towards CO₂ stabilisation: issues, strategies and consequences (Field and Raupach)
- emerging ecosystems (outreach activity, jointly with UNESCO/MAB) (Hobbs and Douglas)
about what happens when humans leave after having used the environment, for example, cutting the mangroves for aquafarming and leave the area again, how to try for restoring

Cluster III: Health and environment (Sharma)

Cluster IV: Bridging the gap between environmental scientists and policy planners (Aide)

This was the topic of the symposium

- information transfer

New project proposals

- Global change science in Monsoon Asia (jointly with START and IGBP) (Fuchs)
The results of SCOR WG 113 "Evolution of the Asian Monsoon in marine records" was brought to the attention of the meeting. SCOR will be contacted.
- International nitrogen initiative (INI- jointly with IGBP and other partners) (Gallowa)

Possible future activities

- studies related to water quality and availability
- international conventions interlinkages
- ozone depletion and climate change

SCOPE Strategic Plan

Over the next 5 years, a SCOPE goal is to develop a two-scale agenda, with global and regional issues sharing prominence in SCOPE's scientific programme.

Over the next 5 years, a SCOPE goal is to realign its portfolio to reduce the number of ongoing long-term projects to nine or fewer and to increase the number of RAPs to 2-3 per year.

Over the next 5 years, a SCOPE goal is to redesign the cluster structure, increase interaction among projects, and encourage new projects and emerging themes that would complement the current portfolio.

Over the next 5 years, a SCOPE goal is to engage in more joint scientific assessments with other ICSU interdisciplinary bodies including IGBP, IHDP, WCRP, START and DIVERSITAS.

They should add SCOR here.

Publications

- Continue the series of authoritative assessments resulting from the long-term projects
- Grow the number of RAP publications to between two and three a year
- Increase the number of popular versions
- Explore the possibility of producing educational materials based on SCOPE projects
- Explore the possibility of producing targeted outreach publications for policymakers and other stakeholders

Web-page review and revision

Quarterly newsletter

Amsterdam 21 July 2003 --- Annelies Pierrot-Bults

7.2 Affiliated Organizations

7.2.1 International Association for Biological Oceanography (IABO)

No written report.

7.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS)

No written report

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

No written report.

7.3 Affiliated Programs

SCOR-Affiliated Programs

From time to time, SCOR Working Groups propose activities that will extend beyond the normal life of the group and for which continuing SCOR sponsorship or oversight is appropriate. Unlike existing large-scale programs of SCOR, such as JGOFS and GLOBEC, funding for these programs is in place and the type of relationship proposed would not involve SCOR, or its Secretariat, in heavy commitments of funds or staff support. In 1995, SCOR developed the option of formal affiliation of relevant programs with SCOR.

SCOR's role in relation to Affiliated Programs is one of advice and occasional review. SCOR expects to be involved in membership decisions, ensuring that the steering committees include appropriate international and disciplinary balance. SCOR's national contacts could 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 and 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, and current membership of the steering committee. The proposal for SCOR affiliation should also address the following criteria, accepted at the 1995 SCOR Executive Committee meeting (*1995 SCOR Proceedings*). The Executive Committee agreed that in order to become a SCOR-affiliated Program, an activity must:

- be truly international, with a membership that rotates periodically
- show evidence of existing financial and/or organizational support
- demonstrate a need for 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
- be willing to adhere to the SCOR Publication Policy

Once a program is affiliated with SCOR, annual reports are required. At each biennial SCOR General Meeting, these reports should be somewhat more substantial (and scientific lectures may be requested) as a basis for the decision on continuing the relationship between SCOR and each program. The Chair of each Affiliated Program serves as an ex-officio member of SCOR as a Scientific Rapporteur (see SCOR Constitution, paragraph 4). SCOR will not usually sponsor an Affiliated Program for more than ten years.

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

Goal and Objectives:

The Census of Marine Life (CoML) is conceived as a decade-long program to promote and fund research assessing and explaining the diversity, distribution, and abundance of species throughout the world's oceans. Related activities integral to this research include the design and implementation of standard databases for marine species in collaboration with other international efforts launched recently, and the design and implementation of innovative biological sampling techniques for the marine environment. Outreach and education efforts will help inform the public about the CoML's potential and actual contributions to knowledge, and help tune the program to the concerns and priorities of governments, commercial and recreational fishers, environmental groups, the research community, and other stakeholders in the oceans.

The initial primary goal of the international Steering Committee is to foster the development of coherent goals and a scientific plan for the CoML. The Steering Committee will carry out this task through workshops, working groups, and other appropriate processes and means. The Steering Committee will also oversee the development of the education and outreach plan and its implementation.

Chair:

J. Frederick Grassle
Institute of Marine and Coastal Sciences
Rutgers, the State University of New Jersey
71 Dudley Road
New Brunswick, NJ 08901-8521, USA

Tel.: +1-732-932-6555 ext: 509
Fax: +1-732-932-8578
E-mail: grassle@IMCS.rutgers.edu

Membership:

Vera Alexander	USA
Patricio Bernal	FRANCE
Donald Boesch	USA
David Farmer	USA
Victor Ariel Gallardo	CHILE
Carlo Heip	NETHERLANDS
Poul Holm	DENMARK
Olav Rune Godoe	NORWAY
Ian Poiner	AUSTRALIA
Yoshihisa Shirayama	JAPAN
Andrew Solow	USA

CoML Staff: Ron O'Dor and Kristen Yarincik
Executive Committee Reporter: Akira Taniguchi

Date: Tue, 15 Jul 2003 11:13:15 -0400
From: Kristen Yarincik <KYARINCIK@coreocean.org>
Subject: What's New with CoML?
To: scor@jhu.edu

What's New with CoML?

June/July 2003

- Secretariat. The international program Secretariat at the Consortium for Oceanographic Research and Education (CORE) would like to welcome its first CoML Research Fellow, Ms. Giselle Firme. Originally from Brazil, Giselle holds a Master of Science degree in Marine Science from the University of Delaware and is on a leave of absence from her Ph.D. program at the University of Hawaii. From 2001 to 2002, she was a John A. Knauss Marine Policy (Sea Grant) Fellow in the NOAA Office of the Chief Scientist in Washington, DC.
- Scientific Steering Committee (SSC). On 20-21 June, the Census of Marine Life international Scientific Steering Committee held its 13th meeting in Southampton, England. The discussions of the meeting included updates on the developments in the Arctic, seamounts and canyons and the deep sea, and the endorsement of a workshop concept on censusing marine microbes. The SSC also approved a proposal for a workshop to develop an Indian Ocean regional committee. Guests of the CoML included Ed Green of the World Conservation Monitoring Centre, Steve Hawkins of the Marine Biological Association, Chris Reid of Sir Alister Hardy Foundation for Ocean Science and Paul Sommerfield of the Plymouth Marine Lab. The next SSC meeting will be in Washington DC on 25 October.
- Public Outreach Event. The CoML outreach event - Ocean life: The known, the unknown, the unknowable - will take place on the afternoon 23 October 2003 in Washington DC at the Smithsonian National Museum of Natural History. "Save the Date" postcards were sent in mid-June. An agenda of the day's events and a list of speakers will be available soon. Though the CoML Secretariat will not be able to reimburse travel for any invitees to the event, it is important to have many members of our international community present in Washington, so we ask that all projects try to maximize their representation at this meeting and encourage their special invitees to attend as well.
- All-Program Meeting. On 24 October, following the outreach event, we will hold a meeting of all CoML Component and Project scientific investigators, outreach coordinators and committee members. This will provide our rapidly growing community an unprecedented opportunity to meet at once and learn first-hand about all the goings-on within CoML and to discuss pertinent issues with your international, national and regional committee leaders. It will also offer project leaders the chance to address challenges they all face, such as globalization of field projects or sharing of resources. If you have any such topics to suggest, please forward them to Kristen Yarincik (kyarincik@coreocean.org) as soon as possible. A draft agenda should be available in August.
- Ocean Biogeographic Information System (OBIS). The first version of the OBIS Schema for geo-referenced taxonomic data is now available at the OBIS website (<http://www.iobis.org/technical.shtml>). OBIS is also happy to announce that the

Distributed Generic Information Retrieval (DiGIR) utility for single point access to distributed data sources is now implemented in OBIS portal searches.

- History of Marine Animal Populations (HMAP). The next HMAP workshop will be 16-21 August in Hull, UK. Plans for an HMAP project in the Mediterranean are progressing. Check out the new HMAP website at www.hmapcoml.org.
- Future of Marine Animal Populations (FMAP). In May, the FMAP component of the CoML received funding for core organization, led by Ransom (RAM) Myers (Dalhousie University, Canada). Members of the FMAP steering group currently include: Gunnar Steffansen (Iceland), Hiroyuki Matsuda (Japan), Jeremy Collie (USA) and Andy Rosenberg (USA). Aswea Porter has been hired as FMAP project manager at Dalhousie University (porter@mathstat.dal.ca). Please visit the new FMAP website at www.fmap.ca.
- CoML Website. A new portal for the Census of Marine Life website is being developed by the education and outreach team at the University of Rhode Island. Project outreach leaders have provided input to this portal site, to which the URL www.coml.org will point beginning in mid-to-late July. The portal will link to the Secretariat and project websites. The Secretariat website will remain and can be reached through the portal or directly at www.comlsecretariat.org.

Field Projects

- Mid-Atlantic Ridge: MAR-ECO. In June, MAR-ECO scientists Mike Vecchione, Raymond R. Wilson, Andrey Gebruk, Georgii Vinogradov, Elena Krylova and John Nicolas participated in a cruise on the Russian research vessel Keldysh to the Mid-Atlantic Ridge. On 12-13 June, the team performed 2 double dives in the MIR I & II submersibles to survey the megafauna of the deep pelagic, near-bottom and epibenthic habitats of the Charlie-Gibbs Fracture Zone. These scientists were the first humans ever to visit this exciting undersea location. For a summary of their findings, visit the MAR-ECO cruise website (http://mareco.imr.no/ship/index.php?cruise_id=7). The MAR-ECO project has received new funding for core planning.
- Chemosynthetic Ecosystems: ChEss. On 16-18 June, the ChEss group held a workshop on the Biogeography and Biodiversity of Chemosynthetic Ecosystems at the Southampton Oceanography Centre, co-sponsored by Ridge2000, Ocean Exploration and InterRidge. This successful workshop resulted in community-wide agreements for collaboration on cruises in the Atlantic, Southeast Pacific and New Zealand. The habitats of interest in the ChEss project, previously focused on hydrothermal vents and cold seeps, has been expanded to include whale falls and wood debris sites.
- Tagging of Pacific Pelagics: TOPP. The TOPP project has received new funding to continue its core planning. During the recent SSC meetings in the UK, we learned of the deep interest in CoML and OBIS at the World Conservation Monitoring Centre (WCMC) of the UN Environmental Programme (UNEP) in Cambridge, UK. A presentation from WCMC's Ed Green is available from the Secretariat. An initial area of cooperation may be TOPP and the related OBIS projects on mammals, turtles and seabirds (SEAMAP), which went online in May. The TOPP and SEAMAP teams are working together to integrate their efforts more closely and build partnerships with the WCMC/UNEP.
- Salmon/Coastal Tracking: POST. David Welch and several other leaders of the salmon tracking/coastal curtain project met 1 July at the Vancouver Aquarium to address priorities and strategies for its next phase. They will present major proposals to funders in late 2003 for these activities.

- Latitudinal/Longitudinal Gradients in Near-Shore Biodiversity: NaGISA. The NaGISA project has launched a new website through the Japan Center (<http://nagisacoml.fc2web.com/nagisa0317/index.htm>). The first Taxonomy Training Workshop in Phuket Marine Biological Center Thailand is planned on 27-29 September 2003. Invitations will be sent shortly to NaGISA project participants, and additional participants are welcome. NaGISA will appear in the side events of GBIF board meeting to be held in Tsukuba, Japan, 4-10 October. NaGISA, which originated as a DIVERSITAS in the Western Pacific and Asia (DIWPA) International Biodiversity Observation Year project, will also have a special session at the upcoming DIWPA international workshop in December 2003 in Japan. NaGISA sampling for the 2003 season has begun. Samples were collected at the beginning of May in Usa, Kochi Prefecture (Japan).
- Abyssal Sediments: CeDAMar. The CeDAMar group held a meeting 5-6 June 2003 in Wilhelmshaven, Germany to discuss strategy and future studies. A new expedition (BIOZAIRE) to survey off Zaire, Africa in 2004 has been added to the CeDAMar umbrella. David Billett (UK), Andre Gebruk (Russia) Myriam Sibuet (France), and Anastasios Tselepidis (Greece) have been invited as members to the CeDAMar steering group. There is a new CeDAMar website at <http://www.cedamar.org/>.

