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SCOR Proceedings, Volume 37
REPORT OF THE 35TH EXECUTIVE COMMITTEE MEETING OF SCOR

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35th EXECUTIVE COMMITTEE MEETING OF SCOR

Sheraton Mar del Plata Hotel
Mar del Plata, Argentina

29-30 October 2001

1.0 INTRODUCTION

1.1 Opening Remarks and Administrative Arrangements

The SCOR President, Robert Duce, welcomed participants and asked each person to introduce him- or herself. Thirty-eight individuals attended from 19 nations (Annex 1).

1.2 Approval of the Agenda

The agenda as distributed was accepted, except for a few minor changes made to accommodate individuals' travel schedules (Annex 2).

1.3 Report of the SCOR President

Robert Duce briefly reviewed activities since the XXVth General Meeting in October 2000. Ed Urban became SCOR's Executive Director in October 2000 and Duce and Urban have had frequent contacts since then. Duce introduced some budget issues that arose in 2001 and were discussed later in the meeting (see Section 6.4). Because of an unbalanced 2001 budget, the SCOR Executive Committee decided not to begin any new working groups in 2001; new working groups will be considered at the XXVIth General Meeting in 2002. Urban developed a brochure for SCOR, as well as guidelines for potential working groups regarding proposals and operations.

Duce and Urban represented SCOR at several meetings during the year. Both met with scientists in Thailand to encourage them to return Thailand to SCOR membership. Afterward, they attended a meeting of the Science Committee of the International Geosphere-Biosphere Programme (IGBP), at which the Surface Ocean-Lower Atmosphere Study (SOLAS) was approved (it was approved by SCOR at the 2000 General Meeting). SOLAS was also approved by the Commission on Atmospheric Chemistry and Global Pollution of the International Association of Meteorology and Atmospheric Chemistry; the World Climate Research Programme may become a formal sponsor in 2002. Duce and Peter Liss have written a paper about SOLAS for the journal *Atmospheric Environment*.

Duce and Urban represented SCOR at a meeting on ocean carbon sequestration convened by the American Society for Limnology and Oceanography in April 2001. Participants included representatives from academia, government, and the private sector. Follow-up to this meeting was discussed later in the Executive Committee meeting (see Section 3.3.2).

Duce met with the President of the Scientific Committee on Antarctic Research (SCAR), Robert Rutford, to discuss common interests in Southern Ocean research. The meeting was intended to renew the long-term relationship and improve interactions between the two organizations. (Rutford attended the SCOR Executive Committee meeting.) There is a need to increase communications among Southern Ocean research programs. Section 5.1.1 presents additional information about SCOR-SCAR interactions and Section 4.1.1 discusses a potential activity to promote coordination of Southern Ocean research.

In June, Duce, Urban, John Field, and Elizabeth Gross attended the IOC General Assembly in Paris, France to hear briefings about the many IOC activities of interest to SCOR and to present SCOR views on issues of common interest.

The Executive Committee approved a new activity in which SCOR will assist the U.S. National Research Council's Ocean Studies Board with their International Global Ocean Exploration workshop (see Section 5.3.2).

SCOR had significant involvement in the scientific review of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), with Julie Hall and S. Krishnaswami representing SCOR. The report of the review committee has been completed and, if implemented properly, will be very useful. Duce represented SCOR (and GESAMP) at a meeting of the United Nations Environment Programme on marine environmental assessment in Iceland in September 2001.

1.4 Report of the SCOR Executive Director

Ed Urban thanked Argentine scientists, especially Cintia Piccolo, for hosting the SCOR Executive Committee Meeting. Urban summarized his written report. He thanked the Executive Committee, and Elizabeth Gross (SCOR Finance Officer) and Wesley Anne Ross (SCOR Administrative Officer), for their help in transitioning to his new role as SCOR Executive Director. Urban stated that he is impressed with the quality of SCOR activities and the international good will surrounding them. Nine working groups met in 2001. Several books and other items were published (see Section 6.3). Urban noted that he spent significant time on SCOR finances in 2001 and that the SCOR community should be reassured that there is no real financial danger, although extra diligence is needed. Urban presented some ideas for changes to SCOR membership policies later in the meeting (see Section 6.2.2).

