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SCOR Proceedings, Volume 38
REPORT OF THE XXVITH GENERAL MEETING OF SCOR

Table of Contents

XXVIth SCOR General Meeting

1.0 OPENING

1.1 Opening Remarks and Administrative Arrangements

The SCOR President, Robert Duce (USA), welcomed participants to the XXVIth SCOR General Meeting. Duce introduced SCOR Vice-President Shizuo Tsunogai (Japan), who organized a special joint symposium co-sponsored by SCOR and the Oceanographic Society of Japan, entitled "Our Oceanography Toward the World Oceanography." Tsunogai also hosted the General Meeting. Tsunogai introduced the Dean of the Graduate School of Environmental Earth Science, Motoyoshi Ikeda. The graduate school is dedicated to global earth sciences. Tsunogai reported that a typhoon was approaching Sapporo, but hoped that it would not affect meeting participants.

Duce reported the death of Alexei Kuznetsov (Russia), a former SCOR Vice-President, on September 9, 2002. A moment of silence was observed in memory of Kuznetzov. Duce then asked participants to introduce themselves (see Annex 1).

1.2 Approval of the Agenda

The agenda was reviewed and minor modifications made to accommodate the schedules of a few speakers. No items were added to the agenda (see Annex 2).

1.3 Report of the SCOR President

Robert Duce briefly reviewed activities since the Executive Committee Meeting in Mar del Plata, Argentina in October 2001. He and Executive Director Ed Urban continue to have frequent telephone and email communications and to meet whenever circumstances allow. Duce commented on the improved budgetary situation within SCOR, and that he was particularly pleased that there are now funds available to begin new working groups. Duce mentioned that a more detailed discussion of the budget would take place later in the meeting. He pointed out the increasing efforts to publicize SCOR and its many activities. The new SCOR brochure and guidelines for working groups are only one example. These efforts are described in more detail in the report of the Executive Director.

Duce commented on the successful and continuing development of the two new research activities jointly sponsored by SCOR and the International Geosphere-Biosphere Programme (IGBP): the Surface Ocean - Lower Atmosphere Study (SOLAS) and the Ocean Biogeochemistry and Ecosystems Analysis planning activity. Duce and Urban both attended the initial meeting of the SOLAS Scientific Steering Committee (SSC), which was held in San Francisco on 15-17 December 2001. SOLAS is now clearly off to a strong start, with activities underway or planned in 21 nations. The *SOLAS Science Plan* is now complete and can be viewed on the SOLAS Web site at http://www.solas-int.org/. The *SOLAS Implementation Strategy* will be completed by the end of 2002. The World Climate Research Programme (WCRP) has now agreed to be a co-sponsor of SOLAS. Duce and Peter Liss (UK), Chair of the SOLAS SSC, have written an article on SOLAS, which is in press in the journal *Atmospheric Environment*. Duce was invited to present the Cooper Lecture on the development of SOLAS at the Challenger Society's Centenary Meeting in Plymouth, England on 10 September 2002. Duce also Chairs the Board of Advisors for the Canadian SOLAS program, and he participated in a meeting of that body on 28-29 January 2002 in Vancouver, British Columbia.

A transition team has been formed for the Ocean Biogeochemistry and Ecosystems Analysis Planning Activity, chaired by Dr. Julie Hall (New Zealand), with Dr. Patrick Monfray (France) as Vice-Chair. The

first meeting of this group took place in Potomac, Maryland on 23-26 April 2002. An Open Science Conference for this program is currently scheduled for 7-10 January 2003 in Paris, France.
Duce attended the IOC Oceans and Coasts at Rio+10 Symposium in Paris, France on 4-9 December 2001 and presented a paper entitled "The Health of the World's Oceans." Duce and Urban also participated in the annual IOC Executive Committee meeting at UNESCO in Paris on 4-8 June 2002. At that time they were able to meet with individuals from several nations who are either Nominated Members of SCOR or who have an interest in becoming members.

SCOR played a major role in the review and evaluation of GESAMP (the United Nations Group of Experts on the Scientific Aspects of Marine Environmental Protection) during 2001, with two of the evaluation team experts (Drs. Julie Hall and S. Krishnaswami [India]) being nominated by SCOR. GESAMP has accepted the recommendations of the evaluation team and during 2002 the UN agencies have begun implementation of these recommendations. Duce attended a meeting of the UN agency representatives in Geneva, Switzerland in February to begin the implementation process. He also chaired a meeting of GESAMP in London, England on 6-10 May where further plans for implementation of the evaluation team's recommendations were considered.

The United Nations Environment Program (UNEP) is leading a feasibility study for the development of a comprehensive program for marine environmental assessment. Duce attended the initial meeting related to this effort held in Reykjavik, Iceland on 12-14 September 2001, representing both SCOR and GESAMP. He attended a second meeting of this group in Bremen, Germany on 18-21 March 2002. As this program develops, it is clear that the advice of SCOR will be needed, and it is likely that SCOR may become more actively involved in the future.

As part of a continuing effort to increase interactions between the Scientific Committee on Antarctic Research (SCAR) and SCOR in the Southern Ocean region, Robert Duce attended the XXVIIth meeting of SCAR in Shanghai, China on 14-18 July 2002. The President of SCAR, Dr. Robert Rutford, had attended the SCOR meeting in Mar del Plata in October 2001. Duce noted that SCAR meetings are organized somewhat differently from SCOR meetings. He was very pleased to be able to attend and to interact with those delegates to SCAR who also had interests in the ocean. Duce met with the SCAR Executive Committee, and they exchanged ideas on future cooperation and interaction. Both groups have agreed to continue to have representation at the annual meetings of SCAR and SCOR, and to seek more tangible areas of cooperation in the future.

Following up on the decision made at the Mar del Plata Executive Committee meeting, Urban and Duce have continued to develop plans with IOC for a SCOR-IOC International Symposium on Carbon Sequestration in the Ocean. Subsequent to discussions with the SCOR Executive Committee and IOC, Duce contacted Dr. Ralph Cicerone, Chancellor of the University of California, Irvine (USA) and a highly respected scientist and administrator, to see if he would be willing to chair this symposium. Cicerone has agreed, and currently a steering committee for the symposium is being developed in consultation with Cicerone, the SCOR Executive Committee and IOC. It is expected that the symposium will take place sometime during the latter half of 2003.

1.4 Report of the SCOR Executive Director

Ed Urban described the status of SCOR in a number of general areas. The annotated agenda included in the background book gave a summary of the various projects, which were amplified by the written reports of each group and some verbal reports at the General Meeting.

Finances—SCOR's financial situation has improved significantly from last year, due to a conservative budget approved by the Executive Committee last year and continued efforts by Secretariat staff to reduce

discretionary expenses and increase discretionary income (e.g., interest income, NOAA funding for WG 119, claiming a greater amount of allowed overhead on U.S. government grants). Japan increased to Category V membership this year and Peru and Ecuador became members of SCOR, which also has had a positive effect on SCOR finances. SCOR took the unusual action last year of not considering new working group proposals at the Executive Committee meeting. This action and others have helped stabilize SCOR's financial situation. Urban reported that he has had good success in arranging funding from new sources, while maintaining or increasing support from traditional sources.

Membership—SCOR had a good year in terms of membership. As mentioned above, Peru and Ecuador joined SCOR. Urban will continue to attempt to increase SCOR membership in Latin America, Africa, and Southeast Asia. The membership committee is considering creating a category for observer nations, so that nations with temporary financial difficulties or those wishing to learn more about SCOR can obtain some of the benefits of participating in SCOR activities, without paying full dues. The Executive Committee is considering other changes to SCOR membership policies to attract more developing country members, as well as to make dues income more predictable.

Publications—The *SCOR Proceedings* was published earlier than usual this year, in May. The SCOR Web site has been enhanced in the past year, with additions of individual pages for each SCOR project and links to related meetings, publishers of SCOR reports, and other useful sites. The Web site is the major vehicle for providing up-to-date information about SCOR to the international ocean science community. Changes are made to the site several times each week, as new information is received by the Secretariat, and the site is checked for "dead links" about once every three months.

The SCOR brochure (in English and Spanish) has been updated and is used when Urban meets with potential sponsors and potential member nations. Having some materials available in Spanish probably was helpful in gaining new member nations from Latin American countries this year. Urban asked for a volunteer to translate the brochure into French to improve SCOR's reach into African nations. SCOR was able to send copies of several SCOR reports to libraries in developing nations and received feedback that these contributions were greatly appreciated.

SCOR activities yielded a number of publications in the primary literature and other venues this year.

Poster—It was decided to produce a SCOR poster. Julie Hall volunteered to coordinate its design and production.

Meetings—Between the 2001 and 2002 SCOR meetings, three SCOR working groups met. The Scientific Steering Committee (SSC) for GEOHAB met once to continue work on its Implementation Plan. The GLOBEC SSC and its focus groups have conducted several meetings to continue working on implementing international GLOBEC activities. The JGOFS SSC is sponsoring continued regional and global synthesis activities and is on schedule to hold its final open science conference in 2003. The SOLAS SSC was approved and met for the first time in December 2001. The Ocean Biogeochemistry and Ecosystems Analysis planning activity (in cooperation with IGBP) has almost finished planning for its Open Science Conference at IOC in Paris in January 2003.

Outreach to Scientists From Developing Nations and Capacity-Building Activities—SCOR promotes the improvement of scientific capacity in developing countries and countries with economies in transition by ensuring that every SCOR working group and other activity includes scientists from such countries. SCOR also (1) administers a grant from the U.S. National Science Foundation to provide travel support to scientists from such countries to attend scientific meetings, (2) participates with POGO and IOC in

supporting a program of visiting fellowships for oceanographic observations, and (3) is developing an activity to promote regional graduate schools of oceanography and marine environmental sciences. Urban stated his hope that, in the future, additional funding can be arranged for capacity-building activities from other countries besides the United States, and from charitable foundations.

Partnerships With Other Organizations—SCOR's existing partnerships could be strengthened by better communication among partners about expectations, roles, responsibilities, and institutional capabilities and restrictions of each partner. On some topics, SCOR and other organizations may be missing important opportunities because the topics fall between the mandates of the various organizations. Maintaining existing partnerships and developing new ones will depend on SCOR having the ability to commit funding to joint activities. SCOR has made progress in new partnerships with SCAR and SCOPE.

Staffing—Elizabeth Gross continues to manage many different financial aspects of SCOR, including the audit and reimbursements from sponsoring agencies and organizations. She is also working on the logistics of several large meetings for SCOR, using project funds, rather than SCOR discretionary funds. Urban continues to manage the Secretariat, evaluate how SCOR operates, works on revising the Web site, works on new initiatives (SOLAS and Ocean Biogeochemistry and Ecosystems Analysis), pursues new funding for SCOR activities, and focuses on more strategic financial issues. Wesley Anne Ross assists Urban and Gross in their activities and handles most routine correspondence with national committees and working group members. She also is responsible for handling most income and disbursement transactions.

SCOR's Visibility in Member Nations and Internationally—SCOR often is not acknowledged adequately in publications that result from SCOR activities and in joint projects with other organizations. Knowledge of SCOR and its activities in member nations often does not extend beyond the few scientists who have been or are involved in SCOR activities, resulting in government policymakers deciding to quit paying dues to SCOR because they don't think any of their country's scientists are involved in SCOR. SCOR's long-term reputation and financial health depend on ensuring that its investments of finances and volunteer and staff time are acknowledged. This is a long-term issue that will require constant attention. The SCOR Executive Committee will devote its attention to this issue in the coming year and will attempt to publicize SCOR's activities in national and international forums. Urban will continue to seek opportunities to publish articles about SCOR in various places (e.g., the article he wrote for *EOS* and the article that he and Robert Duce wrote for the *IGBP Newsletter*). Urban has also started to meet with national SCOR Committees when he travels, to improve linkages between these committees and the SCOR Secretariat.

Urban summarized his comments by saying that SCOR faces a bright future in continuing its major role in bringing together ocean scientists from many nations to cooperate in planning international research, identifying important ocean science issues, and building capacity in the ocean science communities of developing countries and those with economies in transition. SCOR possesses unique capabilities that it contributes to its non-governmental and intergovernmental partners.

Richard Stoddart (Canada) praised the meeting book and John Field (South Africa) thanked Urban for the "exemplary" way in which he runs the office.

1.5 Announcement of 2002 Election Results

John Field explained the need for scientific and geographic balance on the Executive Committee, as well as reasonable gender representation. These criteria make an election a complex process, which Field reviewed. Field reported that Roberto Purini (Italy), Laurent Labeyrie (France), and Akira Taniguchi (Japan) were elected as Vice-Presidents of SCOR for 2002-2004 (see Annex 3). Purini will be serving his second and final two-year term. No nations requested an official vote (i.e., the recommendations of the Nominations Committee were accepted). The Executive Committee accepted the recommendations of the Nominations Committee that SCOR co-opt Ilana Wainer (Brazil) and Andrei Zatsepin (Russia) for better geographic balance and gender representation.

1.6 Appointment of an Ad Hoc Finance Committee

Robert Duce reviewed the function of the Finance Committee. Ilana Wainer (Chair), Birger Larsen (Denmark), and Akira Taniguchi agreed to serve as the Finance Committee and to report back by the end of the meeting.

1.7 Appointment of an Ad Hoc Committee to Review the Disciplinary Balance of SCOR's Activities

John Field, Roberto Purini, and Laurent Labeyrie were appointed to continue the analysis of the disciplinary balance of SCOR activities that they began at the 2001 Executive Committee meeting.

2.0 WORKING GROUPS

2.1 Disbanded Working Groups

WG 93—Pelagic Biogeography

This working group was not on the agenda for discussion, but the group's chair, Annelies Pierrot-Bults (The Netherlands) reported that the dictionary of terms has not yet been published, because they have not been successful in finding translators of the terms into Japanese, Russian, German and French. The Spanish translation is completed and could be published. Publication on the SCOR Web site could provide a temporary solution.

2.1.1 WG 103—The Role of Wave Breaking on Upper Ocean Dynamics

The group was disbanded at the 2001 Executive Committee Meeting, with the understanding that its members still owe SCOR a review paper at some point in the next few years, with appropriate acknowledgement of SCOR's contribution to the activity. A letter was sent to the working group, thanking them for their service and reminding them of their obligation.

2.1.2 WG 106—Relative Sea Level and Muddy Coasts of the World

Forty copies of the report of this working group were distributed to libraries in developing nations in 2002. The group was disbanded and thank-you letters sent to the chairs and members.

2.1.3 WG 107—Improved Global Bathymetry

The group's report was to be published in the IOC Manuals and Guides series in 2002. The group was disbanded and thank-you letters were sent when after the report was published on the Web.

Laurent Labeyrie had been tasked at the 2001 Executive Committee meeting to review the WG 107 report and to recommend whether SCOR should plan additional activities related to ocean bathymetry. Labeyrie reported that the group's work was mostly conducted in 1997, but the technology in the field has changed a great deal since then, so the report is out of date. The sections of the report vary in quality. The primary message of the report is that there are many large gaps in bathymetric data sets; many means of filling the identified data gaps are suggested. The report offers 34 recommendations, without suggestions as to how the recommendations could be implemented.

Labeyrie recommended that SCOR and IOC should draft some recommendations to relevant agencies. Altimetry will not fill the data gaps and cannot replace the information about sediments available from classical bathymetry. Perhaps an individual could be identified to develop a summary of the report (e.g., a post-doctoral fellow who could be paid to do this) and prepare a short paper for *EOS*. The major problem related to global bathymetry is that the gridded data sets sold by the U.S. National Geophysical Data Center (NGDC) are very difficult to use for making maps for most people using normal computers. Only one public domain software program in available, but it is not compatible with the NGDC data format. In remote areas, the General Bathymetric Chart of the Ocean (GEBCO) maps have included almost any data without quality control. WG 107 addressed this issue. Fernando Mingram (Chile) reported about the International Bathymetric Chart of the SE Pacific group met in Chile one year ago. This is a regional effort with IOC support. Mingram urged that SCOR stay involved in this topic because the SE Pacific region needs scientific guidance. John Field suggested that SCOR work with IOC to implement both of Labeyrie's recommendations (development of a summary article and preparation of a letter on the software problem). A subgroup was formed to work during the meeting and to report back later to recommend how SCOR should proceed. The subgroup was chaired by Labeyrie and members included Birger Larsen, Leonardo Mingram, Rodridgo Nuñez (Chile), and Umit Unluata (IOC). This subgroup agreed with Labeyrie's suggested approach and recommended that the working group chair should be advised that the report should not be published. [It was learned soon after the meeting that the Working Group's report was published. A short article in *EOS* is planned.] It is, however, important that SCOR make known the need for more and better bathymetric data. SCOR will draft a letter to the agencies on the issue of bathymetric data.

2.1.4 WG 110—Intercomparison and Validation of Ocean-Atmosphere Flux Fields

Two reports were produced from this working group. One (WCRP-112) preceded the workshop and another (WCRP-115) documents the workshop. The working group was disbanded and thank-you letters sent. Discussion has begun regarding continuation of work on this topic in a joint activity between SOLAS and WCRP.

2.1.5 WG 117—Synthesis of Decadal to Millennial Climate Records of the Last 80ky Years

The working group's report was published as a special issue of *Quaternary Science Reviews* in May 2002. The working group was disbanded, and the co-chairs and members were thanked for their service.

2.2 Current Working Groups

The Executive Committee Reporter for each working group presented an update on working group activities and progress and made recommendations on actions to be taken. Meeting participants made preliminary suggestions, based on the progress of working groups and the merits of the requests, whether funding should be provided for 2003 activities of each working group. The Finance Committee took into account the meeting discussions as it developed the 2003 SCOR budget, which was then subject to final approval by meeting participants.

2.2.1 WG 108—Double Diffusion

The Executive Committee Reporter, Roberto Purini, reported that the working group's tasks have been achieved. He suggested that there should be a link in the membership between this working group and the new one on deep-ocean mixing (WG 121). A special issue of *Progress in Oceanography* will be published from this group's activities in 2003. The Executive Committee determined at its 2001 meeting to disband the group after the special issue is published.

2.2.2 WG 109—Biogeochemistry of Iron in Seawater

Shizuo Tsunogai, the Executive Committee Report for this working group, reported that this group was established five years ago and that its activities have been progressing effectively. The main task, the book titled *Iron Biogeochemistry in the Ocean*, is complete. A subgroup on iron standards was set up at the Amsterdam General Meeting (1998) and met at the 2000 Ocean Sciences Meeting in San Antonio, Texas; an intercalibration of standards was underway at the time of the 2000 SCOR General Meeting. SCOR approved funding for a meeting in 2002 to discuss the results of the intercomparison and determine how these results will be published. The subgroup (chaired by Jim Moffett, USA) is planning to hold its meeting in December 2002, to coincide with the Fall Meeting of the American Geophysical Union in San Francisco. The results of the analysis intercomparison demonstrated that a great deal of variability exists among the measurements by different laboratories. The subgroup will make recommendations about what to do next.

2.2.3 WG 111—Coupling Winds, Waves and Currents in Coastal Models

Roberto Purini, the Executive Committee Reporter for this group, reported that this group will examine the relationship between wave motions, coastal dynamics and atmospheric dynamics in models and will produce a review volume. The group is developing a book tentatively entitled *Coupled Coastal Wind-Wave-Current Dynamics*, which they hope will be published by a leading publisher within two years. The book outline is good, although he sees some possible overlap with the WG 101 publication. The group plans to convene a meeting of authors of the book later this year in Goa, India, for its final meeting. The U.S. Minerals Management Service and the U.S. National Aeronautics and Space Administration fund the group's activities.

2.2.4 WG 112—Magnitude of Submarine Groundwater Discharge and its Influence on Coastal Oceanographic Processes

Robert Duce, Executive Committee Reporter for this working group, reported that this has been a very active group and it has raised awareness of the importance of groundwater input to the ocean. Several publications are in preparation and the group is participating in a Gordon Research Conference planned by WG 114 for 2003. SCOR budgeted a small sum in 2002 as the final support for this group. The planned products include a special issue of the journal *Biogeochemistry* in 2003, and a chapter in the synthesis book for the Land-Ocean Interactions in the Coastal Zone (LOICZ) project. The LOICZ synthesis meeting took place in May 2002 and the working group conducted another intercomparison experiment (in Long Island, New York) in June 2002. At Paola Rizzoli's suggestion, following the 2001 Executive Committee meeting, SCOR supported a proposal for funding of an IAHS/IAPSO Commission on Groundwater-Seawater Interactions and the proposal was accepted. Duce clarified that the joint IAHS/IAPSO Commission approved last year will be supported by IUGG and will not involve SCOR. Meeting participants agreed that the working group be disbanded when its publications appear.

2.2.5 WG 113—Evolution of the Asian Monsoon in Marine Records: Comparison between Indian and East Asian Subsystems

Laurent Labeyrie, the Executive Committee reporter for the working group, reported that the final meeting of the group took place in September 2002. Labeyrie reviewed the series of meetings that the

group organized. The aim of the group is to separate winter and summer monsoon variability all along East Asian coast. Labeyrie anticipates no problems with the working group and suggests that they be encouraged to finish up as soon as possible. He suggested that the group may need some additional funds for an editorial meeting, but that such funds might be available from IMAGES. Labeyrie also suggested that more work is needed, including better links with CLIVAR and PAGES. He feels that SCOR will have to come back to this topic at a later date.

Marine Geology has agreed to publish a special volume of the papers contributed to the working group's second workshop, in late 2002 or early 2003. The volume from the previous symposium is behind schedule because of a serious illness of the group member responsible for the document, but the working group chair has recently assumed responsibility for the publication.

2.2.6 WG 114—Transport and Reaction in Permeable Marine Sediments

Shizuo Tsunogai, the Executive Committee Reporter for the group, reported that the working group was formed in 1998. Its first activities have concentrated on the submission and organization of a proposal for a Gordon Research Conference on Transport and Reaction in Permeable Sediments, to be held in conjunction with WG 112 in 2003. This proposal was approved in early 2002 and the group spent the remainder of 2002 organizing the conference programme and selecting session chairs and potential speakers. The group requested a small amount of funds for their Web site in 2003, plus some support for one or two developing country scientists to attend the Gordon Research Conference. Bill Burnett (USA), co-chair of WG 112, and Bernard Boudreau (Canada), co-chair of WG 114, will be the introductory keynote speakers and will explain the role of SCOR in promoting research in permeable marine sediments. Many members of both WG 112 and WG 114 have also been selected as session chairs and keynote speakers.

2.2.7 WG 115—Standards for the Survey and Analysis of Plankton

Julie Hall, the Executive Committee Reporter for this working group, reported that the group has made a good start and have developed an important linkage with WG 118. They are developing a Web site to be hosted by Sir Allister Hardy Foundation for Ocean Science. Hall urged national representatives to make people in their countries aware of the group and its Web site.

The working group met for their first time immediately after the AGU/ASLO Ocean Sciences meeting in February 2002. The group is working on developing a Web site and (1) creating an inventory of major global plankton databases, including sampling methodologies; (2) creating a manual of standard operating procedures for continuous plankton recorders; and (3) beginning the plan for an international symposium to encourage use of long-established surveys and application of new strategies for large-scale and long-term sampling of plankton.

The group has requested assistance in identifying a new member from the Pacific region. Alex Bychkov, the PICES representative, was asked for suggestions. Jorma Kuparinen (Finland) suggested an Associate Member that could be added to the working group, since Finland has a time series of plankton recording on one of their Baltic Seas ferries. Hong Huasheng (China) and Richard Stoddart also will suggest potential new Associate Members for the working group.

2.2.8 WG 116—Sediment Traps and ^{234}Th Methods for Carbon Export Flux Determination

Shizuo Tsunogai, the Executive Committee Reporter for the working group, reported that the group is comparing the two methods of determining carbon fluxes. Tsunogai thought the budget request for 2003 may be a bit low, and an increased budget was approved. The working group was asked not to meet in 2002, because of SCOR budget limitations. They propose to meet in Xiamen, China in May 2003.

Graham Shimmield (UK) asked why some of the other methods to determine export fluxes (he mentioned two or three) were not being addressed by the group. Given the results of the iron experiments and the need to understand methods for estimating carbon flux, the working group should include the newer methods. The field has progressed since the group was set up. John Field responded that the group needed to be focused.

2.2.9 WG 118—New Technologies for Observing Marine Life

Julie Hall, the Executive Committee Reporter for the working group, reported that many of the technologies being examined by the group are emerging and exciting and that their meeting in Mar del Plata was very interesting. The group will decide at its Lima, Peru meeting the form of its final product, which may include a written report and/or a Web-based summary of available technologies. Ilana Wainer suggested that the group produce a CD-ROM version of their final product also. Graham Shimmield suggested that the group should address fluorometric techniques for detecting phytoplankton.
One of the group co-chairs attended the WG 115 meeting in Hawaii to establish cooperation between the groups. The group plans to meet next in October 2002 in Lima, Peru to (1) review technical aspects of South American Census of Marine Life activities; (2) discuss technical areas not covered at previous working group meetings (genetics, zooplankton acoustics, marine mammal research, and phytoplankton); and (3) begin developing their final product. The group is funded by the Alfred P. Sloan Foundation and has adequate funds for their proposed activities.

2.2.10 WG 119—Quantitative Ecosystems Indicators for Fisheries Management

John Field, the Executive Committee Reporter for the working group, reported that the group is trying to anticipate the needs for responsible fisheries management, by developing indicators of the state of ecosystems and the effects of fishing on the systems. Field reviewed the group's terms of reference. The group met first a year ago in conjunction with an FAO conference on responsible fisheries management. Various Task Forces were established at that meeting and they are working in parallel. The group has an informative Web site. Field noted that there is some pressure from FAO to address social issues by identifying appropriate social and economic indicators; one Task Force is looking at this topic. But the Executive Committee meeting in Mar del Plata requested that the group not dilute their efforts on such indicators. Ed Urban and John Field were asked to communicate this information to the co-chairs. The working group will meet in Cape Town, South Africa in December 2002 to report on the progress of its "Task Forces" and to plan its large workshop for Paris in mid-2004. The U.S. National Marine Fisheries Service will contribute $20,000 for the group's activities to complement IOC funding for the group. The group will not require any SCOR discretionary funds.

2.2.11 WG 120—Marine Phytoplankton and Global Climate Regulation: The *Phaeocystis* Species Cluster As Model

Julie Hall, Executive Committee Reporter for the working group, reported that one purpose of the group is to coordinate ongoing activities and develop cohesion in the research community. The group is examining the processes regulating gas production by *Phaeocystis* blooms. The members will be developing a series of chapters or papers to address the group's terms of reference. The second meeting will identify and address gaps in knowledge and how research should proceed. One gap in membership identified at the first meeting was in climate modeling. The group has now made contacts to draw in this expertise. The group is developing a Web site to be hosted at the Netherlands Institute for Sea Research. Laurent Labeyrie asked if this group could be co-sponsored (and co-funded) by SOLAS. Ilana Wainer suggested that an Associate Member with expertise in the South Atlantic Ocean be added to the group and will propose such a member.

The working group's first meeting was held in March 2002 at the University of East Anglia in Norwich, UK. Peter Liss (UK) attended the meeting to represent SOLAS, which has interests related to this group. The WG 120 chair attended the June 2002 SOLAS meeting of national representatives. The working group will meet in Savannah, Georgia (USA) in 2003 to identify knowledge gaps and research priorities on their topic because there is a large research group in Savannah working on *Phaeocystis*.

2.3 New Working Group Proposals

2.3.1 Mechanisms of Sediment Retention in Estuaries

A version of this proposal was presented at the 2000 General Meeting and the proponents were asked to revise and resubmit the proposal. Many comments were received from national committees on the revised proposal. Laurent Labeyrie, the proposal monitor, noted that the version of the proposal reviewed by national committees had a nice introduction, followed by a wish list of things to do, with well-defined terms of reference. The idea of the group is to look in much more detail at sediment processes in lower estuaries, and the impacts of various processes, such as changing sea level. The proponents were asked to revise the proposal; the revised proposal was received just prior to the meeting, so most of the comments from national committees were based on the previous version of the proposal. Labeyrie had been in direct contact with one of the proponents, especially in relation to links of the proposed group to LOICZ, which did not seem (in previous contacts) to be interested in the activity. Ed Urban noted that Hartwig Kramer from LOICZ would be attending the meeting later and could be approached about LOICZ participation in the activity. Wendy Broadgate reported that this proposal is strongly relevant to LOICZ II and that five of the proposed working group members are either on the LOICZ Scientific Steering Committee or may be asked to join it.

The new proposal is much more focused, and most of their interest seems to be in upper estuaries where the water is not saline, but tidal effects are still felt. The proposal does not include interactions with the ocean *per se*. Labeyrie asked whether this is appropriate for SCOR. Interfaces are important places to work, but SCOR should not work alone on this topic. The group needs to link with a group of hydrologists or hydrodynamicists. It is not yet clear how this group would really advance the field. The proposal is still too vague and needs redefinition.

Birger Larsen reported that the Danish SCOR Committee agrees that it is a good idea to pursue this topic through a SCOR working group. But the level of understanding in modeling is not well advanced in the proposal. The proposed membership is biased to North America; some members are well known, but not for estuarine studies. The Danish SCOR Committee will propose a member. Richard Stoddart reported that the Canadian SCOR committee believes that there is value to a working group on this topic, which is important on local and global scales. The linkage to LOICZ is important. Stoddart stated strong support for the inclusion of physical and biogeochemical models of estuaries. The proposal should include an opportunity for a larger group to participate via a symposium, to entrain the broader scientific community. The Canadian SCOR committee believes that the overall goals of the proposal are too broad and need redefinition. They think the proposed membership is acceptable and suggest re-submission.

John Field reported that the South African SCOR Committee believes that the topic is important, but they note that vegetation as an important aspect of sediment retention is not in the proposal.
Shiro Imawaki (Japan) reported that IAPSO strongly supports this proposal due to its importance for wetlands. Rolf Bak (The Netherlands) reported that the Netherlands SCOR Committee thinks that this is an important topic, but the role of biology and organisms that are important in estuaries is not included. The approach is geomorphologic. Julie Hall reported that the New Zealand SCOR Committee believes

that the concept is good, but perhaps the proposal is too broad. It covers an important scientific question. The lack of biology was noted. Björn Sjöberg (Sweden) reported that the Swedish SCOR Committee generally approved the proposal, but believes it should include consideration of areas with isostatic uplift, non-tidal seas, and variability in sea level. The new proposal seems to retain an approach that is very broad.