National and Regional Activities

- Europe. The ad-hoc European Committee held its final meeting in Amsterdam on 5 June. Ulf Lie (Norway) has accepted the position of chair for the new formal Euro-CoML committee, being organized currently. They plan to hold a workshop in September. More information will be available shortly.
- South America. Having won start up funding for the South American Regional Committee, Ruben Escribano and colleagues are now formalizing their plans. The South American regional committee will have its base at the University of Concepción, Chile.
- Indian Ocean. The international SSC has approved a proposal to hold a workshop to examine the known, unknown and unknowable about marine biodiversity in the Indian Ocean. This workshop, co-sponsored by the Partnership for Observation in the Global Oceans, will be organized by Mohideen Wafar (National Institute of Oceanography, India) and Shubha Sathyendranath (POGO).
- Australia. Mark Tucker, new acting Director of Australia's National Oceans Office (NOO), will be the inaugural chair of the Australian National Committee for CoML.
- New Zealand. CoML is a major host of the Deep Sea 2003 Conference in Queenstown, New Zealand (1-5 December). CoML will be the sponsor of Day 1/Theme 1 on "Environment, ecosystem biology, habitat and diversity, oceanography." MAR-ECO scientists Odd Aksel Bergstad and Mike Vecchione will attend. This will also be an excellent opportunity to share the results and next steps of the Seamounts and Canyons workshop (to be held this August).
- Russia. The next SCOR Executive Committee meeting will be held 15-19 September 2003 in Moscow. There will be a CoML session on the 19th, which will involve CoML project participants in Russia and focus on engaging the greater Russian community in CoML activities. The Shirshov Institute of Oceanology will host the meetings.
- USA. The U.S. National Committee will hold a major workshop on 21-23 July 2003 in Salem, Massachusetts. This workshop will provide the opportunity for an active dialogue between the U.S. National Committee, scientific community and government agencies to:

(1) identify and rank biodiversity research priorities in the United States; (2) recommend new and emerging technologies that could lead to major advancements in our ability to map the distribution, abundance and diversity of marine life at all scales in the world oceans, and to understand how marine biodiversity is related to oceanic processes and human activities; (3) evaluate CoML projects with potential for near-term replication/expansion in the United States, as well as other existing efforts in the scientific community in alignment with the goals of the CoML; (4) develop new project ideas based on high priority regions, habitats and species not adequately covered by existing efforts; and (5) discuss ongoing federal programs that provide potential opportunities for collaboration consistent with CoML objectives, as well as the cooperative use of resources. The workshop participants will review a draft research strategy for the Census of Marine Life program in the U.S., the final version of which will be available for distribution in October.

- Antarctic. The British Antarctic Survey has expressed interest in leading an effort to organize an Antarctic implementation committee for the Census of Marine Life. Discussions are ongoing.

Related Activities

- Deep-Sea Sediments. David Billett of SOC is organizing a global workshop on "The Biodiversity of Deep-Sea Sediments: The Known, Unknown and Unknowable." This workshop will be held at Hatfield Marine Science Center in Newport, Oregon on 21-24 August in conjunction with the 10th Deep Sea Symposium. More information can be found at <http://www.soc.soton.ac.uk/GDD/DEEPSEAS/workshop/index.html>.
- Seamounts & Canyons. Running parallel to the Deep-Sea Sediments workshop will be a global workshop on the Biogeography of Seamounts and Submarine Canyons, organized by Karen Stocks of San Diego Supercomputer Center (kstocks@sdsc.edu) and George Boehlert of Hatfield Marine Science Center. This workshop will also be held 21-24 August in Newport, Oregon in conjunction with the 10th Deep-Sea Biology Symposium in Coos Bay. There will be some overlapping sessions with the Sediments workshop.
- DNA Barcodes. The DNA Barcoding Protocol, developed by Mark Stoeckle (Weill Medical College of Cornell University), Ann Bucklin (University of New Hampshire), Nancy Knowlton (Scripps Institution of Oceanography), and Paul Hebert (University of Guelph) is still available at the CoML website (<http://www.coreocean.org/Dev2Go.web?id=245069>) for comment. This September, there will be a follow up meeting to the March 2003 "Taxonomy and DNA" conference at Cold Spring Harbor Laboratory.
- Museums and Specimens. A reminder: 5-7 September in Philadelphia there will be a small workshop to discuss and recommend protocols for specimen collection associated with all CoML field projects. Gary Rosenberg, Academy of Natural Sciences, is the convener (rosenberg@acnatsci.org).

General News

- Newsweek International. CoML Scientists - Jeremy Jackson (HMAP, Scripps), Larry Crowder (SEAMAP, Duke), Barbara Block (TOPP, Stanford), Ransom Myers and Boris Worm (FMAP, Dalhousie) - were all prominently featured in a major article in the 14 July issue of Newsweek International. The article highlights what little we know about the ocean and what lives there, a fact on which the case for the Census program is built. Read the article, Troubled Seas, at <http://www.msnbc.com/news/935201.asp>.

7.3.2 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/>

Co-Chairs:

Robin Muench
Earth & Space Research
1910 Fairview Ave. E, #102
Seattle, WA 98102-3620, USA
Tel.: +1-206-726-0522
fax: +1-206-726-0524
email: rmuench@esr.org

Hartmut Hellmer
Alfred Wegener Institut
Postfach 12 01 61
D-27515 Bremerhaven, GERMANY
Tel.: +49-471-4831-794
Fax: +49-471-4831-797
E-mail: hhellmer@awi-
bremerhaven.de

Membership:

N. Bindoff	AUSTRALIA	J. Launiainen	FINLAND
C. Garcia	BRAZIL	A. Piola	ARGENTINA
M. Garcia	SPAIN	P. Schlosser	USA
K. Heywood	UK	S. Spezie	ITALY
A. Klepikov	RUSSIA	M. Wakatsuchi	JAPAN

Executive Committee Reporter: Roberto Purini

SCOR AFFILIATED PROGRAM -International Antarctic Zone (iAnZone)
Final Report, Including Activities for Period Ending September 2003
36th Executive Committee Meeting of SCOR
Moscow, Russia; September 2003

Introduction

IAnZone was conceived in the early 1990s as a sequence of informal biennial meetings of Southern Ocean researchers, primarily physical oceanographers, who were interested in understanding the Southern Ocean and its role in climate change. Accorded status as a SCOR Affiliated Program in early 1997, iAnZone's goal has been to advance our understanding of climate-relevant processes within that region of the Southern Ocean poleward of the Antarctic Circumpolar Current. IAnZone has (1) provided for exchange of ideas, plans, results and data; (2) identified, developed and coordinated research projects consistent with the latter goal; (3) facilitated coordination among Antarctic and global climate programs, and among other Southern Ocean programs; and (4) advised on the development of appropriate observing systems, datasets and modeling strategies needed to assess the scales and mechanisms of climate variability in the Antarctic Zone.

IAnZone has had a productive tenure under SCOR sponsorship. Planning was initiated for ANSLOPE (Antarctic Slope), an underway international study of the processes by which dense water exits across the Ross Sea continental shelf and slope to ventilate the global ocean. Planning continues for ISPOL-1 (Ice Station Polarstern), a drifting station scheduled to take place in the western Weddell Sea during austral spring-summer of 2004-2005. Planning has led to submission of a proposal to the U.S. National Science Foundation for support of a field study of small-scale processes in the Maud Rise region of the eastern Weddell Sea. Additional information can be found at the Web site: <http://www.ldeo.columbia.edu/physocean/ianzone>.

Current Scientific Activities

ANSLOPE

Recognition of the importance of shelf and slope processes to deep water formation has led to a fourth international iAnZone project; the Antarctic Slope project (ANSLOPE). This ongoing project seeks to define the roles of the Antarctic slope front and continental slope morphology in the exchanges of mass, heat and freshwater between the shelf and oceanic regimes. Topically, the emphasis is on processes that control deep-reaching outflows of shelf water mixtures. The study is sited in the Ross Sea. Non-U.S. participants include the Italian CLIMA program and the German BRIOS-2 coupled ice-ocean modeling program, which provides a large-scale modeling capability to complement process-driven field studies. Updates on ANSLOPE status can be viewed at the iAnZone Web site referenced above.

DOVETAIL

The study of Deep Ocean Ventilation Through Antarctic Intermediate Layers (DOVETAIL) was the third in a sequence of research programs organized under iAnZone over the past decade. Initially, DOVETAIL addressed the transport of newly formed deep waters from the Weddell Sea through the South Scotia Ridge region, whence it contributes to ventilation of the global ocean. Results of the initial experiment have been published together with numerical model results in 2002 in *Deep-Sea Research Part II*, 49(21). DOVETAIL has more lately evolved into a study of interannual variability, so that the possibility now exists that that we may obtain an

unprecedented decade-long time series documenting interannual variability in the region and, in so doing, gain valuable new insight into the interactions among the Southern Ocean and global climate. Ongoing activities have included a 5-year Brazilian field effort and a multi-year U.S. moored instrument program to assess interannual variability in the northern Weddell Sea.

ISPOL-I

The Ice Station Polarstern (ISPOL-I) field program is planned to take place along the western Weddell Sea margin during austral spring-summer of 2004-2005. This international program will use the concept of a manned drifting station, like the first program under iAnZone guidance ISW-1, to study spring to early summer ocean and sea ice conditions along the western Weddell Sea outer continental shelf and upper slope region. In the framework of this experiment several proposals have recently been submitted to the U.S. National Science Foundation for supporting sub-programs focused on ice and ocean processes. Additional information can be found at the Web site <http://www.awi-bremerhaven.de/Climate/ISPOL/index.html>.

Ocean Mixing, Convection, and Equation of State Issues

During austral winter 1994 a field effort studied ocean heat fluxes in the vicinity of Maud Rise, in the eastern Weddell Sea, under the auspices of the Antarctic Zone Fluxes (ANZFLUX) experiment. This was the second of four programs that have come to fruition, to date, under iAnZone auspices. The ANZFLUX program greatly increased our understanding of turbulence and mixing in a weakly stratified ocean, and contributed to our knowledge of physical conditions in the eastern Weddell Sea. The results raised significant issues concerning small-scale processes, such as cabelling and thermobaricity, that involve the equation of state for seawater. A proposal has recently been submitted to the U.S. National Science Foundation for support of a field and modeling study of these processes.

Methodology and Instrumentation Development

There has been an ongoing focus within iAnZone on the development of methods and instruments suitable for use in ice-covered waters. Examples would include Lagrangian drifters, such as seagliders, modified for use beneath an ice cover. The lack of reliable, consistently recorded ice data remains a concern. These issues are being pursued individually by various researchers. One area in which development has proceeded apace has been that of AUVs (Autonomous Underwater Vehicles) that can access regions covered by ice shelves and perennial sea ice. Such a system is being tested under the auspices of the UK NERC (Natural Environment Research Council) five-year program Autosub Under Ice (AUI). Though funding will be available only to UK scientists, possibilities exist for collaboration. Information on this initiative can be viewed on the Web at <http://www.nerc.ac.uk/ms/Autosub/index.htm>.

Administrative Issues

Membership and Meetings

The current membership of iAnZone is given below in Table I. H. Hellmer and R. Muench will co-Chair the group through the September 2003 biennial meeting. For reasons given below, we anticipate that this will be the final meeting of iAnZone.

Active participation in a program of Antarctic ocean research has been the primary prerequisite for membership in iAnZone. Members have had to show a capability to contribute actively within an organization that is driven by its members, meets biennially, and within which much of the activity takes place via email and at program-specific workshops. Members have had to raise their own funds for travel and lodging costs associated with attending the biennial meetings

which have been held, insofar as feasible, in conjunction with major international colloquia in order to facilitate member acquisition of travel funds. Over the past decade, a number of factors have increasingly limited attendance at the biennial meetings and have made it impossible to maintain the membership and leadership rotations needed for a healthy organization. These factors have included increased cost and difficulties of travel, shortage of discretionary funds, a virtual explosion of competing meetings, and various other issues including individual abandonment of research efforts in the Southern Ocean. Another impact has come from the establishment of new programs, such as SO CLIVAR, that stand poised to take over some of the functions filled by iAnZone. The present members interpret these factors as signaling a diminished need for the group, and suggest that the time is appropriate to terminate the group.

Table 1: Current iAnZone Membership

<i>N. Bindoff</i> (Australia)	<i>J. Launiainen</i> (Finland)
<i>M Garcia</i> (Spain)	<i>R. Muench</i> (USA) - co-Chair
<i>C. Garcia</i> (Brazil)	<i>A. Piola</i> (Argentina)
<i>H. Hellmer</i> (Germany) - co-Chair	<i>P. Schlosser</i> (USA)
<i>K. Heywood</i> (UK)	<i>G. Spezie</i> (Italy)
<i>A. Klepikov</i> (Russia)	<i>M Wakatsuchi</i> (Japan)

Coordination with, and Delegation To, Other International Programs

iAnZone has maintained coordination with the Antarctic Sea Ice Processes and Climate (ASPeCt) program and with CLIVAR members nearly since the inception of CLIVAR. A primary goal of the final iAnZone meeting will be to ensure that those issues addressed by iAnZone will now be taken on by alternative organizations.