1.5 Appointment of an *Ad Hoc* Finance Committee

The SCOR Constitution requires that a Finance Committee be appointed at every SCOR meeting. It must consist of three members of SCOR who are not members of the Executive Committee. The SCOR Executive Committee approved an *ad hoc* Finance Committee consisting of Peter Burkill (chair, UK), Adolfo Gracia Gasca (Mexico), and Ilana Wainer (Brazil) before the meeting to give them more time to review financial information. All agreed to serve and were present at the meeting. The Finance Committee reviewed the administration of SCOR finances during 2000 and 2001 and the current year

and proposed a budget for 2002 activities. The Committee's report is summarized in Section 6.4 and given in greater detail in Annex 6.

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

The Executive Committee meeting in 1999 agreed that at future SCOR meetings, after the consideration of working group proposals is complete, the current disciplinary balance of SCOR groups should be assessed. Scientific gaps should be identified and communicated to national committees when the next request for working group proposals is sent. The committee appointed to this task included Roberto Purini (chair), John Field, Laurent Labeyrie, and Alan Meyer (see Section 2.3 for their report).

2.0 WORKING GROUPS

2.1 Disbanded Working Groups

2.1.1 WG 99—Linked Mass and Energy Fluxes at Ridge Crests

This working group produced a report in the Southampton Oceanography Centre report series and was expected also to document its work in the peer-reviewed literature. However, it was obvious that the group was unlikely to produce any additional publications, so the Executive Committee decided early in 2001 to disband the group. No further action was required.

2.1.2 WG 101—Influence of Sea State on the Atmospheric Drag Coefficient

SCOR budgeted \$2,000 in 2001 to purchase copies of the report of this working group to distribute to libraries in developing nations. The report was published by Cambridge University Press and SCOR received 45 copies. The group was disbanded. The working group's report was to be distributed by the end of 2001.

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. (In some cases, the working group chair also presented comments.) The Executive Committee made preliminary decisions, based on the progress of working groups and the merits of the requests, whether funding should be provided for 2002 activities of each working group. The Finance Committee took into account the recommendations of the Executive Committee as it developed the 2002 SCOR budget, which was then subject to final approval by the Executive Committee.

SCOR provided copies of two books published in 2001 to libraries in developing countries and such distribution is scheduled for WG 106's report and the Oceans 2020 book in 2002. Urban asked whether SCOR can afford to continue purchasing copies of books published by working groups? The consensus of Executive Committee members was that such purchases are worthwhile and should

continue if external funds can be arranged. Urban was asked to attempt to obtain special funding for this purpose and to speak with publishers about obtaining less-expensive copies (i.e., paperbacks) or CD versions of SCOR reports.

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

This working group was approved in 1993 and last met in 1999. This group was supposed to produce a review article, but has not yet done so. The working group chair reports that the field is in such flux now that a review paper would be out of date by the time it was published. The Executive Committee Reporter, Wolfgang Fennel, recommended that the group be disbanded, with the understanding that its members are still responsible to produce a review paper at some point in the next few years, with appropriate acknowledgement of SCOR's contribution to the activity. The Executive Committee accepted Fennel's recommendation to disband the group and anticipates a review article in the next few years.

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

The 2000 SCOR General Meeting decided that this group should be disbanded upon publication of its report and budgeted funds to purchase copies of the report for distribution to libraries in developing countries. The chair has been reminded that the group is not approved to continue its activities in 2002. The manuscript for the book has been delivered to the publisher (Elsevier). Urban was asked to contact Elsevier to determine the possibility of obtaining a CD version of the book.

2.2.3 WG 107—Improved Global Bathymetry

The chair of this working group provided the outline for the group's report and a draft has been distributed to working group members for comments. The report will appear in the *IOC Manuals and Guides* series in 2002. Sections of the report may be submitted to peer-reviewed journals. The Executive Committee agreed to disband the working group when its report is published and will review the report to determine whether additional activity is necessary on the topic of bathymetric data.