Robert Duce summarized by stating that it is obvious that the national committees believe that this is an important topic. But many of the original problems remain in the second draft of the proposal. Rather than waiting another year for approval, Duce appointed a sub-committee (Laurent Labeyrie, Birger Larsen, John Field, and Huasheng Hong [China-Beijing]) to develop more specific suggestions for revisions to the proposal and submit a revised proposal that the Executive Committee could review before the 2003 Executive Committee meeting.

Labeyrie noted that the membership should include more young scientists who are at forefront of research and modeling; it now includes too many senior people. Akira Taniguchi will provide a recommendation of a young scientist from Japan for the working group. Leonardo Mingram proposed a Chilean physical oceanographer. Huasheng Hong noted that the Chinese scientist proposed for the group is a good young scientist who is involved in Chinese LOICZ and is a member of the international SSC. Duce stated that three members from the United States are too many. Julie Hall proposed a New Zealand scientist for the group. Labeyrie will be responsible for continued work with the proponents and the proposal. The proposal should include a major publication and a summary article in *EOS* or a similar publication. It should also include a clear link to LOICZ. The proposal will be considered by the Executive Committee before the 2003 SCOR Executive Committee meeting.

2.3.2 Working Group Proposal on Deep-Ocean Mixing

Roberto Purini, the proposal monitor, introduced the proposal (see Annex 4) by explaining that mixing processes in the ocean have different origins, such as wind stress, heat fluxes, and breakdown of internal waves. Mixing in the deep ocean is thought to be an important process, but better understanding and parameterization of this process is needed for physical models, including climate models. The general view of the national SCOR committees is that the terms of reference are appropriate, as is the membership. Some suggestions of additional members and terms of reference were received from National Committees. Rolf Bak stated that the Netherlands SCOR Committee believes this is a good proposal and that the committee had proposed a name for membership. The Netherlands SCOR Committee suggested that use of transient tracers to study deep-ocean mixing be addressed. Shizuo Tsunogai noted that chemical tracers are powerful tools for studies of ocean mixing and that each tracer has special characteristics. He supported the involvement of a tracer chemist in the group's activities. The Swedish SCOR Committee suggested two modifications, including the need to understand small-scale mixing in fjords and other semi-enclosed basins and to include two additional scientists who work on mixing in fjords and in the Baltic Sea. Shiro Imawaki reported that IAPSO approves the proposal and recommended Toshiyuki Hibiya as a Full Member of the working group. Ilana Wainer and John Field tried to develop nominations from their nations for a developing country scientist, but could not identify an appropriate individual.

Richard Stoddart reported that the Canadian SCOR Committee supports the proposal very strongly, but the timing was of concern. The proponents should be asked to come up with a work plan that would include an international workshop by 2004, with the objective of producing a monograph by 2006 as its final deliverable. The monograph could be presented to the 2007 IUGG Symposium to ensure wide dissemination of results. Robert Duce suggested that the report be presented at the IAPSO/IABO Assembly in 2005. Graham Shimmield noted regarding the first proposed term of reference that there is

not much historical data available, although a joint UK–Norway program will generate such data over the next few years.

Robert Duce noted that the consensus was to approve this proposal and include funding in the 2003 SCOR budget, if possible. SCOR and IAPSO have submitted a proposal to the U.S. Office of Naval Research to support this working group. Duce added that the priority of the two working group proposals should be discussed, in case the ONR funding doesn't come through for the group on deep-ocean mixing. SCOR cannot fund both groups from its discretionary funds in 2003. Labeyrie pointed out that last year's disciplinary balance group indicated a need to add some groups on physical oceanography, as some existing groups finish their work.

Björn Sjöberg ranked the deep-ocean mixing working group as higher priority. Umit Unluata noted that mixing is not only related to climate change, but also is relevant to protection of deep-sea ecosystems. Labeyrie added that paleoceanographers need better quantification of parameters involved in variability of deep-water transport. However, Birger Larsen noted that the estuarine sediments activity may be more important for social needs. Duce added that this is especially true in the short term. Duce reminded the participants that, pragmatically, only one proposal is ready to proceed (the proposal on deep-ocean mixing), whereas the other one will need some revision. The prospects for ONR funding are excellent. In this case, it's likely that both groups could be started. Unluata mentioned potential interest of the international Sea Bed Authority as a supporter of the deep-ocean mixing proposal. The decision was thus to give the deep-ocean mixing proposal higher priority for funding in 2003. If funding for this proposal is obtained from external sources and the estuarine sediments proposal is modified appropriately, it could also be started in 2003. The deep-ocean mixing group will be SCOR WG 121 and Roberto Purini will be the Executive Committee Reporter for the group.

Ed Urban raised some general issues about working groups. The Executive Committee discussed the proposal process and thinks that the call for proposals should go out much earlier each year, to give more time for the review and revisions of proposals in better time for the SCOR meeting. Björn Sjöberg noted that the format of the two proposals is quite different and inquired whether there is a specified format. Urban replied that there are proposal preparation guidelines on the SCOR Web site and that the deep-ocean mixing proposal may be used as a model for future proposals. Urban continued by noting that he can discuss funding with U.S. agencies when he knows that a topic is being proposed. He does not have the same kinds of contacts in other countries and urged national representatives to help him find funding for working groups from other countries. Labeyrie responded that this is a good idea but that the funding process in some countries (e.g., France) takes too long to be useful for a short-term working group.

2.4 The Disciplinary Balance Among SCOR Working Groups

As an action item from the 2001 Executive Committee meeting, a letter was sent to all working group chairs from 1980 to 2000 (WG 66 to WG 105), requesting their feedback about the outcomes of their working group's activities. The answers that had been obtained at the time of the meeting (14 working groups of 38 possible) were included in the meeting background book.

Laurent Labeyrie reported that the disciplinary balance among the working groups is still acceptable and has not significantly changed from last year. The same group will look at the responses from past working group chairs on the contributions of their groups to marine science, when more responses have been received. Ed Urban was asked to continue to attempt to collect the missing responses.

3.0 LARGE-SCALE OCEAN RESEARCH PROJECTS

3.1 Committees

There has been a trend of the SSCs of the large-scale ocean research projects to evolve a small core SSC with the chairs of project working groups serving as ex-officio SSC members. JGOFS follows this procedure, GLOBEC is moving in this direction, and LOICZ is proposing to establish such a structure. This approach results in two negative consequences: (1) SCOR and IGBP have approval authority over a smaller proportion of the de facto SSC membership and (2) the core SSC members that SCOR and IGBP would approve may not be balanced appropriately. To avoid both of these potential problems, SCOR requests that the joint projects consider when appointing both core SSC members/Executive Committee and ex-officio members, the following factors: disciplinary balance, geographic balance, gender balance, and a reasonable rotation schedule. The SCOR Executive Committee believes that this approach would be preferable to requiring all working group chairs to be approved by the co-sponsors. SCOR transmitted these views to IGBP.

3.1.1 Joint Global Ocean Flux Study Scientific Steering Committee

JGOFS has a variety of synthesis activities underway and its SSC met in September 2002 in Chile, the week before the SCOR General Meeting. The annual report from JGOFS is given in Annex 5. Their final Open Science Conference will be held in Washington, D.C. in May 2003.

John Field, the Executive Committee Reporter for JGOFS, reviewed the status of the project. It is making good progress toward synthesis. Wendy Broadgate had just come from the JGOFS SSC meeting in Chile and reported that the SSC meeting was a great opportunity to interact with scientists in Chile. The final synthesis book went to press the week before the SCOR General Meeting (there will not be a report from the final open science conference). All the JGOFS synthesis groups are producing their final products. A lot of effort is being devoted to preparing JGOFS legacies and input of ideas for new projects. JGOFS will send a good contingent to the OCEANS Open Science Conference. At the JGOFS Final Open Science Conference, various products will be available (e.g., data CD-ROMS). In regard to the closing of the JGOFS International Project Office (IPO), since there is not a new IPO for OCEANS yet, the question was raised about what will happen to the inventory of publications, mailing lists, Web site, and other IPO legacies? All this needs to be handed over and cared for somewhere. It's not clear how this can be handled, but it is an important problem. Urban was asked to contact the JGOFS IPO to find out what is involved in preserving the JGOFS legacy and consider solutions. The other important ongoing problem is the data management and data archiving. JGOFS has struggled to get funding for this. Not all the data have been submitted; JGOFS is still dealing with the problems and has written a document about data management to try to provide their experience for the future and for new incoming projects.

Field continued by noting that no changes in SSC membership are proposed at this time and that SCOR support for JGOFS comes from a SCOR grant from the U.S. National Science Foundation. Field noted that JGOFS should be congratulated at the appropriate time. JGOFS will be invited to make a formal final report at next year's SCOR meeting.

3.1.2 SCOR/IGBP/IOC Committee on Global Ocean Ecosystem Dynamics (GLOBEC)

GLOBEC was in the midst of final preparations for its 2nd Open Science Meeting (OSM), which was to be held in Qingdao, China in October 2002. GLOBEC's annual report is given in Annex 6. Many of the 2002 activities of GLOBEC and its subgroups will center around the Open Science Meeting. SCOR was awarded extra support for the meeting from the U.S. National Oceanic and Atmospheric Administration ($25,000 for the costs of publishing the report from the meeting and as much as $10,000 additional

funding for U.S. individuals to attend) and the National Science Foundation ($25,000 for travel expenses). The 2002 GLOBEC SSC meeting will be held in conjunction with the OSM in Qingdao and the 2003 SSC meeting will be held in Banff, Canada in June in conjunction with the IGBP Congress.

John Field made his final report as Executive Committee Reporter for GLOBEC, since he has joined the GLOBEC SSC and cannot continue as reporter. (The new Reporter will be Akira Taniguchi.) Field made a PowerPoint presentation prepared for him by Manuel Barange, the GLOBEC Executive Officer. He reviewed the goals of GLOBEC, participating countries, its major components, research highlights and challenges, plans for the OSM and other future meetings, GLOBEC databases, and the 2002 finances. Field reported that GLOBEC is more relevant to policy than ever. The main action is to consider GLOBEC's nomination for chairmanship of the SSC, Francisco Werner, as well as two new SSC members (Qisheng Tang [China-Beijing] and Jeff Runge [USA]).

Ilana Wainer expressed concern about data management issues, particularly in relation to the physical data from the Atlantic Meridional Transect (AMT) program, for which GLOBEC will now bear some responsibility. Data from the transect are important for use for climate studies. Field promised to pass on this concern to GLOBEC and those responsible for the AMT program. Laurent Labeyrie noted that GLOBEC has for several years tried to make links to the IMAGES activity of PAGES. IMAGES has not been as responsive as it should be, probably because fisheries is not really within their area of expertise and IMAGES links to biology are not good. However, Keith Alverson, the PAGES Executive Officer, will be participating in the GLOBEC Open Science Meeting. The IMAGES office will move to Bremen and the new director is very interested in the links between physics and biology in paleoceanography. Field agreed to deliver this message to the GLOBEC SSC in Qingdao. Graham Shimmield noted that pressure is increasing on deep-sea fish stocks at the same time that the complexity of deep-ocean ecosystem dynamics is recognized. Shimmield asked if GLOBEC has addressed deep-sea fisheries issues. Field responded that he didn't think so and that GLOBEC is not a fisheries program *per se.* Wendy Broadgate added that Focus 4 of GLOBEC is just starting and could potentially consider topics such as this. Robert Duce sought the sense of the meeting participants regarding approval of Francisco Werner as the new GLOBEC Chair. The consensus was to approve this change, as well as the addition of Jeff Runge and Qisheng Tang to the GLOBEC SSC. Duce noted that the GLOBEC SSC membership is being reduced.

3.1.3 SCOR/IOC Program on Global Ecology and Oceanography of Harmful Algal Blooms

Julie Hall, the Executive Committee Reporter for GEOHAB, reported that the SSC had finished the GEOHAB Science Plan and is working on its Implementation Plan (see Annex 7 for the GEOHAB report). Implementation will be difficult because there are many national programs with many different interests. It may be difficult to attract and combine the best science from participating nations. Hall expressed concern about the time being taken for the Implementation Plan and asked for a time frame for its completion. Ed Urban responded that the GEOHAB SSC has actually proceeded more rapidly in completing its documents than have the other major ocean research projects. A timeline will be developed at the next SSC meeting.

The GEOHAB SSC met in Finland in May 2002 to work on its *Implementation Plan*. The local costs of the meeting were funded by the Nessling Foundation and the airfares paid by IOC. In addition, a modeling subcommittee (chaired by Wolfgang Fennel) met in April 2002 to begin work on the modeling section of the *Implementation Plan.* Four members of the GEOHAB SSC were rotated off the SSC at the end of 2001, and one new member added in 2002 (Leonardo Guzman from Chile). Roughly one-third of the members will be rotated off the SSC each year. Urban has been working with his counterpart at IOC

to develop nominations for new members beginning from the end of 2003. This community is inexperienced in dealing with global programs and needs experience from other programs.

The SSC is still seeking a physical oceanographer to replace a retiring member of the SSC.
Hall noted that funding continues to be a serious problem, especially for an IPO. Some discussions have been going on with Canada regarding seconding an Executive Director to an IPO in France. The Canadian decision depends on results of proposals for funding of a Canadian national GEOHAB program. The GEOHAB chair, Patrick Gentien, has raised funds for some GEOHAB activities from French sources. Alexander Bychkov, PICES Executive Director, asked Hall to pass on to GEOHAB the new PICES report on HABs in the Pacific region.

Funding for international GEOHAB activities are derived from 4 sources: NOAA, NSF, IOC, and France. There has also been some in-kind support in the form of national support for local meeting expenses, from China, Finland, France, and Mexico. The basic funds are in hand to finish the *Implementation Plan*, but the issue of IPO funding is getting critical.

Huasheng Hong noted that the Chinese GEOHAB program (CEOHAB) is funded and very strong.
Annelies Pierrot-Bults informed meeting participants that the UNESCO Center for Expert Taxonomic Identification has just issued a CD-ROM on HAB species.

3.1.4 SCOR/IGBP/CACGP/WCRP Surface Ocean-Lower Atmosphere Study

Robert Duce, the retired Reporter for the SOLAS activity, reported that the SOLAS SSC met for the first time in December 2001 and that he and Ed Urban attended the meeting (see Annex 8 for the annual SOLAS report). Its *Science Plan* is completed and is available on the SOLAS Web site (www.solas-int.org). The next step is development of the *SOLAS Implementation Strategy*; this is ongoing, to be completed at the next SSC meeting in November 2002. SOLAS held a meeting of the SOLAS SSC Executive Committee in mid-June in Amsterdam. This meeting was preceded by a meeting of national SOLAS representatives. The funding obtained from ICSU for 2002 was used to pay for non-SSC members to attend this meeting. The SSC will hold its next full meeting in November 2002 in Gif-sur-Yvette, France to complete its *Implementation Strategy*. The SSC's 2003 meeting will be held in Banff, Canada in conjunction with the IGBP Congress.

There is a proposal to the National Environment Research Council in the United Kingdom that includes funding for an IPO there. The success of this approach is very uncertain and may result in a short-term solution. SOLAS has four sponsors with different levels of commitment: SCOR, IGBP, WCRP, and CACGP. SOLAS seems to be getting increasing attention in the atmospheric chemistry community. Canada is the most advanced of all national programs, with funded research cruises already accomplished. Several other countries are developing proposals for funding national programs. SOLAS has a variety of implementation activities scheduled for 2003, including a SOLAS Summer School. Ed Urban highlighted two upcoming major SOLAS events: (1) a SOLAS Summer School in 2003 (for which SCOR support for developing country participants has been requested) and (2) a SOLAS Science Meeting in Canada in 2004.

IGBP II projects have been requested to create Implementation "Strategies" rather than Implementation "Plans" (as produced by previous projects), to avoid a multi-year process between the two documents and allow a more evolutionary implementation process for the new projects. SOLAS will produce a combined *Science Plan/Implementation Strategy*. This change does not eliminate the need for detailed implementation planning, which will now take place after the *Implementation Strategy* is published and will require continued funding. SOLAS is the first project to attempt this strategy.

Julie Hall noted that New Zealand has an active SOLAS program, conducted jointly with Australia. Two cruises are funded, the first in January-February 2003. It will focus on iron measurements in a patch tracer experiment. The second cruise will be a two-ship operation in late 2003 to stimulate a bloom and look at its decline and production of gases in detail; there will be a strong focus on the sulfur cycle. There is concern about the breadth of the SOLAS project and Hall asked about how this issue is being dealt with in the *SOLAS Science Plan/ Implementation Strategy*. Wendy Broadgate responded that IGBP had similar concerns with the number of activities and the SOLAS SSC has spent some time in reducing the complexity of the plan and project, especially restricting it more tightly to upper ocean and to issues of interactions between the ocean and atmosphere, rather than all processes in the upper ocean and lower atmosphere. The number of first-priority questions has been reduced.

Umit Unluata reported that IOC would like to sponsor SOLAS activities and has committed funding for the SOLAS Summer School. Shizuo Tsunogai asked why IAPSO has not been involved in SOLAS, since IAPSO is supposed to include chemistry. Shiro Imawaki, the representative of IAPSO, responded that it is not clear to him what the relationship between SOLAS and IAPSO would be; the SOLAS symposium at the IUGG in Sapporo is an IAMAS/IAPSO joint symposium. Imawaki agreed that chemical oceanography is not well focused in IAPSO symposia at the Sapporo IUGG meeting. Robert Duce added that IAPSO is currently re-examining its mission and future activities. Duce noted that it is appropriate to select a new Reporter for SOLAS since his close previous involvement may create a perception of conflict of interest. Julie Hall and Labeyrie volunteered to help with Reporter duties, with Hall to be the primary Reporter and Labeyrie to track it as an alternate Reporter.

3.1.5 Land-Ocean Interactions in the Coastal Zone (LOICZ)

LOICZ is in the midst of developing a synthesis of its first decade of activities and is making plans for the next decade (LOICZ II). LOICZ is not presently co-sponsored by SCOR, but is requesting that SCOR consider a co-sponsorship arrangement that would include financial support.

Hartwig Kremer, the LOICZ Deputy Executive Officer, made a presentation on future plans for LOICZ. He reported that a synthesis of LOICZ's first 9 years is due to be published in mid-2003, as will a brochure. Financial sponsorship of future LOICZ activities is not yet clear. LOICZ has described human pressures on the coastal zone and described challenges for coastal zone science. Proposed themes for LOICZ II include

Theme 1 – River basins and human dimensions
Theme 2 – Coastal development and change: Implications of land and sea use
Theme 3 – Fate and transformation of materials in coastal and shelf waters
Theme 4 – Towards system sustainability and resource management issues
Theme 5 – Risk and safety

Robert Duce continued the LOICZ topic by noting that the issue for discussion is whether SCOR should become a co-sponsor of LOICZ. It is not clear what will be the roles of the sponsor, how LOICZ II will work, and whether it will essentially be a data-mining exercise, as LOICZ I was, or if it will include process research projects. Kremer responded that LOICZ II will include both. Duce asked for more detail about how the sponsors' committee will work. Kremer responded that LOICZ is developing a new sponsorship structure. The sponsors' committee (each sponsor should want to have some influence on the LOICZ project) will receive reports on an annual basis and will have opportunities to influence the project. The sponsors' committee will be asked to assist in funding. Umit Unluata added that the need for a formal sponsors' committee is not clear, based on the experience of GLOBEC, which is co-sponsored by three organizations—IOC, SCOR, and IGBP—with no need for a sponsors' committee.

The Executive Committee decided that SCOR will seek external funds to co-sponsor LOICZ, if the funds will be used only for the LOICZ II research related to natural science of the continental shelf and estuaries (primarily Theme 3). SCOR funds provided to its joint projects with IGBP and IOC are contingent upon being able to raise such funds from other agencies or organizations. SCOR could play an important role in ensuring interactions among projects. The Executive Committee expressed some concerns about the balance of the full SSC membership versus the corresponding membership.

3.2 Panels/Planning Committees

3.2.1 SCOR-IOC Advisory Panel on Ocean Carbon Dioxide

The panel met before the Ocean Sciences meeting in Hawaii in February 2002. The panel is completing the report of its second meeting and its watching brief on ocean carbon sequestration, and recently redesigned its Web site. The panel also has helped to identify potential members of the planning committee for the ocean carbon sequestration symposium and potential funding sources. The panel is primarily staffed by Maria Hood (IOC), who consults with Ed Urban on a regular basis. The next activity of the panel will be an ocean carbon observation meeting in Paris in January 2003. The purpose of this meeting is to discuss how to coordinate ocean carbon measurement activities internationally. Wendy Broadgate noted that the Panel has good links with JGOFS and asked about plans to adjust the Panel's terms of reference to reflect the completion of JGOFS. Urban agreed that this needs to be done and that the panel membership needs representation from the new projects (e.g., SOLAS and OCEANS). Julie Hall was concerned that the Panel does not have strong enough links to GOOS, including its Coastal Ocean Panel. There is supposed to be a joint member, but the identified member hasn't attended GOOS Science Committee meetings. Hall agreed to help identify a panel member to attend GOOS meetings.

3.2.2 SCOR/IOC International Symposium on Ocean Carbon Sequestration

This activity resulted from discussions held at the 2001 Executive Committee meeting. SCOR received initial funding of $25,000 from the U.S. National Science Foundation, which will be used to convene a meeting of the planning committee, in late 2002 or early 2003. Additional funds have been requested from the Research Council of Norway ($15,000 has been committed from this source) and the International Energy Agency. Other sponsors are expected and the symposium will be held in early 2004. The Executive Committee approved Prof. Ralph Cicerone (USA) to chair the planning committee and SCOR and IOC staff are working to develop a slate of committee members for approval by the sponsoring organizations. Ed Urban presented an overhead of the members approved by the SCOR Executive Committee and who had accepted membership. The membership includes people on both sides of the issue. In addition to planning the symposium, this group will be responsible to produce a special issue of a major journal to document what we know and need to know about the science related to the topic. The symposium will not focus on policy or industrial applications. Some potential sponsors want to see the symposium program before considering funding, so there will be a second round of proposals when the program has been finalized.

Robert Duce added that this topic has large public relations and political implications, as well as scientific importance, and thus it is important to plan and execute the symposium carefully. Labeyrie noted that he is pleased to see this progress after the discussion in Argentina. Wendy Broadgate asked if it might be necessary to include someone from the policy/social science community to help make the output of the conference more relevant. Urban responded that the experience with the ASLO-sponsored meeting in Washington, D.C. showed that involving such people resulted in an unfocused meeting. IOC, which is co-sponsoring the activity, may be helpful in disseminating the results of the symposium. Broadgate clarified that she meant someone with expertise in translating science to information that

policy makers can use. Julie Hall suggested that perhaps someone from the ASLO meeting could be helpful in such a role. Umit Unluata asked if other organizations will be invited to the conference. Urban responded affirmatively and that it is likely to be a large meeting, but that the focus must remain on science. The location of the symposium has not yet been set. Robert Duce will be the Executive Committee Reporter for this activity.

3.2.3 SCOR/IGBP Ocean Biogeochemistry and Ecosystem Analysis Planning Activity

Peter Burkill reported on the "Ocean Futures" Committee at the Executive Committee meeting in 2001. The Ocean Futures Committee met in Barcelona, Spain in December 2001 to complete its Framework Report. The report was reviewed and comments were presented at the SC-IGBP meeting in Stockholm, Sweden in mid- February 2002, after which the Ocean Futures Committee was disbanded. The Framework Report will be used as a major input for development of the OCEANS project. The reviews of the document were generally positive and reviewers felt that the document covered most of the important research questions for the next 10 years.

SCOR and IGBP approved the membership of the Ocean Biogeochemistry and Ecosystems Transition Team in early 2002. The Transition Team held its first meeting in Potomac, Maryland in May 2002. The Transition Team is planning an Open Science Conference, funded in part with support from ICSU and NSF, to be held at IOC in Paris on 7-10 January 2003. Julie Hall, the chair of the Transition Team, showed the committee membership and noted that two additional members had recently been approved by SCOR and IGBP. The charge to the Transition Team is to develop a *Science Plan/Implementation Strategy* by end of 2003.

Hall reviewed the activities that have been taken in developing the OCEANS project (see Annex 9 for report). She showed the structure of IGBP II and how OCEANS fits into the structure. The ocean projects—GLOBEC, SOLAS, OCEANS, and LOICZ—need to work together in a well-considered way. Interactions are also needed with related programs such as the Climate Variability and Predication (CLIVAR) project, DIVERSITAS, and IMAGES. Hall described the OCEANS Open Science Conference. The Transition Team drafted a Discussion Document to help participants prepare for the conference and to stimulate discussion. Hall reviewed the three overarching questions:

1. How does global change, represented by changes in natural climatic modalities and anthropogenic forcing factors, impact marine biogeochemical cycles and ecosystem dynamics?
2. How do these impacts mechanistically alter the relationship between elemental cycling and ecosystem dynamics?
3. What are the feedback mechanisms to the Earth System from these changes?

The OSC will include keynote addresses, poster sessions and working groups. She showed list of invited talks and described the working groups.

In the future, the Transition Team will hold a subgroup meeting in November 2002 to finalize the plans for the Open Science Conference, will meet before and after Open Science Conference and at the IGBP Congress, and will hold other opportunistic meetings, such as at the JGOFS Open Science Meeting. They may hold an editorial meeting late in 2003. Hall encouraged participation by SCOR nations and asked national SCOR representatives to urge their national communities to get involved. Even if individuals are unable to attend the OCEANS Open Science Conference in Paris, there is a lot of material on the conference Web site that is open to comment by the worldwide ocean science community. All comments will be considered in the planning process.

Wendy Broadgate added that IGBP is grappling with the issue of how and how much to introduce the issues of human dimensions into new projects. Laurent Labeyrie stated that he didn't see the link with physics made very clearly in the documentation and in the figures used to describe the project; ocean dynamics needs to be shown between marine ecosystems and biogeochemical cycles. Hall and Broadgate responded that the Transition Team includes two physical oceanographers and those physical forcing factors and dynamics are implied in "natural forcing factors."

John Field noted that deep-ocean and paleoceanography issues don't seem to be included among the working group topics. Hall responded that there is a paleoceanographer on the Transition Team. Paleoceanography will necessarily need to be addressed by several of the working groups, rather than isolating it as a separate topic. Graham Shimmield stated that he gets the sense that the thrust of the OCEANS project will have to undergo a conceptual shift away from the cruise-oriented style of JGOFS and GLOBEC if the forcing factors issues are going to be addressed. Hall responded that the Transition Team will need to think very broadly about new types of approaches. Umit Unluata asked about the intersection of OCEANS with LOICZ. Hall responded that this is not yet clear and will have to be worked out, since LOICZ is developing stage II of its project. Hartwig Kremer added that there will be many options for cooperation.

SCOR and IGBP agreed that **t**he potential benefits of co-located GLOBEC and OCEANS IPOs at the Plymouth Marine Laboratory are significant, and funding for co-located IPOs should be pursued. If the IPOs are co-located, however, they will have separate Executive Officers and perhaps other scientific staff. Sharing of administrative staff and other resources will be encouraged, under the oversight of the director of the host institution. The success of the co-location strategy and joint activities will be evaluated at the end of 2006.

3.3 Capacity-Building Activities

3.3.1 Regional Graduate Schools of Oceanography and Marine Environmental Sciences

Elizabeth Gross reviewed the history of the activity up to the Mar del Plata meeting of Latin American representatives. Ed Urban continued with a description of the South American regional meeting in Mar del Plata. The project has no funding and no real progress has been made to carry it forward. One problem is to determine where an RGSO would be located in a region, because it is often difficult for countries to support activities that take place in other countries.

SCOR decided that the report on curriculum development can be released. The Executive Committee decided not to release the foundation database unless there is a specific proposal from a region to be pushed forward. The SCOR Secretariat will coordinate any funding requests. SCOR needs to coordinate the search for funding so that requests from various individuals on behalf of SCOR are not made to the same potential sponsors or compromise SCOR's proposals for other activities.

John Field stated that it may be difficult to raise funds while the project is so non-specific. Fund-raising might be easier if related to an RGSO in a particular region. Rivalries within and between countries in a region make it difficult to favor a particular institution. A scheme to rotate courses between different institutions in a region might help decrease this problem. Agreement on a rotating scheme might move things forward, but a more difficult problem may be that ultimately, a single institution grants the degree and the degree-granting institution would need to recognize courses offered in other institutions. The administration of an RGSO would need to be centralized, and not move from country to country, in order to maintain continuity.

Adolfo Gracia-G. (Mexico) stated that this is an important initiative. Existing institutions in a region need to recognize courses offered by each other. Hong Huasheng identified a need to establish a network in Asian countries. Rodrigo Nuñez stated that the main issue is capacity building. Sending students all around a region will be too expensive. SCOR should stay involved, since SCOR interest has improved the University of Concepción program. Roberto Purini reported about an experiment carried out in Italy, which founded an international network of universities in Adriatic area and Eastern Europe. Teachers from different countries held courses and all the universities in the network accepted the credits. There was some discussion about whether an individual hired by IOC for Training, Education, and Mutual Assistance (TEMA) activities could contribute to RGSO development. Help from the LOICZ project was also offered by Hartwig Kremer.

Individuals in several of the target regions (Latin America, Southeast Asia, Africa, and Southern Asia) are interested in pursuing this activity, but no funds have been identified to do so. If SCOR wants to continue this activity, it will need to devote special effort to finding external funding, using a list of potential foundation sources. Robert Duce proposed a sub-group (John Field, Ilana Wainer, Hong Huasheng, and Manuwadi Hungspreugs) to consider the RGSO issue, working by email over the next year. Field and Wainer will co-chair the subgroup. The Executive Committee will set some terms of reference for this sub-group, which should report at next year's SCOR Executive Committee meeting, with recommendations for SCOR action.

3.3.2 POGO-IOC-SCOR Visiting Fellowships for Oceanographic Observations

A second set of fellowships has been awarded through this program as listed in the background book. The selections have been made each year by Maria Hood (IOC), the POGO Executive Director (Shubha Sathyendranath), and Ed Urban. SCOR agreed at the 2001 Executive Committee meeting to provide support again in 2002 for the POGO Fellowships. Last year's recipients and hosts provided positive feedback.