The Final Biennial Meeting

The final iAnZone biennial meeting, its third since becoming a SCOR-Affiliated Program, will take place at the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven, Germany on 11 September 2003 in association with the Southern Ocean Science Week (<http://www.awi-bremerhaven.de/Research/IntCoop/Oce/ASW/SOSW-titel.htm>). This will comprise part of a week of conferences including joint meetings among iAnZone, ASPeCt, CLIVAR and the CLIC Southern Ocean Panel, and a planning workshop for the ISPOL-1 project.

The current membership of iAnZone wishes to acknowledge the support provided during its productive lifetime by various agencies, including the U.S. National Science Foundation, the Alfred Wegener Institute for Polar and Marine Research, and SCOR.

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

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

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

Chair:

William B. Curry
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
USA

Tel: +1-508-548-1400
Fax: +1-508-457-2034
Email: wcurry@whoi.edu

Membership:

F. Abrantes	PORTUGAL	H. Kawahata	JAPAN
J. Backman	SWEDEN	K.L. Knudsen	DENMARK
L. Carte	NEW ZEALAND	D. Kroon	NETHERLANDS
M.T. Chen	CHINA (Taipei)	J. Lee-Thorp	SOUTH AFRICA
J. Eriksson	ICELAND	C. Lange	CHILE
J.A. Flores	SPAIN	M.L. Machain-Castillo	MEXICO
F. Florindo	ITALY	A. Mackensen	GERMANY
B. Flower	USA	B. Manighetti	NEW ZEALAND
J. Grimalt	SPAIN	B. Opdyke	AUSTRALIA
F. Grousset	FRANCE	V. Ramaswamy	INDIA
W. Hantoro	INDONESIA	E. Rohling	UK
J.C. Herguera	MEXICO	J. Rogers	SOUTH AFRICA
C. Hillarie-Marcel	CANADA	R. Schneider	GERMANY
E. Ivanov	RUSSIA	J. Sopaheluwakan	INDONESIA
E. Jansen	NORWAY	T. Stocker	SWITZERLAND
N. Kallel	TUNISIA	P. Wang	CHINA (Beijing)

Executive Director: Michael Sarnthein

Executive Committee Reporter: Roberto Purini

images

Short Report on IMAGES 2002-2003 activities
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International Marine Global Change Study,
Marine program of IGBP-PAGES
associated to SCOR

Prof. M. Sarnthein, Executive Director and Dr. A. Holbourn Assistant Director
both at Institut fuer Geowissenschaften, Christian-Albrechts-Universitaet, Olshauenstr. 40, D-24118
Kiel, Germany

Dr. W. Curry, Chairman, Woods Hole Oceanographic Institution, Department of Geology
and Geophysics, Woods Hole, MA 02543, USA

INTRODUCTION

IMAGES was initiated to respond to the challenge of understanding the mechanisms and consequences of abrupt, natural climate changes at time scales of decades to millennia using oceanic sedimentary records. A fundamental goal of IMAGES remains to produce data sets to test models of climate variability and future climate change, to determine the sensitivity of the ocean and climate response to external and internal forcing and to constrain the role of the ocean in controlling atmospheric CO₂. IMAGES accomplishes these objectives through (1) the planning and coordination of oceanic cruises to retrieve and exploit in international collaboration giant sediment cores from long, continuous time series in high sedimentation rate areas of the ocean, and (2) the support of symposia, working groups and their workshops.

1 - IMAGES ADMINISTRATION

This is the seventh year of the IMAGES program. 26 countries and Universities consortium are members and 23 of them contribute to the budget (*).

*Australia	B. Opdyke	*Netherlands	D. Kroon
*Canada	C. Hillaire-Marcel	*New Zealand	L. Carte/ B. Manighetti
Chile	C. Lange		E. Jansen
*China	P. Wang	*Norway	F. Abrantes
*Denmark	K.L. Knudsen	*Portugal	E. Ivanovy
*France	F. Grousset	*Russia	J. Rogers/ J. Lee-Thorp
*Germany	R.Schneider/ A. Mackensen	*South Africa	J. Grimalt/ J.A. Flores
*Iceland	J. Eriksson	*Spain	J. Backman
*India	V. Rasmawany		T. Stocker
Indonesia	J. Sopaheluwakan/ W. Hantoro	Sweden	M-T. Chen
*Italy	F. Florindo	*Switzerland	N. Kallel
*Japan	H. Kawahata	*Taiwan consortium	E. Rohling
*Mexico	M.L. Machain Castillo/ J.C. Herguera	*Tunisia	B. Flower
		*United Kingdom	
		*USA	

The program has a permanent office, with salary of the Director covered by the host institution at the University of Kiel in Germany. Our budget covers, in addition to the day to day expenses of the office:

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

1.1 Changes 2002-2003

The IMAGES Office is presently located at the University of Kiel, Germany until end of 2003. The Office will move for a period of four years to the University of Bremen, Germany starting from January 2004. Ralf Schneider will become Executive Director of IMAGES. One full salary for either a data manager or science officer will be provided by the University of Bremen.

1.2 Administrative activities

The IMAGES Office wrote to all national representatives in January 2002 to seek an increase in the financial contributions from member countries. Most countries responded positively and agreed to raise their annual contribution by 10 to 50%. Regrettably, Sweden was not able to contribute to the program in 2002.

2 - IMAGES ACTIVITIES

2.1 Data Archiving and Synthesis

Major progress was achieved over the last year in archiving IMAGES data, including shipboard and laboratory data. A number of major IMAGES-related laboratories in Europe, USA and Asia were visited to set up and consolidate archiving procedures with the WDC-Mare (with PANGAEA serving as technical operator). Stefan Rothe, the current IMAGES data manager, also attended the 2002-2003 IMAGES cruises. Cruise reports for these cruises are now available.

2.2 The **IMAGES Web** page is in service, with all recent information concerning our activities (workshops, past and future cruises, database).

2.3 IMAGES *has* supported the activity of several IMAGES and SCOR-IMAGES **Working Groups**: There are currently six active Working Groups, whose main task is to coordinate the acquisition of cores and laboratory data in key areas. A new proposal for a SCOR/IMAGES WG on the Reconstruction of Past Ocean Circulation was submitted, and the proposal is currently under review.

WG1 - Ice-Ocean Interaction Chairs: E. Jansen and John Andrews. A workshop took place at the Institute of Arctic and Alpine Research, University of Colorado in December 2002, prior to the AGU Fall Meeting. IMAGES contributed 10 000 US\$ to support the workshop.

SCOR-IMAGES WG2 - SEAMONS (South East Asian Monsoon) Chair: P. Wang and S. Clemens. A final synthesis meeting focusing on "Asian Monsoons and Long-Term Tectonic Forcing" was held in Aix-en-Provence in September 2002 (Organizer: L. Beaufort). IMAGES contributed 7 500 US\$ to support the workshop.

WG3 - EPILOG (Environmental Processes of the Ice Age: Land, Ocean and Glaciers) Chairs: A. Mix, P. Clark and E. Bard. A six-day workshop entitled: "Multiproxy Approach for the Reconstruction of the Glacial Ocean surface (MARGO) convened by Dr. Ralph Schneider was held at the HANSE Institute for Advanced Studies in Delmenhorst in September 2002. IMAGES contributed 5 000 US\$ to support the Delmenhorst workshop.

WG4 - Southern Ocean Chairs: A. Mackensen and R. Dunbar. A meeting was organised at the University of Barcelona in Spain in September 2002. Four preliminary coring proposals were submitted to IODP at the 1 October 2002 deadline, and were recommended for submission as full proposals. IMAGES contributed 10 000 US\$ to support the Barcelona workshop. Additional funding came from JEODI and US IMAGES.

WG5 – Tropical Pacific Dynamics Chairs: Luc Beaufort and Min-Te Chen. A workshop is planned in November 2003 either in Taiwan or Japan, to formally set up this new WG. IMAGES will contribute funds to this first WG meeting.

WG6 – Holocene Chairs: F. Grousset and P. de Menocal. A first meeting took place in June 2002 at the Lamont-Doherty Earth Observatory, Palisades, New York, USA. A workshop will take place in Bergen, Norway in August 2003. IMAGES contributed 5 000 US\$ to support the Lamont workshop and will contribute 10 000 US\$ to the 2003 Bergen workshop.

2.4 IMAGES Cruises

Over the last eight years, the IMAGES program has organized ten international cruises, and a new coring cruise on board the French research vessel *Marion Dufresne* is taking place from May to June 2003. The main IMAGES activity in 2002 focused on the two-month MONA and PAGE Cruises on board *Marion Dufresne*, from Vancouver (Canada) to Panama and from Panama to Belem (Brazil). In the next three years, IMAGES plans a series of cruises to retrieve cores from key areas such as the Southern Ocean, which remains the least understood region on Earth in terms of past involvement in climate change at suborbital timescales. A first SO cruise with coring target off Terre Adélie took place in January-February 2003. Specific information may be found on the IMAGES Web site: <http://www.images-pages.org>

The Calypso corer was accepted as a European large-facility, opening access to European PIs at no-cost for about 22 days of giant coring (within 2002-2003). However, the main funding system, which is to fund IMAGES cruises bottom up with individual proposals from various PIs from different countries, and France having to fill the gap for missing funds, is far from satisfactory. In the long term, the French Polar Institute is trying to get international support to commit more funds for *Marion Dufresne* operations, which would allow no-cost international access. In particular, the future **IODP Mission-Specific Platform scheme** offers an opportunity to alleviate such problems. Discussions are currently taking place to define the IMAGES policy in relation to IODP.

2.5 Support of representatives and scientists from developing countries

IMAGES awarded travel support to four young scientists from developing countries to join the *Marion Dufresne* cruises in mid-2002.

PAGES awarded travel support (US\$ 5 000) to IMAGES representatives from developing countries, in order to enable them to attend the IMAGES Scicom Meeting on 15-16 September 2002 in Selfoss, Iceland.

7.3.4 InterRidge - International Ridge Studies (affiliated in 1996)

InterRidge is an international and interdisciplinary initiative concerned with all aspects of mid-ocean ridges. It is designed to encourage scientific and logistical coordination, with particular focus on problems that cannot be addressed as efficiently by nations acting alone or in limited partnerships. Its activities range from dissemination of information on existing, single-institution experiments to initiation of fully multi-national projects. The InterRidge Web site can be found at triton.ori.u-tokyo.ac.jp/~intridge.

Terms of Reference:

- To facilitate exchange of ideas and plans, for example, by convening international workshops.
- To provide current information about research activities, especially sea-going operations.
- To help improve procedures for data management, exchange, synthesis, and preservation.
- To create an information database (e.g., track lines, sample locations, geochemical analyses...).
- To assist in defining and coordinating field programs and experiments.
- To encourage participation of smaller oceanographic countries and individual scientists from non-seagoing countries.

Chair:

Kensaku Tamaki
Ocean Research Institute
University of Tokyo
1-15-1 Minamidai
Nakano-ku, Tokyo 164

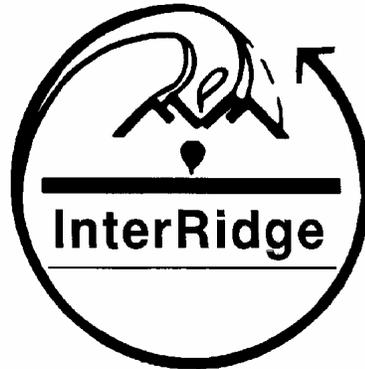
Tel.: +81-3-5351-6443
Fax: +81-3-5351-6445
E-mail: tamaki@ori.u-tokyo.ac.jp

Membership: InterRidge 2001 Steering Committee

F. Barriga	PORTUGAL	S. Kim Juniper	CANADA
P. Blondel	UK (ad hoc)	M. Kinoshita	JAPAN
E. Bonatti	ITALY	J. Lin	USA (ad hoc)
D. Christie	USA	Sang-Mook Lee	KOREA
P. Dando	UK	C. Mével	FRANCE
C. Devey	GERMANY	A. Mudholkar	INDIA
J. Dymant	FRANCE	R. Pedersen	NORWAY
J. Escartin	FRANCE (ad hoc)	R. Santos	PORTUGAL (ad hoc)
C. Fisher	USA	D. Smith	USA
F. Gaill	FRANCE (ad hoc)	D. Teagle	UK
T. Gamo	JAPAN	S. Webb	USA (ad hoc)
C. German	UK (ad hoc)		

Programme Coordinator: Agnieszka Adamczewska

Executive Committee Reporter: Laurent Labeyrie



InterRidge Report 2003

By Agnieszka Adamczewska
InterRidge Coordinator

Introduction

Mid-oceanic ridges are the primary site of volcanic activity on the planet and the primary site of creation of new crust. They exert a major influence on the evolution of the solid earth, affect the composition of the ocean waters and support unique forms of life. Yet, because they lie beneath the sea and originate in mantle processes deep within the earth, they are poorly understood.