2.2.4 WG 108—Double Diffusion

This working group requested that their final meeting be postponed until the Ocean Sciences meeting in Hawaii in 2002. The group's work is completed (a special issue of *Progress in Oceanography* will be published in 2003) and their idea for the final meeting is to convene a special session at the Ocean Sciences meeting to present the contents of the special issue and obtain feedback from the community, which they would distill into a short written report to SCOR to present recommendations about potential future SCOR activities. The Executive Committee Reporter, Roberto Purini, noted that the working group has presented many results on its Web site, including notes for students. SCOR declined to provide funding for the special session and approved disbanding of the working group when its report is published.

2.2.5 WG 109—Biogeochemistry of Iron in Seawater

The book from this working group was published just before the Executive Committee Meeting. The \$2,000 designated in the 2001 SCOR budget has been used to purchase books for developing country

libraries. The International Union for Pure and Applied Chemistry (IUPAC) agreed to match this amount and both organizations agreed on a list of recipient libraries. The publisher (John Wiley & Sons, Ltd.) will mail the reports directly to the libraries.

A subgroup on iron standards was set up at the 1998 SCOR General Meeting and met at the 2000 Ocean Sciences Meeting in San Antonio, Texas; an intercalibration of standards and an intercomparison experiment were underway at the time of the 2000 General Meeting. The working group will meet in 2002 to discuss the results of the intercomparison and determine how these results will be published. SCOR approved funding for the meeting, which will be held in conjunction with another meeting in late 2002.

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

The working group's report has been published by WCRP (WCRP-112). The group's final workshop was held in Washington, D.C. in May 2001 and workshop organizers have arranged to have papers from the workshop published in a special issue of the *Journal of Climate* (most papers were submitted by October 1, 2001), as well as by WCRP (WCRP-115). Elizabeth Gross attended the event to represent SCOR and reported that it was a successful activity. Approximately 100 individuals from 17 different nations participated. The group would like to propose follow-on activities. SCOR informed the working group at the 2000 General Meeting that a SCOR working group might not be an appropriate mechanism to do this.

Robert Duce noted that the continuing activities proposed by WCRP are very relevant to SOLAS and that WCRP and SOLAS might put together a joint group to deal with continuing issues of air-sea exchange fluxes. Duce recommended this approach, rather than establishing a new SCOR/WCRP working group. The Executive Committee approved disbanding of the working group and asked that a letter be sent to WCRP to inform them that the working group is complete from SCOR's point of view and encourage them to take future action with SOLAS.

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

This working group is funded by the U.S. Minerals Management Service and the U.S. National Aeronautics and Space Administration. It held a workshop in conjunction with The Oceanography Society meeting in Miami in April 2001. Twenty-one individuals participated in the workshop, predominantly from Western Europe and North America, but with some representation from Russia, India, South Korea, and Australia. 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. A co-chair of the working group, Christopher N.K. Mooers, noted that the book will be unique in integrating 3 different communities: scientists who study waves, coastal ocean modelers, and atmospheric scientists.

Continued funding of the group was approved. The Executive Committee noted that this group provides an excellent example of obtaining external funds for SCOR working groups. Julie Hall recommended negotiation with the publishers regarding publishing a CD-ROM version of the book.

2.2.8 WG 112—Magnitude of Submarine Groundwater Discharge and its Influence On Coastal Oceanographic Processes

This working group was established in 1997 and the Land-Ocean Interactions in the Coastal Zone (LOICZ) project agreed to cosponsor it in 1998. The group met most recently in conjunction with a meeting of the International Atomic Energy Agency in Sicily. The group anticipates developing a special issue of the journal *Biogeochemistry* and contributing to a LOICZ synthesis document in 2002. The Executive Committee Reporter, Robert Duce, noted that the group is very active and successful. One of the group's co-chairs, Evgeny Kontar, presented results of the group. It has made good strides in determining the influence of groundwater discharge on coastal processes and implications for coastal zone management. Members have presented their results at several international meetings. IOC agreed to fund 5 intercalibration experiments in different parts of the world, which the working group is coordinating. The working group has also established good links with the International Atomic Energy Agency. Considerable integration of results remains to be done. The results seem to converge towards a good estimate of submarine groundwater discharge, but more results are coming in.