Urban stated his concern that this year's fellowships were awarded to some individuals for activities that are not directly related to observations and GOOS, many being more research-oriented. The numbers of good applications could be increased. SCOR agreed to continue co-funding the program.

3.3.3 NSF Travel Support for Developing Country Scientists

A new proposal was submitted to the U.S. National Science Foundation for these awards in mid-2002 and the proposal was funded at a level of $75,000 per year for three years (July 15, 2002 to June 30, 2005). Approximately $75,000 can be approved for meetings to be held between July 15, 2002 and June 30, 2003. No more than 25% of the funds can be used for summer schools/longer-term workshops (i.e., at least 75% for conferences/symposia of a week or less in duration).

This is a successful program, and SCOR has been able to play an important role in the global ocean sciences community by providing these travel funds. Awards have been made to 206 recipients from 39 countries in the past three years. 82% of the awards were to individuals from nations having SCOR national committees, and this can be considered a benefit SCOR can provide to its developing country members. Ed Urban discussed the new requests for support for meetings, which were contained in the meeting book. He suggested that the requests for the July 2003-July 2004 funding be held until later. SCOR should think carefully about continuing to fund meetings that are not directly related to SCOR activities (e.g., annual meetings of the Committee on Space Research and Pacific Ocean Remote Sensing Conference). SCOR receives some visibility benefits from supporting such meetings, but the travel funds could be better used for meetings more closely linked to SCOR activities. The SCOR Executive Committee decided to support the following meetings until July 2003: the JGOFS Open Science

Meeting, the ICES/PICES/GLOBEC 3rd International Zooplankton Production Symposium, the Workshop on Real-time Coastal Observing Systems for Ecosystem Dynamics and Harmful Algal Blooms (a GEOHAB-endorsed activity), the Gordon Research Conference on Transport and Reaction in Permeable Sediments (related to WGs 112 and 114), and the SOLAS Summer School.

3.3.4 SCOR Reports to Developing Country Libraries

SCOR sent copies of the reports from SCOR Working Groups 101, 106, and 109 to 40 libraries in 30 different developing nations, both in nations with national SCOR committees and those without. These donations have been appreciated, as shown by many letters received by the SCOR Secretariat. SCOR approved distribution of copies of the Oceans 2020 book to its list of developing country libraries. The draft 2003 SCOR budget will include $6,000 for publications, which could fund distribution of 2-3 reports in 2003. Three special issues of journals are likely to be produced by SCOR working groups in 2003 and could be distributed, if individual copies can be purchased.

3.4 Affiliated Programs

The benefit to SCOR of continued affiliation to SCOR of each affiliated program is evaluated at each General Meeting.

3.4.1 Acoustic Monitoring of the Global Ocean (AMGO)

AMGO feels it has finished its work and that it is not longer necessary. It is dissolving and asked to de-affiliate. SCOR agreed to this change and will thank AMGO for their association with SCOR.

3.4.2 International Antarctic Zone (iAnZone) Program

Roberto Purini, the Executive Committee Reporter for iAnZone, reviewed their report. Ilana Wainer asked why the program is having problems establishing links with CLIVAR and SCAR. Ed Urban will discuss this issue with the iAnZone chair. Continued affiliation of iAnZone to SCOR was approved.

3.4.3 PAGES International Marine Global Changes Study (IMAGES)

Roberto Purini, the Executive Reporter for the group, reviewed its report. There was some discussion about the program finances. The handling of finances has improved in the past year and the financial transfer from France to Germany has been completed. Chile, Turkey, and Italy are new members. The annual membership fee is voluntary, ranges between US$1,000 and US$10,000, and is negotiated each year. All members have agreed to try to increase their contributions by 40%

IMAGES is a global program with an integrating role. Rolf Schneider will be the new Director when the office moves to Bremen. Laurent Labeyrie brought up the issue of interactions between IMAGES and the International Ocean Drilling Program (IODP). The United States and Japan will be the major partners in IODP, each contributing a ship. In the future, ships from other countries may be added. Although there are obvious reasons that IMAGES could be a contributor to IODP, the drilling objectives are different. IMAGES drills many cores of about 30 m in length, to study climate change in the Holocene Era. IODP will drill much deeper holes to study a variety of subjects, as the Ocean Drilling Program has done; these deeper holes require a significant pre-drilling review for safety purposes. Labeyrie stated that since IMAGES drills shorter cores, it should not need to conduct the same kind on labor-intensive and expensive safety reviews to participate in IODP.

Robert Duce questioned why there are so many members in the IMAGES SSC and Labeyrie responded that this has resulted because of IMAGES' desire to provide equal rights to all member countries. Continued affiliation of IMAGES to SCOR was approved.

3.4.4 International, Interdisciplinary Ridge Studies (InterRidge)

Laurent Labeyrie, Executive Committee Reporter for InterRidge, introduced Agnieszka Adamczewska to describe the program and to speak about how SCOR and InterRidge could interact to a greater extent.

Adamczewska continued with a presentation about InterRidge and its activities. She started by explaining that mid-ocean ridges (MORs) are "constructive plate boundaries," the primary site of volcanism on Earth. The youngest crust is found at ridges. Slow- and fast-spreading ridges are very different from each other. Hydrothermal vent systems are found on MORs. These systems are still early in their study, but it is known that they host unique and complex ecosystems and are potential sources of sulfide ore deposits.

Adamczewska reviewed the purposes of the InterRidge program, which are to support thematic and interdisciplinary research on MORs and to strengthen the international community working in these areas. InterRidge activities include meetings, workshops, working groups, reports, development of research directions, information exchange, and communication. Twenty-six countries currently participate in InterRidge. Nine scientific working groups currently oversee development and execution of the program. The international InterRidge office is presently located in Japan and will rotate to a new location at the end of 2003. Two developing projects are on (1) monitoring and observatories and (2) hydrothermal reserves to protect these unique ecosystems.

Notable success in InterRidge's first 10 years include exploration of the SW Indian Ridge, liaison with other international programs, and providing a voice for ridge science. In the coming decade, InterRidge will focus on the following themes: ultra-slow spreading ridges, ridge-hotspot interactions, back-arc spreading systems/back-arc basins, and mid-oceanic ridge ecosystems. The present InterRidge management and scientific structure are effective and will be continued; the working groups are a real success story. InterRidge databases have grown to the point where the InterRidge office cannot support them and they are looking for a solution to this problem. InterRidge has not formally been involved in the development of IODP.

Labeyrie stated that he thinks this is a very successful program. He is impressed by the quality of the *InterRidge News* and sees that InterRidge has helped that entire community work together. The database problem should concern SCOR, just as for high-quality bathymetric data, as mentioned previously. It is critical to find a solution. The marine geology and geophysics community is accustomed to working with World Data Centers, so InterRidge should consider using the centers. Adamczewska replied that they are considering working with PANGEA in Bremen. The success of international programs depends on sharing of data. Labeyrie concluded that IMAGES and InterRidge should cooperate in encouraging IODP to include other programs. Opportunities for joint activities were discussed and it was concluded that InterRidge and SCOR could try to create joint working groups. Topics of the deep biosphere, mapping, and use of tracers were mentioned. Continued affiliation of InterRidge to SCOR was approved.

3.4.5 International Ocean Colour Coordinating Group (IOCCG)

John Field, the Executive Committee Reporter for IOCCG, opened the discussion by reminding the group that IOCCG is a group of experts in satellite ocean color. The group consists of agency representatives and individual scientists. IOCCG's role is to advise governments and the scientific community on ocean color issues through working groups, for example, on data and algorithms. IOCCG is conducting a number of capacity-building activities. The pace of their activities has slowed. They need to send names to SCOR of proposed membership changes after their meeting in Florence, Italy. Elizabeth Gross will attend that meeting as IOCCG's financial manager and will inquire about the issue of future rotations, including that of the IOCCG chair. Continued affiliation of IOCCG to SCOR was approved.

Robert Duce proposed that SCOR should review the issue of Affiliated Programs, beginning in 2004. The program was set up in 1996 for 10 years.

4.0 RELATIONS WITH INTERGOVERNMENTAL ORGANIZATIONS

4.1 Intergovernmental Oceanographic Commission (IOC)

Robert Duce and Ed Urban attended the IOC Executive Committee Meeting in June 2002 to represent SCOR.

4.1.1 Coastal Ocean Advanced Science and Technical Studies (COASTS)

Umit Unluata reported that the COASTS workshop was held in August 2001 and production of the two volumes from the meeting is well underway. The volumes should be published in 2004.

4.1.2 Oceans 2020 and Follow-up

The SCOR Executive Committee approved in 2002 the purchase of copies of the report from this activity for libraries in developing countries. SCOR will purchase 100 paperback copies with the amount budgeted. The book was distributed at the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa in August 2002, where John Field participated in the briefing of the report. Field reviewed the background of the Oceans 2020 activity and noted the order form contained in the background book. Field was to present an overview of the book later in the week at the International Symposium on "Our Oceanography Toward the World Oceanography" convened by the Oceanographic Society of Japan (JOS).

4.1.3 IOC Policy on Access to Oceanographic Data

The most recent meeting on this topic was held in Paris in June 2002. Ferris Webster (USA) represented both SCOR and ICSU. A revised policy statement was drafted. Umit Unluata noted that the draft statement will be presented to the IOC Assembly in June 2003. SCOR endorsement will be requested. Rodrigo Nuñez noted that SCOR endorsement is premature now, because there will be a lot of discussion at the IOC Assembly and the draft might be changed. Ed Urban was instructed to notify the ICSU Executive Director that the data issue would be discussed at the IOC Assembly, since ICSU supports a policy of free and open access to data.

4.1.4 Rio+10 Oceans and Coasts Meeting Follow-Up

Umit Unluata reported on the outcome of the WSSD in Johannesburg, South Africa, reading from the document at www.johannesburgsummit.org. The political declaration by the participating governments does not include oceans or coastal areas. In the plan of implementation, several chapters involve oceans and recommended that be an ecosystem approach should be used in all aspects of protection of the marine environment. The plan calls for various actions under the UN system, including assessments of state of the oceans and effective coordination. Key outcomes of the summit are summarized on the Web site in non-technical language.

4.2 Other Intergovernmental Organizations

4.2.1 Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)

Robert Duce referred to his President's report at the beginning of the meeting. GESAMP was recently reviewed (Julie Hall and S. Krishnaswami participated). GESAMP is now planning for implementation

of the report's recommendations. The WSSD agreed to develop a program for the evaluation of the health of the marine environments, a "marine IPCC"; the role of GESAMP in such an evaluation is not clear. GESAMP is in a period of transition and its future activities are currently being developed .

4.2.2 World Meteorological Organization

Robert Duce stated that no written report is available, which is not surprising, because there has not been significant interaction between WMO and SCOR. They have had a change in the leadership of their marine environment division; Len Barrie (Canada) is the new Director.

4.2.3 International Council for the Exploration of the Sea (ICES)

Robert Duce stated that there is no written report from ICES. Their meeting, including their centenary celebration, was being held at the same time as the SCOR meeting.

4.2.4 North Pacific Marine Science Organization (PICES)

PICES has provided an update of its activities and has suggested areas of potential cooperation with SCOR. Ed Urban noted that PICES' status as a regional intergovernmental organization provides significant opportunities for implementing SCOR activities, but also a challenge to SCOR in avoiding over-representation of specific regions in SCOR's global planning. SCOR has historically tended to avoid close partnerships with regional organizations.

Alexander Bychkov, Executive Director of PICES, made a presentation about the organization. PICES is only 10 years old. It is doing many of the same things as ICES. But, it is also different, for example, in that PICES does not have an official advisory function to governments. Bychkov reviewed the PICES terms of reference. PICES is a major forum for coordination of marine sciences in the North Pacific region. Their eleventh annual meeting will be held in Qingdao, China a few weeks after the SCOR meeting. PICES looks to SCOR for scientific guidance. Bychkov reported on existing and potential areas of cooperation between PICES and SCOR. The closest relationship between two organizations currently is through the Climate Change and Carrying Capacity (CCCC) program of PICES and GLOBEC. Every year, CCCC has at least one joint scientific session with GLOBEC at their annual meetings. This year, CCCC is meeting as part of the GLOBEC Open Science Meeting. PICES and GLOBEC will produce a joint newsletter issue in January. They will also collaborate on the Third Zooplankton Symposium in Spain in May 2003, along with ICES. PICES and GLOBEC requested SCOR support for travel for developing country scientists for this symposium. Bychkov report that the theme of 12th PICES annual meeting in 2003 is Human Dimensions of Ecosystem Variability.

PICES also collaborates with JGOFS, especially with regard to the North Pacific Ocean. Bychkov reviewed the joint meetings between PICES and JGOFS, including a meeting of the North Pacific Synthesis Group in conjunction with the JOS Symposium in Sapporo, which will result in the publication of a report in February 2004. PICES is interested in collaboration with SOLAS and has initiated communication with the North Pacific SOLAS representatives to organize a workshop on implementation of SOLAS in their region, in conjunction with the PICES 12th Annual Meeting in Seoul. PICES sponsors an advisory panel on Iron Fertilization in the Subarctic Pacific Ocean, which convened a workshop in 2000 to design an experiment. The outcome of the workshop influenced a Japanese experiment in the western North Pacific Ocean in the summer of 2001. Preliminary results were reported at the 10th Annual PICES Meeting in 2001 and more results will be presented at the 11th Annual PICES Meeting in Qingdao.

PICES sponsors a Working Group on Ecology of Harmful Algal Blooms in the North Pacific region, which has published a volume summarizing HAB events in the region. The working group will convene a joint session with Chinese HAB scientists at the Qingdao meeting. PICES would like to establish better

cooperation with the GEOHAB SSC. PICES has a close relationship with SCOR WG 118 on New Technologies for Observing Marine Life. The working group is cooperating with the PICES Science Board to prepare a session on technical advances in marine scientific research at the Qingdao PICES meeting. Gabriel Gorsky, a member of WG 118, will give an invited lecture in the session. PICES is producing an Ecosystem Status Report on the North Pacific Ocean and would like to involve WG 119 on Quantitative Ecosystem Indicators for Fisheries Management in aspects of this report. PICES requested to send a representative to meetings of WG 119 and to involve WG 119 members in their relevant Working Group (Ecosystem Considerations in Fisheries Management), which is now underway. Bychkov reviewed past PICES activities in ocean carbon, including PICES WG 17 on Biogeochemical Data Integration and Synthesis. The SCOR-IOC Advisory Panel on Ocean CO_2 is well aware of PICES activities and recommended PICES as a forum for coordination in the Pacific region.

John Field stated that PICES is to be congratulated for the range of their activities and their efforts to collaborate with so many SCOR activities. Laurent Labeyrie asked about cooperation of PICES with IMAGES. Bychkov responded that there is no geology in PICES to date, but that they are looking at their overall structure, so this situation may change.

4.2.5 Global Bathymetric Chart of the Ocean (GEBCO)

Robert Duce sent a letter to Sir Anthony Laughton declining to provide future support for travel for a SCOR liaison to attend GEBCO meetings. SCOR decided in 2001 to provide support for developing country scientists to attend the GEBCO Centenary meeting in 2003.

5.0 RELATIONS WITH NON-GOVERNMENTAL ORGANIZATIONS

5.1 International Council for Science (ICSU)

SCOR did not apply for 2003 funds from ICSU, due to a lack of good ideas that fit their criteria, SCOR's success in 2002, and the extension of one of SCOR's 2002 grants into 2003. Guidelines for the 2004 proposals will be available later this year. Ed Urban reviewed current (2002) ICSU support that was received for meetings related to the SOLAS and Ocean Biogeochemistry and Ecosystems Analysis planning activity. Proposals for new activities in 2004 must be submitted by March 1. Urban stated that he will look for opportunities with SCOPE and SCAR, but requested other ideas. Urban met with Thomas Rosswall (ICSU Executive Director) in May 2002 and exchanged views about SCOR and its interactions with ICSU, including how ICSU will next review SCOR.

5.1.1 International Geosphere-Biosphere Program (IGBP)

Ed Urban and Julie Hall attended the IGBP Scientific Committee meeting in Stockholm, Sweden in mid-February to represent SCOR. Robert Duce and Ed Urban published an article about SCOR in Volume 49 of the *IGBP Newsletter* (included in the background book). Hall (as OCEANS chair), Urban, and Duce will attend the IGBP Science Committee meeting in Punta Arenas, Chile in January 2003.

Wendy Broadgate presented a review of IGBP, particularly plans for IGBP II. She explained that IGBP is considering global change as global-scale changes that affect the functioning of the Earth system, including more than climate change, natural as well as anthropogenic changes, and socioeconomic as well as biophysical changes. The IGBP II structure will focus on biogeochemical sciences with relevance to issues of societal concern, interdisciplinary and Earth system science (to avoid gaps among projects), and regional-scale integrated studies.

Broadgate discussed the marine projects in greater detail. She noted that JGOFS will complete its work at the end of 2003, and JGOFS is very positive about the development of the OCEANS project. GLOBEC will continue until 2009 and IGBP and SCOR need to ensure that GLOBEC is not negatively affected by the development of OCEANS. LOICZ and SOLAS are the interface projects. LOICZ is changing significantly for IGBP II. SOLAS wasn't part of IGBP I. It crosses traditional funding agency boundaries between oceanic and atmospheric sciences and this is a challenge for them. All of the IGBP marine projects, except LOICZ, are co-sponsored by SCOR. Broadgate is seeking advice on all these developments. IGBP and SCOR need to ensure that these projects work well together. Integrating projects are the Past Global Changes (PAGES) and Global Analysis, Integration, and Modeling (GAIM) projects.

We need a "vision" for the ocean component of IGBP, which is being developed cooperatively by IGBP and SCOR. The Ocean Vision will focus on the sustainability of the ocean system. Humans have many impacts on the ocean and atmospheric inputs to the ocean. How sustainable are human activities? The Ocean Vision will also include the role of the ocean in the Earth system. It will stress the need to be more integrative, for example, linking human activities (e.g., fishing) to their impacts on the system and their feedbacks to the Earth system. Examples of Earth system questions include

- What are the critical elements and processes in the ocean that actually can be transformed by human action?
- What are the accessible, but intolerable, domains in the co-evolution space of marine ecosystems and humanity?
- What are the options and caveats for technological fixes like geoengineering in the ocean?
- What are the hot spots in the Earth system? A map presented showed that several are oceanic.

The SCOR Executive Committee recommended to IGBP that the proposed composition of the editorial team for the Oceans Vision (Karin Lochte, S. Krishnaswami, Katherine Richardson, Robert Duce, and Guy Brasseur) should be augmented with additional expertise related to physical oceanography, climate, and some other ocean science disciplines. SCOR offered to suggest a few additional individuals to help balance the editorial team.

The 3rd IGBP Congress will be held in Banff, Canada on June 19-24 2003. The SSCs of all IGBP projects will meet in conjunction with the Congress, as will the transition teams for the new projects and IGBP national committees. The Congress will include plenary presentations and workshops, in addition to the SSC meetings. Broadgate presented information about the Earth System Science Partnership, which is a cooperative effort among IGBP, WCRP, IHDP, and DIVERSITAS to promote integrated study of the Earth system, the changes that are occurring to the system, and the implications of these changes for global sustainability. Three pilot projects, on food, carbon, and water, are being developed. The food and carbon projects are relevant to SCOR. The Global Environmental Change and Food Systems included a marine project on Pacific Coastal Fisheries, in which GLOBEC is involved. Its premise is that changes in the way people fish have consequences for the marine ecosystem. The Global Carbon Project has three foci: Patterns and Variability; Processes, Controls, and Interactions; and Carbon Futures. A scientific framework is under development.

Graham Shimmield asked what were bad things about IGBP I. Broadgate replied that the projects worked in isolation, and focused internally and not enough on how their outcomes related to the other parts of the Earth system. Shimmield continued by stating that at the beginning our preoccupation was with fluxes; now we're being asked to look more at energy flows. Do we know enough about the systems now to do this? Julie Hall stated that she thought the joint projects (food, carbon, and water) would be synthesis

projects, not research. But Broadgate's talk implied that they will do research. Broadgate replied that the joint projects should act as a way to pull the pieces of other projects together and synthesize their activities and results, but they also will develop new research activities as needed. Robert Duce asked about IGBP's current thoughts about IPOs for the ocean projects. There is currently no office for SOLAS, no offers for an IPO for OCEANS. Broadgate replied that IGBP has discussed this issue; they are going to seek offers to enhance the GLOBEC IPO to include OCEANS. But, SCOR and IGBP must agree on this. John Field asked why GCP is not within GAIM. Broadgate replied that such a placement would leave out social sciences.

Ed Urban expressed concerns about the Global Carbon Project because they seem to be moving toward assuming a role in coordinating research in ocean carbon. This is not appropriate because SCOR is the sponsor of much of the ocean research to be coordinated and SCOR needs to maintain control of the projects it sponsors, while cooperating with GCP to make sure our projects contribute appropriately to GCP's integrative activities. Broadgate responded that some progress might be made during the Ocean Carbon Coordination Project meeting following the OCEANS Open Science Conference in Paris. Laurent Labeyrie expressed concern about the joint projects. Broadgate responded by pointing out the need for integration with WCRP, IHDP, and DIVERSITAS, but stated that IGBP is aware of the concerns and will work with GCP leadership to protect the ocean projects in IGBP.

5.1.2 Scientific Committee on Antarctic Research (SCAR)

SCOR and SCAR have been developing renewed interactions in the past two years. For example, the SCAR President attended the 2001 SCOR Executive Committee meeting and Robert Duce attended the SCAR meeting in July 2002 in Shanghai to represent SCOR. The two organizations are cooperating with IAPSO in convening a session on Southern Ocean research at the 2003 IUGG Assembly. Both organizations have been exploring the potential need for an activity to promote coordination of Southern Ocean research. Julie Hall was appointed as the SCOR liaison to SCAR, with Laurent Labeyrie as the alternate.

5.1.3 World Climate Research Program (WCRP)

Robert Duce sent a letter to WCRP President Peter Lemke, stating SCOR's continued interest in cooperating on issues of air-sea flux, preferably through SOLAS. WCRP has agreed to be a co-sponsor of SOLAS and provides funding for the participation of two members of the SOLAS SSC. WG 110 has concluded its work, so SCOR is now working with WCRP with regard to SOLAS. John Field asked whether CLIVAR would co-sponsor OCEANS? Urban replied that they are represented on the OCEANS Transition Team, but that we need to strengthen the links to ensure success of OCEANS. Elizabeth Gross added that there was the same problem with the World Ocean Circulation Experiment (WOCE) at the beginning of JGOFS. It took a lot of work to resolve interaction problems and create good links.

5.1.4 International Union of Pure and Applied Chemistry (IUPAC)

IUPAC and SCOR are cooperating on WG 109 and co-funded the purchase of copies of *The Biogeochemistry of Iron in Seawater* to distribute to libraries in developing nations. The report from IUPAC in the meeting background book states that IUPAC may submit to SCOR next year a proposal for new collaboration on a working group.

5.1.5 Scientific Committee on Problems of the Environment (SCOPE)

Cintia Piccolo volunteered in 2001 to be the SCOR Executive Committee liaison to SCOPE, but is finishing her final term as a co-opted member of the SCOR Executive Committee in 2002. SCOR has requested membership in SCOPE, which is being considered by their Executive Committee. Annelies

Pierrot-Bults is the new liaison from SCOR to SCOPE. If SCOR becomes a member of SCOPE, SCOR will have to send a representative to the SCOPE General Assembly once every three years. SCOR and SCOPE could develop joint activities where their interests coincide.

5.2 Affiliated Organizations

5.2.1 International Association for Biological Oceanography (IABO)

Annelies Pierrot-Bults assumed the presidency of IABO following the Mar del Plata meeting and thus has replaced Fred Grassle as an ex-officio member of the SCOR Executive Committee.
Pierrot-Bults noted that the report in the meeting background book combines information from 1994 to 2001. A new IABO Secretary, Mark Costello, has been appointed. IABO is forming links with DIVERSITAS and CoML. Pierrot-Bults would like to see IABO give more attention to taxonomy, biodiversity, and biogeography. IABO and IAPSO are planning a joint meeting in November 2005 in Italy and have begun planning the sessions.

5.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS)

Robert Duce continues as the ex-officio representative from IAMAS to the SCOR Executive Committee, appointed by the IAMAS President, who is not a marine scientist. Duce referred meeting participants to the written report in the background book and noted that there will be an IAMAS/IAPSO session on SOLAS at the IUGG General Assembly in Sapporo in 2003. IAMAS is the parent of the Commission on Atmospheric Chemistry and Global Pollution (CACGP), which is a co-sponsor of SOLAS.

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

As noted earlier, a cooperative SCOR/SCAR/IAPSO session on Southern Ocean research was accepted for the IUGG meeting in Sapporo in 2003. Eileen Hofmann (USA) has agreed to be the SCOR convener for the session. SCOR and IAPSO are cooperating in WG 121 on Deep-Ocean Mixing and have worked together to try to arrange funding for it. Shiro Imawaki, IAPSO's representative at the General Meeting, reviewed plans for IAPSO at the IUGG Assembly in 2003 and for the IABO/IAPSO Assembly in 2005. IAPSO is now developing a strategic vision for the future. The task group that is doing this will meet in Cape Town, South Africa soon after the SCOR meeting, and John Field will attend part of the meeting on behalf of SCOR. The task group is evaluating IAPSO's relevance, visibility, communications, finances, and other issues.

5.3 Other Organizations

5.3.1 Partnership for Observation of the Global Ocean (POGO)

POGO met near Halifax, Canada in November 2001. John Field and Cintia Piccolo attended the meeting in other capacities, but also represented SCOR. POGO will meet next in Hobart, Tasmania at the same time as the IGBP-SC meeting in January 2003. POGO continues to be involved in a number of activities of interest to SCOR, including promotion of biological observations in the ocean, Southern Hemisphere ocean observations, and time-series stations. Ed Urban described the POGO mandate and, as discussed in the capacity-building session of the meeting, SCOR has a joint fellowship program with POGO and IOC. Field will represent SCOR at the POGO meeting in Hobart, Australia in January 2003. Field reiterated that there is a good working relationship, but that POGO needs to be reminded about SCOR and its activities. The SCOR Executive Committee decided to maintain a liaison with POGO and to try to send SCOR representatives to POGO's annual meetings.

5.3.2 Ocean Studies Board, U.S. National Academy of Sciences: International Global Ocean Exploration Workshop

Jennifer Merrill (NAS) described the background of the activity. As part of the activity, the U.S. Congress requested that the NAS convene an International Global Ocean Exploration Workshop. Gross described SCOR's role and major questions that were addressed in the workshop sessions. Elizabeth Gross worked with the NAS study director and the chair of the planning committee for the international workshop to identify individuals to invite to the workshop. The workshop was held at IOC in Paris in mid-May 2002. Elizabeth Gross, John Field, and Ed Urban attended. The committee succeeded in making this a fully international event. The meeting will be used as input to an NAS report. Ed Urban provided comments to the NAS committee after the meeting, as shown in the meeting background book. Merrill added there will be an interim report in about a month and final report in February/March 2003.

5.3.3 Census of Marine Life (CoML) and Ocean Biogeographical Information System (OBIS)

Annelies Pierrot-Bults made a detailed presentation about the components of CoML, and about OBIS. A key feature of CoML is to sample poorly known marine environments. CoML presented a proposal to become an affiliated program to SCOR, which was approved by SCOR. Akira Taniguchi will be the Executive Committee Reporter for this activity.

6.0 ORGANIZATION AND FINANCE

6.1 2002 Election of SCOR Officers

The call for nominations for new SCOR officers was transmitted by mail and email before the April 1, 2002 deadline, six months prior to the 2002 General Meeting. The Nominating Committee was chaired by John Field, as Past President, and included Wang Pinxian (China-Beijing) and David Turner (Sweden). The slate of nominees, transmitted to Nominated Members and representatives of Affiliated Organizations, was included in the background book. The slate is automatically considered elected if at least three countries do not call for an election at the General Meeting two weeks beforehand. There were no requests for an election at the General Meeting. As noted previously, the new SCOR Officers are Laurent Labeyrie (Vice-President, France) and Akira Taniguchi (Vice-President, Japan). Ilana Wainer (Brazil) and Andrei Zatsepin (Russia) was approved as new Co-opted Members of the SCOR Executive Committee. The Nominating Committee's report is given in Annex 3.

6.2 Membership

6.2.1 National Committees

National Committees—Japan increased to Category V membership in 2002. The Executive Committee has approved new membership by Ecuador. Ed Urban expressed gratitude from SCOR to Japan for increasing their membership level and to Ecuador for becoming a member of SCOR.

Urban met with the Swedish SCOR Committee on Feb. 25, after attending the IGBP-SC meeting in Stockholm and presented a seminar about SCOR at Göteborg University on the same day. He also made a presentation to SCOR Nominated Members from Finland and other Finnish scientists in Helsinki in June, during the GEOHAB meeting. All SCOR Executive Committee members should make it a point to meet with National Committees when they travel, and Nominated Members will need to help facilitate such visits. Urban and Duce hope to meet with the Chilean SCOR Committee in January 2003 when they are in Chile for the IGBP-SC meeting. Richard Stoddart noted that the Canadian SCOR Committee will

meet in Ottawa in June 2003 and that Robert Duce will attend as the head of the oversight committee for Canadian SOLAS.

6.2.2 Proposed New Membership Policy

In 2001, the Executive Committee approved a committee to review SCOR membership policies, chaired by Wolfgang Fennel, and also including Ilana Wainer, Björn Sundby (Canada), and John Field. The committee's report (see Annex 10) will be considered by the Executive Committee to determine whether further action is needed and which of the Membership Committee's recommendations should be implemented. Field noted the written report in the background book and presented the three recommendations of the committee:

1. A new category of "Observer" was proposed, to serve as entrance to full membership.

2. New procedures were proposed for loss of benefits of membership. It is imperative to try to keep countries involved even if they default on their payments, perhaps by dropping countries to Observer status. The Executive Committee does not like this approach because it means using the same category (Observer) to encourage new members as well as those in default. Instead, a category of "Suspended Member" was proposed, into which members would be placed after three years of non-payment for Category III-V members and four years of non-payment for Category I and II members. Suspended members would not be allowed to nominate members for the Executive Committee or working groups. SCOR should be flexible about the repayment of old dues.