InterRidge is an initiative that was created in 1992 with express objective of supporting and developing programs that are of major scientific interest, interdisciplinary, globally or thematically defined and, most importantly, require or will benefit from international discussion, planning and implementation. The original science plan for IR was created for a period of 10 years. Thus, the InterRidge program will come to an end of its first science plan at the end of 2003. The InterRidge steering committee unanimously voted that the program should continue to exist and that a new science plan should be drafted for the second decade of InterRidge.

The first 10 years of activity have produced a united, coordinated international ridge community. Thus, the primary objective of InterRidge can move away from the fostering of contacts within the active community and move more strongly towards the achievement of major, long-term scientific goals.

The revised mission statement for InterRidge in the next decade could be put like this:

“InterRidge exists to promote interdisciplinary, international studies of spreading axes. InterRidge promotes the scientific exchange between researchers in all countries of the world. InterRidge promotes the sharing of ridge-related technologies and facilities internationally collaborative projects. InterRidge especially encourages the involvement of less industrialized countries in the study, use and protection of ridges. InterRidge has a clear obligation to inform and involve both the public and governments in and about ridge research.”

InterRidge – The first ten years

When InterRidge began, ridge research was characterised by numerous national groups working either alone or in limited collaborations on many aspects of ridge science. The first ten years of InterRidge have seen the transformation of these groups into a strong, coordinated and informed community consisting of over 2700 active researchers from 54 countries. The success of the program has been recognised by the ridge community and a very strong desire to continue with a new program in the next decade has been expressed. Substantial input from the Ridge community worldwide has resulted in the formation of the “Next Decade” Science Plan for InterRidge. The science plan, which underwent a number of reviews and considered input from the entire InterRidge community was endorsed at the last IR steering committee meeting, 27-28 June, Tokyo, Japan. The next decade plan will come into operation from next year, *i.e.* 2004.

Horizon – The next decade

The second decade of IR will start off with a new science plan for the next decade, a strong sense of an integrated international ridge community and a strong foundation of the scientific research achieved by InterRidge in the first decade. The program is now ideally placed to play a leading role in facilitating major advances in ridge science; with more in-depth studies of the ridges with real substance to the science and to look at future technological developments (including ships of the future). In the next decade, IR will also focus on the sharing of resources, expertise and costs of scientific cruises as well as future ocean bottom observatories, all of which will increasingly depend on international and multidisciplinary collaborations to minimise research costs to individual nations while at the same time maximising research output.

Structure of InterRidge

The location of the InterRidge office rotates, usually every 3 years, between its Principal member nations and for the last 4 years (2000-2003) has been hosted by the Ocean Research Institute, University of Tokyo, Tokyo, Japan. The Office is currently managed by Kensaku Tamaki (Chair of the Steering Committee) and Agnieszka Adamczewska (InterRidge Coordinator), with the help of a part time assistant (Marek Kaczmarz).

Representatives from the Principal and Associate Member Nations form the Steering Committee, which plans and directs InterRidge activities. Working groups are established by the Steering Committee to oversee development and execution of various aspects of the InterRidge program. The National correspondents, are a vital component of InterRidge, representing the main nodes of communication between InterRidge and the member countries.

The Office is supported by annual membership fee contributions of the Principal (20 000 USD per annum) and Associate (5000 USD per annum) member countries.

InterRidge Membership

InterRidge has 3 levels of membership but only two of these (Principal and Associate) provide the opportunity for a given nation to be actively involved in InterRidge affairs, planning of future research programs and research direction. Germany has upgraded its membership status with InterRidge to become a Principal member nation in 2003.

The current status of InterRidge member nations is a total of 28 countries: 5 Principal members (France, Germany, Japan, UK and USA), 6 Associate members (Canada, India, Italy, Korea, Portugal and Norway) and 17 Corresponding members (Australia, Austria, Brazil, China, Denmark, Iceland, Mauritius, Mexico, Morocco, New Zealand, Philippines, Russia, Spain, South Africa, Sweden, Switzerland and SOPAC).

InterRidge 2003 Steering Committee Japan - Kensaku Tamaki (Chair, 2000)

- | | |
|---|---|
| 1. Canada - S. Kim Juniper (1998) | 11. Korea - Sang-Mook Lee (2001) |
| 2. France - Jérôme Dymont (2001) | 12. Norway - Rolf Pedersen (1996) |
| 3. France - Javier Escartin (<i>ad hoc</i> , 2002) | 13. Portugal - Fernando Barriga (2001) |
| 4. France - Françoise Gaill (<i>ad hoc</i> , 1998) | 14. Portugal - Ricardo Santos (<i>ad hoc</i> , 2002) |
| 5. France - Catherine Mével (1997) | 15. UK - Paul Dando (1999) |
| 6. Germany - Colin Devey (1999) | 16. UK - Damon Teagle (2002) |
| 7. India - Abhay V Mudholkar (2002) | 17. USA - Charles Fisher (2002) |
| 8. Italy - Enrico Bonatti (1998) | 18. USA – Deborah Smith (2003) |
| 9. Japan - Toshitaka Gamo (2001) | 19. USA - Jian Lin (<i>ad hoc</i> , 1999) |
| 10. Japan - Masataka Kinoshita (2002) | 20. USA - Spahr C. Webb (<i>ad hoc</i> , 2001) |

The Steering Committee will undergo substantial changes in membership in the year 2004. Firstly, a change in the Working Groups under the “Next Decade” science plan will result in a number of new “*ad hoc*” members. Secondly, new national representatives for Italy, France, Germany and Canada need to be selected at the beginning of 2004. InterRidge has a policy of exchanging national representatives every 4 years or so. Working Group chairs may, under some circumstances, continue longer as “*ad hoc*” representatives.

InterRidge National Correspondents

Principal Members:

France - Catherine Mével
 Japan - Nobuhiro Isezaki
 Germany - Colin Devey
 UK - Damon Teagle
 USA - Charles Fisher

Associate Members:

Canada - S. Kim Juniper, Kathryn M. Gillis
 India - Sridhar D Iyer, KA Kamesh Raju
 Italy - Enrico Bonatti, Paola Tartarotti
 Korea - Sang-Mook Lee
 Norway - Rolf Pedersen
 Portugal - Fernando Barriga

Corresponding Members:

Australia - Dietmar Müller
 Austria - Monika Bright
 Brazil - Suzanna Sichel
 China - Wang Zhihong
 Denmark - John R. Hopper
 Iceland - Karl Grönvold
 Mauritius - Daniel P. E. Marie
 Mexico - J. Eduardo Aguayo-Camargo

Morocco - Jamal Auajjar
 New Zealand - Ian Wright
 Philippines - Graciano P. Yumul, Jr.
 Russia - Sergei A. Silantyev
 South Africa - Anton le Roex
 Spain - Juan José Dañoibeita
 Sweden - Nils G. Holm
 Switzerland - Gretchen Früh-Green
 SOPAC - Russell Howorth

InterRidge Projects

InterRidge Working Groups are the principal mechanism for implementation of the InterRidge program. Working Groups, established by the Steering Committee, oversee development and execution of various projects identified by the Steering Committee as areas that require, or will benefit from, international and multidisciplinary collaborations.

The main function of the Working Groups is to provide a forum for the international ridge community to utilise their expertise to define and refine scientific questions and to focus interests, both geographically and thematically. This is achieved by organising workshops, symposia and theoretical institutes. The end products of workshops are Workshop Reports, which represent a synthesis of international and multidisciplinary efforts to pose the scientific questions and propose how best to address them. As a consequence the Workshop reports form the basis of grant proposals and carry the weight of international support and recognition. These reports continue to form an important basis for grant proposals and international and multidisciplinary collaborations.

During the first decade of InterRidge, the three InterRidge themes—(1) Global Studies, (2) Meso-Scale Studies and (3) Active Processes—were subdivided into various Working Groups (WGs). A number of these working groups will cease to exist under the “Next Decade Plan”, while some will continue to be active. Below is a summary of the membership and Chairs of the last of the active WGs as well as the time frame that each of the WGs they were active. Updates and progress of the activities of the various WGs during the past decade can be found in the “InterRidge Publications” archives on the IR website:<http://www.intridge.org/act2.html>.

1. Global Studies

Arctic Ridges Working Group:(1995-2003) Colin W. Devey (Germany), Chair

Georgiy A. Cherkashev (Russia)
Bernard J. Coakley (USA)
Kathleen Crane (USA)
Olivier Dauteuil (France)
Vladimir Glebowski (Russia)
Karl Gronvold (Iceland)
H. Ruth Jackson (Canada)
Wilfried Jokat (Germany)
Yngve Kristoffersen (Norway)
Peter J. Michael (USA)

Neil C. Mitchell (UK)
Roland Rhim (Germany)
Hans Albert Roeser (Germany)
Hideki Shimamura (Japan)
Yoshifumi Nogi (Japan)
Cindy Lee Van Dover (USA)

Global Digital Database Working Group: (1995 – 2002) Philippe Blondel (UK), Chair

J.S. Cervantes (Spain)

Christine Deplus (France)

Martin Jakobsson (Sweden)

William Ryan (USA)

Marco Ligi (Italy)

Kyoko Okino (Japan)

Ron McNab (Canada)

T. Matsumoto (Japan)

K.A.K Raju (India)

Wilhelm Weinrebe (Germany)

Global Distribution of Hydrothermal Activity Working Group: (1998-2002) Chris German (UK), Chair

Ed Baker (USA)

John Chen (USA)

Don Cowan (UK)

Toshi Gamo (Japan)

Eulalia Gracia (Spain)

Peter Halbach (Germany)

Sang-Mook Lee (Korea)

Gary Massoth (New Zealand)

Joel Radford-Knoery (France)

Anna-Louise Reysenbach (USA)

Dan Scheirer (USA)

Steve Scott (Canada)

Kevin Speer (USA)

Carol Stein (USA)

Verena Tunnicliffe (Canada)

Cindy Van Dover (USA)

SWIR (Southwest Indian Ridge) Working Group: (1994-2002) Catherine Mével (France), Chair

Miquel Canals (Spain)

Chris German (UK)

Nancy Grindlay (USA)

Charlie Langmuir (USA)

Anton le Roex (South Africa)

Chris MacLeod (UK)

Jonathan Snow (Germany)

T. Kanazawa (Japan)

Cindy Lee Van Dover (USA)

2. Meso-Scale Studies

Back-Arc Basins Database Working Group: (1995 -) Sang-Mook Lee (Korea), Chair

Philippe Bouchet (France)

Jean-Luc Charlou (France)

Kantaro Fujioka (Japan)

Katsunori Fujikura (Japan)

Eulália Grácia (Spain)

Peter M. Herzig (Germany)

Jun-ishihiro Ishibashi (Japan)

Yukari Kido (Japan)

Roy A. Livermore (UK)

Steve D. Scott (Canada)

Robert J. Stern (USA)

Brian Taylor (USA)

3. Active Processes

Biological Studies at the Ridge Crest Working Group: (1994 -) Françoise Gaill (France), S. Kim Juniper (UK), Co-Chairs

Manuel Biscoito (Portugal)

Andrey Gebruk (Russia)

Olav Gierre (Germany)

Timothy Shank (USA)

Paul Tyler (UK)

Franck Zal (France)

Ken Takai (Japan)

Anna Metaxas (Canada)

Jung-Ho Hyun (Korea)

Undersea Technology Working Group: (1996 – 2002) Spahr C. Webb (USA), Chair

John R. Delaney (USA)

J. Kasahara (Japan)

Hiroyasu Momma (Japan)

M. Kinoshita (Japan)

Adam Schultz (UK)

Debra S. Stakes (USA)

Pascal Traits (France)

H. Villinger (Germany)

Hotspot-Ridge Interactions Working Group: (2002 -) Jian Lin (USA), Jerome Dymont (France) Co-chairs

Eulalia Gracia (Spain)

David Graham (USA)

Nobukazu Seama (Japan)

Garrett Ito (USA)

Bramley Murton (UK)

Kaj Hoernle (Germany)

Rajendra Drolia (India)

F. Sigmundsson (Iceland)

Joaquim Luis (Portugal)

Javier Escartín (France)

Monitoring and Observatories: (2002 -) Javier Escartin (France), Ricardo Santos (Azores), Co-Chair

Chris Fox (USA)

K. Mitsuzawa (Japan)

Pierre Sarradin (France)

Adam Schultz (UK)

Paul Snelgrove (USA)

Paul Tyler (UK)

InterRidge contacts with other programs

ChEss (Biogeography of Chemosynthetic Ecosystems)

ILP (International Lithosphere Project)

SOPAC (South Pacific Geosciences Applied Commission)

SCOR (Scientific Committee on Oceanic Research)

ODP/IODP (Ocean Drilling Program/Integrated Ocean Drilling Program)

ISA (International Seabed Authority)

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Distribution of information by the InterRidge office

Information and data exchange services are a major component of the InterRidge Office activities. We provide information to a worldwide audience, both in electronic format in the form of various publications.