The group requested SCOR funds for a 2002 meeting. The consensus of Executive Committee members was that SCOR should not provide full support for another meeting because this group has received more SCOR funds than most working groups already. However, a small amount of funding will be provided for the report of the working group. The working group will be disbanded upon publication of its products.

Paola Rizzoli noted that the Joint International Association for the Physical Sciences of the Ocean (IAPSO)/International Association of Hydrological Sciences (IAHS) Commission on Groundwater has been established and has met once. This is an excellent example of a SCOR working group that has resulted in activities within the International Union of Geodesy and Geophysics (IUGG). Rizzoli suggested that the Joint IAPSO/IAHS Commission could find a way to support the working group with IUGG funds and that Kontar and Bill Burnett (the group's other co-chair) should submit a proposal for these special funds for activities of joint IUGG Commissions by 1 December. SCOR will endorse the proposal to IUGG.

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

The working group met in Beijing in May 2001 in conjunction with a post-cruise meeting of the Ocean Drilling Program's Leg 184, with 64 individuals participating. *Marine Geology* has agreed to publish a special volume of the papers contributed. The first papers have been received and will be sent to review in November. 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. The Executive Committee Reporter, Laurent Labeyrie, noted that the working group has been quite active in involving various groups in discussions of evolution and variability of Asian monsoons. They have had three major meetings and have requested support for a final meeting in 2002, which was approved by SCOR as part of the original proposal for the group. This

will not be the conclusion of the need for study of the topic because the field is still evolving rapidly. The International Marine Global Changes Study (IMAGES) will pay most of the meeting expenses because they were unable to help with support for the 2001 meeting in Beijing, so the amount needed from SCOR will be lower than last year. SCOR approved funding for the group's 2002 meeting. Labeyrie recommended that a report from a Japanese member of the working group be scheduled during the 2002 SCOR General Meeting in Japan.

2.2.10 WG 114—Transport and Reaction in Permeable Marine Sediments

The Executive Committee Reporter, Shizuo Tsunogai, noted that the group is tackling a difficult problem: measuring fluxes at the seafloor in sandy sediments. This working group held its second meeting in January 2001. It published an article in the March 13, 2001 issue of *EOS* about its activities. During 2001, the Executive Committee approved the addition of Carolyn Oldham (Australia) and Björn Sundby (Canada) as Associate Members of the group. The group has developed plans to enhance its Web site and received approval for a Gordon Conference on their topic for 2003. They have requested a small sum in 2002 for Web site enhancement. The working group's funding request was approved.

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

The Executive Committee Reporter, Julie Hall, noted that this working group was approved in 1999, but that there was some difficulty in identifying a chair for the group; Ivan Heaney eventually accepted. Heaney and Hall developed the working group composition, which was approved by the Executive Committee in 2001. The group is planning to meet immediately after the AGU/ASLO Ocean Sciences meeting in February 2002. Funding was approved for the group's first meeting.

2.2.12 WG 116—Sediment Traps and ²³⁴Th Methods for Carbon Export Flux Determination

This working group met for the first time in Amsterdam in July 2001, in conjunction with the IGBP Open Science Conference. Shizuo Tsunogai, the Executive Committee Reporter for the group, attended, as did Ed Urban. The group is exploring the possibility of conducting an intercomparison study in conjunction with their next meeting. If they are unable to locate funds for such an activity, they will use the meeting to develop chapters or papers for a document or special journal issue that reviews the state of knowledge on their topic. SCOR has requested that the group postpone their second meeting until 2003. This would give them an opportunity to obtain funds for the intercomparison study they would like to conduct. Funds requested to send working group members to related meetings were not approved.

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

WG 117 met in May 2001 to finalize the report from their meeting in Trins, Austria. The report will appear as a special issue of *Quaternary Science Reviews*. The group did not request additional funding. The Executive Committee Reporter for the working group, Laurent Labeyrie, asked that the group attempt to publish their report also on CDs. SCOR approved the disbanding of the group when their special issue is published.