3. The dues deadline should be moved to September 30 to help discretionary cash flow and budgeting process.

Roberto Purini approved the idea of the two new categories. Ilana Wainer added that if a country has to be suspended, SCOR should make it clear what they are losing. She agreed that it is important to establish a policy, even if, in practice, we maintain some flexibility. Laurent Labeyrie suggested that there must be serious discussion with a national committee before a decision to suspend is made, to try to resolve the problem. Graham Shimmield agreed with creating both Observer and Suspended country categories, to avoid countries abusing the Observer category. Akira Taniguchi pointed out that the fiscal years and budget cycles of some countries (like Japan) may make payments by September 30 difficult. Richard Stoddart noted that the table of overdue dues payments in the background book indicate that most countries had paid by the time of the meeting anyway and the ones that had not have been overdue for several years. Pierrot-Bults commented that the Observer status should not be indefinite; for example, it might be limited to four years. There should be evidence of progress toward full SCOR membership during this period and the SCOR Secretariat should help as needed. The SCOR Executive Committee will examine the SCOR Constitution to determine whether any changes need to be proposed for the 2004 General Meeting.

6.3 Publications Arising from SCOR Activities

Publications from Working Groups and Major Programs—The book from WG 106 has been published and is now listed on the Elsevier Web site (see http://www.jhu.edu/scor/pubs.htm). The special issue of *Quaternary Science Reviews* from WG 117 was published in May 2002. Links have been added to the Publications page of the SCOR Web site to the publishers' Web sites, so the reports can be ordered easily.

2001 *SCOR Proceedings*—The *Proceedings* report was printed in late May and distributed by mid-June. 650 copies were ordered this year to ensure enough copies to last until the next *Proceedings* report is printed. Ed Urban stated that his goal is to get *Proceedings* printed and distributed as soon as possible after each annual meeting.

SCOR Brochure—The SCOR brochure is updated occasionally and given to potential sponsors, potential member nations, and others. Cintia Piccolo updated the Spanish version. 100 copies of the English language version and 20 copies of the Spanish version were taken to the IOC meeting in June and resulted in discussions with representatives from Malaysia about joining SCOR. Efforts will be made in the coming year to get the brochure translated into French for use in informing French-speaking scientists, including those in Africa, about SCOR activities. The Canadian SCOR Committee offered to do this.

SCOR Web site—Individual pages were added to the Web site for each working group, containing basic information for each group (e.g., members, terms of reference, and products), similar to that formerly given in the *SCOR Handbook*. Part of the 2002 budgeted funds for computer equipment were used to purchase a CD read-write drive for the SCOR Secretariat so the SCOR Web site can be put onto CDs. The SCOR Web site takes up only about 5% of the capacity of a CD, so suggestions of other documents that could be placed on the CDs will be considered. In the coming year, more information will be put on the Web site about the travel grants for developing country scientists. The SCOR Web site has improved considerably in the past year. Meeting participants asked for the background book for annual meetings to be posted on Web site in future years. Ed Urban agreed to do this. Laurent Labeyrie asked for some highlights of SCOR-sponsored science to be featured prominently on the Web site.

Other Publications—Articles about SCOR that were published in *EOS* and the *IGBP Newsletter* were included in the meeting background book. A list of publications from other SCOR activities was given in the background book and is on the SCOR Web site. This is a useful list of SCOR products.

6.4 Finances

The annual audit was performed in mid-February and Elizabeth Gross and Wesley Anne Ross worked to prepare information for the auditors. The financial records and financial controls of the SCOR Secretariat were found to follow accepted standards.

In the invoices for 2002 dues to SCOR, payments were requested by September 30. This does not seem to have affected the pace at which dues are paid, but it may take several years to see an effect. SCOR was offered, and used, some NSF funds specific for travel of U.S. scientists to SCOR-related meetings, which reduced discretionary expenses slightly. An interest-bearing account was established for SCOR funds that are not needed immediately.

The Finance Committee—consisting of Ilana Wainer, Akira Taniguchi, and Birger Larsen—met on October 2 with Ed Urban and Elizabeth Gross to review SCOR finances. Finance Committee members were approved by the Executive Committee before the General Meeting and received financial information in advance to review. The Finance Committee did the following:

- Reviewed the statements from SCOR's auditors (see Annex 11). The financial accounts are audited every year in accordance with the requirements of ICSU and of U.S. funding agencies.
- Reviewed the final (audited) statement for 2001 (see Annex 12). The Finance Committee recommended that the 2001 financial statements be approved. SCOR's cash balance

decreased by US$4,541 from the end of 2000 to the end of 2001, to US$134,278.[1]

- Reviewed proposed revisions to the 2002 budget. The Finance Committee recommended that the 2002 revised budget be approved. The original budget was approved at the 2001 SCOR meeting in Mar del Plata, but was revised throughout the year to take account of increases in income for new activities and several unexpected changes in plans for 2002 activities. As noted earlier, at its Mar del Plata meeting, SCOR decided not to establish any new Working Groups in 2001 and, as several working groups have completed their activities in the past year or so, this has helped SCOR's 2002 financial situation. The budget for 2002 is in good shape and we project a surplus of about US$13,000 at the end of this year.
- Reviewed and adjusted the draft budget for 2003. The committee reviewed the projected income and expenses for 2003, taking into account, among other things, funding for one new working group and changes in staff support in the Secretariat (changing from a full-time Administrative Officer to a part-time position). The budget drafted is approximately balanced, with a small surplus of income over expenses of US$143. Elizabeth Gross showed the proposed 2003 budget, which was accepted.

Ilana Wainer reported that the Finance Committee recommended that dues for Category I and II nations stay the same for 2004 as for 2001-2003 and that dues for countries in Categories III to V be increased by 1% for 2004. She also clarified the issue of funding for the two new SCOR working groups. If funds are received from the U.S. Office of Naval Research for the Deep-Ocean Mixing working group, discretionary funds will be used for the proposed working group on estuarine sediment dynamics. If funds are not received from ONR, only the Deep-Ocean Mixing working group will be funded in 2003. It will take some time and effort to revise the estuarine sedimentary dynamics proposal, in any case.

Meeting participants accepted the recommendations of the Finance Committee.

7.0 FUTURE MEETINGS

7.1 Annual Meetings of SCOR

The Executive Committee considered potential locations in which to hold future meetings, particularly in nations that have not recently hosted annual meetings. There have been no invitations for meeting locations after 2004.

7.1.1 2002 Meeting – Sapporo, Japan

Shizuo Tsunogai and his colleagues made excellent arrangements for the Sapporo meeting and the field trip following. SCOR was pleased to have joint sessions with the Oceanographic Society of Japan. Robert Duce stated that it has been a very pleasant meeting and successful in terms of SCOR business. Duce thanked the Japanese SCOR Committee, particularly Shizuo Tsunogai and Akira Taniguchi, for their hospitality and excellent arrangements.

[1] It is important that a comfortable cash balance be maintained because all the income does not come at the beginning of a new fiscal year and it is necessary to ensure that activities can be supported early in the year. In addition, all of the U.S. grants to SCOR operate on a reimbursement basis only, so SCOR must provide the funds "up front" for its activities and be reimbursed at the end of each financial quarter. Again, a comfortable financial cushion is needed if activities are to run smoothly without frequent cash flow problems.

7.1.2 2003 Executive Committee Meeting – Moscow, Russia

Russia sent an official invitation for SCOR to meet in Moscow in 2003, which the Executive Committee accepted. The meeting will be held during the week of 15 September 2003. Ed Urban is working on a budget for the meeting.

Sergey Shapovalov, the Executive Secretary of the Russian SCOR Committee, made a presentation about the planned meeting site and details. Moscow was selected as the meeting site because it is the center of Russian marine science, as the location of the Shirshov Institute of Oceanography of the Russian Academy of Sciences (RAS), the State Oceanographic Institute of Hydromet service, and the Russian Fisheries Institute. The RAS is located in Moscow and is responsible for all Russian ICSU organizations. The RAS official responsible for ICSU organizations will participate in the SCOR meeting. There are many historic sites in Moscow and an excursion to St. Petersburg can be arranged. Meeting participants will stay at the Hotel Sputnik. The SCOR meeting will include one day of scientific sessions with Russian scientists, presenting reviews of progress in different areas of marine science. This will be the first SCOR annual meeting in Russia, which is significant for all Russian marine scientists. The Russian SCOR Committee will try to use this opportunity to bring more Russian oceanographers into SCOR activities. The meeting will increase SCOR visibility among Russian scientists.

7.1.3 2004 General Meeting – Venice, Italy

SCOR received an invitation from the Italian National Research Council to hold the 2004 SCOR General Meeting in Venice, Italy, which the Executive Committee has accepted. The most recent annual SCOR meeting held in Italy took place in Rome in 1966, so it is timely to return to Italy. Roberto Purini referred to the invitation letter in the background book and suggested that a meeting in late September or early October would have the best weather.

7.1.4 Planning for Post-2004 SCOR Meetings

Meeting locations have not yet been set for 2005 or 2006. The Executive Committee has agreed to hold its 2007 meeting in Woods Hole to celebrate SCOR's 50th Anniversary, since Woods Hole was the site of the first SCOR annual meeting, in 1957. The Executive Committee believes that there should be some kind of special event that looks backward and/or forward.

SCOR had received an invitation from Chile to host the SCOR annual meeting in 2004 after invitation from Italy had been accepted, so that Chile should be given consideration for the 2005 meeting. Holding a meeting in South America would maintain the regional balance of SCOR meetings. The Chilean SCOR members present were unsure whether it would be feasible to generate another invitation, since the one for 2004 had been declined. Huasheng Hong stated that China would like to host a meeting in 2005 or 2006 in Xiamen. The university in Xiamen has close links to southeast Asia and is easy to reach from Hong Kong. They would organize an international symposium in conjunction with the SCOR meeting. The best time for a meeting in Xiamen would be in October or November, to avoid typhoons.

7.2 Other Meetings of Interest to SCOR

The background book presented a list of SCOR-relevant meetings (see Annex 13). Ilana Wainer mentioned a South Atlantic workshop on oceanography and climate in Rio de Janeiro, Brazil in early February 2003. It will be held back to back with a PIRATA meeting.

8.0 OTHER BUSINESS

Robert Duce raised the issue of the visibility of SCOR. A number of organizations are starting to tackle issues that fall in SCOR's domain. Competition for resources will become more difficult. SCOR is looking at ways to improve its visibility and to familiarize people with its capabilities. Roberto Purini pointed out that few people from the Mediterranean region are involved in SCOR working groups; perhaps SCOR should put some effort into regional studies. Ed Urban replied that he is in favor of working groups focused on specific regions, if we can get external funding from the region. SCOR needs to be careful not to use its international funds to conduct activities that only benefit one or a few regions.

Laurent Labeyrie noted that the European Union has a lot of ways to encourage development of science within Europe and between Europe and developing countries. Could we develop a SCOR lobby in Europe, for example, a Euro-SCOR that would develop specific activities related to SCOR. Laurent Labeyrie was appointed to chair a group to explore this concept, to be assisted by Roberto Purini, Annelies Pierrot-Bults, and Graham Shimmield.

Graham Shimmield added that in the new EU Sixth Framework there is money for countries of all nations to participate in European science. Duce noted that he and Ed Urban had met with the NSF Assistant Director for Geosciences on the possible cooperation with EU since NSF has close links with them and a new Memorandum of Understanding on cooperative activities. There is a new organization in Europe bringing together 8 national oceanographic societies. It is called the European Federation of Marine Science and Technology Societies. Umit Unluata added that the Sixth Framework emphasizes international cooperation.

Ed Urban emphasized that he needs help from national committees in seeking funds from new sources. He has begun trying to visit national committees when traveling in member nations, as mentioned earlier. Richard Stoddart replied that SCOR is unknown to foreign funding agencies. It's fine to visit national committees, but that is "preaching to the choir." SCOR representatives should visit agencies also, to promote SCOR at that level. Mingyuan Zhu added that the Chinese SCOR Committee wants to increase their impact within the Chinese scientific community. But, they were warned that it would be a conflict of interest with their oceanography society. Zhu continued his comments by stating that increasing the number of people involved at the national level will increase the number of people who know about SCOR internationally. The Chinese SCOR Committee is going to develop a national SCOR Web site.

Keisuke Taira noted that, in Japan, the National SCOR Committee and oceanographic society work together; members of the Japanese National SCOR Committee are recommended by several different academic societies. The Japanese SCOR Committee has 20 members and meets at least three times each year. Duce added that solving the visibility problem in SCOR member nations will help us internationally. He appealed to national representatives to help. Bjorn Sjöberg stated that there is a presentation by the Swedish SCOR Committee at every annual national ocean science symposium. They also invite foreign speakers to these symposia, for example, Peter Liss was invited to speak about SOLAS. Umit Unluata suggested that SCOR should participate in the new global marine assessment process as one of the non-governmental organizations. There will be a meeting next year. Duce indicated at the UNEP meeting in Bremen in March 2002 that SCOR, as an ICSU body, could serve in an advisory and/or review capacity for this new UN effort in global marine assessment.

Duce closed the open meeting by reminding participants about the SCOR speakers at the symposium on the next day. John Field expressed thanks to Robert Duce as Chair, and to Ed Urban and Elizabeth Gross for their hard work in running and organizing the meeting.

ACRONYMS

AGU	American Geophysical Union
ASLO	American Society for Limnology and Oceanography
CACGP	Commission on Atmospheric Chemistry and Global Pollution (IAMAS)
CCC	Cod and Climate Change (ICES and GLOBEC)
CCCC	Climate Change and Carrying Capacity (PICES and GLOBEC)
CLIVAR	Climate Variability Study (WCRP)
CMTT	Continental Margins Task Team (JGOFS and LOICZ)
COSPAR	Committee on Space Research (ICSU)
CUFES	Continuous Underway Fish Egg Sampler
DMTT	Data Management Task Team (JGOFS)
ENSO	El Niño-Southern Oscillation
FAO	Food and Agriculture Organization (UN)
GAIM	Global Analysis, Interpretation, and Modeling (IGBP)
GCM	general circulation model
GCOS	Global Climate Observing System
GCP	Global Carbon Project
GCMD	Global Change Master Directory
GEBCO	General Bathymetric Chart of the Ocean (IOC)
GEOHAB	Global Ecology and Oceanography of Harmful Algal Blooms program (SCOR and IOC)
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection (UN)
GLOBEC	Global Ocean Ecosystem Dynamics project (SCOR, IGBP, IOC)
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GSWG	Global Synthesis Working Group (JGOFS)
HAB	harmful algal bloom
HNLC	high nutrient-low chlorophyll
IABO	International Association for Biological Oceanography (IUBS)
IAHS	International Association of Hydrological Sciences (IUGG)
IAMAS	International Association for Meteorology and Atmospheric Sciences (IUGG)
iAnZone	International Antarctic Zone program
IAPSO	International Association for the Physical Sciences of the Ocean (IUGG)
ICES	International Council for the Exploration of the Sea
ICSU	International Council for Science
IGAC	International Global Atmospheric Chemistry project (IGBP)
IGBP	International Geosphere-Biosphere Programme (ICSU)
IGOSS	Integrated Global Ocean Services System (IOC/WMO)
IHDP	International Human Dimensions Programme (ICSU)
IMAGES	International Marine Global Changes Study (IGBP/PAGES)
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IOCCG	International Ocean Colour Coordinating Group

IOSG	Indian Ocean Synthesis Group (JGOFS)
IPO	international project office
IRD	Institut de recherche pour le Développement
IUBS	International Union of Biological Sciences (ICSU)
IUGG	International Union of Geodesy and Geophysics (ICSU)
IUGS	International Union of Geological Sciences (ICSU)
IUPAC	International Union of Pure and Applied Chemistry (ICSU)
IUPAP	International Union of Pure and Applied Physics (ICSU)
IUTAM	International Union of Theoretical and Applied Mathematics (ICSU)
IWC	International Whaling Commission
JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology (WMO and IOC)
JGOFS	Joint Global Ocean Flux Study (SCOR and IGBP)
JGTT	JGOFS-GAIM Task Team
LOICZ	Land-Ocean Interactions in the Coastal Zone (IGBP and IOC)
LMR	living marine resources
MOR	mid-ocean ridge
NASG	North Atlantic Synthesis Group (JGOFS)
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	National Ocean Data Center (NOAA)
NPTT	North Pacific Task Team (JGOFS)
NPIW	North Pacific Intermediate Water
NSF	National Science Foundation (USA)
OCMIP	Ocean Carbon Model Intercomparison Project (JGOFS and IGBP)
OOPC	Ocean Observations Panel for Climate (GCOS)
OPC	optical particle counter
OSC	open science conference
OSM	open science meeting
PAGES	Past Global Changes project (IGBP)
Pg	Petagrams
PICES	North Pacific Marine Science Organization
P-JTT	Paleo-JGOFS Task Team (JGOFS)
POGO	Partnership for Observation of the Global Ocean
PORSEC	Pacific Ocean Remote Sensing Conference
SCAR	Scientific Committee on Antarctic Research (ICSU)
SCOPE	Scientific Committee on Problems of the Environment (ICSU)
SCOR	Scientific Committee on Oceanic Research (ICSU)
SeaWiFS	Sea-Viewing Wide Field Sensor
SOLAS	Surface Ocean-Lower Atmosphere Study (SCOR, IGBP, CACGP)
SOSG	Southern Ocean Synthesis Group (JGOFS)
SOWER	Southern Ocean Whale and Ecosystem Research program (IWC)
SPACC	Small Pelagic Fish and Climate Change (GLOBEC)

SSC	scientific steering committee
Sv	Sverdrups
TIW	tropical instability wave
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WCRP	World Climate Research Programme (WMO, IOC, and ICSU)
WG	working group
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WSSD	World Summit on Sustainable Development

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ANNEX 2
AGENDA

XXVIth SCOR GENERAL MEETING
University of Hokkaido
Sapporo, Japan

1-5 October 2002

DRAFT AGENDA

1.0 OPENING

1.1	**Opening Remarks and Administrative Arrangements**	*Duce, Urban*
1.2	**Approval of the Agenda**	*Duce*
1.3	**Report of the President of SCOR**	*Duce*
1.4	**Report of SCOR Executive Director**	*Urban*
1.5	**Appointment of an *Ad Hoc* Finance Committee**	*Duce*
1.6	**Appointment of an *Ad Hoc* Committee to Review the Disciplinary Balance of SCOR's Activities**	*Duce*

2.0 WORKING GROUPS

2.1 Disbanded Working Groups

2.1.1	WG 103—The Role of Wave Breaking on Upper Ocean Dynamics	*Urban*
2.1.2	WG 106—Relative Sea Level and Muddy Coasts of the World	*Labeyrie*
2.1.3	WG 107—Improved Global Bathymetry	*Labeyrie*
2.1.4	WG 110—Intercomparison and Validation of Ocean-Atmosphere Flux Fields	*Duce*
2.1.5	WG 117—Synthesis of Decadal to Millennial Climate Records of the Last 80ky Years	*Labeyrie*

2.2 Current Working Groups

2.2.1	WG 108—Double Diffusion	*Purini*
2.2.2	WG 109—Biogeochemistry of Iron in Seawater	*Tsunogai*
2.2.3	WG 111—Coupling Winds, Waves and Currents in Coastal Models	*Purini*
2.2.4	WG 112—Magnitude of Submarine Groundwater Discharge and its Influence on Coastal Oceanographic Processes	*Duce*

4.0 RELATIONS WITH INTERGOVERNMENTAL ORGANIZATIONS

4.1 Intergovernmental Oceanographic Commission *Unluata, Duce, Urban*

- 4.1.1 Southern Ocean Committee *Urban*
- 4.1.2 Coastal Ocean Advanced Science and Technology Studies (COASTS) Meeting *Unluata*
- 4.1.3 Oceans 2020 and Follow-up *Gross*
- 4.1.4 IOC Policy on Access to Oceanographic Data *Unluata*

4.3 Other Intergovernmental Organizations

- 4.2.1 Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) *Duce*
- 4.2.2 World Meteorological Organization
- 4.2.3 International Council for the Exploration of the Sea (ICES)
- 4.2.4 North Pacific Marine Science Organization (PICES) *Bychkov*
- 4.2.5 Global Bathymetric Chart of the Ocean (GEBCO)

5.0 RELATIONS WITH NON-GOVERNMENTAL ORGANIZATIONS

5.2 International Council for Science

- 5.1.1 Scientific Committee on Antarctic Research (SCAR) *Duce*
- 5.1.2 International Geosphere-Biosphere Programme (IGBP) *Broadgate*
- 5.1.3 World Climate Research Programme (WCRP)
- 5.1.4 Scientific Committee on Problems of the Environment (SCOPE) *Urban*
- 5.1.5 International Union of Pure and Applied Chemistry (IUPAC)

5.2 Affiliated Organizations

- 5.2.1 International Association for Biological Oceanography (IABO) *Pierrot-Bults*
- 5.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS) *Duce*
- 5.2.3 International Association for the Physical Sciences of the Ocean (IAPSO) *Rizzoli*

5.3 Other Organizations

- 5.3.1 Partnership for Observation of the Global Oceans (POGO) *Urban*
- 5.3.2 Ocean Studies Board, U.S. National Academy of Sciences: International Global Ocean Exploration Workshop *Urban*
- 5.3.3 Census of Marine Life and Ocean Biogeographical Information System *Pierrot-Bults*

6.0 ORGANIZATION AND FINANCE

6.1 2002 Election of SCOR Officers *Field*

6.2 Membership *Field, Urban*

- 6.2.1 National Committees
- 6.2.2 Proposed New Membership Policy

6.3 Publications Arising from SCOR Activities *Urban*

6.4 Finances *Finance Committee, Urban, Gross*

6.5 The Disciplinary Balance among SCOR Working Groups *Disciplinary Balance Committee*

6.6 Miscellaneous

7.0 FUTURE MEETINGS

7.2 Future meetings of SCOR

7.1.1 2002 Meeting – Sapporo, Japan
7.1.2 2003 Executive Committee Meeting – Moscow, Russia *Shapovalov*
7.1.3 2004 General Meeting – Venice, Italy *Purini*
7.1.4 2007 Executive Committee Meeting—SCOR 50th Anniversary—Woods Hole, USA

7.2 Other meetings of interest to SCOR *Urban*

8.0 OTHER BUSINESS

ANNEX 3
REPORT OF THE NOMINATING COMMITTEE

15 July 2002

To: Voting Members of SCOR: Nominated Members and Representatives of Affiliated Organizations
cc: National Committees, Executive Committee
From: Ed Urban, Executive Director
Re: **Nominations for Vacant Positions on SCOR Executive Committee**

At the XXVIth General Meeting of SCOR in October, the terms of office of the following members of the SCOR Executive Committee will expire:

Vice-Presidents	Wolfgang Fennel	Germany
	Roberto Purini	Italy
	Shizuo Tsunogai	Japan

Professor Purini is eligible to be re-elected for a second two-year term of office and has agreed to be nominated for re-election. However, Professors Fennel and Tsunogai are all ineligible for re-election, each having served for a total of four years.

A number of very good nominations were received this year and we are grateful to all of the National Committees that participated in this process. Your contributions are always invaluable to SCOR. The Nominating Committee has considered all nominations received and their proposed slate is included in the attached message from John Field. We are required to notify you of all nominations received (see enclosed).

In accordance with the new procedures for SCOR elections, which were approved at the General Meeting in 1998 (see enclosure), clauses 6 through 10 of the enclosed document apply to this stage of the process. We believe that this slate, along with the continuing Executive Committee members, provides an excellent international and disciplinary coverage on the SCOR Executive Committee.

Date: Fri, 28 Jun 2002 16:55:11 +0300
From: John Field <jgfield@pop.uct.ac.za>
Subject: Re: Nominations for SCOR Officers
To: Ed Urban <scor@jhu.edu>
Cc: David Turner <david@amc.gu.se>, David Turner <david@amc.chalmers.se>,
Pinxiang Wang <pxwang@online.sh.cn>, Wesley Anne Ross <Wesley.Ross@jhu.edu>,
Robert Duce <rduce@ocean.tamu.edu>

Dear Dr Urban,

The nominating committee, consisting of Drs John FIELD (South Africa), David TURNER (Sweden), and WANG Pinxian (China, Beijing) is pleased to make the following brief report and nominations for the SCOR Executive Committee for the period 2002 - 2004. The Nominating Committee conducted its business by mail and electronic mail.

Only vice-presidential positions are open, as three vice-presidents rotate off the committee, and two are not eligible for re-election, having served two terms. Our task is to recommend a slate that will give an Executive Committee balanced in terms of scientific expertise, geographic distribution of countries and gender. The Committee had a difficult task in choosing from the list of six excellent scientists nominated by National Committees for the vacant positions, but in the end agreed upon the following.

We nominate as vice - presidents of SCOR for 2002 - 2004:

Dr Roberto PURINI (Italy, physical oceanographer) for a second term.
Dr Laurent LABEYRIE (France, Palaeo-oceanographer)
Dr Akira TANIGUCHI (Japan, biological oceanographer)

The Nominating Committee also recommends that for better disciplinary, gender, and geographic balance the SCOR Executive Committee seriously consider co-opting:

Dr. Ilana WAINER (Brazil, physical oceanographer)
and
Dr Andrei ZATSEPIN (Russia, physical oceanographer)

as members of the Executive Committee for 2002-2004.

Yours sincerely,

John Field (chair)
Nominating Committee

Nominations for 2002-2004 SCOR Vice-President Positions

Name	Nominated by National Committee	Expertise
Laurent Labeyrie	France	Chemical oceanography, paleoceanography
Roberto Purini	Italy	Physical oceanography
José Stuardo	Chile	Biological oceanography
Akira Taniguchi	Japan	Biological oceanography
Ilana Wainer	Brazil, South Africa	Physical oceanography, climate
A. Zatsepin	Russia	Physical oceanography

ANNEX 4
WG PROPOSAL ON DEEP-OCEAN MIXING

Proposal for a Joint IAPSO/SCOR Working Group to Investigate Deep-ocean Mixing Processes[3]

Abstract

Understanding of deep-ocean mixing processes generally can be construed to have fallen behind our grasp of large-scale ocean circulation. A number of elegant studies have been carried out, notably those involving tracer releases and, more recently, studies of mixing associated with the Hawaiian Ridge. We now are gaining a quantitative as well as a qualitative understanding of the interactions among currents, internal waves, seafloor topography and roughness, stratification, and mixing.

The proposed working group would focus on deep-ocean mixing, to conduct its work over a period of four years, culminating in a final report that (1) summarizes past results, including analyses of historical field data, concerning the sources for, and geographical distribution of, mixing in the deep-ocean basins, particularly related to tidally driven mixing mechanisms; (2) assesses, within the established observational and theoretical context, difficulties involved with parameterization of mixing in numerical ocean GCMs; and (3) assesses what more should be done by further observational programs or improved observational techniques to fill gaps in understanding essential to provide useful information for modeling the effects of deep-ocean mixing. Recent work suggests considerable spatial and temporal non-homogeneity in deep-ocean mixing; an improved understanding of the distribution of deep-ocean mixing intensity is central to the proposed Working Group. The so-called "hot spots," where tidal energy conversion associated with steep seafloor topography leads to locally strong mixing, are of particular interest, as are high-latitude ocean areas where such energy sources can be especially significant in the context of typically low-energy environments. The working group will also establish and maintain a Web site as a "virtual workshop" that can be used by the deep-ocean mixing community for exchange and discussion of ideas, results, and future planning.

Rationale

Understanding of deep-ocean mixing processes is important to society because such information is needed to parameterize global circulation models correctly and to make model simulations more similar to observations. Such improvements are not merely of scientific interest; they are necessary for correctly predicting both the time course and magnitude of the net transfer of heat and gases (e.g., CO_2) from the atmosphere to the ocean, and thus, the evolution and extent of global climate change, as well as changes to the ocean environment resulting from absorbed heat and gases.

It is particularly timely to focus on the issue of deep-ocean mixing because interest has heightened over the past few years in tidal interactions with seafloor topography and the ensuing impacts on deep-ocean mixing. This interest stems in part from recent analytical and field results indicating that these interactions can contribute a significant portion of the energy needed to force mixing in deep-ocean basins remote from physical boundaries. A full understanding of this mechanism may enhance our ability to

[3]As modified after the meeting, in terms of scope and content of project, and working group membership.

parameterize mixing processes that occur at spatial scales smaller than the grid scales typifying even eddy-resolving ocean general circulation models (GCMs).

A working group formed jointly between SCOR and IAPSO is the best mechanism to focus international scientific effort on the topic of deep-ocean mixing. Appropriate scientific expertise must be assembled from several different nations and an international working group could help build capacity on this topic in developing nations. (The original proposal left full member spots on the working group open for individuals from developing nations to be identified by SCOR and IAPSO.) Because this topic is one of fundamental science, it is appropriate that the activity be conducted by non-governmental organizations such as SCOR and IAPSO. The two organizations can attract top-level scientists to volunteer their time to participate in the group and may be able to help arrange funding for the activity. Other organizations would not be able to ensure that the activity is suitably international and involves scientists from developing countries and young scientists.

Scientific Background

No attempt is made here to provide a complete background on deep-ocean mixing, as such could easily fill a volume. Rather, we will summarize only those issues that have motivated the organization of the working group that is under consideration, that is, deep-ocean mixing processes remote from the physical boundaries, their impacts, and the difficulties inherent to their incorporation in large-scale numerical models.

Barotropic tidal flow over variable topography is now believed to be a major source of mixing in the world ocean (see e.g., Munk, 1997; Munk and Wunsch, 1998; Egbert and Ray, 2000; Wunsch, 2000; Jayne and St. Laurent, 2001). There are two classes of conceptual model for the generation of tide-induced mixing: (*i*) flow over steep mid-ocean ridges, and (*ii*) flow over rough topography. In each case, the barotropic tide is first converted to a baroclinic tide by coupling with the topography, and then the baroclinic tide dissipates through shear instabilities and other processes. The two models differ, however, in significant ways. In (*i*), present evidence suggests that most barotropic energy is converted to "low-mode" baroclinic tides. These are internal waves with fairly simple vertical structures that span most of the water column. Such waves can propagate long distances from their source before dissipating (Ray and Mitchum, 1996). In model (*ii*), limited evidence suggests that "high-mode" baroclinic tides are generated. These internal waves have a complex vertical structure and might be strongly constrained to near the seabed (Polzin et al., 1997). They would be expected to dissipate locally and lose most of their energy to mixing near the region of rough topography and, possibly, primarily near the seabed. How and where the conversion to baroclinic tides occurs, and where the baroclinic energy is ultimately dissipated, have profound effects on water mass conversion. This conversion is an integral part of the global thermohaline and wind-driven circulation, both active topics in temperate-latitude studies.