InterRidge WWW Pages

In this age of technology the Internet has become an important means for “instantaneous” information transfer to all corners of the world. The InterRidge office maintains an extensive Web site containing various information including databases. The databases on the InterRidge Web site were initiated in response to a request by the international community to have a centralised clearing house for information collected by scientists all over the world so that relevant information is readily available to everybody at one site. Any information sent to the InterRidge office for distribution is promptly posted on our Web site.

It has become clear that the resources of the IR office are not sufficient to maintain extensive databases. During the next decade the IR office will concentrate on maintaining the database of ridge researchers and will create portal pages with information about relevant databases around the world. The existing IR databases will be amalgamated with other databases such as “pangea” and/or “ChEss” databases.

The InterRidge Web site continues to grow, and currently there are over 1000 files with information on our Web server. The use of the InterRidge Web site (<http://www.intridge.org>) also continues to increase steadily, reaching over 140,000 page requests per month.

InterRidge Publications

The InterRidge office publishes and distributes a number of publications every year. These publications are freely available to scientists and students on request. The printing and postage costs comprise a substantial proportion of the InterRidge annual budget. Nonetheless, these publications are an invaluable source of information transfer to less developed nations with limited access to Internet resources and international meetings. Recent issues of *InterRidge news* and other InterRidge publications are now freely available as PDF files that can be downloaded from the InterRidge Web site. As electronic files, this makes the IR publications available to a wider community without increasing printing and postage costs.

InterRidge News

The *InterRidge News* remains the primary means of communication with the Ridge Community. Currently, over 2700 people from 55 countries receive this publication. The entire issues of *InterRidge News* from Spring 2000 have been made available as downloadable PDF files from the InterRidge Web pages. While the costs of printing and postage of *InterRidge news* alone comprises 15% of the InterRidge annual budget, *InterRidge News* is an important means of providing the most recent and up-to-date research articles to scientists without easy access to the web. Due to budget

constraints, there is increased pressure to make the *InterRidge News* an electronic publication; nonetheless, in the end there is always agreement that this is one of the most valuable InterRidge publications which identifies InterRidge. The unanimous feedback is that the research articles, in particular, but also the calendar of international meetings and the schedule of ridge cruises are the most valuable information distributed *via* the *InterRidge News*.

Summary of 2002-2003 Publications

- *InterRidge News*, vol. 11, no.1 pp 64, April 2002
- InterRidge Workshop: SWIR (South West Indian Ridge Workshop), pp. 79, April 2002
- InterRidge Theoretical Institute Abstracts Volume, pp84, September 2002
- Extended abstracts volume from the 2nd International Symposium on Deep - sea Hydrothermal Vent Biology are published in the *CBM - Cahiers de Biologie Marine*, vol 43 n°3-4, 2002
- *InterRidge News*, vol. 11, no. 2, pp. 68, November 2002
- InterRidge Steering Committee Report, September 2002
- *InterRidge News*, vol. 12, no. 1, pp. 52, May 2003

Publications planned for 2003

- New InterRidge Science plan for the next decade, July 2003
- InterRidge Steering Committee Report, June 2003
- Abstract volume - IR Symposium and Workshop: Ridge-Hotspot Interaction: Recent Progress and Prospects for Enhanced International Collaboration.
- Meeting report - IR Symposium and Workshop: Ridge-Hotspot Interaction: Recent Progress and Prospects for Enhanced International Collaboration.
- *InterRidge News*, vol. 12, no. 2, pp. ??, November 2003

InterRidge Meetings and Workshops 2002 - 2004

Recent and Upcoming meetings

- SWIR Working Group Workshop
17 - 19 April 2002 SOC, UK
- InterRidge – The Next Decade Workshop
10 – 12 June 2002, Bremen, Germany
- InterRidge MOMAR Workshop
15-17 June 2002 Azores, Portugal
- InterRidge Theoretical Institute: Thermal Regime of Ocean Ridges and the Dynamics of Hydrothermal Circulation
9 - 13 September 2002, University of Pavia, Italy

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- InterRidge Steering Committee Meeting
13 -14 September 2002, Sestri Levante, Italy
- InterRidge Steering Committee Meeting
27 -28 June 2003, Tokyo, Japan
- IR Symposium and Workshop: Ridge-Hotspot Interaction: Recent Progress and Prospects for Enhanced International Collaboration
8 - 10 September 2003, Brest, France
- InterRidge Workshop: Opportunities and Contributions of Asian Countries to the InterRidge Next Decade Initiative
POSTPONED - New Date: 27-29 October 2003, Beijing, China
- Joint R2K-InterRidge Theoretical Institute: Interactions among Physical, Chemical, Biological, and Geological Processes in Backarc Spreading Systems on back-arc basins and back-arc spreading systems,
24-28 May 2004, Jeju Is., Korea
- InterRidge Steering Committee Meeting
May 2004, Korea

Meetings proposed for the near future

- Indian Ocean Ridges
January 2004?, Goa, India.

IR Symposium and Workshop: Ridge-Hotspot Interaction

Objectives

- 1) To review recent progress in geological, geophysical, geochemical, and theoretical studies of hotspots and their interaction with mid-ocean ridges on global ocean basins;
- 2) To identify key scientific issues that could be addressed in the coming years;
- 3) To discuss a general plan for more focused international collaboration in this important research field, especially multi-disciplinary experiments that cannot be achieved by single nations alone.

Organising Committee

Jerome Dyment (co-chair), Institut de Physique du Globe de Paris, France (jdy@ipgp.jussieu.fr)

Jian Lin (co-chair), Woods Hole Oceanographic Institution, USA (jlin@whoi.edu)

Marcia Maia, Institut Universitaire Europeen de la Mer, Brest, France (marcia@univ-brest.fr)

Christophe Hemond, Institut Universitaire Europeen de la Mer, Brest, France (chhemond@univ-brest.fr)

Bramley Murton, Southampton Oceanography Centre, UK (bjm@soc.soton.ac.uk)

Agnieszka Adamczewska, InterRidge Office, Tokyo, Japan (intridge@ori.u-tokyo.ac.jp)

IR workshop - Opportunities and Contributions of Asian Countries to the InterRidge Next Decade Initiative

Objectives

- 1) To promote active participation of Asian countries in the InterRidge program and to improve coordination of InterRidge research activities among Asian countries;
- 2) To bring together scientists from different disciplines to discuss unique contributions that Asian countries can make to the InterRidge Next Decade Initiative; and
- 3) To provide a forum for exchange of ideas and research results on a variety of subjects including oceanic crustal processes, back arc spreading ridges, hydrothermal systems, vent biology, and sub-seafloor biosphere.

Organising Committee

John Chen (co-chair), Peking University, Beijing, China (johnyc@pku.edu.cn)
 Jian Lin (co-chair), Woods Hole Oceanographic Institution, USA (jlin@whoi.edu)
 Kensaku Tamaki, University of Tokyo, Japan (tamaki@ori.u-tokyo.ac.jp)
 Sang-Mook Lee, Korea Ocean Research & Development Institute, Korea (smlee@kordi.re.kr)
 Catherine Mevel, Universite Pierre et Marie Curie, France (mevel@ipgp.jussieu.fr)
 A.M. Adamczewska, InterRidge Office, Tokyo, Japan (intridge@ori.u-tokyo.ac.jp)

RIDGE 2000-InterRidge Joint Theoretical Institute (R2K-IRTI): Interactions among Physical, Chemical, Biological, and Geological Processes in Backarc Spreading Systems

Organising Committee

Sang-Mook Lee, KORDI, Korea – Local Organizer (smlee@kordi.re.kr)
 Kensaku Tamaki, Univ. of Tokyo, ORI, Japan (tamaki@ori.u-tokyo.ac.jp)
 David Christie, Oregon State Univ., USA (dchristie@coas.oregonstate.edu)
 Patricia Fryer, Univ. of Hawaii, USA (pfryer@soest.hawaii.edu)
 Peter Herzig, Univ. of Freiberg, Germany (herzig@mineral.tu-freiberg.de)
 Daniel Desbruyeres, IFREMER, France (Daniel.Desbruyeres@ifremer.fr)
 Anna-Louise Reysenbach, Portland State Univ., USA (reysenbacha@pdx.edu)

Major milestones and scientific highlights

The first ten years of InterRidge has cultivated a strong, coordinated and informed community consisting of over 2700 active researchers from 55 countries. A number of countries that have joined InterRidge (for example, Japan and India) can boast a great change, for the better, in their ridge research activities within just a short period of time. InterRidge has been the prime driving force

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behind many important research projects in the first decade, some of the most notable amongst them being:

Study of the South-West Indian Ridge: At the inception of InterRidge the SWIR was, due to its geographical remoteness, relatively unknown. The efforts of InterRidge and its SWIR Working Group have led to 18 cruises to this region in the last decade, making the SWIR now one of the best studied slow-spreading ridges of the world.

First sampling of the Gakkel Ridge: One of the few unknown areas of the global ridge system was, until recently, the arctic Gakkel Ridge. Through the activities of the IR Arctic Ridge working group and the organization of two workshops to formulate a workable plan for mapping and sampling this ridge, InterRidge provided essential support which finally led to the first, very successful, two-ship international cruise to the Gakkel ridge in 2001.

Workshops on many aspects of ridge science: InterRidge has convened and coordinated 21 workshops with publication of white papers in 8 countries during the last decade. Combined, these meetings had a total of 1300 attendees from 36 countries, which clearly shows the international significance of this effort.

Generation of an international ridge scientific community: There are over 2700 active ridge researchers registered in the InterRidge directory data bank. The semi-annual *InterRidge News*, containing information on Working Group activities, upcoming cruises and reports of cruise results is circulated to all of these researchers. The InterRidge Web site receives over 10 000 hits per month from people requiring ridge information. All of these features are clear indicators of the sense of community that InterRidge has fostered in its first decade.

Liaison to other international programs: Collaborations with other international programs, SCOR, ODP, IAVCEI, were pursued through the joint coordination of working groups and workshops.

Providing a voice for ridge researchers: With the advent of submersible tourism and ore prospects at the mid-ocean ridges, ridge researchers have found themselves challenged to formulate standpoints and principles for controlling the use of the mid-ocean ridges for such diverse uses as the designation of Marine Protected Areas and advising the International Seafloor Authority. InterRidge has provided a vital central voice for ridge scientists in this.

Global sampling of the ridges: Prior to the inception of InterRidge many areas of the world's ridge system were poorly or not sampled. The concerted effort of InterRidge scientists using both specific cruises and cruises of opportunity has greatly improved this situation

Increasing international involvement: As part of the action to increase the involvement of nations that lack the resources to independently carry out ridge studies, InterRidge continues to encourage scientists from less active countries to become involved in IR activities. Currently, an effort is made to include China in international ridge research and facilitate collaborative studies.

Plans for the near future

Since the InterRidge office is due to move to a new host nation, and at the same time the "Next Decade Science Plan" will come into effect from January 2004, this year is very much a time of

transition for the IR initiative.

At the meeting of the IR steering committee (27-28 June 2003, Tokyo, Japan) the bid for the new office location was accepted from Prof. Colin Devey, University of Bremen, Germany. The InterRidge office will move to its new location from January 2004, for a period of 3 years, and will be chaired by Prof. Colin Devey. A new project coordinator will take over the daily running activities of the office. The transition of the InterRidge office is expected to be carried out without a break in the normal activities.

Since Working Group chairs are *ad hoc* members of the steering committee and there will be a major change in the working groups of InterRidge under the new science plan, the membership of the InterRidge steering committee is expected to undergo considerable changes during the upcoming year.

InterRidge Next Decade Science Plan

The present working structure of InterRidge is very effective and will in general be continued. Some changes in the nature of the overall objectives of the working groups include a focus more towards long-term science planning. Rotation of the InterRidge Office amongst the member nations was seen by all as a good thing. In the next decade InterRidge plans to redouble its efforts in strengthening contacts to the less industrialised or non-coastal nations, heightening the appreciation that the world's oceans are relevant to the lives of all the peoples on Earth.