2.2.14 WG 118—New Technologies for Observing Marine Life

The first meeting of this working group took place in November 2000 in Victoria, Canada. The report of the working group's first year and a work plan for 2001 were submitted to the Alfred P. Sloan Foundation (the sole sponsor of the group) and SCOR received the second portion of funding for the working group's activities. The working group did not hold a full meeting in 2001, but members attended several meetings to provide a liaison with other activities. Julie Hall, the Executive Committee Reporter for the group, noted that it has interacted very widely with the community of scientists who need these new technologies, especially in relation to the Census of Marine Life. The most significant 2001 event followed the IAPSO/IABO meeting in Mar del Plata on October 27. A subset of the working group met with the Census of Marine Life Pilot Project leaders to discuss how the working group can assist the pilot projects.

D. Vance Holliday, a co-chair of the working group, has been in contact with the chairs of SCOR Working Groups 115 and 119 to arrange his attendance at their meetings. The group's Web site is operational. Ed Urban noted that the Sloan Foundation is encouraging the working group to have broad interactions with other groups and to meet with them. Fred Grassle suggested that participants at the Executive Committee meeting look at WG 118 Web site and send suggestions of important technologies not yet being considered. SCOR approved the working group's use of a portion of its funds from the Sloan Foundation in 2002.

2.2.15 WG 119—Quantitative Ecosystems Indicators for Fisheries Management

The Executive Committee Reporter for this activity, John Field, introduced the topic by explaining that indicators are numbers that indicate the status of a fishery. The Executive Committee approved a larger than normal size (15 full members) for this working group because it is co-sponsored by IOC and will conduct its activities through a number of subgroups (Task Forces). The group also includes a large number of associate members. It met for the first time in early October 2001, in conjunction with a UN Food and Agriculture Organization (FAO) Conference on Responsible Fisheries in Marine Ecosystems, in Iceland. Field attended the working group meeting on behalf of SCOR. The group has developed a nice Web site (<http://www.ecosystemindicators.org/>) that describes the group's plans. Task Forces were developed at the meeting and were asked to consider theory of ecosystem functioning, selection criteria for indicators, needs for data and statistical aspects, and case studies. The group will meet next in Cape Town, South Africa in December 2002. It is planning a symposium in 2004 in Paris, to be organized in a way similar to the WG 105 Montpellier symposium, with a special volume of a journal (e.g., *Fisheries Oceanography*) to be produced.

IOC is the primary sponsor of this group. The U.S. National Marine Fisheries Service has agreed to provide support for the working group's activities, which will constitute the SCOR contribution. FAO is not a cosponsor of working group meetings, but expects to help sponsor the symposium. Other sponsors may need to be found. Some participants at the Executive Committee meeting expressed the opinion that the activity should not include social and economic indicators, given the composition of the working group.

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

The working group members were approved by the Executive Committee in August 2001 and members have since been invited to participate in the activity. The working group's first meeting will be held in March 2002 (the working group was asked not to meet in 2001 because of SCOR's financial situation). The Executive Committee Reporter for the working group, Julie Hall, noted that the terms of reference were modified, as requested by SCOR at the 2000 General Meeting. The Executive Committee requested that the group make links with SOLAS; Peter Liss, the SOLAS SSC chair, will attend the group's first meeting. The group's funding request was approved.

2.3 Disciplinary Balance Among SCOR Working Groups

Following the discussion of working group activities, but before the group on disciplinary balance met, discussion about this issue arose. Topics that meeting participants thought would be important foci for future working groups include

- physical oceanography
- interfacial areas among disciplines
- proxies for ocean variability in water column and sediments
- impacts of tides in ocean mixing
- shelf-break exchange processes
- sediment budgets related to estuaries and coastal environments—This idea was the topic of a working group proposal considered, but not funded, at the 2000 General Meeting.

Duce encouraged proponents of new working groups to speak with Ed Urban about the development of such proposals. Urban pointed out that information for proponents of new working groups is available on the SCOR Web site. Several documents on the site should clarify all aspects of working group processes from proposal stage to operations and publications. Urban noted that proponents should try to arrange funding from outside SCOR for new working groups to diversify our income sources, especially from outside the United States, since U.S. agencies currently fund a significant portion of SCOR's activities.