Additional mixing can be driven by molecular-scale processes such as double diffusion. A good summary of the related observational issues has been provided by Ruddick and Richards (2002). These processes, generally less energetic than those arising from tidal conversion, can nonetheless be significant in regions of overall low energy such as the north and south polar ocean basins. In fact, interleaving processes that depend in part upon double diffusion may play a significant role in heat and salt exchange between the peripheral boundary currents surrounding the Arctic Ocean and its relatively quiescent deep central basins (Gunn and Muench, 2001).

The issue of incorporating turbulence into ocean models has been widely recognized in recent years, coincident with a realization that large-scale models generally did not satisfactorily incorporate turbulent processes, and at least one significant effort addresses many of the related issues. This effort, titled *GOTM, a General Ocean Turbulence Model: Theory, Implementation and Test Cases*, is described in Burchard et al. (2002), accessible from the Web site at **http://www.gotm.net**. This material, which includes a comprehensive list of references, is strongly focused on the "nuts and bolts" issues concerned with different model codes and incorporation into them of turbulent parameters. It does not focus specifically on the deep-ocean mixing issues that are the primary interest for this working group, however, but rather encompasses all aspects of ocean mixing, including upper mixed layer formation and near-coastal processes.

Statement of Work/Terms of Reference

The proposed working group would

1. Summarize past results, including analyses of historical field data, concerning the sources for, and geographical distribution of, mixing in the deep-ocean basins. In light of recent results, tidally driven mixing mechanisms will be emphasized.
2. Assess, within the established observational and theoretical context, those difficulties involved with parameterization of mixing in numerical ocean GCMs.
3. Assess what more should be done by further observational programs or improved observational techniques to fill gaps in understanding essential to provide useful information for modeling the effects of deep-ocean mixing, including the potential to detect deep-ocean mixing through remote sensing and tracer techniques.
4. Establish and maintain a Web site as a "virtual workshop" that can be used by the deep-ocean mixing community for exchange and discussion of ideas, results, and future planning.
5. Produce a comprehensive, published final report incorporating appropriate results from the above topics.

Meetings*:* It is proposed that the first formal meeting of this Working Group take place during July 2003 in Sapporo, Japan in association with the International Union of Geodesy and Geophysics (IUGG) General Assembly. Preliminary communications leading up to this meeting will take place during the preceding year and will lead to firm identification of the membership, fine-tuning of the Terms of Reference, and creation of an agenda. A second meeting will be convened in association with the workshop (proposed below) approximately one year following the initial meeting. A third and final meeting is proposed to take place approximately three years following the initial meeting in order to allow final discussion and input to the Working Group's report.

Workshop in summer-autumn 2004: An international workshop on deep-ocean mixing will be convened in order to facilitate input to the Working Group en route to fulfilling the above terms of reference. This workshop is proposed to take place approximately one year following the 2003 meeting, allowing a nominal one-year period over which to structure the workshop agenda, issue announcements and invitations, secure needed funds, and make other necessary preparations. Separate funding will be sought from ONR and other sources for this workshop. This workshop will provide opportunities to involve a greater number of experts than can be included as working group members.

Symposium in 2007: It is proposed that the Working Group, as its final action, oversee convening of a symposium on the topic of deep-ocean mixing to take place at an anticipated 2007 IAPSO Assembly to be held jointly with the 2007 IUGG General Assembly.

A duration of four years is proposed for this activity, to commence formally at the time of the IAPSO symposium on "The role of mesoscale processes and bottom topography in energy transfer and mixing" that is scheduled to take place in Sapporo, Japan during the summer 2003 IAPSO Assembly. The project would be completed by 30 September 2007.

Working Group Membership: Working Group membership is proposed to consist, when complete, of ten specialists and will be international in scope. The members listed below have agreed to serve on the working group, pending approval and input from SCOR and IAPSO. We feel that an especially useful membership might consist of three "senior" members, considered broadly based experts in oceanography with interests in mixing, three "junior" members who can perhaps bring new perspectives, three members falling along the spectrum between these two categories, plus the working group chair. The chair is a non-specialist who will attempt to provide balance and will address coordination, Web site maintenance, and preparation of the final, published report. The working group is intended to include members from developing countries, and we are working at present, with the help of SCOR and IAPSO, on identifying suitable individuals.

Full Members		Associate Members	
Robin Muench, Chair	USA	Molly Behringer	USA
Chris Garrett	Canada	Sybren Drijfhout	Netherlands
Toshiyuki Hibiya	Japan	Gary Egbert	USA
Peter Killworth	UK	Ann Gargett	USA
Trevor MacDougall	Australia	Barry Ruddick	Canada
Eugene Morozov	Russia		
David Sales de Leon	Mexico		
Anders Stigebrandt	Sweden		
Louis St. Laurent	USA		

One additional Full Member and several additional Associate Members may be appointed.

References

Burchard, H., Bolding, K., and Villarreal, M.R., 2002: GOTM, a General Ocean Turbulent Model. Theory, Implementation and Test Cases. Unpublished document available at **http://www.gotm.net.**

Egbert, G. D., and Ray, R. D., 2000: Significant dissipation of tidal energy in the deep ocean inferred from satellite altimeter data. *Nature,* 405, 775-778.

Jayne, S. R., and St. Laurent, L.C., 2001. Parameterizing tidal dissipation over rough topography, *Geophys. Res. Lett.*, 28, 811-814.

Munk, W., 1997: Once again: once again – tidal friction. *Prog. Oceanogr*., 40, 7-35.

Munk, W., and Wunsch, C., 1998: Abyssal recipes II: Energetics of tidal and wind mixing. *Deep-Sea Res*., 45, 1977-2010.

Polzin, K.L., Toole, J.M., Ledwell, J.R., and Schmitt, R.W., 1997: Spatial variability of turbulent mixing in the abyssal ocean. *Science*, 276, 93-96.

Ray, R. D., and Mitchum, G.T., 1996: Surface manifestation of internal tides generated near Hawaii. *Geophys. Res. Lett*., 16, 2101-2104.

Ruddick, B., and Richards, K., 2002: Oceanic thermohaline intrusions: Observations. *Prog. Oceanog*., submitted.

Wunsch, C., 2000: Moon, tides and climate, *Nature*, 405, 743-744.

ANNEX 5
JOINT GLOBAL OCEAN FLUX STUDY (JGOFS)

Annual Progress Report (August 2001 to June 2002)

Roger B. Hanson
Executive Science Officer
JGOFS International Project Office
University of Bergen, Norway

INTRODUCTION

The Joint Global Ocean Flux Study (JGOFS) has successfully completed most of the science objectives set forth under its Science and Implementation Plans published more than a decade ago. The research design and measurement protocols have produced a wealth of high-quality data sets previously unattainable. The results have advanced our understanding of biogeochemical processes and feedbacks controlling the ocean carbon cycle and other associated bioelements under the framework of international global change research (IGBP, International Geosphere-Biosphere Programme). The knowledge base now includes the dynamics of marine food webs, the pathways by which ocean regions transform and transport carbon, the variability of plankton species over annual to decadal time scales, and the links between biogeochemical processes and large-scale climate patterns. This new knowledge, especially the concept of the ocean dynamics of the biological pump, has generated a new wave of advanced models that better describe carbon flow through the ocean ecosystem. The compilation of biogeochemical datasets continues and will only be completed upon the delivery of all datasets to the World Data Centre system. JGOFS views this process as one of its most important and critical activities in the time that remains. With a successful archival, properly cared-for, accessible, and comprehensive dataset, JGOFS will have achieved a major milestone in its synthesis and modeling phase. This year's annual report provides a brief summary of these and other activities arranged under the leadership of the Scientific Steering Committee, Regional Synthesis Groups, Working Group and Task Teams. In addition, the report describes briefly the International Project Office (IPO), its supportive role in these activities, and an overview of the available resources and estimated expenses for this year.

Report on the Synthesis Groups, Working Group and Task Teams

All SSC activities are approaching a successful completion of their Terms of Reference in time to showcase their accomplishments at the Third JGOFS Open Science Conference next year. The event will be hosted by the U.S. JGOFS Planning and Implementation Office and will be held at the U.S. National Academy of Sciences in Washington, D.C., 5-8 May 2003 (http://www.uib.no/jgofs/jgofs.html). Below are brief summaries of the activities and future plans.

North Atlantic Synthesis Group. This group was the first to reorganize during the JGOFS Synthesis and Modeling Phase, and since 1998 they have held three meetings[4] and recently published a *Deep-Sea Research II* volume, edited by Wolfgang Koeve and Hugh Ducklow.[5] The volume deals with the synthesis of biogeochemical studies in the North Atlantic Ocean and is a contribution to the ongoing

[4] *First-Third Meetings of the North Atlantic Synthesis Group (1998-2001).* JGOFS Report 34, October 2001

[5] Koeve, W. and H. Ducklow. 2001. JGOFS Research in the North Atlantic Ocean: A Decade of Research, Synthesis and Modelling. *Deep-Sea Research II*, 48(10)

international synthesis of this decade-long project. In the remaining time, the group plans to perform a joint modeling project in mid-2002; establish strong links with the Global Synthesis Working Group (see below); and organize joint North Atlantic Biogeochemistry sessions at upcoming international meetings. Regarding the idea of a joint modeling project, plans are underway to design a simple 2- to 6-box model to describe the relative inventories of NO_3, PO_4, DIC and DOC in the North Atlantic Ocean, excluding the equatorial region. Following Tyrell's approach, a representation of the ecological competition between two types of phytoplankton, a nitrogen fixer and one that cannot, will be inserted into the model. After convergence to steady state, the group will investigate whether the steady-state solution has reasonable concentration, fluxes and stoichiometry. Sensitivity tests will be included.

Indian Ocean Synthesis Group. After 81 cruises between 1992 and 1997, involving 7 countries, the Indian Ocean Synthesis Group (IOSG) met in India in 1999 and planned a synthesis of the Arabian Sea and Indian Ocean studies. The first product was recently printed in JGOFS Reports, edited by Louisa Watts, Peter Burkill and Sharon Smith.[6] The report provides an excellent overview of the results published in more than 120 referenced articles that address different aspects of the biogeochemistry and physical forcing of this fascinating and dynamic region. The knowledge base now suggests, for instance, that seasonal monsoonal forcing results in levels of primary production that are as high during the weaker NE Monsoon as they are during the stronger SW Monsoon; bacterial production would seem to be less strongly coupled to monsoonal forcing than primary production, with an amplification of about a factor of 2, considerably lower than primary production. While microzooplankton grazing continues at high levels throughout all seasons, these grazers have little impact on diatoms that bloom during the SW Monsoon. The fate of these diatoms depends on the trophic coupling to herbivorous crustaceans, such as *Calanoides carinatus*, and export flux to the deep ocean has been shown to be strongly seasonal and spatially variable. The next step of the IOSG is to focus on the synthesis of the primary literature in the disciplinary chapters of the JGOFS Report and publish a final version in book form, possibly by Springer Verlag, before the end of next year.

Equatorial Pacific Synthesis Group. During the past three years, the Equatorial Pacific Synthesis Group has coordinated the "synthesis of synthesis" in the region and published its synthesis in a special issue of *Deep-Sea Research II*, edited by Robert Le Borgne, Richard Feely and Denis Mackey.[7] The volume synthesized published results on the carbon cycle of the equatorial Pacific Ocean, which accounts for a major fraction of the net exchange of CO_2 between the atmosphere and the ocean. The equatorial Pacific zone is influenced by oceanic circulation, the effect of which is the clear division of two distinct regions: the oligotrophic warm pool and the mesotrophic high-nutrient, low-chlorophyll (HNLC) area. Although different, the two ecosystems have much in common and may be qualified as "tropical open ocean". Both areas have the same basic planktonic population and diel variability in primary production. Superimposed on the basic pico-phytoplanktonic population and due to the presence of macronutrients in the photic layer, larger cells are more abundant in the HNLC system and generate higher biomasses and fluxes. Advection of macronutrients to the surface in the HNLC system is due to ocean upwelling, which also transfers CO_2-rich waters from the deep layers to the surface that results in degassing of CO_2 to the atmosphere. There are other important interannual variations (related to the El Niño-Southern Oscillation [ENSO]) in the export of CO_2 from the ocean to the atmosphere and less variability in the biological pump fluxes. The reason for such differences is that the thermodynamic pump responds faster to variations in the upwelling intensity, whereas the biological pump is not influenced by such variations,

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[6] *Report of the Indian Ocean Synthesis Group on the Arabian Sea Process Study*, edited by L. Watts, P. Burkill and S. Smith. JGOFS Report No. 35, January 2002

[7] Le Borgne, R., R.A. Feely, D.J. Mackey, Guest Editors. 2002. The Equatorial Pacific JGOFS Synthesis. *Deep-Sea Research Part II*, Volume 49, Issue 13-14, 2002.

being limited primarily by micronutrients, not macronutrients. For example, the Iron-Ex experiments have shown the effect of iron on phytoplankton composition and the subsequent effect on the increased biological flux. It is now thought, however, that there may be a co-limitation by both iron and silicon on the downward carbon flux because the sinking rate relies on particle size and plankton assemblage. One of the unexpected discoveries of the Equatorial Pacific Process Study was the impact of Tropical Instability Waves (TIWs) on the biological pump. TIWs occur at certain periods of the year in the Atlantic and Pacific oceans and their effect is centered on the equator and north of it. Although observed on different occasions, their impact on the system is still being debated. For example, they may have a negligible effect on the biological production when the overall phenomenon is considered over space and time, or may have a positive effect on primary productivity via iron inputs and thus a profound effect on the spatial distribution of planktonic biomasses and fluxes.

With the completion of this literature synthesis, the group felt that the modelers could benefit from the new concepts and organized a small modeling workshop on Equatorial Pacific Synthesis and Modeling, which will be held in September 2002 at the Darling Marine Center, University of Maine, USA. The goals of this workshop are to present current views of the carbon cycle in the Equatorial Pacific, taking opportunity of the recent synthesis in the *Deep-Sea Research II* volume; to present current ecosystem and large-scale models developed in the region; to identify potential conflicts within the observations; to identify critical gaps in our knowledge; and to consider the ability of models to predict long-term variations in the equatorial ecosystem. The speakers and structure of the workshop are available online at the Web site http://www.dmc.maine.edu/html/epsmw.html.

Southern Ocean Synthesis Group (SOSG). Since 1998, the SOSG has held a number of meetings, workshops and two major international symposia in Brest, France.[8] In a report to the SSC, Paul Tréguer and Robert Anderson recently reported on the SO-JGOFS Workshop in Hawaii (February 2002) and describe the possible responses of the Southern Ocean, as well as the world ocean, to combined climate and external forcing. From advanced 3-D models, an increased stratification of the ocean is expected with global warming, which will play a major role in biogeochemical fluxes in the future. In the high latitudes, both primary and export production is expected to increase significantly, whereas biogenic fluxes are expected to decrease in low latitudes. Iron from below the surface mixed layer seems to play a role and generally is underestimated, as most present studies have focused on iron from above. Inconsistencies still remain between the outputs of atmospheric inversion models and the global synthesis of air-sea exchange of pCO_2 data. Present estimates of the austral annual sink of atmospheric CO_2 remain poorly constrained and vary between -0.1 to -0.6 PgC yr^{-1} for the Southern Ocean south of 50°S. Negative fluxes such as these are not reconcilable with outputs of atmospheric inversion models validated from a few CO_2-measuring land-based stations located in the Southern Hemisphere. More land stations and new approaches for a better integration of ocean and atmospheric data of CO_2 and O_2 were strongly recommended. Following the plenary talks and discussions, participants assessed three topics of the Southern Ocean carbon cycle. First, what physical and chemical conditions regulate phytoplankton growth and species composition? To better account for the complexity of the Southern Ocean ecosystems and the impact of climate change on phytoplankton dynamics, future biogeochemical models should consider a "polygonal" approach to the limitation of the primary production, such as the role of light, nitrate, phosphate, silicic acid, iron, and grazing for the major players (diatoms, *Phaeocystis*, crytophyceans, and other small phytoplankters). Second, what is the "fate" of biogenic material (e.g., regeneration, grazing, and export), and can the "fate" be correlated with environmental conditions? From SO-JGOFS observations and modeling work about the "fate" of biogenic material and link with

[8]Meeting of the Southern Ocean Synthesis Group, Year 1998, edited by Ulrich Bathmann. JGOFS Report No. 32, October 2001.

environmental conditions in the Southern Ocean, we have learned that the export production of organic carbon out of the photic layer is high. However, the export flux of carbon deeper than 2000 meters is almost comparable to the rest of the world ocean. If true, mineralization of organic carbon in the "twilight" zone of the Southern Ocean should be high, presently supported by a few observations. And third, is the satellite view of phytoplankton biomass in the Southern Ocean consistent with the results from the first two topics? Data from the Sea-viewing Wide Field Sensor (SeaWiFS) allow realistic estimates of the seasonal and interannual variability of chlorophyll concentrations in Southern Ocean surface waters, although persistent cloud coverage makes continuous determinations difficult. With improved algorithms in the future, satellite determinations of chlorophyll in offshore waters of the Southern Ocean will be constrained better to reduce the disagreement between satellite-based estimates and that of inverse modeling estimates of primary production and export.

North Pacific Synthesis Group. The NPSG has met regularly, generally alongside the annual PICES meetings while the fieldwork continues in parallel with synthesis and modeling activities. Several publications are in development:

- *Journal of Oceanography* publication from the joint PICES-JGOFS sessions on carbon cycle and ecosystem dynamics during the PICES IX meeting in Japan (October 2000) and the joint session on plankton size classes and function during PICES X meeting in Canada (October 2001).
- PICES Science Report and National Institute for Environmental Studies (NIES) Report on data synthesis from the workshop during PICES IX
- NIES Report on the CO_2 data intercomparison held at 15 international laboratories.
- Internet data links (Japan Oceanographic Data Centre (JODC) Web site: http://www.jodc.go.jp/JGOFS_DMO/index.html for the North Pacific Data Inventory, CO_2 and CO_2-related data, exchange and integration.
- *Deep-Sea Research II* volume with Arthur Chen, Paul Harrison, Toshiro Saino and Alexander Bychkov, eds. (2002).
- Another publication is planned for *Journal of Oceanography* (2003). Topic or content (TBA)

Plans for future fieldwork continues, with Canada planning three cruises per year to Station PAPA, and Japan with two annual cruises (summer and winter) in western North Pacific (Station KNOT) and a joint Japan/Canada: Fe-Fertilization Experiment at Station PAPA in May 2003.

Global Synthesis Working Group (GSWG) and **JGOFS-GAIM Task Team (JGTT).** The GSWG, one of the youngest SSC synthesis groups, with a focus on advance biogeochemical modeling techniques, combined forces with the JGTT on ocean carbon modeling and held a joint workshop on "Global Ocean Productivity and the Fluxes of Carbon and Nutrients: Combining Observations and Models" in Ispra, Italy (June 2002). The first JGOFS modeling meeting was held in Oban, Scotland (May 1997) by Trevor Platt and Coleen Moloney. Reiner Schlitzer (Global Synthesis Working Group) and Patrick Monfray (JGTT) along with site host Nicolas Hoepfner (EC Joint Research Center) organized the latest high-profile, ocean-modeling workshop. The goals of this workshop were to assess the present state of research on global ocean productivity and downward material fluxes from observations and biogeochemical models, and to identify future research needs. Emphasis is on integrated studies and the comparison between methods. During the course of the three days, participants provided answers to such questions as, how accurate are satellite productivity algorithms? Are sediment trap data consistent with satellite productivity maps? Are benthic-food supply requirements matched by measured downward fluxes? What controls the export and sequestration efficiency? How important are ocean margins for global ocean biogeochemical cycles? Are modeled productivity rates and fluxes consistent with observations? How will marine

biogeochemical cycles change in the future? Regarding the next generation of biogeochemical models: what level of complexity is required to improve productivity and flux estimates? New technologies and observations: which new datasets will be available in 10 years? Are they sufficient to validate future models? Many of the speaker's updated presentations are available as pdf files on the JGOFS Web site (http://www.uib.no/jgofs/jgofs.html).

Continental Margins Task Team. The joint JGOFS/LOICZ Continental Margins Task Team (CMTT) is the most advanced of the synthesis task teams and plans to produce an overall synthesis volume on the assessment of carbon, nitrogen and phosphorus fluxes on and across continental margins. Planning for this volume, the CMTT created four regional working groups: Marginal Seas and Tropical Coastal Zones (Liana McManus, KK Liu and Shu Gao, leaders), Eastern and Western Boundary Currents (Renato Quiñones and Larry Atkinson, leaders), Polar Margins (Robie MacDonald, leader) and Subpolar Margins (Jonathan Sharples and Larry Atkinson, leaders). The main objective of the workshops was to produce a general outline of the chapters in relation to the designated regions, which would include an extensive analysis and definition of the geographic limits of the systems, relevant spatial and temporal scales of variability, main fluxes and processes to be considered in the synthesis, and identification of major gaps and uncertainties in the current understanding of continental margin biogeochemistry. What follows is a brief description of each regional meeting, location and dates:

- **Workshop on Eastern and Western Boundary Current Systems** was held at Old Dominion University, Norfolk, Virginia (November 2001) and focused on the currents lying equator-ward of the westerlies and poleward of the tropics.
- **Workshop on Arctic Margins** was held at the Institute of Ocean Sciences, British Columbia, Canada (May 2001) and defined its study area as Arctic continental shelves and seas.
- **Workshop on Marginal Seas and Tropical Coastal Zones** was held at the National Taiwan University, Taiwan (September 2001) and focused on the marginal seas and tropical continental shelves.
- **Workshop on Subpolar Margins** was held at Southampton Oceanography Centre, UK (April 2002) and focused on sub-polar margins and seas, for example, the North Sea and Antarctic margins.

In December 2002, the final workshop will be held with a focus on global synthesis of the regional syntheses. The major contributors of the regional efforts will meet and merge the regional syntheses into a global view of the continental margins. Tentative plans are to publish this volume in the IGBP Book Series at Springer Verlag in summer 2003. The volume is well overdue since the last comparable volume on continental margins was published more than a decade ago. To assist this effort, the database and bibliography for the synthesis book are now managed through Pangaea at the World Data Center-MARE: http://www.pangaea.de/wdc-mare/Projects/CMTT/. Pangaea is a relational database system aimed at archiving, publishing and distributing data from global change research communities, with special emphasis on paleo-climatic, marine and environmental sciences.

Paleo-JGOFS Task Team (PJTT). The PJTT is one of the youngest SSC task teams. It held its first workshop in Gif-sur-Yvette, France last year (November 2001) to discuss future paleo-ocean research topics. Participants drafted an important document on the most central issues to be included in a future programme of ocean research. Karin Lochte, Roger Francois, Laurent Labeyrie and Raja Ganeshram edited the document and subsequently submitted it to the SCOR/IGBP Ocean Futures Meeting in Barcelona, Spain (December 2001). In February 2002, the PJTT organized a well-attended and exciting special session on "Linking modern and past biogeochemical fluxes", chaired by Roger Francois and Rick

Jahnke, at the AGU/ASLO Ocean Science Meeting. The PJTT is now seeking to build a stronger network of scientists studying modern and past biogeochemical states of the ocean and its variability. Such a network and better information exchange among scientists of different disciplines will help to develop new scientific ideas and research projects. Plans are now underway to propose a SCOR Working Group and develop the network, information exchange and research projects.

Data Management Task Team (DMTT). The DMTT met at the Ocean Climate Laboratory, National Oceanographic Data Center (NOAA) in Silver Spring, Maryland (January 2002). The immediate tasks at hand are enormous over the next year. The DMTT calls for

1. long-term stewardship and accessibility to the decentralized JGOFS national data sets for future generations and ocean biogeochemical programs. To accomplish this task, the national data managers from Australia, Canada, France, Germany, India, Japan, Pakistan, UK and USA will deliver a copy of the national JGOFS datasets to WDC-MARE in Bremen, Germany, which will convert the diverse datasets to common format under the one title "JGOFS Master Dataset";
2. continuing the documentation of national datasets in the NASA Global Change Master Directory (GCMD). This task is the responsibility of the national data managers who will deliver the metadata, in the form of DIF files. Metadata describe the core parameters, cruise inventories and fieldwork of the national activities; and
3. continuing the rescue of small datasets from participating countries. Margarita Conkright and Bernard Avril recently held a "data rescue" meeting in Ispra (June 2002), which laid the groundwork for incorporating additional datasets. The participating countries were The Netherlands, Spain, Belgium, Italy, and Norway. Other countries that posses JGOFS field data are Chile, China-Beijing, China-Taipei, Iceland, Ireland, Korea, Russia, South Africa and Sweden.

Photosynthesis Measurement Task Team (PMTT). The PMTT was one of the first teams to complete its Terms of Reference and disbanded shortly after the first of two publications from its last workshop, which was held in Svalbard, Norway (August 1997). The first paper was published in *Journal of Plankton Research*[9] and later reprinted in a JGOFS Report.[10] The second paper,[11] edited by Edward Laws, discusses the theoretical and practical considerations relevant to determining the relationship between irradiance and carbon uptake by phytoplankton as estimated by the ^{14}C method (Steemann Nielsen, 1952) and to estimating light absorption by phytoplankton. The paper also deals at length with the physiological interpretation of parameters associated with photosynthesis-irradiance (P vs. E) curves. Finally, it includes a discussion on the relationship of core profiles and P vs. E curves to satellite maps of ocean color and estimates of basin-scale primary production. It is complementary to the earlier report of Sakshaug et al. in the sense that it addresses practical aspects of implementing the theory presented in that publication.

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[9]Sakshaug, E., A. Bricaud, Y. Dandonneau, P.G. Falkowski, D.A. Kiefer, L. Legendre, A. Morel, J. Parslow, and M. Takahashi. 1997. Parameters of photosynthesis: Definitions, theory and interpretations of results. *Journal of Plankton Research* 19: 1637-1760.

[10]Sakshaug, E., A. Bricaud, Y. Dandonneau, P. Falkowski, D. Kiefer, L. Legendre, A. Morel, J. Parslow and M. Takahashi. 1998. Parameters of Photosynthesis: Definitions, Theory and Interpretation of Results. JGOFS Report No. 27 (August 1998)

[11]Laws, E., E. Sakshaug, M. Babin, Y. Dandonneau, P. Falkowski, R. Geider, L. Legendre, A. Morel, M. Sondergaard, M. Takahashi and P. J. leB. Williams. 2002. Photosynthesis and Primary Productivity in Marine Ecosystems: Practical Aspects and Application of Techniques. JGOFS Report No. (TBA).

SCIENTIFIC STEERING COMMITTEE

The JGOFS Scientific Steering Committee held its 16th Meeting before the IGBP Open Science Conference in Amsterdam, The Netherlands (July 2001) and all current members indicated that they would accept an appointment to 31 December 2003, the sunset date for JGOFS. In the fall, SCOR and IGBP approved JGOFS recommendations to extend the terms of the remaining at-large members and appoint Dennis Hansell (USA) to the SSC. The at-large members agreed that this action also applied to present chairs of synthesis groups, global synthesis working group and task teams, in that they would remain on the SSC after the Terms of Reference are completed and the activity disbands. These actions will maximize the momentum and retain the knowledge base throughout the synthesis and modeling phase. The committee presently stands at 19 members: 7 at-large members and 12 activity chairs. The current membership is shown in the table below.

Name	**Country**	**Function**		**Term Ends**[12]
Ducklow, Hugh	USA	SSC Chair, North Atlantic SG	At-large	2003
Haugan, Peter	Norway	SCOR/IOC Advisory Panel on Ocean CO_2, GOOS/OOPC	At-large	2003
Saino, Toshiro	Japan	North Pacific SG	At-large	2003
Anderson, Robert	USA	SSC, Geochemistry Expert	At-large	2003
Hansell, Dennis	USA	SCOR/IGBP OCEANS Transition Team	At-large	2003
Hong, Huasheng	China-Beijing	SSC, Continental Margins Expert	At-large	2003
Tilbrook, Bronte	Australia	SSC, CO_2 Inventory Expert	At-large	2003
Lochte, Karin	Germany	Paleo JGOFS TT	Chair	2003
Monfray, Patrick	France	JGOFS-GAIM TT	Chair	2003
Quiñones, Renato	Chile	Continental Margins SG	Chair	2003
Schlitzer, Reiner	Germany	Global Synthesis WG	Chair	2003
Tréguer, Paul	France	Southern Ocean SG	Chair	2003
Wallace, Douglas	Germany	SCOR/IOC Advisory Panel on Ocean CO_2	Chair	2003
Conkright, Margarita	USA	Data Management TT	Chair	2003
Bychkov, Alex	Canada	North Pacific SG	Chair	2003
Garçon, Véronique	France	North Atlantic SG	Chair	2003
Le Borgne, Robert	France	Equatorial Pacific SG	Chair	2003
Platt, Trevor	Canada	International Ocean Color Coordinating Group	Chair	2003
Smith, Sharon	USA	Indian Ocean SG	Chair	2003

Normally, annual meetings of the SSC are held during the spring of each year, but with this year's synthesis activities well underway, the SSC agreed to delay and hold one of its last annual meetings in the Southern Hemisphere. The last Southern Hemisphere meeting was held in Cape Town, South Africa (April 1998), hosted by John Field, who was stepping down after 6 years as chairman. After local agreements, Renato Quiñones informed the SSC that the University of Concepción would welcome the SSC to Chile and set the dates of 23-25 September 2002 for the 17th Meeting.

[12]Sunset date for the Joint Global Ocean Flux Study project, 31 December 2003.

CALENDAR OF ACTIVITIES FOR 2001 AND 2002

In Amsterdam, the SSC also set the priority for meetings and tentatively allocated funds for activities. The current list of meetings in 2001-2002 is shown below.