A copy of the "Next Decade Science Plan" is available from the InterRidge Web site:
<http://www.intridge.org/irnd.pdf>

Working Groups

These are the real success story of InterRidge up to present. They have proved very effective at both fostering international collaboration and, through the organisation of workshops, in defining clear program plans for the attainment of new ridge research objectives. Without InterRidge it is clear that many projects would not have been achieved. The "Next Decade Science Plan" identifies a number of themes that will constitute the core of InterRidge research focus in the upcoming decade. New chairs will need to be selected for these new working groups before the next steering committee meeting (May 2004). The following themes will constitute the core of InterRidge for the next decade:

- Ultraslow-spreading Ridges
- Ridge-Hotspot interaction
- Back-arc Spreading Systems/Back-arc Basins
- Mid-oceanic ridge Ecosystems
- Monitoring and Observatories
- Deep Earth Sampling
- Global Exploration

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The scientific questions which InterRidge intends to focus efforts upon are flexible and the new science plan allows for new ideas and working groups to be established during the duration of the project.

InterRidge aims to continue to develop scientific, technical and logistical co-operation among nations and to strengthen international foundations for innovative research. Furthermore, in the next decade InterRidge will focus more on long-term observatories and more complex investigations.

The initial Working Groups identified in the Next Decade Plan certainly are not intended to be the exclusive research areas of interest to InterRidge during the next decade. The InterRidge program is always open to new proposals from the international ridge community to create new working groups that will be of interest to the international community and will require/benefit from coordination on international and interdisciplinary levels.

Scientific objectives

New scientific objectives have been outlined for the various principal themes. The details can be obtained from the “Next Decade” science plan available on the InterRidge Web site: <http://www.intridge.org/irnd.pdf>.

InterRidge has no budget for funding data collection or analysis. Instead, its contribution to international ridge research is to facilitate and coordinate research. InterRidge can achieve its objectives by:

- bringing the expertise of the international ridge research community together to identify priority issues, define questions and focus interests both geographically and thematically;
- facilitating the exchange of ideas and planning, for example, by convening international meetings and workshops;
- providing a unified voice to express the views and priorities of the international ridge community to other scientists, the general community, and most importantly, to government bodies, including national funding agencies and other international programs;
- assisting in defining and co-ordinating field programs and experiments;
- providing current information about research activities, especially seagoing operations, by publication of workshop reports and a semi-annual newsletter;
- encouraging participation of smaller oceanographic countries and individual scientists from non-seagoing countries;
- providing an international electronic directory of InterRidge researchers.

In addition, InterRidge is concerned with research, which although carried out under other programs, is highly relevant to achieving overall InterRidge aims. Strengthening interaction with the Integrated Ocean Drilling Program (IODP) for example. Similarly, research areas such as whole-mantle seismic tomography, satellite altimetry, and certain theoretical and experimental studies are of vital interest

to the development of ridge science.

Outreach

InterRidge has a major role to play in the education of the public and governments about the global significance of ridges. Thus, the outreach activities will be of high priority both for contacting the public and also for informing and involving government in all parts of the world. Particular resources which InterRidge plans to provide are Web-based presentations on InterRidge itself and on what a ridge is and why it is important. Press releases and scientific resources (suggested codes of conduct, policy for ridge environmental protection etc.) will be provided on the InterRidge server. Thus, all InterRidge scientists will have access to materials necessary to act as ambassadors for InterRidge in any country in which they should find themselves.

Benefits of Affiliation to SCOR

For InterRidge to live up to its goal of facilitating international/multidisciplinary collaborations IR needs to be able to interact with scientists from many nations and organise meetings to create opportunities for scientists to get together. Countries without the capacity to carry out ridge research independently most often also have difficulty in raising funds to send representatives to InterRidge meetings and workshops.

It has become clear that IR can greatly benefit by being an affiliate program of SCOR. Firstly, some financial support for members of developing or former Easter Block nations would greatly assist some scientists in attending InterRidge meetings and have an opportunity to discuss potential collaborative projects. InterRidge has no resources to provide such financial support, yet increasing the number of nations involved in the InterRidge program is one of the crucial aims. Secondly, the advice provided by the SCOR Executive Committee about the possible liaisons of InterRidge to other international projects such as IODP was met with enthusiasm by the InterRidge steering committee. A working group will be formed next year to, among other issues, focus on submitting “project-type” proposals to IODP (as opposed to individual-type drilling proposals).

The prime objective of InterRidge is to facilitate collaborative research at an international level to maximise the use of resources, and thus the success of InterRidge is measured by the benefit of the program to the international ridge community. InterRidge could greatly benefit from strengthening its affiliation to SCOR in a number of ways, including an increase in profile and thereby enhance its support and facilitation of international collaborations and development of new research projects.

The international profile and impact of InterRidge on ridge research worldwide is steadily increasing. Closer ties between InterRidge and SCOR 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 international program.

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Summary

The ocean ridges extend in a chain close to 60 000 km along the ocean floors and are a primary site of volcanic activity on the planet. The associated hydrothermal activity exerts a major influence on the ocean's chemistry, while the hydrothermal vents support unique and complex ecosystems in the absence of sunlight. Mining companies are already investigating exploitation of mineral deposits accumulated along the ocean ridges as an economically viable possibility. Our understanding of many aspects of mid-ocean ridges is still poor. Increased understanding of the mid-ocean ridges will be crucial for management and conservation of the oceans' resources in the future.

The scientific purpose of InterRidge is to discover and quantify the inter-relationships among the various manifestations of the ridge system and to integrate growing understanding of ridge dynamics with knowledge about the functioning of the Earth as a whole. These goals concern many subjects, from seismology to bacteriology, and a variety of approaches at many different scales. To acquire a balanced set of global-scale data on the entire mid-ocean ridge system requires international cooperation and planning. InterRidge plays a vital role in facilitating international cooperation and pooling of resources and expertise to address complex scientific questions.

InterRidge provides a means to coordinate research projects that will achieve significant added value by being part of a coordinated program. Workshops organised by the InterRidge working groups result in a synthesis of international/multidisciplinary effort to clearly identify scientific questions and areas that require investigation, as well as write proposals and outlines as how best to address these problems.

Providing up-to-date information is a fundamental part of InterRidge activities, and the latest results from cruises are regularly distributed to over 2700 scientists on our mailing list. Additionally, all of the relevant information obtained by the InterRidge office is available to the general community *via* the InterRidge Web site: <http://www.intridge.org>.

The second decade of InterRidge will focus on bringing in more countries into the program, increasing the profile of the program among the general public, governments and funding agencies as well as fostering of more sophisticated and long-term research projects.

7.3.5 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:

Trevor Platt
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia, B2Y 4A2, CANADA

Tel.: +1-902-426-3793
Fax: +1-902-426-9388
E-mail: tplatt@is.dal.ca

Membership:

David Antoine	FRANCE	Yongseung Kim	KOREA
Ichio Asanuma	JAPAN/NASDA	Vivian Lutz	ARGENTINA
Ray Barlow	SOUTH AFRICA	Mervyn Lynch	AUSTRALIA
Paula Bontempi	USA/NASA	Shailesh Nayak	INDIA
Christopher Brown	USA/NOAA	Michael Rast	ESA
Curtiss Davis	USA/Naval Res. Lab	Ian Robinson	UK
Pan Delu	CHINA	Tasuku Tanaka	JAPAN
Roland Doerffer	GERMANY	Eric Thouvenot	FRANCE/CNES
Robert Frouin	USA	Ron Zanefield	USA
Nicolas Hoepffner	ITALY/JRC		

Executive Committee Reporter: John Field

Annual Report of the
International Ocean-Colour Co-ordinating Group (IOCCG)

an Affiliated Program of the Scientific Committee on Oceanic Research (SCOR), and
an Associate Member of the Committee on Earth Observation Satellites (CEOS)

June 2003

Background

The International Ocean-Colour Co-ordinating Group (IOCCG) was founded in 1996 following a resolution endorsed by the Committee on Earth Observation Satellites (CEOS). The group acts as a liaison and communication channel between the providers and users of ocean-colour data, promoting international co-operation in various aspects of ocean-colour science and technology. In 1998 the group became an Affiliated Program of the Scientific Committee on Oceanic Research (SCOR), which also provides infrastructure support and financial management to the group. The IOCCG is chaired by Dr. Trevor Platt of the Bedford Institute of Oceanography, Canada and a Project Office has been set up at the Institute, staffed by a Project Scientist and an Information Officer, both under contract to SCOR. In 1999, the IOCCG became an Associate Member of CEOS.

About the IOCCG

The IOCCG consists of an international committee of 20 experts in the field of satellite ocean colour, with representatives from the provider community, that is various Space Agencies, as well as the user community (scientists, managers). Part of the mandate of the group is to promote strong international co-operation and co-ordination in the acquisition, distribution, calibration, validation and utilisation of ocean-colour data from satellites launched by various nations. Currently there are eleven ocean-colour missions in orbit (three from the USA, two from China and one each from Germany, India, Korea, Taiwan, Japan and the European Space Agency) all of which are producing Level 3 products. One of the Terms of Reference of the IOCCG is to promote the long-term continuity of ocean-colour data sets by building a multi-sensor, multi-year ocean-colour archive to examine mid- to long-term changes in phytoplankton biomass. A number of issues need to be addressed before this can be done including the calibration of each sensor, inter-calibration between different instruments, algorithm differences and also data-binning issues. Many of these issues are currently being addressed by various IOCCG working groups.

The IOCCG also has a strong interest in capacity building, and has conducted and sponsored a number of advanced training courses and workshops on applications of ocean-colour data. These courses are usually in high demand and help to broaden the user community as well as advocate the importance of ocean-colour data.

Capacity-Building Initiatives

Training and capacity building has been one of the IOCCG's main areas of focus over the past year. Many developing countries require training on how to use remotely sensed ocean-colour data, in conjunction with models, to produce useful products. For this reason, the IOCCG sponsored an advanced training course on "**Primary Production: Theory, Modelling and Estimation by Remote Sensing**" at the University of Concepción, Chile (October 21 to November 1, 2002). A total of 26 students attended the course, 8 of whom were from Chile and 18 from elsewhere (7 other countries, primarily in Latin America). Students attended lectures on many aspect of ocean colour and also received hands-on training in the acquisition and processing of ocean-colour data for regions of their interest. The data was used to estimate primary production for the region concerned. Students also received training on the use of MATLAB.

Other capacity-building initiatives include an IOCCG Fellowship Programme, which was designed to offer the opportunity for young scientists from developing countries to conduct hands-on research, or to receive in-depth training, at a foreign institute. Two Fellowships were awarded in 2002 and a further four fellowships will be awarded this year. In general, the response from supervisors and trainees has been very positive, indicating that these exchanges provide a mechanism to develop technical skills as well as facilitate invaluable long-term collaboration between institutes.

Furthermore, three IOCCG delegates attended the first **Indian Ocean GOOS Conference** (4 - 9 November 2002 Grand Bay, Mauritius) and made presentations at the "Satellite Applications/Users Seminar". The aim was to help develop plans for regional capacity building, with the aim of expanding the use of satellite applications in the area.

Scientific Working Groups

The specialised IOCCG working groups continue to be a key focus area of the IOCCG. These working groups were developed to investigate various aspects of ocean-colour technology and its applications. Many of the working groups are examining issues that need to be addressed before data from different sensors can be merged. One of the long-term goals of the IOCCG is to establish a global, internally consistent, uninterrupted stream of ocean-colour data. The end product of these working groups will be either the publication of an IOCCG report, a technical memorandum or a recommendation. Currently, there are eight active IOCCG working groups in various stages of progress. A summary of each working group's progress is given below.