The ad hoc Disciplinary Balance Committee suggested that it would be good to assess the impacts and products of past working groups, starting from 1990. Such an assessment should provide useful information for promoting SCOR, encouraging countries to remain in SCOR, arrange new funding, and determine SCOR's impact in different disciplines. Products to be assessed include major meetings, publications, recommendations for new projects, and other recommendations that have had major impacts on specific fields of ocean science. If this analysis seems to be useful, it should be extended back into the 1980s. The assessment will start by sending an e-mail to all past chairs to ask what they think were the main impacts of their groups. One or two members of Executive Committee will assess responses in each discipline: Shizuo Tsunogai will be responsible for chemistry, Paola Rizzoli and Roberto Purini for physical oceanography, John Field and Julie Hall for biological oceanography, and Laurent Labeyrie for marine geology and climate.

The general conclusion of the committee was that SCOR's activities are relatively balanced presently, but that an annual discussion is useful.

3.0 LARGE-SCALE SCIENTIFIC PROGRAMS

3.1 Committees

Wendy Broadgate noted IGBP's recommendation that the vice-chairs of all IGBP projects be more active. IGBP would like to see some International Project Offices located outside Europe and North America.

3.1.1 Joint Global Ocean Flux Study (JGOFS) Scientific Steering Committee

Ed Urban attended the JGOFS SSC meeting that immediately preceded the IGBP Open Science Conference in Amsterdam in July and presented information about current SCOR activities that he thought would be of relevance to JGOFS. John Field, the Executive Committee Reporter, also attended part of the meeting. A comprehensive report from JGOFS is included in Annex 3. JGOFS is in its final program-wide and global synthesis phase, which will culminate in the Third JGOFS Open Science Conference in Washington, D.C. in 2003. Peter Burkill commented that JGOFS is going into an exciting, very productive phase and is the first IGBP program to have agreed to a final sunset date. JGOFS is seeking approval of one new SSC member (Dennis Hansell to replace Paul Falkowski) and re-appointment of other members to the project's completion in 2003. SCOR approved the requested appointments, as did IGBP. Both the Norwegian and IGBP funding for JGOFS will continue until the project's end.

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

Ed Urban attended the GLOBEC SSC meeting in May 2001 and made a presentation about the GEOHAB program. Wendy Broadgate and Ed Urban presented information about the Ocean Futures project. The GLOBEC SSC is enthusiastic about cooperating with the GEOHAB SSC in modeling and prediction subgroups. The SSC was concerned that Ocean Futures would be duplicative of GLOBEC and that the biology questions were relatively undeveloped. Broadgate and Urban assured the GLOBEC SSC that they would work to avoid duplication and increase GLOBEC involvement in the Ocean Futures activity. The biology questions later received focused attention at a June meeting of a subgroup of the Ocean Futures Planning Committee.

Ian Perry, Vice-Chair of the GLOBEC SSC, presented highlights of GLOBEC's 2001 activities (see Annex 4). GLOBEC is about at its halfway point, with some national programs just starting and GLOBEC considering new regional programs. At the same time, other national programs are almost completed. The GLOBEC working groups are up and running and have held meetings and workshops. Working Groups 1-3 and GLOBEC regional programs were all active in 2001. The 4th working group (on Feedbacks from Marine Ecosystem Changes) will initiate activities in 2002. Southern Ocean GLOBEC had a wintertime field program. A major focus for GLOBEC in 2002 will be the 2nd Open Science Meeting in Qingdao, China, which will result in a special issue of *Fisheries Oceanography*. The Executive Committee Reporter for GLOBEC, John Field, noted that the publications, Web site,

and newsletter are good products of the project. Wendy Broadgate noted that IGBP is very happy with GLOBEC and the way its International Project Office is running. IGBP will support GLOBEC through 2009 to let them run their full cycle and will help to ensure strong involvement of GLOBEC in development of the Ocean Futures activity.

GLOBEC sought permission for two members to be re-appointed (Tim Baumgartner and Celia Marasse) and two new members (John Field [South Africa] and Ana Parma [Argentina]) to be appointed. All the membership proposals were approved by SCOR, as they had previously been by IOC and IGBP. A significant turnover in SSC membership, including the chair and vice-chair, will occur at the end of 2002.