Year 2001

15-16 Jan.	**North Atlantic Synthesis Group Meeting.** Arcachon, France.
7-11 May	**JGOFS/LOICZ Continental Margins Workshop on Polar Margins.** Sidney, B.C., Canada.
7-9 June	**Indian Ocean Synthesis Group editors meeting.** Miami, FL, USA.
27-29 June	**JGOFS/WOCE/IOC CO_2 Transport Workshop.** Southampton, UK
6 July	**Global Synthesis Working Group Meeting.** Amsterdam, The Netherlands.
7-8 July	**16th JGOFS Scientific Steering Committee.** Amsterdam, The Netherlands.
28-30 Sept.	**JGOFS/LOICZ Continental Margins Task Team Workshop on Marginal Seas and Tropical Coasts.** Taipei/Taiwan.
1-5 Oct.	**Sixth International Carbon Dioxide Conference.** Sendai, Japan.
5-13 Oct.	**North Pacific Synthesis Group Meeting.** Victoria, B.C., Canada.
21-28 Oct.	**Joint IAPSO-IABO Assembly.** Mar del Plata, Argentina.
15-16 Nov.	**Paleo-JGOFS Task Team Meeting.** Gif-sur-Yvette, France.

Year 2002

29-30 Jan.	**Data Management Task Team Meeting.** Washington, D.C., USA.
11-15 Feb.	**During the 2002 Ocean Sciences Meeting organized by AGU and ASLO, special sessions or meetings were sponsored by JGOFS for the SOSG, the PJTT, the Equatorial Pacific Synthesis Group, and the North Atlantic Synthesis Group (NASG).** Honolulu, Hawaii, USA.
16-17 Feb.	**Southern Ocean Synthesis Group Workshop**: "**The Cycle of Carbon in the Southern Ocean".** Honolulu, Hawaii, USA
16-18 April	**Continental Margin Task Team Workshop on Subpolar Regions.** Southampton, UK.
22-26 April	**European Geophysical Society 27th General Assembly, special session "OA8. Biogeochemistry of the carbon cycle of the Atlantic Ocean".** Nice, France.
24-27 June	**Joint Global Synthesis Working Group and JGOFS-GAIM Task Team Workshop** entitled "Global Ocean Productivity and the Fluxes of Carbon and Nutrients: Combining Observations and Models". Ispra, Italy.
28 June	**DMTT European Countries, Data Rescue Meeting**. Ispra, Italy.
17-19 Sept.	**Equatorial Pacific Synthesis Meeting and Workshop.** Orono, Maine, USA.
23-25 Sept.	**17th JGOFS Scientific Steering Committee Meeting.** Concepción, Chile
1-2 Oct.	**North Pacific Synthesis Group Meeting and Symposium for the North Pacific Synthesis**. Sapporo, Japan.
Fall	**North Pacific Synthesis Group editorial meeting** for an issue of the *Journal of Oceanography* on JGOFS NP synthesis. Sidney, B.C., Canada.
4-6 Dec.	**Continental Margin Task Team Workshop for the Global Synthesis of the Regional Syntheses.** Washington DC, USA.

INTERNATIONAL PROJECT OFFICE

The IPO continues its full support of the SSC from our new offices on the main campus of the University of Bergen. Office staff has changed in the last year with the departure of Reidun Gjerde and the arrival of Sturle Litland (Financial Assistant).

Finances. In Year 2001, the project completed an overall operation budget of $392,068, with funds coming from the Research Council of Norway (NRC), SCOR, IGBP, University of Bergen (UiB), IOC, and ICSU. These funds covered the administration costs of the project, overhead costs for the project and facilities, publication costs, and travel costs of the committee and activities, such as meetings, workshops and symposia. In Year 2002, operating funds from NRC, SCOR, IOC, UiB and IGBP, including residuals from Year 2000 and 2001, totals $367,265. The expected expenditure for Year 2002 is $367,390. As of July 2002, the estimated balance is -$125. Other details are shown in the table below.

Data Management. As JGOFS approaches its sunset date, the Data Management Task Team (DMTT) and the JGOFS International Project Office (IPO) are continuing to document and compile all data and metadata collected over the past decade. Bernard Avril is collecting information on participating national research projects and cruises from each contributing country since 1988. This compendium also includes aspects of national data management, including the location and archival of JGOFS data collected during the fieldwork. This information will also assist the DMTT in their activities directed at securing the long-term stewardship of the "JGOFS Master Dataset". The ultimate purpose of the Master Dataset is to provide scientists with a comprehensive biogeochemical dataset in a common file and data format for use not only in current modeling projects, but also as a JGOFS legacy to future global change studies. It is the responsibility of the DMTT and IPO to ensure the future accessibility and long-term archival of this most valuable and one-of-a-kind dataset. Plans are now underway to deliver the national datasets to the WDC-MARE for inclusion in the Master Dataset and to eventually produce a JGOFS Master Dataset CD ROM. Countries, institutions and principal investigators who submit data will be given full credit within the JGOFS Master Dataset and have priority access to it.

JGOFS Core Parameters. During previous DMTT meetings, members defined cruises with JGOFS core parameters and those with a sufficient number of core parameters as "level 1", and other cruises with parameters relevant to JGOFS, for example, global CO_2 surface survey as "level 2", and drafted a list of parameters with preferred units for inclusion on the JGOFS Master Dataset. Avril circulated the list among the SSC for discussion and comment recently. SSC members reached a general agreement on the list and the preferred units to standardize and convert data files to a common format.

2002 Budget (as of June 30, 2002)			
SOURCES	**Budget**	**Purpose**	**Dates**
Resource Council of Norway	$171 415	Office Administration	Jan-Dec 02
SCOR funds (Mar-Dec 2002)	$70 833	JGOFS SSC	Mar-Dec 02
SCOR funds (Jan-'Feb 2003)	$14 167	JGOFS SSC	Jan-Feb 03
University of Bergen (2002)	$27 000	Office Operations	Jan-Dec 02
IGBP Secretariat (2002)	$20 145	JGOFS SSC	Jan-Dec 02
IGBP Secretariat (2001 carry over)	$2000	Springer-Verlag/Technical support	
IOC funds (2002)	$18 200	CMTT Regional and Global	
LOICZ funds (2002)	$15 000	CMTT Regional and Global	
SCOR residual from 2001	$8 332	SCOR Secretariat Account	
SCOR residual from 2000	20 173	University of Bergen Account	
Subtotal	**$367 265**		
	Expenses		
ACTIVITIES		**Comments**	**Dates**
International Project Office	$ 171 415	Office Administration (staff)	
International Project Office	$27 000	Office Operations (supplies, etc.)	
SSC Meeting (19)	$40 000	IGBP & SCOR funds/Chile	23-25 September
Executive Meeting (5)	$0		Cancelled
SYNTHESIS GROUPS AND TASK	**Estimate**		
CMTT (7)--Subpolar workshop	$14 100	LOCIZ--$5K and IOC--$9,100	17-19 April
CMTT (12)--Global Synthesis	$19 100	Joint: IOC--$9,100 & LOICZ--	4-6 December
JGTT--Workshop	$10 000	Joint c/ GSWG ($10K GAIM?)	23-25 June
NASG	$0	Meetings at OSM and EGS	Multiple dates
DMTT (10)	$10 000	General Business Mtg	28-28 Jan
DMTT (tentative)	$9 000	Ispra, IT, Database Rescue	26 June
DMTT (tentative)	$8 000	Pangaea/WDC-MARE, DE	Nov (tentative)
PJTT (9)	$5 000	Joint c/ PAGES ($5K)	TBD
IOSG	$500	Evening Meeting	10 February
SOSG	$11 005	Synthesis Workshop, Hawaii	11-12 February
Equatorial Pacific Synthesis Group	$10 000	Workshop (requested $34K)	17-19 September
NPSG (9)	$0	Alongside PICES	1-2 October
GSWG--Workshop	$20 000	Joint c/ JGTT / Ispra	23-25 June
OTHER MEETINGS AND EXPENSES			
Capacity Building & Training		Chile (Quiñones)	Cancelled
CMTT Book Publication	0	IOC funds/deferred to 2003	2003
IOSG Book Publication	0	Springer Verlag/deferred to 2003	2003
OSC Planning Committee	$1 270	Honolulu/ASLO OSM	February
SCOR Secretariat	$4 000	Conkright (USA) multiple travel	
JGOFS Synthesis Book/IOSG	$2 000	Technical layout at Springer-Verlag	
JGOFS Reports Series	$5 000	Estimate	
Subtotal	**$367 390**		
Balance	$(125)		

JGOFS Web Site. Avril launched a new international JGOFS home page (http://www.uib.no/jgofs/jgofs.html) with three objectives in mind: (1) to enhance the navigation through the pages and make it user friendly to all within and outside the JGOFS community; (2) to preserve it as the long-term information resource that requires minimal support after the IPO closes in December 2003, and (3) to facilitate transfer of the site to the next ocean biogeochemical program. It is presently designed

with 2 frames, one for the main menu and the other for content with many "pdf" files. You are warmly welcomed to visit the new Web site for historical, present and future plans; your comments are greatly appreciated at this stage, since the content and structure are still under construction.

Other Data Management Activity. The Norwegian JGOFS database project, fostered by the IPO and financed by the Research Council of Norway, continues with the aim to centralize all JGOFS data gathered by Norway at the Institute of Marine Research (IMR) for easy access and to produce a Norwegian JGOFS CD-ROM. Datasets to be included: Carbon profiles in the Nordic Seas (CARNOR); Carbon dioxide and deep water formation circulation in the Nordic Seas (CARDEEP); the carbon cycle in the Greenland Sea from ESOP-2; Carbon Time Series in the Norwegian Sea at Station M; and the Norwegian contribution to Continental Margins Studies (OMEX I). A steering group supervises the database project with representatives from IMR, the Norwegian JGOFS Committee and the IPO.

Third JGOFS Open Science Conference. In 2003, JGOFS will hold its final Open Science Conference. Several goals have been set for the Final Conference. First, the conference will bring together all JGOFS scientists involved in the project since its inception. Second, it will present the major accomplishments of the national and international JGOFS process studies, time-series stations, ocean surveys and ocean modeling. Third, it will reach out to the broader global change programs in climate, human dimension and biodiversity research by linking conference themes to emerging issues in the global carbon cycle. Fourth, it will include science and educational activities for the general public. And finally, it will offer the scientific community and general public an opportunity to discuss ocean-related issues and concerns with renowned JGOFS scientists and notable national officials.

The first goal of the conference committee is to ensure full participation of JGOFS and related global change research scientists. This goal will be an enormous financial undertaking and well beyond the capabilities of our immediate sponsors. To be successful, we will seek the support and generosity of our affiliates at the regional, international programs and intergovernmental organizations in oceanography, marine science and global change research. Therefore, the IPO is presently seeking co-sponsorship from the Asia-Pacific Network for Asia and western Pacific scientists (APN, $45,000), the Intergovernmental Oceanographic Commission for Eastern Europe and Middle East JGOFS scientists (IOC $20,000), the Inter-Americas Institute for Global Change Research for South and Central American scientists (IAI, $20,000), the European Union for similar targeted scientists in Western Europe (EU, $20,000), and finally the Research Council of Norway for several Norwegian scientists who were instrumental in bringing the JGOFS IPO to Norway and the University of Bergen in 1996 (NRC, $10,000). As of July 2002, we have not received any confirmation of co-sponsorships from the above organizations. Through the SCOR Secretariat, we have contacted the global change SysTem for Analysis, Research, and Training for assistance with young and mid-career African scientists (START, $20,000).

In the United States, Dr. Kenneth Buesseler, U.S. JGOFS PO Executive Officer, has sought conference support from the U.S. National Science Foundation within the framework of the U.S. PO budget for 2003. Thus, the US NSF will contribute directly with a large PO and conference grant ($100,000) that will include travel support for American and international scientists. Buesseler has also sought financial support from other U.S. agencies, including the National Oceanic and Atmospheric Administration (NOAA, $50,000) and the Office of Naval Research (ONR, $25,000). Additional conference support will be sought through the National Aeronautics and Space Administration (NASA, $25,000) and the Department of Energy (DOE, in preparation).

The IPO and PO estimate an overall conference and travel budget of $400,145.

Publications. SCOR and the IPO support the printing of the JGOFS Reports (ISSN: 1016-7331) in Bergen, Norway, distributes them internationally free of charge to libraries, institutions and scientists, and makes them available as pdf files from the JGOFS Web site. In 2001/2002, the IPO managed the technical editing and printed the following reports:

- No. 31. Thirteenth, Fourteenth & Fifteenth Meetings of the JGOFS Scientific Steering Committee. October 2001.
- No. 32. Meeting of the Southern Ocean Synthesis Group, Year 1998. October 2001.
- No. 33. Joint IGBP EU-US Meeting on the Ocean Component of an Integrated Carbon Cycle Science Framework. October 2001.
- No. 34. First, Second & Third Meetings of the North Atlantic Synthesis Group. October 2001.
- No. 35. IOSG Synthesis Report on the Arabian Sea Process Study. January 2002.
- No. 36. Photosynthesis and Primary Productivity in Marine Ecosystems: Practical Aspects and Application of Techniques. July 2002.

For further information about JGOFS or any of the activities discussed in this report, please contact Roger B. Hanson, Executive Director, Joint Global Ocean Flux Study IPO, Centre for Studies of Environment and Resources, University of Bergen, 5020 Bergen, NORWAY, Tel: +47-5558-4244, FAX: -9687, E-mail: **roger.hanson@jgofs.uib.no**, Homepage: **http://ads.smr.uib.no/jgofs/jgofs.htm**.

ANNEX 6
GLOBAL OCEAN ECOSYSTEM DYNAMICS (GLOBEC)

Report of the SCOR/IOC/IGBP GLOBEC International Programme for 2002
To the XXVI SCOR General Meeting
Sapporo, Japan, October 2002

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In October 2002 GLOBEC will host its 2nd Open Science Meeting in Qingdao, P.R. China. Meetings of the GLOBEC Scientific Steering Committee and of its three established working groups have been scheduled immediately before and after the OSM. The activity of the programme over the last months has focused on planning these events. Thus, the report to SCOR will follow a different format from previous years. Emphasis will be placed on specific working group activities over the last year, updates of Regional and National programme activities, and IPO review. When possible, specific research highlights have been included, reflecting GLOBEC's implementing phase.

GLOBEC OPEN SCIENCE MEETING
Qingdao, P.R. China, October 2002. Programme of Sessions

Tuesday 15 October 2002

- Session 1 (Invited). Decadal/centennial variability in marine ecosystems: A comparative approach. Convener: Andrew Bakun (IRI for Climate Prediction, USA)
- Session 2 (Invited). Antarctic marine ecosystems and global change. Convener: Eileen Hofmann (Old Dominion University, USA)
- Session 3 (Contributing). Novel mechanisms linking climate and fisheries. Convener: Juergen Alheit (Baltic Sea Research Institute, Germany)
- Session 4 (Contributing). Variability in Antarctic Marine Populations – Physical and Biological Causes. Convener: Steve Nicol (CSIRO, Australia)

Wednesday 16 October 2002

- Session 5 (Invited). Regional and mesoscale coupled physical-biological models. Convener: Francisco Werner (University of North Carolina, USA)
- Session 6 (Invited). Comparative studies of North Atlantic Ecosystems. Conveners: Keith Brander (ICES, Denmark) and Ken Drinkwater (Fisheries and Oceans, Canada)
- Session 7 (Contributing). BioPhysical Ocean Ecosystem Modeling: New models, technologies and observing systems. Convener: Michio Kishi (Hokkaido University, Japan)
- Session 8 (Contributing). Zooplankton-climate linkages in different regions of the Northern Hemisphere. Conveners: Kurt Tande (Tromso University, Norway) and Francois Carlotti (Universite Bordeaux, France)

Thursday 17 October 2002

- Session 9 (Invited). Linking zooplankton with fishery dynamics. Convener: Serge Poulet (Station Biologique, France)
- Session 10 (Invited). Modelling of transport processes and early fish life history. Convener: Claude Roy (IRD and University of Cape Town, South Africa)
- Session 11 (Contributing). Interactions between small, meso- and large-scale physical and ecosystem processes. Convener: Ulrich Bathmann (AWI, Germany)
- Session 12 (Contributing). Development and application of indices/variables for the description/prediction of ecosystem dynamics. Convener: Anne Hollowed (Alaska Fisheries Science Centre, USA)

Friday 18 October 2002

- Session 13 (Invited). Social impacts from changes in marine ecosystem structure. Convener: Patrick Lehodey (Secretariat of the Pacific Community, New Caledonia)
- Session 14 (Invited). ENSO and decadal-scale variability in North Pacific ecosystems. Session Convener: Ian Perry (Fisheries and Oceans, Canada)
- Session 15 (Contributing). Towards a GLOBEC Synthesis: Ecosystem comparisons. Session Convener: Michael Fogarty (Woods Hole Oceanographic Institution, USA)
- Session 16 (Contributing). Coupled biophysical processes, fisheries, and climate variability in coastal and oceanic ecosystems of the North Pacific. Session Conveners: Harold P. Batchelder (University of Oregon, USA) and Makoto Kashiwai (Fisheries Research Agency, Japan)

1. The GLOBEC-IRI-IPRC Pacific Climate-Fisheries Workshop

Under the auspices of GLOBEC's Focus 1 (Retrospective Analysis and Time Series Studies) an international workshop on climate and fisheries was held at the East-West Center of the University of Hawaii in Honolulu on 14-17 November 2001. The primary sponsors of the workshop were the International Research Institute for Climate Prediction (IRI) and the International Pacific Research Center (IPRC) of the University of Hawaii. Supporting co-sponsors included the GLOBEC-IPO, PICES, the Center for Sustainable Fisheries (CSF) of the University of Miami, the French Institut de Recherche pour le Dèveloppement (IRD), the IOC, FAO, NOAA Office of Global Programs, and NASA. 48 participants were invited, and reached consensus on a number of issues:

1. effects of environmental variability on fish stocks and fisheries can no longer be ignored, but we remain stuck in a paradigm without solving the problem in any general way;
2. there is a need to move away from focusing on identifying particular specific relationships and on producing empirical models fitted to specific sets of data, but rather to undertake efforts at more general synthesis (need to search for mechanisms, not correlations);
3. climate forecasts do have significant potential value for management, but the information content must be relevant and compatible with available decision support models;
4. downside risks related to reliance on a poor forecast might in many cases outweigh potential benefits; and
5. the apparent large-scale synchronies would seem to indicate a direct link of climatic events to fish dynamics, which led to optimism that major progress on the problem might be possible on the near term.

Several interesting ecological hypotheses were proposed and discussed. One of these that excited particular interest focused on gyre-wide variations in the content of mesoscale "energy" in the system as being potentially involved in synchronous alterations between sardine and anchovy dominance. More generally along this same line, the basic proposition that the essential linkage of the large-scale climate forcing to fish population dynamics may act through smaller-scale processes—such as occur in mesoscale ocean features—excited considerable interest. These and other hypotheses will be expanded at a special session at the GLOBEC Open Science Meeting in Qingdao.

2. GLOBEC Workshop on Paleoceanography

Scientists from Namibia, Argentina, Mexico, United States, Portugal, Norway and Germany met in October 2001 in Munich (Germany) to participate in a workshop sponsored by Munich University and the GLOBEC IPO. The objective of the workshop was to bring together GLOBEC research teams carrying out high-frequency analyses of fish scales in sediment cores from different anoxic sites (Benguela, California, Humboldt and Peru currents) in order to compare and cross-calibrate methodologies. Fish scale deposition is used as a proxy for reconstructing the variability in fish populations in these areas. It was the first time that groups working in these upwelling systems met and exchanged ideas and results. Their discussions centred on comparing and standardizing methodologies and approaches, on the calibration of proxy records and on site developments. Special emphasis was put on the identification of fish scales recovered from sediment cores. The workshop participants decided to write a handbook on "Methods of Paleoceanographic Studies within GLOBEC/SPACC" with chapters on design of site development, coring and sampling, chronology development, identification and counting protocol of fish scales and use of proxies related to paleoclimatological data sets.

3. GLOBEC Optical Plankton Counter Workshop

GLOBEC continued its promotion of relevant technologies across the community by hosting an Optical Plankton Counter Workshop. The workshop was held from 17-20 June 2001 in Tromsø, Norway, and was attended by 32 scientists from Canada, England, Finland, France, Iceland, Japan, Norway, Scotland, Spain and the United States. The workshop started with a one-day cruise in Grötsundet to demonstrate hardware configurations and data processing procedures. On Days 2 to 4, seven invited talks were given and then followed by discussion on a broad range of topics, in particular focused on

1. need to improve flow measurements in the OPC tunnel for better abundance estimates,
2. need to standardize OPC calibration procedures to avoid instrument drifting and malfunctioning,
3. need to develop methods for judging coincidental counts, and
4. continuity between existing and next-generation optical particle counters (OPCs).

Participants shared their experiences on how to mount the OPC on their platforms, including the setup of lab OPC systems, and related problems. The workshop encouraged OPC users to work together to ensure the quality of OPC data acquisition, as well as the efficiency and quality control of OPC post-data processing. This co-ordination will allow the community to conduct ecosystem and food-web studies using multiple OPC data sets. The workshop also discussed

1. additional environmental variables that can be collected with OPC data,
2. necessity of net-tows to estimate community structure,
3. use of OPC data in studying spatial and temporal distribution of zooplankton, and
4. use of OPC data in modeling zooplankton population dynamics.

A Web site for OPC-related topics was set up. The results of the workshop have been published in GLOBEC Report 17.

4. Regional Programme Updates

4.1 PICES-GLOBEC Climate Change and Carrying Capacity (CCCC)

The CCCC programme was jointly organized in 1993 by GLOBEC and PICES to address how climate change affects ecosystem structure and productivity of key biological species at all trophic levels in the open and coastal North Pacific Ocean ecosystems. The programme is organized through four task teams:

- BASS - Basin-Scale Studies
- REX - Regional Experiments
- MODEL - Modeling
- MONITOR

Since the last report, the following activities have taken place and are planned. At the Tenth Annual meeting of PICES, held in Victoria, Canada, October 2001, the following CCCC workshops were held:

- REX Workshop on temporal variations in size-at-age for fish species in coastal areas around the Pacific Rim.
- BASS/MODEL workshop to review ecosystem models for the subarctic Pacific gyres.
- REX/MODEL workshop to include higher trophic levels in the PICES NEMURO model
- MONITOR workshop to review progress in monitoring the North Pacific.

In addition, CCCC organised two sessions at PICES X:

- A decade of variability in the physical and biological components of the Bering Sea ecosystem: 1991-2001.
- Results of GLOBEC and GLOBEC-like programs (with emphasis on a possible 1999 regime shift).

CCCC initiated recently an Integration Plan to evaluate, reconfirm and expand the CCCC questions, design a new work plan for each task team and schedule integrating activities. For this purpose, CCCC will host an integration session during PICES XI Annual Meeting. At the same meeting (Qingdao, China, October 2002) the following workshops will be held:

- Responses of upper trophic level predators to variation in prey availability: An examination of trophic level linkages. Co-conveners: Hitherto Kato (Japan), Elizabeth A. Logerwell (U.S.A.) and Gordon A. McFarlane (Canada)
- Requirements and methods for "early detection of ocean changes". Co-Conveners: David L. Mackas (Canada) and Sei-Ichi Saitoh (Japan)
- Monitoring from moored and drifting buoys. Co-Conveners: David L. Mackas (Canada) and Sei-Ichi Saitoh (Japan)

In addition, a PICES-GLOBEC Data Management Workshop, Exchange, inventory and archival of GLOBEC data, will be hosted during PICES XI, co-convened by Igor I. Shevchenko (PICES, Russia) and Hester Willson (GLOBEC, UK).

4.2 Small Pelagics and Climate Change (SPACC)

SPACC continues to develop as a relevant and dynamic programme networking research activities in places of significant pelagic fish production. At present most field work takes place in the Benguela, Humboldt and California upwelling regions, the Bay of Biscay, the Baltic Sea and the Sea of Japan. In 2003, fieldwork will be extended to the North East Atlantic upwelling region, with a project that aims at creating an information system that incorporates environmental monitoring into predictive analysis of the status of pelagic fish resources in Mauritania, Senegal and Morocco (name-coded NATFISH). Since the last reporting period, central activities have taken place along the following lines:

1. Long-term data series. In an effort to ensure that comparable data are made available to conduct ecosystem comparisons we organised meetings in the Benguela (Cape Town, February 2001), the California/Humboldt (Lima, May 2001) and East Asia region (Kobe, August 2001) to review the status and availability of long-term physical and biological data. These meetings resulted in several GLOBEC Reports and review publications (in preparation), as well as the activation of a number of initiatives to rescue and compile existing data series through IAI, German Academic Exchange Service, the Subsecretaria de Pesca of Chile and others.
2. Methodology**.** Following previous efforts on the development on continuous underway methodology (e.g., Continuous Underway Fish Eggs Samplers, Optical Particle Counters), we hosted a paleoceanographic workshop (Munich, August 2001) to standardize methods of analyzing fish scales in sediments. A handbook of methods is currently being planned. A workshop to review implementation of the Continuous Underway Fish Egg Sampler (CUFES) system in Chile, Peru, Mexico and the United States was held in Miami in June 2002. CUFES is currently also used in South Africa, Spain, and Namibia. Australia and Korea will start testing this equipment shortly.
3. Population dynamics. The IOC and SPACC have teamed to support a Study Group on "Use of environmental information on the management of pelagic fish populations". The first meeting of the group (Cape Town, September 2001) resulted in a report (GLOBEC Special Contribution No. 5), and specific research papers are currently in preparation, prior to the second meeting of the group in Paris, December 2002.
4. Reproductive Habitat Dynamics. A major workshop on “Spatial approaches of the dynamics of coastal pelagic resources and their environment in upwelling areas” was hosted (Cape Town, September 2001). It resulted in a special GLOBEC Report 16. ENVIFISH, an affiliated EU project (1999-2001) on “Remote sensing and spatial dynamic of pelagic resources in the Benguela region,” was completed. A special issue of *Progress in Oceanography* is in preparation. Two meetings are planned in the future (2004): a workshop on “Spawning Habitat Dynamics and the Daily Egg Production Method”, to be held in Concepción, Chile, January 2004, and a community meeting on “Comparative analysis of the carrying capacity of the Humboldt, California and Benguela EB systems”.
5. Economic consequences of Climate Change. A scoping workshop on the economic impacts of climate change on small pelagic fish is planned for 2003, under the leadership of Dale Squires and Sam Herrick (SWFSC, USA). Some of the issues to be discussed are effects of low and high-frequency climatic events on fish productivity, impacts of climate change on harvesting and processing capacity and fisheries investments and economic benefits of cooperative management of transboundary stocks.
6. Capacity Building: The SPACC Executive Committee is exploring the idea of supporting SPACC graduate programmes at University of Concepción and University of Cape Town, among other potential institutions. The intention is to bring expertise to the regions where the science needs to

take place rather than send individual scientists abroad. This could be combined with a SPACC Summer School in a developed country. These ideas will be explored further.

Finally, the original chairs of SPACC, John Hunter and Jürgen Alheit, stepped down in 2002. The SPACC Executive proposes that the new chairs be Claude Roy (IRD-France and UCT-South Africa) and David Checkley (Scripps Inst. of Oceanography, USA). A final decision is expected at the next GLOBEC SSC (October 2002).

SPACC Research Highlight: Modelling fish egg and larval transport under different environmental scenarios

The processes determining the recruitment success of anchovy *Engraulis capensis* have been the focus of IDYLE, a SPACC-GLOBEC activity in southern Africa. A 3-D hydrodynamic model was implemented (Penven et al., 2000), and coupled to an IBM model to simulate scenarios and investigate the dynamics of different spatial and temporal spawning patterns (Mullon et al., 2002). The results have allowed the identification of appropriate spawning times and areas, helping elucidate the mechanisms controlling fish production in this region. [Penven *et al.*, 2000. Simulation of a coastal jet retention process using a barotropic model. *Oceanologica Acta*, Vol. 23, No. 5, 615-634 and C. Mullon et al. 2002. Individual Based Modelling (IBM) of the early stages of anchovy in the Southern Benguela System. GLOBEC Report 16: in press.]

Mullon et al. 2002. Output from simulation: maps at 15 December, 15 January and 1 February of 25,000 particles (in white) released in one of the spawning areas on the South African Agulhas bank, and passively transported by currents provided by a 3D-hydrodynamic model.

4.3 ICES-GLOBEC Cod and Climate Change (CCC) Programme

The ICES Cod and Climate Change working group meets biennially and operates by correspondence between meetings. The latest planning meeting took place in Hillerød, Denmark in April 2002. This is a brief summary of the major lines of activity since the last meeting of the group in Dartmouth, Canada in May 2000:

- Theme session on "Growth and Condition in Gadoid Stocks and Implications for Sustainable Management" at the ICES Annual Science Conference in Oslo, Norway, September 2001 (Conveners: L. Buckley, J.D. Dutil, T. Marshall). The session included 30 presentations showing linkages among growth, physiological condition, reproductive effort, and production in gadoid stocks. The aim of the session was to demonstrate that not all gadoid stocks or all individuals within a stock exhibit similar growth responses under similar environmental conditions, and to explore the consequences of this finding in terms of stock management.
- Active participation in the ICES Symposium on "Hydrobiological Variability in the ICES Area, 1990-1999", held 8-10 August 2001 in Edinburgh, Scotland (Conveners: R. Dickson and J. Meincke). A volume reviewing the results of the symposium is expected by end of 2002.

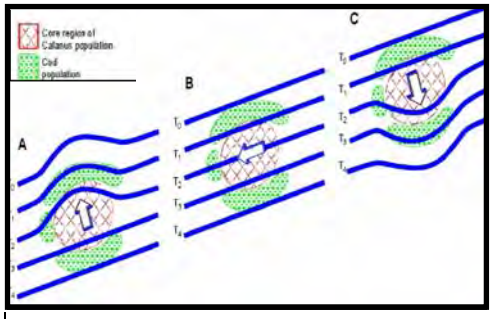
In 2002, CCC completed its 5-year programme of activities, and focuses its immediate attention on the following:

a) Publication of a synthesis book on cod. This will be a multi-authored publication, co-edited by Keith Brander (ICES, Denmark) and Ken Drinkwater (Fisheries and Oceans, Canada). It will cover history of the fishery, physical and biological oceanography settings, growth, recruitment, transport and migrations, management and climate change impacts. Provisional printing date is the end of 2003.
b) Planning of a theme session at the 2003 ICES Annual Science Meeting, to take place in Copenhagen, Denmark, provisionally on the topic of "Transport of gadoid larvae". Conveners are B. Ållandsvik and J. Quinlan.
c) Continuation of the data-gathering exercises initiated through the "Backward facing workshops I-IV"
d) Preparations for a major symposium entitled "The influence of Climate Change in North Atlantic Fish Stocks", to be held in Bergen, Norway, May 2004 (Conveners: H Loeng, R. Cook and K. Drinkwater).