- i) Ocean-Colour Data Binning Issues** (Chair: Dr. David Antoine, LOV, France). The objectives of this group are to examine the time- and space-binning schemes used by various ocean-colour missions (CZCS, POLDER, OCTS, SeaWiFS, MODIS, MERIS, GLI) and to summarise the rationale for the different approaches. Noise is frequently introduced by using different scales and different methods of averaging pixels into bins. For example, a difference of up to 20% was found in primary production estimates when using different spatial and temporal scales. The group is also assessing the consequences of having different schemes and will try to recommend one or more approaches that each mission should incorporate in order to facilitate the merging of data sets from different ocean-colour sensors. Over the past year, the group has revised the first draft report and a near-final report should be submitted within the next few months. The report will be entitled “**Guide to the use of ocean-colour level-3 data: A report from an IOCCG working group on ocean-colour data-binning issues**”. The group will recommend one or more specific binning schemes to be used for ocean-colour satellites as well as other satellites, and the report will also stress the importance of the requirement to reprocess data archives.
- ii) Comparison of Atmospheric Correction Algorithms** (Chair: Dr. Menghua Wang, Univ. Maryland). The objectives of the working group are to quantify the performance of atmospheric correction algorithms used by various ocean-colour satellite sensors. In addition, the group has examined how the derived products from various ocean-colour missions could be meaningfully compared and possibly merged. Atmospheric correction algorithms from MERIS, POLDER, OCTS, GLI, MODIS and SeaWiFS were examined using simulated data sets. At the last IOCCG meeting (February, 2003, Florence) Dr. Wang presented an outline of the proposed IOCCG report, entitled “**Comparison of atmospheric correction algorithms from the various operational ocean-colour missions**”, which should be completed by the end of the year. The report will consist of an introduction (objectives, members, overview of atmospheric corrections), description of algorithms, simulated data set, results (Case 1 and 2 waters with maritime and urban aerosols), discussion (errors from various algorithms, influence of errors on chl retrieval), recommendations and conclusions.
- iii) Co-ordination of Merged Data Sets** (Co-chairs: Chuck Trees, San Diego State Univ. and Nicholas Hoepffner, JRC). The objectives of this working group are to develop a procedure to be used by 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. While the IOCCG does not have the resources to produce a large merged data set, it could help implement a strategy to achieve this. The group will work with various agencies to ensure that similar data are being archived and will make recommendations regarding data-merging techniques. The group plans to schedule a meeting in late summer/fall this year to try to reach a consensus about how ocean-colour data should be merged.
- iv) Operational Ocean-Colour** (Chair Dr. Christopher Brown, NOAA). The goals of this working group are to promote the use of near-real-time ocean-colour products, to facilitate the

exchange of ocean-colour applications, and to assist in the exchange of ideas and approaches among agencies that currently possess, or will establish, an operational ocean-colour mission. The first meeting of this working group took place on 17 November, 2002 in Santa Fe. A major outcome of the meeting was to assign the highest priority to the publication of a report entitled "Why Ocean Colour?". The report will be divided into three sections: Introduction, Uses of Satellite Ocean Colour and Elements of Operational Ocean Colour. Various authors are being assigned to write different sections of the report, which will also include a number of specific case studies.

v) Standardizing the Extraterrestrial Solar Flux Spectrum (Chair Prof. André Morel, LOV, France). Currently, two different determinations of the solar spectral irradiance (at the top of the atmosphere) are being used by the ocean-colour community. There are small, but significant, differences between the two spectra which have a number of important consequences since they enter into the normalisation of water-leaving radiance, calibration of atmospheric radiation measurements and atmospheric correction algorithms. The working group assessed the problem and concluded that the solution would be to request that all agencies provide all the necessary documentation on the derivation of the $F_0(\lambda)$ spectrum used for data processing. Prof. Morel agreed to write a letter, on behalf of the IOCCG to the respective agencies requesting that they adopt this recommendation. After this has been accomplished, the activities of this working group will be completed.

vi) Radiometric Calibration of Satellite Ocean-Colour Sensors (Chair Dr. Robert Frouin, Scripps). The objectives of this group are to make recommendations about how to calibrate satellite ocean-colour sensors based on requirements and available calibration techniques. The group plans to publish a report, which will include pre-launch and post-launch calibration procedures. A meeting will be held later this year to discuss contributions from various members of the group, and a rough draft should be ready by end of the year. This group consists of members from NASA and CNES, as well as members from the University of California and Arizona.

vii) Sensor Characterisation (Chair Dr. George Joseph, ISRO, India). This new working group was established to address the need to standardise specified sensor parameters in the remote sensing community, in the context of the increasing relevance of merging data from various sensors. The group had anticipated producing a user handbook with a list of definitions for various sensor parameters, but the chair had a number of other commitments so he was unable to co-ordinate the working group this year. He is nevertheless still very keen to take this up at a later date.

viii) Ocean Colour Algorithm Working Group (Chair Dr. Zhong Ping Lee, Naval Research Laboratory). This new IOCCG working group was officially established at the recent IOCCG meeting in Florence (February 2003). The objectives of the group are to perform algorithm cross-comparisons, recommend certain algorithms and also report on the progress of algorithm

development. There are a variety of different algorithms in use today, many of which are empirical or have only one component (chl) and many are only partially tested/validated. At a preliminary meeting of this working group (17 November 2002, Santa Fe), participants expressed an interest in a more fundamental analytical approach. This working group plans to assemble a broad *in situ* database for systematic comparison of IOP retrieval and will also synthesise a data set based on known information (probably using the HYDROLIGHT platform). The data set will be stored on the IOCCG Web page.

Reports from each of these working groups will be published by the IOCCG and distributed in a timely manner (free of charge), as and when they become available.

Advocating the importance of ocean colour

Another objective of the IOCCG is to advocate the importance of ocean-colour data to the global community through information systems such as a Web page. The IOCCG has developed, and maintains, a comprehensive Web page (www.ioccg.org) providing a wealth of information on many aspects of ocean-colour (including sensors), publications, conferences, training opportunities, ocean-colour data and software programs. In addition, the IOCCG distributes a newsletter via the Internet every 2-3 months to over 700 subscribers. These newsletters keep the ocean-colour community informed of important events, research activities, training initiatives and instrument news.

Plans for 2004

Capacity Building

IOCCG will be involved in a number of different capacity-building initiatives during 2003/4, including hands-on training, formal training courses, workshops and fellowships:

- i) IOCCG is sponsoring an advanced workshop at the National Institute of Fisheries Research (INIDEP), Mar del Plata, Argentina (7 - 11 July 2003) with the specific aim of helping a group of young researchers from South America write a scientific proposal to funding agencies, to create a network of bio-optical stations around South America. The workshop is a direct outcome of the IOCCG training course that was held in Chile last October.
- ii) IOCCG is sponsoring a number of students to take part in the JAMSTEC round-the-world Southern Hemisphere cruise, to receive hands-on training in protocols used for bio-optical measurements. The cruise is comprised of 6 legs, starting on 3 August 2003 (Brisbane, Australia) and ending on 19 February 2004 (Fremantle, Australia). This is an excellent opportunity for students to receive on-board oceanographic experience as well as to collect high quality bio-optical data.

- iii) IOCCG will co-sponsor a training course on Remote Sensing of Ocean Colour, at the University of Udayana, Bali, Indonesia from 2-5 September 2003. The course is aimed at about 20 junior experts, who have good capabilities, but little chance to access ocean-colour data. Two previous IOCCG-sponsored training courses, held in Thailand in 1999 and 2000, were very successful and a large number of applications were received, suggesting that there was a need for capacity building in this area. The course will be co-sponsored by NASDA and LAPAN.
- iv) The IOCCG has rescheduled the “Remote Sensing Applications Workshop”, which was to be held in Fiji last year, to 30 September - 3 October 2003 at the University of Queensland in Brisbane, Australia. The workshop will be co-sponsored by IOC. This workshop is a follow on from the workshop on Remote Sensing Resources for Marine Management, which was held in Noumea, New Caledonia September, 2001, and is designed to develop strategies considered appropriate for regional implementation.
- v) The IOCCG will award a further four IOCCG Fellowships during 2003 to students from Mexico, China, Korea and Brazil. The Fellowship Programme allows students from developing countries to conduct research, or to receive training at a foreign institute of their choice.

Working groups

Several of the IOCCG working groups are nearing completion, and will be encouraged to prepare their final reports for publication. Unfortunately, many of the working groups are taking longer than expected to submit their reports, as they are chaired by volunteers, many of whom have a large number of other commitments. Nevertheless, we fully expect that two of the working groups (the working group on ocean-colour binning issues and the working group on atmospheric correction algorithms) will submit their final reports this year.

The data-merging working group plans to hold a meeting late this year to try to reach a consensus about how ocean-colour data should be merged. This meeting, scheduled to take place at JRC in Ispra, Italy, will be attended by a small group of representatives from the ocean-colour community.

Lastly, the IOCCG received a proposal for a new working group entitled “Working Group on Biogeographical Methods” submitted by Dr. Mark Dowell (University of New Hampshire). Biogeographical provinces are commonly used for large-scale computations of primary production from ocean-colour data, and it was felt that this field was advanced enough to merit a review or synthesis in the form of an IOCCG report. The Committee was concerned that this group might not be in line with the IOCCG’s Terms of Reference as it did not address a problem linked directly to ocean colour. The proposal will be rewritten to bring it more in line with the IOCCG’s objectives and should be resubmitted this year.

Committee Meetings

The next meeting of the IOCCG Committee will take place 15-17 January 2004, in Hyderabad, India. At the meeting the Committee will review the progress of the various working groups, discuss plans for the year ahead and propose new working groups and training initiatives.

Current Membership of the IOCCG

The IOCCG Committee is chaired by Dr. Trevor Platt and consists of 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. There are two types of committee members: (1) scientific members, appointed in their personal capacities, who fill the needs of the IOCCG for specific expertise, and (2) members representing various Space Agencies and other organizations that have an interest in ocean-colour remote sensing and in providing support for the activities of the IOCCG.

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. This year, five new members joined the Committee, two of whom are scientific members (Antoine and Barlow) and the other three are Agency nominations (Bontempi, Hoepffner and Thouvenot). Next year, three members (indicated with an asterisk) will step down.

IOCCG Committee Members (2003)

Antoine, David	-	Laboratoire de Physique et Chimie Marines, France
Asanuma, Ichio	-	NASDA/EORC, Japan
Barlow, Ray	-	MCM, Cape Town, South Africa
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
Frouin, Robert	-	Scripps, USA
Hoepffner, Nicolas	-	Joint Research Center, Ispra, Italy
Kim, Yongseung*	-	Korea Ocean Research and Development Institute
Lutz, Vivian	-	INIDEP, Argentina
Lynch, Mervyn*	-	Curtin University, Australia
Nayak, Shailesh	-	ISRO, India
Platt, Trevor (Chairman)	-	Bedford Institute of Oceanography, Canada
Rast, Michael	-	ESA/ESTEC, Netherlands
Robinson, Ian	-	Univ. Southampton, UK
Tanaka, Tasuku	-	EORC/NASDA, Tokyo, Japan

Thouvenot, Eric - CNES, France
Zaneveld, Ron - Oregon State University, USA

Sponsors

Activities of the IOCCG are sponsored by several major Space Agencies and other organisations listed below:

- NASA (U.S. National Aeronautics Space Administration)
- NASDA (National Space Development Agency of Japan)
- NOAA (U.S. National Oceanic and Atmospheric Administration)
- ESA (European Space Agency)
- JRC (Joint Research Centre, EC)
- IOC (Intergovernmental Oceanographic Commission)
- CNES (Centre National d'Etudes Spatiales)
- SCOR (Scientific Committee on Oceanic Research).

The Bedford Institute of Oceanography provides in-kind support for the IOCCG, by providing office space for the Project Office as well as use of all services.

7.4 Other Organizations

7.4.1 Partnership for Observation of the Global Ocean (POGO)

Report of the POGO-IOC-SCOR Initiative for Intelligent Use and Management of the Oceans

Partners Involved:

Governments:

Intergovernmental organizations:

Intergovernmental Oceanographic Commission (IOC), UNESCO

Major groups:

Partnership for Observation of the Global Oceans (POGO)

Scientific Committee on Oceanic Research (SCOR)

Leading Partner: Partnership for Observation of the Global Oceans

Name of the contact person/focal point: Shubha Sathyendranath

Address: Bedford Institution of Oceanography, Dartmouth, Nova Scotia, Canada B2Y 4A2

Phone: 1-902-426-8044

Fax: 1-902-426-9388

E-mail: shubha@dal.ca

Main objectives of the Partnership/Initiative

To promote intelligent and sustainable use and management of the oceans through

- (i) Promotion of collaboration and co-ordination among major oceanographic institutions committed to ocean science;
- (ii) Development of capacity in the weaker countries for using and managing their ocean space under UNCLOS intelligently;
- (iii) Advocacy for sound use and management of the oceans

In this report, the major activities of the Partnership in 2002, that contribute to attaining the objectives, are presented.

I. Training, Education and Capacity Building

1. Fellowship Programme:

The POGO-IOC-SCOR Fellowship Programme was launched in 2001. The programme (co-sponsored by IOC and SCOR) facilitates visits (1-3 months long) of scientists/technicians and graduate students from developing countries (and economies in transition) to oceanographic labs in other countries, for training on selected areas related to ocean observation, analysis and interpretation. The fellowship provides international airfare and subsistence allowance for the fellowship period (the actual amount will be tailored to meet local conditions, but will not exceed US \$ 1,000 per month). The trainee's institute will bear all expenses incurred by the fellow in his/her own nation (domestic travel, visa costs, etc.), and the host institute will waive any bench fees that they may normally charge trainees. (Details on POGO web site.) Thirteen Fellowships have been offered in 2001, and another 13 Fellowships have been awarded in 2002. The Fellowships are not restricted to POGO members.