Programmatically, the CCC is currently co-chaired between Ken Drinkwater (Bedford Institute of Oceanography, Canada) and Geir Ottersen (IMR, Norway). One of their immediate tasks is to establish a new set of activities for the programme. It is possible that it will move beyond its initial objectives, perhaps even setting up a sunset clause for CCC and a migration of its members to tackle broader issues such as ecosystem management. The CCC is coordinated from an ICES-GLOBEC Office located at the ICES Secretariat in Copenhagen. The Office is 75% co-funded by NSF-USA and DFO-Canada, with added contributions from Norway, UK and Iceland. Funding is presently secured until the end of 2004.

CCC Science highlight

The links between SST, *C. finmarchicus* and Atlantic cod are a major research thrust in GLOBEC-CCC. A new hypothesis tries to explain why recruitment of Atlantic cod stocks shows different responses to temperature changes depending on the local habitat. Stocks inhabiting the lower temperature range of the species show an increase in recruitment with increasing temperature, while cod stocks inhabiting the uppermost part of the temperature range show a decrease in recruitment with increasing temperature. It has been proposed that the overall recruitment response of Atlantic cod stocks to temperature is an indirect effect of the availability of the main prey species, *C. finmarchicus*, through variable advection onto the shelf. Increased transport north (case A) would bring *C. finmarchicus* to, and increase SST of, areas covered by northern cod stocks, while increased southward transport (case C) would cool the water but enhance prey abundance for southern cod stocks. *Sundby, S. 2000. Recruitment of Atlantic cod stocks in relation to temperature and advection of copepod populations.* Sarsia *85:277-298.*



Sundby, S. 2000. Conceptual interpretation of movements of *C. finmarchicus* in the North Atlantic subpolar gyre (dashed) towards cod stocks (green) as a result of advection (arrows).

4.4 Southern Ocean GLOBEC

SO GLOBEC is a field research programme that includes studies of the habitat, prey, predators and competitors of Antarctic krill, as well as studies specifically focused on Antarctic krill biology and

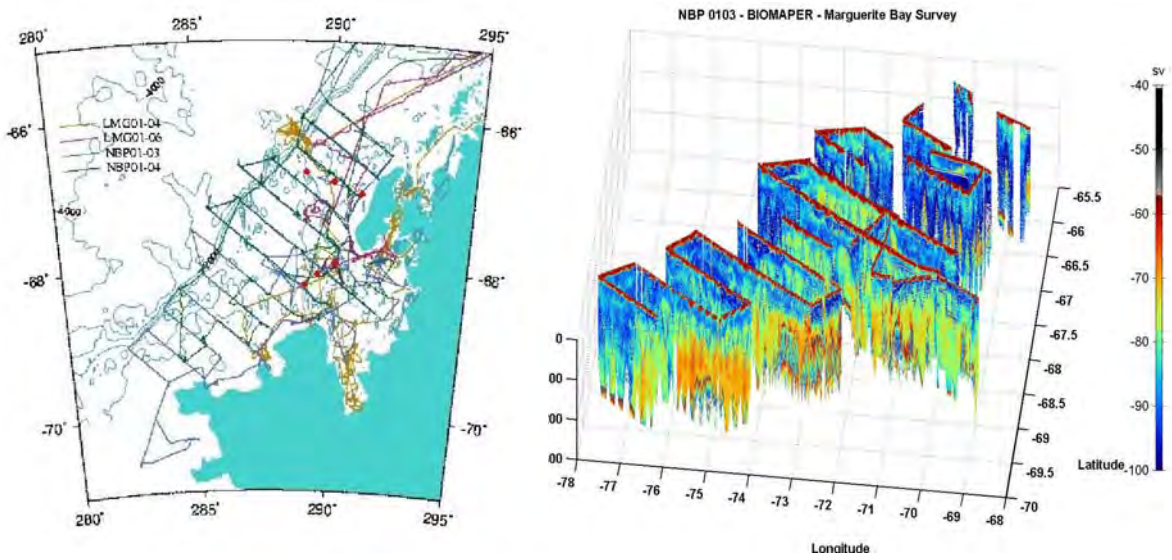
physiology. The science questions are focused on understanding zooplankton and top predator population dynamics and linkages of these to environmental variability:

1. What key factors affect the successful reproduction of krill between seasons?
2. What key physical processes influence krill larval survival and subsequent recruitment to the adult population between seasons?
3. What are krill's seasonal food requirements in respect to energetic needs, and distribution and type of food?
4. What are the geographical variations in krill distribution in relation to the between- and within-season variability in the physical environment?
5. How does winter distribution/foraging ecology relate to characteristics of physical environment and prey?
6. How does breeding season foraging ecology relate to abundance/dispersion and characteristics of krill?
7. How does year-to-year variation in population size and breeding success relate to distribution, extent and nature of sea ice and krill availability and cohort strength?

Summary of SO GLOBEC cruises that have taken place and are planned. Western Antarctic Peninsula is abbreviated as WAP.

COUNTRY	**AREA**	**CRUISE DATES**
Australia	70º E	January 2001
U.S. mooring cruise 1	West Antarctic Peninsula (WAP)	March – April 2001
Germany	WAP	April – May 2001
U.S. survey cruise 1	WAP	April – June 2001
U.S. process cruise 1	WAP	April – June 2001
U.S. survey cruise 2	WAP	July – September 2001
U.S. process cruise 2	WAP	July – September 2001
U.S. mooring cruise 2	WAP	February – March 2002
U.S. survey cruise 3	WAP	April – May 2002
U.S. process cruise 3	WAP	April –May 2002
U.S. survey cruise 4	WAP	July – September 2002
U.S. process cruise 4	WAP	July – September 2002
United Kingdom	WAP	October – November 2002
Australia	70º E	January – February 2003
United Kingdom	Scotia Sea	January – February 2003
U.S. mooring cruise 3	WAP	February – March 2003
Germany	Lazarev Sea	February – March 2004 October – November 2004 August – September 2005

SO GLOBEC includes activities from the United States, Germany, United Kingdom, Australia and Korea.



Tracks followed by the U.S. SO GLOBEC cruises in 2001 (Left panel). The red squares show the locations of the current meter moorings that were deployed in March 2001. Marguerite Bay is the indentation in the coastline of the Antarctic Peninsula. Preliminary three-dimensional rendering of the 120 kHz volume backscattering data collected on the first U.S. SO GLOBEC survey cruise in April-May 2001 in Marguerite Bay (right panel). Data provided and used with permission of Prof. Eileen

It consists of multidisciplinary oceanographic research programs focused near 70ºE, in the southeastern Weddell Sea, and along the western Antarctic Peninsula. Studies in the first two regions are part of the Australian and German Antarctic programs. Field programs in the western Antarctic Peninsula (WAP) region are being undertaken by Germany, the United States, and the United Kingdom. The programme's year-round focus, with an emphasis on winter processes by the U.S. SO GLOBEC programme, provides a new and different thrust in international Antarctic research. Because the programme initiated field activities in 2001, this report will focus on highlighting some research achievements of the U.S. GLOBEC winter season field programme.

Scientific Highlights From the 2001 Field Studies

1. **Acoustic Mapping of Antarctic Krill Distribution**

   One of the goals of the U.S. SO GLOBEC survey cruises is to determine the abundance and distribution of Antarctic krill in the Marguerite Bay study region. We used the BIOMAPER-II system, which consists of a multi-frequency sonar, with frequencies of 43 kHz, 120 kHz, 200 kHz, 420 kHz, and 1 MHz; a video plankton recorder and an environmental sensor package consisting of a CTD, fluorometer and transmissometer. BIOMAPER-II is towyoed along the track lines. The acoustic observations from the individual track lines are then combined to provide three-dimensional renderings of the scattering record, and the records are used to determine Antarctic krill distribution and variability. The three-dimensional image from the April to June 2001 cruise shows that nearshore scattering is stronger than offshore scattering. Larval krill, in contrast, were found in the upper water column offshore and over the continental shelf. This provides the first mesoscale view of Antarctic krill distribution for the austral fall from any region of the Antarctic.

2. Penguin and Crabeater Seal Tracking

In the winter season Adélie penguins and crabeater seals were fitted with satellite transmitters, both during the surveys and near Palmer Station in the early austral fall preceding the cruises. Sixteen crabeater seals were tagged with satellite transmitters that relay information on animal position and dive behavior. During the winter, seals dove deeper and longer than previously reported.

Mean dive depth was 140 m with a maximum of 540 m and dive durations were 7.5 min with maximum of 23.5 minutes. All seals remained on the continental shelf and foraged in areas of abrupt bathymetric change. Returned trajectories show that Adélie penguins move over large areas and suggest that the animals are concentrating in areas that are characterized by fronts, where availability of Antarctic krill may be greatest.

GLOBEC-International Whaling Commission (IWC) Collaboration

The first three cruises in the year-round SO GLOBEC series for 2001-2002 were conducted from March-June 2001. International Whaling Commission researchers participated in all three cruises (Gould LMG 01-03 USA mooring cruise, *Polarstern* AntXVIII5b ship and helicopter based studies Germany, *Nathaniel B Palmer* NBP 01-03 USA survey cruise) to produce a time series of continuously collected cetacean data simultaneous with krill and other physical and biological data suites. The cetacean data collection and analysis will potentially complement krill process studies and contribute to understanding the dynamics of krill swarms and life strategies. It is hoped that the cetacean data will contribute to the legacy of GLOBEC well into the future by providing high quality standardized data series for cetaceans continuous with a wide range of other biological and physical parameters.

5. National Programmes

There are currently GLOBEC national activities in the following countries: Angola, Brazil, Canada, Chile, China, France, Germany, Italy, Japan, Korea, Mexico, Namibia, the Netherlands, Norway, Portugal, Turkey, South Africa, Ukraine, United Kingdom and the United States, as well as through European Union programmes.

In 2001, Germany approved a three-year (phase I) GLOBEC programme entitled "Trophic Interactions between Zooplankton and Fish under the Influence of Physical Processes". The project aims to investigate the influence of physical processes on zooplankton, on the spawning of two planktivorous fish species with different life histories (herring and sprat) and on their trophodynamic interactions, in the Baltic and North seas. Top-down and bottom-up processes will be studied comparatively in both ecosystems. As the Baltic Sea has a considerably lower number of species, the importance of food-web complexity for ecosystem functioning can be studied in a comparative manner between the two systems. The same suite of species will be investigated in both areas: the planktivorous clupeids, herring and sprat, and their main food sources, the copepods *Pseudocalanus* sp., *Acartia* sp. and *Temora longicornis*. The project will involve 80 scientists and has funding of US$7.5 M.

A Spain-GLOBEC working group was organized after the 1st symposium “GLOBEC Spain” held in Cadiz in December 2001. The mission of the group is to co-ordinate efforts and to interchange results and discussions among the different Spanish scientists working on objectives related to GLOBEC. Initially, the role of the group is to build a metadata file with information on the different projects, in co-ordination with GLOBEC International Data Management services. The ultimate objective of the GLOBEC-ES

group would be to lead the publication of synthesis studies for each geographical area and horizontal activity, and to conduct ecosystem comparisons.

In November 2001, the first field phase of the UK-GLOBEC programme ("Marine Productivity") was launched with the first of four major research cruises in the Irminger Sea and Iceland basin. The main thrust of this programme is to investigate the copepod species *Calanus finmarchicus*, arguably the most ecologically important species of zooplankton in the northern hemisphere, based on its summer biomass of several hundred million metric tons, a value similar to the biomass of krill in the Southern Ocean, or the total body weight of the Earth's human population. In particular MarProd will investigate the physical and biological factors determining the species' survival during the crucial overwintering period (diapause).

6. Data Management

The GLOBEC metadata portal has been on-line for almost one year. Statistics on its use are recorded by our portal hosts, the Global Change Master Directory (GCMD), which show that more than 400 people enter the Portal every month, and about 120 of these open metadata files.
GLOBEC and GLOBEC-affiliated programmes use this facility to inform present and future generations of scientists of their research. Metadata is included through an online form from the GLOBEC Web site.

Extract of the Global Change Master Directory search retrieval engine for GLOBEC entries

Dataset Search Retrieval	Oct '01	Nov '01	Dec '01	Jan '01	Average
Total number of users	361	628	255	397	410
Dataset descriptions retrieved	172	147	89	71	120

To enter the portal, one accesses the GLOBEC Web site and clicks on the Data button. There are two ways of searching for metadata – by a free-text search, similar to those used by Internet search engines or by using the Keywords listed to narrow down your search using a tree structure. The free text search has now been enhanced to allow a search of only the GLOBEC portal or the entire GCMD.

7. GLOBEC IPO

Funding issues

The IPO continues to work with its co-sponsors, and with the UK IGBP Committee and the UK Royal Society Global Environmental Change Research Committee to try secure a more established and balanced support for its activities. Presently, personnel costs are funded by UK-NERC through GLOBEC research allocations, and by the University of Plymouth. Unfortunately, the contribution from the latter will not be extended beyond December 2002, due to funding constraints at University level. It seems likely that the matter will be resolved through additional IPO duties for which UK funding may be available. These duties would facilitate links between GLOBEC and the new SCOR/IGBP Ocean Biogeochemistry and Ecosystems Analysis project, which is expected to be coordinated from co-located IPOs for the two projects (see below).

The IPO has been successful in generating additional funds for GLOBEC in 2002. We thank in particular the Executive Director of SCOR, for his role in successfully requesting contributions from NSF and NOAA for the GLOBEC Open Science Meeting. SCOR's assistance in ensuring a healthy continuation of

GLOBEC has proven invaluable once again.

GLOBEC Funding 2002 [@]	***US $***	***Objective***
UK –NERC	106,295	IPO support (until 2004)
PML (minus overheads)*	36,908	In-kind support (until 2004)
University of Plymouth	24,191	IPO support (**ENDS** December 2002)
IGBP, IOC	36,500	SSC activities (annual)
NSF through SCOR	85,000	Programme activities (annual)
NSF+NOAA through SCOR	50,000	GLOBEC OSM
Other *ad-hoc* (APN, IOC, SCOR)	17,000	Programme activities (2002)
TOTAL	$355,894	

@ not including national programmes

Publications

In 2001/2002, the IPO published five reports and three Newsletters, which were distributed to the 1500-address mailing list:

Willson, H. (ed.). 2001. *Report on the GLOBEC National, Multinational and Regional Programme Activities.* GLOBEC Special Contribution No. 4: 122 pp.

Barange, M. (ed.) 2001. *Report of the First Meeting of the SPACC/IOC Study Group on "Use of Environmental Indices in the Management of Pelagic Fish Populations".* GLOBEC Special Contribution No. 5: 143 pp.

Oozeki, Y. and H. Nakata (eds.). 2002. *Report of an APN/GLOBEC-SPACC Workshop on the Causes and Consequences of Climate-induced Changes in Pelagic Fish Productivity in East Asia.* GLOBEC Report 15: 62 pp.

Van der Lingen, C., C. Roy, P. Freon, M. Barange, L. Castro, M. Gutierrez, L. Nykjaer and F. Shillington (eds.) 2002. *Report of a GLOBEC-SPACC/IDYLE/ENVIFISH Workshop on Spatial Approaches to the Dynamics of Coastal Pelagic Resources and their Environment in Upwelling Areas.* GLOBEC Report 16: 97 pp.

Zhou, M, and K. Tande (eds.) 2002. *Optical Plankton Counter Workshop.* GLOBEC Report 17: 67 pp.

GLOBEC Newsletter 7.1. April 2001
GLOBEC Newsletter 7.2. October 2001
GLOBEC Newsletter 8.1. April 2002

This is in addition to the publications of the different scientists and research groups as peer-reviewed publications, which are being collated by the IPO.

GLOBEC and the SCOR-IGBP Ocean Biogeochemistry and Ecosystems Analysis Project

GLOBEC has actively participated in the development of the new SCOR/IGBP OCEANS project. At the recent IGBP SC meeting it was decided that GLOBEC and OCEANS should be encouraged to reduce the complexity of their organizations, through cross representation on SSCs, back-to-back SSC meetings and co-location of IPOs. The GLOBEC IPO is planning ahead for this eventuality. M. Barange attends meetings of the OCEANS transition Team as ex-officio member, and will assist in the planning of the programmatics of the new project.

8. GLOBEC SSC 2001

The 6th GLOBEC SSC met in Lima, Peru, 23-26 May 2001. Minutes of the SSC meetings are available in

the GLOBEC Web site (http:/www.globec.org), or by request to the IPO.

The current membership of the GLOBEC SSC is shown in the table below.

Name	Country	Function 2002	Term end	2003
Dr Jürgen Alheit	Germany	Chair Focus 1, SPACC Executive	2nd term 2002	Ex-Officio Focus 1
Dr Tim Baumgartner	Mexico	SSC, SPACC Executive	2nd term 2004	SSC
Prof John Field	South Africa	SSC	1st term 2004	SSC
Dr Roger Harris	UK	SSC Chair	2nd term 2002	Ex-Officio Past Chair
Prof Eileen Hofmann	USA	SSC, Southern Ocean Chair	2nd term 2002	Ex-Officio Southern Ocean
Dr Patrick Lehodey	New Caledonia	SSC, OFCCP Chair	1st term 2002	SSC
Dr Celia Marrase	Spain	SSC	2nd term 2004	SSC
Dr Steve Nicol	Australia	SSC, S.O. Planning Comm.	1st term 2002	-------
Dr Rosemary Ommer	Canada	SSC	1st term 2002	SSC
Dr Geir Ottersen	Norway	SSC, CCC Co-Chair	1st term 2002	SSC
Dr Ana Parma	Argentina	SSC	1st term 2004	SSC
Dr Ian Perry	Canada	SSC Vice-Chair, Focus 4 Acting Chair	2nd term 2002	Ex-Officio Focus 4
Dr Serge Poulet	France	SSC, Chair Focus 2	2nd term 2002	-------
Dr Takashige Sugimoto	Japan	SSC	1st term 2002	-------
Dr Cisco Werner	United States	SSC, Chair Focus 3	1st term 2002	SSC

GLOBEC would like to reduce the size of its core membership of the SSC to

a) add some flexibility during early implementation of IGBP Phase II, and
b) to ensure representation of key regional programmes and Foci working groups in the deliberations of the SSC.

For this purpose it is proposed that four members of the current SSC whose second term expires at the end of 2002 be considered as ex-officio members. The SSC would thus consist of eleven ordinary members, of whom three would be nominated shortly, and four ex-officio members.

9. CALENDAR August 2001- August 2003

2001

7 August	**SAHFOS-GLOBEC Symposium on the Occasion of the 70th Anniversary of the Continuous Plankton Recorder Survey on the North Atlantic.** Edinburgh, Scotland
25-27 August	**APN-SPACC workshop on causes and consequences of climate-induced changes in pelagic fish productivity in East Asia.** Kobe, Japan.
3-5 Sept.	**IOC-SPACC Workshop on the use of environmental indices in the management of pelagic fish.** Cape Town, South Africa.
6-8 Sept.	**SPACC workshop on spatial approaches of the dynamics of coastal pelagic resources and their environment in upwelling areas.** Cape Town, South Africa
10-13 Oct.	**SPACC-GLOBEC workshop on paleoceanographic methods.** Munich, Germany

21-28 Oct.	**GLOBEC session at the IAPSO/IABO Symposium.** Mar del Plata, Argentina
14-17 Nov.	**IRI-GLOBEC Climate-Fisheries Workshop.** Honolulu, Hawaii
28- 30 Nov.	**1st Symposium GLOBEC-Spain.** Cadiz, Spain
5-7 Dec.	**PNEC-GLOBEC annual meeting.** Paris, France
Dec.	**SO GLOBEC USA Science Investigator Meeting.** Arlington, USA

2002

Jan.-Feb.	**Korea, Spain, and Peru Southern Ocean GLOBEC cruises.**
11-15 Feb.	**Southern Ocean GLOBEC session at the AGU-OSM.** Honolulu, Hawaii.
March	**Southern Ocean GLOBEC USA Mooring cruise**
April – May	**Southern Ocean GLOBEC USA Field season**
8-12 April	**BENEFIT-GLOBEC Forum 2002.** Swakopmund, Namibia.
17-19 April	**ICES/GLOBEC Cod and Climate Change Working Group Meeting.** Hillerød, Denmark.
11-12 May	**SPACC Executive Committee Meeting.** Dartington, UK.
13-14 May	**GLOBEC Executive Committee Meeting.** Plymouth, UK.
26-28 June	**GLOBEC Focus 4 Working Group Meeting. Global Changes in Marine Ecosystems and Coastal Communities: Who Done it?** Sidney, Canada.
July – August	**Southern Ocean GLOBEC USA Field season**
1-12 July / 15 July-6 Sept.	**GLOBEC - Marine Zooplankton Analysis Course.** University of Aberdeen, UK.
Oct.-Nov.	**Southern Ocean GLOBEC UK cruise**
13-14 Oct.	**GLOBEC Working Groups 1, 2 and 3 Meetings.** Qingdao, P.R. China.
14 Oct. (pm) and 19-20 Oct.	**GLOBEC SSC Meeting.** Qingdao, P.R. China.
15-18 Oct.	**2nd GLOBEC Open Science Meeting.** Qingdao, P.R. China
19 Oct. (am)	**Joint GLOBEC Foci WG/PICES Task Team meetings.** Qingdao, P.R. China
20 Oct.	**PICES-GLOBEC CCCC Integration session.** Qingdao, P.R. China
Dec.	**IOC/SPACC Study Group on use of environmental information on the management of pelagic fish populations.** Paris, France.
Dec. 2002-Jan. 2003	**Southern Ocean GLOBEC UK Scotia Sea Frontal cruise**
10-12 Dec.	**IOC-SPACC Study Group on the use of environmental indices in the management of pelagic fish.** Paris, France

2003

13-17 Jan.	**GLOBEC-NEP/CGOA Symposium on Marine Sciences in the Northeast Pacific: Science for Resource Dependent Communities.** Anchorage, Alaska
April	**BENEFIT-GLOBEC Forum 2003.** Swakopmund, Namibia.
Spring	**GLOBEC-ICES CCC Synthesis Workshop.** TBA
21-23 May	**GLOBEC-PICES-ICES Zooplankton Production Symposium.** Gijon, Spain
19 and 24 June	**GLOBEC SSC meeting.** Banff, Canada

ANNEX 7
OCEAN BIOGEOCHEMISTRY AND ECOSYSTEMS ANALYSIS (OCEANS) PLANNING ACTIVITY

Report 2001/2002

Submitted by
Dr Julie Hall, OCEANS Chair
on behalf of the OCEANS Transition Team

Oceans Futures Committee

The Ocean Futures Committee (Appendix 1) was requested by SCOR and IGBP to prepare an integrative research Framework for the Biological and Chemical Aspects of Global Change research in the Ocean for the next ten years. Peter Burkill reported on the progress of this committee at last year's SCOR meeting. The Oceans Futures Committee held its final meeting in Barcelona in December 2001. The meeting was focused on getting input to the report from other projects and programmes and completing the draft of the *Framework for Future Research on Biological and Chemical Aspects of Global Change in the Ocean: An IGBP/SCOR Collaboration* report. On the first day of the meeting the committee was joined by representatives from LOICZ, GLOBEC, GAIM, PAGES/IMAGES, JGOFS, SOLAS, IOC, DIVERSITAS, IHDP, and CLIVAR to discuss the first draft of the report. The remainder of the meeting was focused on writing sections of the report.

In early January 2002, the *Framework Report* was completed and sent to 12 reviewers for comment. Overall, the reviews were positive, with the majority of reviewers saying that the key issues for future research in biological and chemical aspects of global change in the ocean for the next 10 years were covered in the report. A summary of the reviews prepared by Karen Lochte for the IGBP SC is attached in Appendix 2. The report is now being edited by Ed Urban and will be posted on the OCEANS project Web site as a background document for the OCEANS Open Science Conference. The report has been a key reference for the OCEANS Transition Team in developing the OCEANS project.

Development of the Ocean Biogeochemistry and Ecosystems project

The Ocean Biogeochemistry and Ecosystems Transition Team has been charged with preparing a *Science Plan and Implementation Strategy* for the new joint SCOR/IGBP Ocean Biogeochemistry and Ecosystems Analysis project by the end of 2003. To achieve this, the Transition Team will draw on the Framework Report developed by the Ocean Futures Committee and input from the Open Science Conference to be held January 7-10, 2003. The Transition Team held its first meeting in Washington at the end of April 2002 to develop an outline for the project and a plan for the Open Science Conference. The name OCEANS: Biogeochemistry and Ecosystems Analysis has been identified as the name for the new project.

Science Base for the Project

The primary goal of the OCEANS project is to understand the role of the ocean in the Earth System's response to global change, focusing on biogeochemical cycles, marine food webs and their interactions.

The over-arching questions for the project are

- *How does global change, represented by changes in natural climatic modalities and anthropogenic forcings, impact marine biogeochemical cycles and ecosystem dynamics?*
- *How do these impacts alter the mechanistic relationship between elemental cycling and ecosystem dynamics?*
- *What are the feedback mechanisms to the Earth System from these changes?*

The OCEANS project will seek a comprehensive understanding of the impacts of climate and anthropogenic forcings on food-web dynamics (i.e., structure, function, diversity, and stability) and elemental cycling (i.e., geochemical pathways, transfers, and cycling), including the impacts of underlying physical dynamics of the ocean. It will also strive for mechanistic and predictive understanding of how these linked systems respond to global change resulting from natural climate modes (e.g., ENSO, the North Atlantic Oscillation) and anthropogenic perturbations, and then feed back to climate, ocean physics, and marine resources (Figure 1). An integral tool for this research is palaeo-oceanography, including the reliable calibration of proxies for nutrients, productivity, plankton composition, temperature, and other physical changes.

Some areas of the ocean are likely to be particularly sensitive to gradual long-term changes in climate and will be subject to intensive studies. These "hot spots" include regions of upwelling and deep mixing, continental margins, high-latitude areas, the sediment-water interface, the mesopelagic layer and intermediate waters.

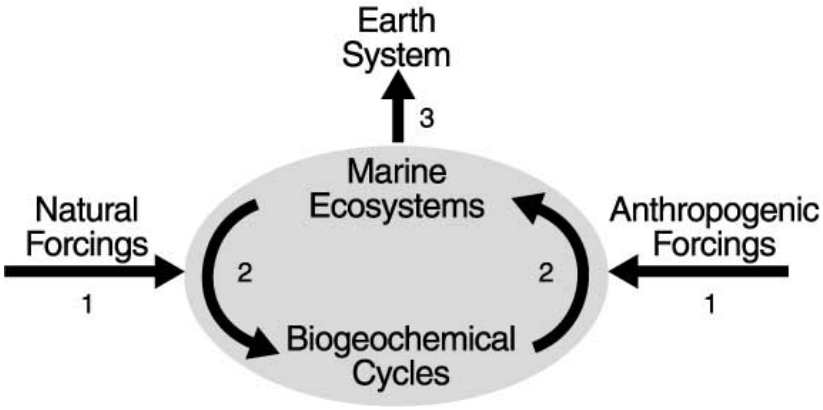


Figure 1: The scientific questions of the OCEANS project focus on the impacts of natural climatic and anthropogenic forcings on geochemical cycles and marine ecosystems (arrows 1), with particular focus on how these forcings alter the relationships between elemental cycles and ecosystems (arrows 2) and how these responses feedback to the Earth System (arrow 3).

OCEANS Open Science Conference

To obtain input from the wider scientific community into the development of the OCEANS project, an Open Science Conference will be held January 7–10, 2003 in Paris, France.

The conference will include

- plenary presentations by leading scientists in ocean biogeochemistry and ecosystems
- working group discussions
- poster sessions

The working group discussions will be held over two days in two sets of working groups. The first set will focus on processes and the second set on cross-cutting issues. The working group topics are

Set A—Process oriented issues:

1. Trace elements in ecological and biogeochemical processes
2. Physical forcing on biogeochemical cycling and biology
3. Climatic modulation of organic matter fluxes
4. Direct effects of anthropogenic forcing on biogeochemical cycles and ecosystems
5. Integrating food webs from end to end

Set B—Cross-cutting issues:

6. Continental margins
7. The mesopelagic layer
8. Biogeochemical hotspots, choke points, triggers, switches and non-linear responses
9. Modelling approaches to biogeochemical cycles and ecosystems and their integration
10. Feedbacks to the Earth System

For details of the OCEANS Open Science Conference, see www.igbp.kva.se/obe/

Linkages to Other Projects and Programmes

Developing linkages with other projects is an important aspect in the development of the OCEANS project. Three members of the Transition Team attended the LOICZ Synthesis and Futures meeting in Miami in May 2002 to present the OCEANS project and discuss how to develop strong collaborative approaches between the two projects, particularly in the region of the continental margins. Transition team members will attend relevant meetings of other projects throughout the development of the OCEANS project.

Meetings

- June 2002 – Transition Team member attended the SOLAS National Representatives meeting
- October/November 2002 – Possible meeting of the OCEANS Open Science Conference planning team
- October 2002 – Three Transition Team members will attend the GLOBEC 2nd Ocean Science meeting
- November 2002 – A Transition Team member will attend the WOCE and Beyond Synthesis meeting to promote the OCEANS project
- January 2003 – OCEANS Open Science Conference and Transition Team meeting

- May 2003 - Transition Team members will attend the JGOFS Open Science Meeting to promote the OCEANS project
- June 2003 - Transition Team meeting in conjunction with the 3rd IGBP Congress
- Late 2003 – Final meeting of Transition Team

Funding

The SCOR and IGBP offices have worked hard to secure funding for the Transition Team meetings and the Open Science Conference. The development of the OCEANS project has been given substantial support from NSF and ICSU. At present, the OCEANS project has sufficient funds to support the activities planned by the Transition Team.

Acknowledgements

I would like to thank Ed Urban and Liz Gross from the SCOR office and Wendy Broadgate, Sofia Rogers and John Bellamy from the IGBP office for the excellent support they have provided for the OCEANS Transition Team. Their support has been key to the rapid development of this project.