2. Participation in Training Courses

An advanced course on "Primary Production: Theory, Modelling and Estimation by Remote Sensing" was held from October 21 to 1 November, 2002 at the University of Concepción (UdeC), Chile. It was held under the auspices of IOC/UNESCO, the Chilean Ministry of Education (MECESUP), Minera Escondida, the DAAD, the UdeC's School of Graduate Studies and the Center for Oceanographic Research (COPAS). Additional funding was provided by the International Ocean-Colour Coordinating Group (IOCCG) and by the Partnership for Observation of the Global Ocean (POGO) to facilitate participation by students from outside Chile. The course was on the theory and modelling of primary production at large-scales and emphasised the complementary aspects of *in situ* and satellite data, and how they can be combined to enhance and improve the applications of ocean observations. The training course was held on 21 – 31 November 2002. The morning sessions were devoted to formal lectures and the afternoon sessions to computer lab work. POGO supported two lecturers and five students from abroad (four from South America and one from South Africa). Dr. Trevor Platt (Canada), Dr. Mark Dowell (USA), Dr. César Fuentes-Yaco (Mexico), Dr. Osvaldo Ulloa (Chile), Dr. Vivian Lutz (Argentina), Mr. Gabriel Varas (Chile) and Dr. Shubha Sathyendranath (POGO) provided instruction at the training course. The training course was initiated by Dr. Osvaldo Ulloa. There were 26 students in all: 8 of them from Chile, and 18 international. The quality of the students and their level of preparation for the course, and their dedication, enthusiasm and hard work during the course, were exemplary. Many of them took the course for credit at graduate level. There is strong interest in repeating the course in the region periodically (perhaps every two or three years) given the level of interest. There were also serious discussions on forming regional alliances and regional programmes to address common problems related to infrastructure (ship, equipment) and manpower, to ensure effective follow-up to the training received.

The organisation and facilities provided by the University of Concepción for the course were excellent. The local organisers also made laudable efforts to provide lodging for the foreign students. The logistical support was great in all respects. We have a valuable partner in these efforts in the University of Concepción.

3. POGO Participation in the UdeC – WHOI Austral Summer Institute

At its second meeting in São Paulo, POGO resolved to contribute to the enhancement of existing initiatives at regional or bilateral levels, when appropriate. In this spirit POGO supported the travel of two Argentinian students to an Austral Summer Institute (ASI) organised as part of a bilateral agreement between Universidad de Concepción and the Woods Hole Oceanographic Institution. The local expenses of the Argentinian students were borne by UdeC. The ASI is a series of intensive courses on various aspects of ocean observations aimed at students from Chile, with expert instructors and lecturers drawn from Chile and the USA. Thus, POGO was able to facilitate Argentinian participation in this initiative. At POGO-3, it was decided to support the participation of five trainees from South American countries at the Austral Summer Institute in 2002. The Department of Fisheries and Oceans, Canada, has provided financial support towards this initiative. Similar support is planned for 2003.

4. POGO Co-sponsorship of SEREAD

Along with seven other organisations and programmes, POGO has co-sponsored a project called SEREAD (Scientific Educational Resources and Experience Associated with the Deployment of Argo drifting floats in the South Pacific Ocean) that has been developed to promote awareness of the Argo programme among school children in the South Pacific islands. The students will be encouraged to “adopt” a float, follow its trajectory, and study its observations. Dr. Dean Roemmich reported on the progress of SEREAD at POGO-3.

5. Advertising Existing Opportunities

The POGO web site is being developed as a site where existing opportunities for training and education in oceanography can be announced and advertised.

II. Biodiversity Initiative in South America

1. Background

The idea of a South American Biodiversity Meeting originated following a Biology Workshop held by POGO in June 2001 (Report of the Biology Workshop is available on the POGO web site). The goal of the Workshop was to have a small group of experts advise POGO Directors on what could be done by POGO to enhance biological observations (long-term, large-scale). The recommendations from the workshop were presented at the general meeting, POGO-3, in the end of November 2001. Further, during the previous POGO-2 meeting (Brazil) the need to enhance oceanographic observations in the Southern Hemisphere was discussed. Putting these two priorities together, a

workshop was proposed to facilitate enhancement of biological oceanographic observations in the Southern Hemisphere. It was further observed that the goals of POGO expressed above coincided with those of the Census of Marine Life (CoML) in promoting studies of marine biodiversity in the Southern Hemisphere. Therefore, a joint proposal was prepared and funding for the Workshop secured from the Sloan Foundation.

The workshop was held at the University of Concepción where the Chilean Government, through the National Commission for Scientific and Technological Research, has recently funded the first National Center for Oceanography. This university has, furthermore, a long tradition in the area of marine biodiversity and strong ties with other universities, both national and regional. The meeting took place in October 2002.

2. Objectives

From the point of view of interested scientists of the region, one of the main objectives of the South-American Marine Biodiversity Workshop was to learn both about the activities and goals of CoML and POGO, and about opportunities for international cooperation in new projects relating biodiversity and ocean observations.

Another major objective of the workshop was to learn about the activities of South American countries on these subjects and their national priorities. To accomplish this, a small number of key South American experts were invited to offer overview presentations. Additionally, non-South American scientists with expertise and experience in the SA marine realm were invited.

The dual strategies of the CoML to attain its goals are to develop key projects that explore unique marine habitats in particular regions and to create regional committees to support these projects and encourage CoML approaches to other habitat zones. So far, the only CoML activities in the Southern Hemisphere are in the Western Pacific region. This leads to the final objective: to identify possible new projects addressing problems of either regional (such as the Humboldt biome, and the Sub-Antarctic biome) or global (for example marine mammal migrations and South Pacific jack-mackerel migrations) relevance for the study of marine biodiversity.

Waters around South America comprise a very large marine region, for the most part still unexplored. Therefore, a regional biodiversity effort appears to be most timely, to (1) gain a precise insight on what is known and what is unknown, what is at present being done, and what is the potential for further activity regionally on the subject of biodiversity; and (2) explore how the present effort could be enhanced through both regional coordination and the participation of scientists from the developed world. New approaches have to be integrated with scientific effort and financial resources already in place.

3. Report of the Workshop

The participants from South American countries provided written papers describing the national status of efforts to monitor marine biodiversity and priorities for new initiatives. These reports (after revision) are to be submitted for publication in a Chilean Journal devoted to Marine Sciences (the *Revista Chilena de Historia Natural*).

The workshop was divided into two parts. In the first part, there were presentations from national coordinators from each of the South American Countries represented at the meeting (Argentina, Brazil, Chile, Columbia, Ecuador, French Guiana, Perú, Uruguay and Venezuela) and also from representatives of some of the existing CoML projects with interests in, and relevance for, South America. The second half of the meeting was devoted to discussions on how the South American countries could collaborate and co-ordinate new international initiatives on marine biodiversity, under the umbrella of CoML.

During the discussions, participants identified the following activities as priorities:

- (1) organising a database for storing and sharing information on marine biodiversity, along the lines of OBIS (Ocean Biogeographic Information System),
- (2) participating in and extending a few selected CoML initiatives to South American waters, and
- (3) initiating new field programmes to explore the marine environments around South America.

The quality of the papers presented was excellent. The ideas that have emerged for new initiatives are innovative, and take into account regional priorities. The participants decided to propose a small number of new and exciting projects as CoML initiatives. A SA committee for CoML has been formed. Professor Victor Ariel Gallardo, chairman of the organizing committee, will report on these activities at POGO-4.

III. Advocacy Role

1. POGO News and Information Group: POGO has a News and Information Group that is active and works on enhancing public awareness of ocean-related issues. The group was chaired first by Mr. Don Michel (CSIRO, Australia). The chairmanship has now passed on to Ms Cindy Clark (Scripps Institution of Oceanography, USA). Several participating organisations within POGO have nominated members to the POGO News and Information Group. During 2002 the group's name was changed from Media and Outreach to News and Information to reflect more accurately the group's function and expertise. The group is helping the Time Series Working Group with the creation of a Time Series Web site, and also with the creation of a Time Series Brochure. POGO web master Wendy Hunter continues to enhance the "In the News" section of

the POGO web site. The group also seeks and posts relevant material for the Documents, Fellowships, Jobs and Training, and Outreach pages of the POGO web site.

2. The São Paulo Declaration: At the second meeting of POGO in São Paulo, much of the discussion focused on the need for improved observations of the oceans in the Southern Hemisphere. Many of the challenges that face mankind today (climate change, collapsing fisheries and rising sea level, to name only a few) are global in scope. Our response to these challenges must be based on knowledge of how the world oceans act as a system. Yet, the oceans remain grossly undersampled, and the Southern Hemisphere much more so than the Northern Hemisphere. This issue cannot be addressed without recognising a geopolitical reality: most of the oceans are in the Southern Hemisphere, and most of the major economies in the Northern Hemisphere. A concerted effort at the global level is needed to solve this problem. At the meeting, a resolution was passed to adopt the “São Paulo Declaration”, which draws attention to the need for enhanced oceanographic observations in the Southern Hemisphere. This declaration has been distributed widely. It is also on the POGO web site.

In response to the São Paulo Declaration, JAMSTEC announced at POGO-3 that it was planning to organise an international circumpolar cruise in the Southern Hemisphere. This was hailed as a major initiative at the POGO-3 meeting. The cruise is now being planned as a truly international programme, under the leadership of JAMSTEC. Netherlands Institute of Sea Research (NIOZ), with international collaboration, has initiated a new project for three long-term time-series stations (two in the Indian Ocean). In the spirit of the São Paulo Declaration, the Atlantic Oceanographic and Meteorological Laboratory (AOML, USA) has initiated a new ZBT line from Cape Town to Buenos Aires.

3. POGO Brochure: A POGO brochure was prepared through the team effort of the News and Information Group. The brochure was printed and distributed in 2001. A second printing was facilitated by financial support from the Department of Fisheries and Oceans, Canada. The WOCE Programme Office was extremely helpful with mailing the brochures to some 2000 oceanographers and meteorologists.

POGO Members

- Bedford Institute of Oceanography (Canada)
- Bermuda Biological Research Station (Bermuda)
- Chilean Consortium Consisting of
SHOA (Servicio Hidrográfico y Oceanográfico de la Armada)
Universidad de Concepción
- Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Australia)
- Dalhousie University (Canada)

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- French Consortium Consisting of
- IFREMER (Institut Français de Recherche pour l'Exploitation de la MER)
- INSU (L'Institut National des Sciences de l'Univers du CNRS)
- German Consortium consisting of:
 - *AWI (Alfred-Wegener-Institute), Bremerhaven*
 - IfM (Institut of Marine Research), Kiel
 - GEOMAR (Research Center for Marine Geosciences), Kiel
- Japan Marine Science and Technology Center (JAMSTEC) (Japan)
- National Institute of Oceanography (India)
- National Oceanic and Atmospheric Administration (NOAA)
 - PMEL (Pacific Marine Environmental Laboratory)
 - AOML (Atlantic Oceanographic and Meteorological Laboratory)
 - Office of the Chief Scientist (NOAA HQ)
- Netherlands Institute of Sea Research (Holland)
- Scripps Institution of Oceanography (USA)
- P.P. Shirshov Institute of Oceanology (Russia)
- UK Consortium Consisting of
 - Southampton Oceanography Centre
 - Plymouth Marine Sciences Partnership (includes Plymouth Marine Laboratory)
 - Proudman Oceanographic Laboratory
- Universidad de São Paulo (Brazil)
- Woods Hole Oceanographic Institution (USA)

7.4.2 Ocean Studies Board, U.S. National Academy of Sciences

Ocean Studies Board, U.S. National Academy of Sciences
International Workshop on Exploration of the Seas

The SCOR Secretariat was approached by the Ocean Studies Board (OSB) of the U.S. National Research Council/National Academy of Sciences to help them plan and execute an international workshop on ocean exploration, as input to a project requested by the U.S. Congress. The OSB asked SCOR to help with:

1. Selecting a site for the workshop, including describing the advantages and disadvantages, and relative costs, of four different venues.
2. Suggesting 25 high-profile international speakers who could address the committee's statement of task and make initial contacts with the individuals selected by the committee.
3. Suggesting other participants and organizations to invite.
4. Recommending hotels and logistical procedures for registration, etc.

The SCOR Executive Committee agreed in 2001 to assist the OSB and the SCOR Secretariat accepted a subcontract from the OSB for time spent by Liz Gross working with the committee. This was not a joint project, but SCOR probably benefited from the exposure and the international ocean sciences community benefited from the opportunity to participate in the workshop. SCOR provided some support for travel of scientists from developing countries.

Although the OSB committee was primarily composed of U.S. scientists, three members were from other nations: Isao Koike (Japan), Jörn Thiede (Germany), and Víctor Vicente-Vidal Lorandi (Mexico). The committee (with substantial help from Liz Gross) created a truly international workshop, which was held at the IOC in Paris. Liz Gross, Ed Urban, and John Field attended the workshop.

The project committee produced an interim report and a final report. The final report should be available by the time of the Executive Committee meeting. The final report may contain recommendations related to a potential role of SCOR in any program that develops.