ANNEX 8
SOLAS REPORT TO SCOR

Summary of Activities in 2001/2002

During the past year the Scientific Steering Committee (SSC) for SOLAS has been formed by the sponsors (IGBP, SCOR, CACGP, and most recently, WCRP). The following members have been appointed to serve until the end of 2003:

Peter Liss (UK) Chair
Paty Matrai (USA) Vice-Chair
Phil Boyd (New Zealand)
Elsa Cortijo (France)
Ken Denman (Canada)
Barry Huebert (USA)
Tim Jickells (UK)
Truls Johannessen (Norway)
Gerbrand Komen (The Netherlands)
Dileep Kumar (India)
William Miller (Canada)
Ulrich Platt (Germany)
Katherine Richardson (Denmark)
Peter Schlosser (USA)
Mitsuo Uematsu (Japan)
Ilana Wainer (Brazil)
Doug Wallace (Germany)

The SSC met for the first time in San Francisco on 14-17 December 2001. The main item on the agenda was revision of the *SOLAS Science Plan* in the light of comments from referees and the sponsors. A significant amount of the necessary rewriting was done in San Francisco and was continued afterwards by e-mail. The final changes are currently being made and the final version should be posted on the SOLAS Web site in early July 2002. The SSC also identified committee members to act as liaison with other projects (SCOR/IGBP OCEANS Project, LOICZ, GLOBEC, GAIM, PAGES, IGACII, WCRP and CACGP). Linkage to IGBP and SCOR will be through Wendy Broadgate and Ed Urban, respectively. The committee began a discussion of the form that the *Implementation Strategy* for SOLAS should take and a first attempt was made to define its contents. An Executive Group was formed from within the SSC, whose main task is to put together the *Implementation Strategy*. Other items dealt with at the San Francisco meeting included the status of the International Project Office (IPO), a SOLAS Summer School, Web site and Brochure, all of which are discussed later in this report.

SOLAS is now sponsored by WCRP in addition to the three original sponsors. This follows from the decision of the Joint Scientific Committee (JSC) of WCRP at their meeting in March 2002. WCRP interests are represented on the SSC by two members (Ken Denman and Peter Schlosser) both of whom also serve on the JSC-WCRP. Discussions are now taking place to see how to integrate/interface the continuing WCRP (formerly jointly with SCOR) Working Group on Air-Sea Fluxes into/with SOLAS, in particular with Focus 2 on "Exchange Processes at the Air-Sea Interface and the Role of Transport and Transformation in the Atmospheric and Oceanic Boundary Layers".

Despite considerable effort, funding for a SOLAS IPO has still not been identified, so we have no properly staffed project office. We are very grateful to Wendy Broadgate, Ed Urban and Philip Williamson for the time they give to SOLAS, and some funds have been found to employ temporary help for particular tasks. However, this situation is unsatisfactory and absence of an IPO is significantly delaying implementation of international SOLAS research coordination.

A meeting of national SOLAS representatives was held in Amsterdam on 11-12 June 2002, with the purpose of obtaining information on national inputs to the project, so that the *Implementation Strategy* can be properly aligned with country efforts. Twenty nations were represented at the meeting, many of them enabled to attend by a generous grant from the International Council for Science (ICSU). The SSC Executive Group met for 2.5 days following this meeting and made significant progress in developing and writing the *SOLAS Implementation Strategy*. It was decided that this would be fully integrated into the *Science Plan* and the combined document would be called the *SOLAS Science Plan and Implementation Strategy*.

On the publicity front, the SOLAS e-mail contact list is currently being converted into a full mailing list. The SOLAS Web site has been redesigned and has a new address (www.solas-int.org). A "glossy" brochure about SOLAS had been designed under the leadership of Philip Williamson and is shortly to be printed for distribution to a wide audience during the summer. Copies should be available for those attending the SCOR General Meeting.

There are now SOLAS national committees or interest groups in the following countries (contacts' e-mail addresses are listed):

Australia: Neil Tindale n.tindale@bom.gov.au
*Belgium: Christiane Lancelot lancelot@ulb.ac.be
Brazil: Amauri Pereira apdolive@usp.br
Canada: William Miller William.miller@da.ca
Chile: Giovanni Daneri gdaneiri@udelmar.cl
China (Beijing): Guang-Yu Shi shigy@mail.iap.ac.cn
China (Taipei): Gwo-Ching Gong gcgong@mail.ntou.edu.tw
*France: Catherine Goyet cgoyet@univ-perp.fr, Remi Losno losno@lisa.univ-paris12.fr
*Germany: Doug Wallace dwallace@ifm.uni-kiel.de
India: Dileep Kumar dileep@csnio.ren.nio.in
Japan: Mitsuo Uematsu uematsu@ori.u-tokyo.ac.jp
Korea: Sung Yang sryang@hosim.kwangju.ac.kr
*Netherlands: Hein de Baar debaar@nioz.nl
New Zealand: Philip Boyd pboyd@niwa.cri.nz
*Norway: Truls Johannessen truls.johannessen@gfi.uib.no
Russian Federation: Sergey Gulev gul@sail.msk.ru
*Spain: Emilio Fernandez esuarez@uvigo.es
*Sweden: David Turner david@amc.gu.se
*United Kingdom: Philip Newton ppn@nerc.ac.uk
United States: Rik Wanninkhof www.aoml.noaa.gov/ocd/solas

* Member of SOLAS-EUROPE Coordination Group

Plans for 2002/2003

The second meeting of the SOLAS SSC will take place in Gif-sur-Yvette, France on 24-27 November 2002. Important agenda items will include completion of the *SOLAS Implementation Strategy*, and establishing a number of Task Teams, for example, on large-scale fertilization experiments, data issues, modeling, coupled atmosphere-ocean experiments, and atmospheric transformation experiments. During

the meeting we will take the opportunity to have presentations from French scientists carrying out SOLAS research, and to interact with them.

A SOLAS Summer School will take place in Corsica in the first two weeks of July 2003. The School is intended for Ph.D. students and other younger scientists, to broaden their understanding across the entire research field covered by SOLAS. Funding for the course and student participation in it has been obtained from the European Union, and several applications to other potential sponsors are pending. The course Director is Corinne Le Quere from MPI Jena, Germany.

Other activities planned for the coming year include

- The *SOLAS Science Plan and Implementation Strategy* document will be submitted to the sponsors for approval prior to planned publication in mid-2003.
- SOLAS will be represented at the launch meeting for the European Union's FPVI Research Programme in Brussels in early November 2002.
- The SOLAS Web site will carry a twice-yearly information sheet on recent and planned SOLAS activities.
- An evening session on SOLAS is being organized for the CACGP/IGAC Atmospheric Chemistry Conference being held in Greece in September 2002
- Articles on SOLAS will shortly appear in the journal *Atmospheric Environment* and the *IGBP Newsletter*.
- Negotiations will continue with WCRP concerning the Air-Sea Flux Working Group.
- A session on early results of SOLAS research will be held at the IUGG 23rd General Assembly being held in Sapporo, Japan in July 2003.

Peter Liss
July 2002

ANNEX 9
GLOBAL ECOLOGY AND OCEANOGRAPHY OF HARMFUL ALGAL BLOOMS (GEOHAB) PROGRAMME
2001-2002 REPORT
Patrick Gentien, Chair

Meetings

The Scientific Steering Committee (SSC) for the GEOHAB program met once since the 2001 SCOR General Meeting. At its 27-31 May 2002 meeting in Helsinki, Finland, the SSC focused on the preparation of the *GEOHAB Implementation Plan* based on the *Science Plan* published in April 2001. The Nessling Foundation paid the local expenses for the Helsinki meeting. In order to optimize the available funding, some subcommittees have met on the basis of opportunities. The SSC has been invited to hold its next meeting in La Rochelle, France on 3-7 December 2002. Communication and call for inputs will be made at the Xth Harmful Algae Conference in St. Petersburg, Florida, USA.

SSC Membership

SSC members were appointed initially for two-year terms, from January 1, 2000 to December 31, 2001. GEOHAB presented to SCOR and IOC some ideas for SSC replacements to be effective at the beginning of 2002 to ensure that the proper expertise was included on the SSC for writing the *Implementation Plan.* Prof. Y. Fukuyo, Dr. S. Blackburn and Dr. N. Lagos were rotated off the SSC at the end of their initial terms. Dr. L. Guzman (Chile) was approved by SCOR and IOC as a new SSC member. Dr. G. Pitcher was appointed as the Vice-Chairman in replacement of Y. Fukuyo. Prof. T. Osborn resigned. The other members have not be replaced so far for budgetary reasons and due to the difficulties of finding a scientist with the right expertise and experience in organizing and implementing large programs.

Subcommittees

At its 2001 Shanghai meeting, the SSC decided to form subcommittees that would focus on writing parts of the *Implementation Plan* and also plan some short-term coordination activities that will take place while the *Implementation Plan* is being developed.

The SSC has begun work on creating terms of reference and identifying potential members for each subcommittee (including two SSC members and some individuals from outside the SSC). The planned subcommittee on sampling protocols and data quality control has not been formed. Not enough funding being available for each subcommittee to meet in 2001, so the work has been based on meetings of opportunity. Discussions were initiated in 2001 between the GEOHAB and GLOBEC modeling subcommittees on possible cooperation, allowed a joint meeting of the Modeling Committees.

GEOHAB Protocols/Quality Control Subcommittee—The SSC recognizes the need for such a sub-committee whose first task would be to determine what other programs (e.g., GLOBEC, JGOFS, LOICZ, GOOS) have done on protocols and standards, to avoid redundancies between the different programs sponsored by SCOR and IOC. This subcommittee would deal with such issues as accuracy of measurements, intercalibrations, and data-banking needed. The IOC Assembly endorsed a proposal for the IOC to invite the relevant programmes for a joint working group.

The GEOHAB Modeling Group met in Warnemünde, Germany at the end of the ICES Study Group on Physical-Biological Interactions. The meeting involved the chairman of the GLOBEC modeling group and set priorities for action. Wolfgang Fennel chairs the group.

The joint Subcommittee on PE1 (Biodiversity and Biogeography) and PE 3 (Adaptive Strategies) met on 28-31 October 2001 in Calvia, Mallorca, Spain following the LIFEHAB Workshop on Life History of Microalgal Species Causing Harmful Blooms, sponsored by the Commission of the European Communities Fifth Framework, Programme Energy, Environment and Sustainable Development.

A GEOHAB subcommittee meeting on real-time measurements was established for planning a workshop on real-time coastal observing systems for ecosystem dynamics and harmful algal blooms. It met in Villefranche sur Mer, 4-5 February 2002; an application for funding was submitted to the E.U.

On request of the organisers, the workshop on "Molecular Probe Technology for the Detection of Harmful Algae", 20-24 May 2002 at Martin Ryan Institute, Galway, Ireland was endorsed by the GEOHAB Programme. It was a timely initiative that will help the community working on the ecology and oceanography of harmful algal blooms. The primary objective of the workshop was to compare and exchange information in molecular techniques for use in monitoring HAB events. Despite the fact that GEOHAB is designed to address oceanography and ecology of HABs, most of its operations will rely on rapid detection and numbering of a single species for synoptic descriptions, on detection of low cell numbers for localisation of possible seed-beds and time series acquired in monitoring programs for validation of models. As such, this initiative will contribute to the Program Elements 1, 3, 4 and 5 of the *GEOHAB Science Plan*.

Regional GEOHAB-Affiliated Programs

Baltic Sea—Jointly with ICES, the Baltic Sea GEOHAB program is well on its way to developing a proposal for a regional study and for affiliation with GEOHAB. A meeting of the ICES Study Group on GEOHAB Implementation in the Baltic was held on 24 November 2001 in Stockholm. The plan follows the lines defined in the *Science Plan* and the prospects of this study developing are good.

China—Following the SSC letter sent to Chinese HAB scientists in support of continued development of CEOHAB (Chinese Ecology and Oceanography of Harmful Algal Blooms), a research proposal submitted to the Chinese Ministry for Science and Technology received a support of RMB 30 million. The project involves 30-40 scientists nationwide and addresses some of the major questions of the *Science Plan*. It is expected that CEOHAB will be an important national contribution to GEOHAB.

Canada—A meeting was organized in Montreal 19-20 October 2001 to set the scope for the establishment of a Canada-GEOHAB proposal (Canadian Technical report of Fisheries and Aquatic Sciences 2400, 2002). A second meeting is planned during the last week of August 2002 to finalize a proposal for endorsement by GEOHAB and the Canadian funding agencies. Patrick Gentien and Ed Urban will attend.

Europe—In the context of the preparation of the European 6th Framework Program, at least 2 projects for Integrated Projects and Network for Excellence have been submitted. They should at least partly correspond to *GEOHAB Science Plan,* since the focus of the call was on ecosystems. There is a planned workshop to be held in Trieste, Italy on 4-9 September 2002, sponsored by NSF and the EU to examine European-American implementation of comparative ecosystems studies.

Publications

GEOHAB Science Plan—2,500 copies of the revised *Science Plan* were printed and were distributed to all IOC delegations and SCOR Nominated Members, working group and committee chairs, and sponsors. A PowerPoint presentation has been prepared for use by SSC members and presented to different institutions. It can be modified to tailor it to specific audiences and highlight species and issues of local interest.

GEOHAB brochures—Available upon request for relevant meetings.

GEOHAB Implementation Plan—The purpose of the *Implementation Plan* is to describe steps and procedures for implementing GEOHAB science. The *Implementation Plan* will be cross-cutting in approach, but should address each defined objective of the *Science Plan*, and consider the action required to achieve it. The *Implementation Plan* will also consider the extent to which the objectives are already being undertaken, or standards are being set, by existing national programmes and how GEOHAB can help in international coordination. The *Implementation Plan* is being modelled on the *GLOBEC Implementation Plan*, and will include a description of the benefits and responsibilities of affiliation with GEOHAB and a description of the application process for affiliation. A first draft of the *Implementation Plan* was prepared during the SSC meeting in Helsinki, Finland.

Progress reports of the GEOHAB sub-committees will be published regularly in the IOC *Harmful Algal News*, ensuring the widest audience.

Liaisons

The GEOHAB SSC maintains liaisons with other international organizations involved in HAB research, including the ICES/IOC Working Group on the Dynamics of Harmful Algal Blooms, the ICES Study Group on Physical-Biological Interactions and ICES Study Group on the Implementation Plan of GEOHAB in the Baltic.

Finances

International Project Office (IPO)—We have not yet been able to raise sufficient funds to establish an IPO, although we have arranged support for office space and support staff at La Rochelle, France. What remains is to obtain support for the salary of an Executive Director. Several delegations at the IOC Assembly (Canada, France, United States) in July 2001 supported a draft resolution calling for financing of an IPO, but we do not yet know how this will translate into actual funding.

SSC Funding—The SSC has now reached a level of funding of US$60,000 per year ($20,000 from IOC, $20,000 from the U.S. National Science Foundation, and $20,000 from the U.S. National Oceanic and Atmospheric Administration). The Workshop on Real-time Coastal Observing Systems for Ecosystem Dynamics and Harmful Algal Blooms to be held in Villefranche, France, 11-21 June 2003 has already received a funding of 170,000 euros from the European Commission, following an application prepared by a sub-committee. IFREMER contributed 15,000 euros and the French bureau will contribute before the end of 2002 for IOC to 30000 euros.

The SSC is still underfunded in terms of the finances needed to complete its *Implementation Plan* through the SSC and its subcommittees. Funding for the SSC may be available in small amounts from nations that participate in GEOHAB on a national or regional level, but we have not yet explored these potential sources.

Income	2002	2003
Carry-over from previous year		$2,891.24
NOAA	$20,000.00	$20,000.00
NSF	$20,000.00	$20,000.00
IFREMER	$15,000.00	$30,000.00
IOC	$20,000.00	$20,000.00
Total	$75,000.00	$92,891.24

Expenses		
Publications	$8,335.44	
Subcommittees	$4,317.32	
Trieste Meeting	$5,000.00	
Real-time Monitoring Meeting	$10,000.00	$30,000.00
SSC Meeting 1	$14,500.00	$20,000.00
SP Reprint (1000 copies)	$9,565.00	
SSC Meeting 2	$20,391.00	$25,000.00
Total	$72,108.76	$75,000.00
Remaining	$2,891.24	$17,891.24

ANNEX 10
REPORT OF COMMITTEE ON MEMBERSHIP POLICIES

Members of the Committee:
Wolfgang Fennel (chair) (Germany)
John Field (South Africa)
Bjorn Sundby (Canada)
Ilana Wainer (Brazil)

The task of the Ad Hoc Committee on Membership Issues was to provide thoughts on three items, which are highlighted by following bullets (bold).

- **Examine membership categories and the need for a new category with lower dues and lower benefits.**

Looking through the categories of membership listed in the *SCOR Handbook* it appears that a couple of nations with strong economies and strong engagements in oceanography and SCOR supported activities might be encouraged to increase their category, for example Australia and Norway. This could be pursued by direct contacts with their national SCOR committees.

We support the idea to establish a new "Observer" status. (receipt of the *SCOR Proceedings* and an invitation to attend SCOR annual meetings at their own expense, but no right to vote or influence directions of SCOR). (Ed Urban noted that the "Invited Member" status described in the SCOR Constitution could be applied.).

The observer status could be an entrance point to full SCOR membership. We should use the opportunity that money given to scientists or institutions (travels, books for libraries) from non-member nations could also be helpful to increase the visibility of SCOR in those nations. For example, scientists receiving travel support through SCOR should be asked/charged to approach and encourage their responsible administration to consider SCOR membership, which could start at least with the observer status.

- **Develop new procedures for gradual loss of benefits when dues are not paid.**

The Committee felt that it must be taken into account that the non-paying members are often those who can least afford the membership while needing it the most. Scientifically active individuals in those nations need the exposure to international research that SCOR offers.

Often, the payment of the membership fee is handled by an organization that has little or no interest in the subject of SCOR, which it sees as only one of a large number of non-governmental organizations for which it has to pay membership fees. To deal with members not paying their dues, we believe that an inclusive approach, including moving them to observer status, is to be preferred.

The sanctions should be that members fall back into the Observer status after 3 years (Categories III-V) or 4 years (Categories I-II) of not paying their dues. These member nations no longer have the opportunity to

nominate members to the SCOR Executive Committee, working groups and have no influence on the directions of SCOR.

How long can a nation be in the observer status? There is a difference between developing nations which became observer but can not afford full membership and those which became observer by a sanction for unpaid dues. The Committee felt that SCOR should not place a time limit on observer status. It could happen that too stiff a penalty would make it impossible for a nation to join. Flexibility and individual attention is preferable.

If an observer nation wants to become a regular member again, the entry conditions should be negotiated on an individual basis. (An internal guideline could be that the nations dropped to observer status are requested to pay the current year's dues, plus 10-20% of the dues accrued re-establish their privileges. In some cases the option to forgive arrears might be better.)

- **Move the dues payment deadline earlier in the year than December 31 (preferably to September 30), to get more discretionary funding in hand earlier in the year.**

This could only be achieved through direct contacts with the national committees which can work on this problems on national level. A formal resolution of the SCOR General Meeting might be helpful.

[Note: This report was discussed at the General Meeting. A draft policy will be reviewed by national SCOR committees.]

ANNEX 11
AD HOC FINANCE COMMITTEE REPORT

The Finance Committee—consisting of Ilana Wainer, Akira Taniguchi, and Birger Larsen—met on October 2 with Ed Urban and Elizabeth Gross to review SCOR finances. Finance Committee members were approved by the Executive Committee before the General Meeting and received financial information in advance to review. The Finance Committee did the following:

- Reviewed the statements from SCOR's auditors. The financial accounts are audited every year in accordance with the requirements of ICSU and of U.S. funding agencies.
- Reviewed the final (audited) statement for 2001 (see Annex 12). The Finance Committee recommended that the 2001 financial statements be approved. SCOR's cash balance decreased by US$4,541 from the end of 2000 to the end of 2001, to US$134,278.[12]
- Reviewed proposed revisions to the 2002 budget. The Finance Committee recommended that the 2002 revised budget be approved. The original budget was approved at the 2001 SCOR meeting in Mar del Plata, but was revised throughout the year to take account of increases in income for new activities and several unexpected changes in plans for 2002 activities. As noted earlier, at its Mar del Plata meeting, SCOR decided not to establish any new Working Groups in 2001 and, as several working groups have completed their activities in the past year or so, this has helped SCOR's 2002 financial situation. The budget for 2002 is in good shape and we project a surplus of about US$13,000 at the end of this year.
- Reviewed and adjusted the draft budget for 2003. The committee reviewed the projected income and expenses for 2003, taking into account, among other things, funding for one new working group and changes in staff support in the Secretariat (changing from a full-time Administrative Officer to a part-time position). The budget drafted is approximately balanced, with a small surplus of income over expenses of US$143. Elizabeth Gross showed the proposed 2003 budget, which was accepted.

Ilana Wainer reported that the Finance Committee recommended that dues for Category I and II nations stay the same for 2004 as for 2001-2003 and that dues for countries in Categories III to V be increased by 1% for 2004. She also clarified the issue of funding for the two new SCOR working groups. If funds are received from the U.S. Office of Naval Research for the Deep-Ocean Mixing working group, discretionary funds will be used for the proposed working group on estuarine sediment dynamics. If funds are not received from ONR, only the Deep-Ocean Mixing working group will be funded in 2003. It will take some time and effort to revise the estuarine sedimentary dynamics proposal, in any case. Meeting participants accepted the recommendations of the Finance Committee.

[12] It is important that a sufficient cash balance be maintained because all the income does not come at the beginning of a new fiscal year and it is necessary to ensure that activities can be supported early in the year. In addition, some of the U.S. grants to SCOR operate on a reimbursement basis only, so SCOR must provide the funds "up front" for its activities and be reimbursed at the end of the activity. Again, a sufficient cash balance is needed if activities are to run smoothly without frequent cash flow problems.

ANNEX 12
POST-AUDIT FINANCIAL STATEMENT FOR 2001

	BUDGET			ACTUAL		
	Disc	**F-T**	**Total**	**Disc**	**F-T**	**Total**
INCOME						
Membership	238,939		238,939	229,924		229,924
ICSU Grant / JGOFS		40,000	40,000		40,000	40,000
ICSU Grant / GLOBEC		10,000	10,000		10,000	10,000
IOC Contract to SCOR		25,000	25,000		25,000	25,000
NSF Grant / Travel Awards	5,000	65,000	70,000		73,885	73,885
NSF Grant / Science Activities	38,602	256,011	294,613	39,004	229,490	268,494
NASA and MMS grants for WG 111	523	30,852	31,375		30,861	30,861
Expected NOAA Support / GEOHAB	880	19,120	20,000		10,929	10,929
Sloan Foundation / WG on Technologies	7,500	42,500	50,000			
to be carried forward to 2002		(42,500)	(42,500)			
2000 SLOAN and IGBP funds brought fwd		30,600	30,600		21,355	21,355
Rockefeller Foundation					8,000	8,000
ICSOS residual funds (net)	13,575		13,575	13,012		13,012
Reimbursement for staff support - IOCCG	7,000		7,000		739	739
Interest income	1,065		1,065	1,070		1,070
TOTAL SCOR INCOME	**313,084**	**445,983**	**789,667**	**283,010**	**450,259**	**733,269**
SCIENTIFIC EXPENSES						
Sea State WG - book purchase	2,000		2,000	2,823		2,823
Fe book purchase+ 2000 meeting exp	2,500		2,500	2,500		2,500
Air-Sea Fluxes – workshop	6,914		6,914	6,914		6,914
Coastal Models – workshop	523	30,852	31,375	523	30,861	31,384
Groundwater	12,580		12,580	12,580		12,580
Asian Monsoons	5,282		5,282	5,282		5,282
Permeable Sediments	11,577		11,577	11,577		11,577
Sediment Traps & 234Th Methods	15,000		15,000	12,163		12,163
Decadal to Millennial Climate Records	7,111		7,111	7,111		7,111
Technologies for Census of Marine Life		28,411	28,411		19,166	19,166
Quantitative Indicators	5,000	15,000	20,000	1,187	15,000	16,187
JGOFS		110,833	110,833		102,550	102,550
GLOBEC		137,677	137,677		134,313	134,313
GEOHAB		35,787	35,787	2,030	30,929	32,959
SOLAS		30,000	30,000		12,449	12,449
Ocean Futures (formerly FOBGC)		23,022	23,022		22,367	22,367
Travel Awards		65,000	65,000		73,885	73,885
Support for COASTS workshop	10,000		10,000	10,000		10,000
Representation	11,557		11,557	11,575		11,575
Publications (including Web page)	7,000		7,000	6,995		6,995
Exec. Committee Mtg. Argentina	25,000		25,000	25,046		25,046
Graduate Education Initiative					7,998	7,998
ICSOS book purchase	1,400		1,400	1,400		1,400
SCOR SECRETARIAT EXPENSES						
JHU Salaries and Benefits	157,503		157,503	136,740		136,740
Outside services (Finance Officer)				16,503		16,503
Program contributions to salaries				(14,119)	739	(13,380)
Communications	4,500		4,500	4,652		4,652
Office Equipment	1,708		1,708	1,837		1,837
Audit and Accounting Services	8,750		8,750	8,750		8,750
JHU overhead charges	22,976		22,976	21,143		21,143
Miscellaneous, office supplies,	4,500		4,500	3,639		3,639
Bank charges				365	2	367
TOTAL SCOR EXPENSES	**323,381**	**476,583**	**799,963**	**299,215**	**450,259**	**749,474**
Accumulated Balance 1/1/2001	128,927					128,927
Excess of Income over Expenses	(10,297)					(16,205)
Accumulated Balance 12/31/01	118,630					112,722

ANNEX 13
SCOR-RELATED MEETINGS (2002-2003)

2002

Feb. 9-10	Ocean Carbon Dioxide Panel	Honolulu, Hawaii
Feb 11-15	Ocean Sciences Meeting	Honolulu, Hawaii
Feb. 16-17	WG 115 – Standards for the Survey and Analysis of Plankton	Honolulu, Hawaii
Feb. 19-22.	SC-IGBP	Stockholm, Sweden
March 7-9	WG 120 – Marine Phytoplankton and Global Climate Regulation	Norwich, UK
April 5-6	GEOHAB Modeling Committee	Warnemünde, Germany
April 23-26	Ocean Biogeochemistry and Ecosystems Transition Team	Potomac, Maryland (USA)
May 6-10	34th International Liège Colloquium on Ocean Dynamics	Liège, Belgium
May 13-15	Symposium on International Global Ocean Exploration	Paris, France
May 27-31	GEOHAB SSC Meeting	Helsinki, Finland
June 3-8	IOC Executive Council	Paris, France
June 10-14	SOLAS Exec. Comm. and National Representatives	Amsterdam, Netherlands
July 15-26	SCAR General Assembly	Shanghai, China
Aug. 5-16	NATO Advanced Study Inst. on Ocean Carbon Cycle and Climate	Ankara, Turkey
Sept. 2-4	WG 113 – The Evolution of the Asian Monsoon in Marine Records: Comparison Between Indian and East Indian Monsoon Subsystems	Aix-en-Provence, France
Sept. 20-22	ICSU Capacity Building Conference	Rio de Janeiro, Brazil
Sept. 23-25	JGOFS SSC	Concepción, Chile
Sept. 24-28	ISCU General Assembly	Rio de Janeiro, Brazil
Oct. 1-5	SCOR General Meeting	Sapporo, Japan
Oct. 10-19	34th COSPAR Scientific Assembly	Houston, Texas
Oct. 14,16,19	GLOBEC SSC Meeting	Qingdao, China
Oct. 15-18	2nd GLOBEC Open Science Meeting	Qingdao, China
Oct. 28-30	WG 118 – New Technologies for Observing Marine Life	Lima, Peru
Nov. 13-15	OCEANS Open Science Conference Planning Committee	Potomac, Maryland, USA
Nov. 16-19	WG 111 – Coupling Waves, Currents, and Winds in Coastal Models (Editorial Group)	Goa, India
Nov. 18-22	WOCE Final Conference`	San Antonio, USA
Nov. 24-27	SOLAS SSC	Gif-sur-Yvette, France
Dec. 4-7	GEOHAB SSC	La Rochelle, France
Dec. 4-6	WG 119 – Quantitative Indicators	Cape Town, South Africa

2003

January 6, 12-13	OCEANS Transition Team Meeting	Paris, France
January 7-10	Biogeochemistry and Ocean Ecosystems Open Science Conference	Paris, France
January 13-15	International Workshop on Ocean Carbon Observation Activities and Their Relation to Planned Research Projects	Paris, France
January 20-24	International Geosphere-Biosphere Programme Science Committee	Punta Arenas, Chile
February 19-22	GEOHAB Editorial Committee	Copenhagen, Denmark
May 2-3	OCEANS Editorial Team Meeting	Washington, D.C.
May 5-8	Third JGOFS Open Science Conference	Washington, D.C.
May 30-June 2	SCOR-IOC Project on Extending Ecosystem Models to the Basin Scale	Harlow. U.K.
June 11-21	Workshop on Real-time Coastal Observing Systems for Ecosystem Dynamics and Harmful Algal Blooms	Villefranche, France
June 15-20	Gordon Research Conference on Permeable Sediments (WGs 114/112)	Waterville, Maine, USA
June 18,19,24	GLOBEC SSC Meeting OCEANS TT Meeting	Banff, Canada
June 19,24	SOLAS SSC Meeting	Banff, Canada
June 20-23	Third IGBP Congress	Banff, Canada
June 30-July 11	SOLAS Summer School	Corsica, France
July 5-6	IAPSO/SCOR WG 121 on Deep-Ocean Mixing	Sapporo, Japan
Sept. 15-19	SCOR Executive Committee Meeting	Moscow, Russia
Oct. 21-22	WG 118 on New Technologies for Observing Marine Life	Washington, D.C., USA
November 3-7	WG 116 on Sediment Trap and ^{234}Th Methods for Carbon Export Flux Determination	TBD
November 15-16	WG 115 on Standards for the Survey and Analysis of Plankton	Concepción, Chile
Nov. 17-20	GEOHAB Open Science Meeting on HABs in Upwelling Systems	Lisbon, Portugal
Dec.	WG 120 on Marine Phytoplankton and Global Climate: The *Phaeocystis* sp. Cluster as a Model	Savannah, Georgia, USA