Although the GLOBEC Executive Director is actively seeking new funding, there is a serious problem in securing sufficient funding for full implementation of the project. Laurent Labeyrie noted that funding is a general problem for most IGBP projects and that national committees should do more to contribute funds for these projects that respond to global change. Broadgate agreed that this is a constant problem and that IGBP attempts to secure national funding for its projects.

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

Revisions to the GEOHAB Science Plan were approved by Julie Hall (the Executive Committee Reporter) on behalf of SCOR and the plan was published in May 2001. Two U.S. SSC members and Ed Urban provided a briefing in Washington, D.C. in July 2001 on the Science Plan to staff at the National Science Foundation and the National Oceanic and Atmospheric Administration (NOAA), U.S. sponsors of the program. Other SSC members have provided briefings at their home institutions and at harmful algal bloom conferences.

The SSC met in Shanghai in April 2001 to continue work on its Implementation Plan and to meet with Chinese scientists involved in research on harmful algal blooms. The SSC made a good beginning on its Implementation Plan and identified urgent actions that need to be taken before the next SSC meeting. In addition, the SSC decided to form a set of subcommittees, each having 3-7 members, to focus on writing different sections of the Implementation Plan. A subcommittee will be formed for each of the 5 GEOHAB Program Elements, plus a subcommittee on measurement protocols and an Editorial Subcommittee. The subcommittees for Program Elements 1 (Biodiversity and Biogeography) and 3 (Adaptive Strategies) were scheduled to meet after the LIFEHAB meeting in Mallorca in late October 2001 to work on their sections of the Implementation Plan. The GEOHAB Modeling Committee will meet in April 2002. A significant aspect of GEOHAB will be regional projects proposed for affiliation to GEOHAB by regional scientists.

The SSC will meet next in Finland in May 2002. Local costs will be supported by the Nessling Foundation and IOC will pay airfares. Rotations of some SSC members will take place at the end of 2001.

Funding for a GEOHAB IPO continues to be a major concern. France has made an offer of partial support, but support for an executive director is still lacking. Ed Urban met with staff at NOAA in late 2000 and in mid-2001 to discuss the potential for full support for an IPO located in the United States or to have an individual seconded from the United States to fill the Executive Director position in France, but a commitment for the requested support has not been obtained. Urban also spoke with a member of the Canadian IOC delegation regarding an offer they made for support of the GEOHAB SSC. Canada cannot provide funding for 2001, but may be able to provide funding and/or a secondment in later years. The GEOHAB SSC is now supported by SCOR, IOC, NSF, and NOAA.

3.1.4 SCOR/IGBP/CACGP Surface Ocean-Lower Atmosphere Study (SOLAS)

SOLAS has been approved by SCOR, IGBP, and CACGP, with IGBP's stipulation that the Science Plan be focused by the SOLAS Scientific Steering Committee (SSC). WCRP is also participating in SOLAS by supporting the participation of two SSC members and is considering becoming a full partner. SOLAS will serve as IGBP's ocean-atmosphere interface project. Peter Liss was approved as chair of the SOLAS SSC and the partner organizations have approved a full roster of SSC members. The SSC will develop a plan for its 2002 activities at its first meeting on 14-17 December 2001 in San Francisco, following the American Geophysical Union Fall meeting. Robert Duce, the Executive Committee Reporter for the activity, noted that IGBP requested that SOLAS create a combined Science Plan/Implementation Strategy, instead of separate documents, as was typical for earlier IGBP Core Projects. SCOR and IGBP obtained a grant from ICSU for \$40,000 to broaden community input to the SOLAS Implementation Strategy. So far, no IPO has been established, although Peter Liss is working on this through a number of channels.

SCOR approved terms of reference for the SOLAS Scientific Steering Committee, as modified by IGBP:

- To develop the Surface Ocean-Lower Atmosphere Study (SOLAS) Science Plan and an Implementation Strategy, in accordance with guidance of the sponsoring organizations.
- To oversee the development of SOLAS in accordance with its Science Plan/Implementation Strategy.
- To collaborate, as appropriate, with other related projects and global change programmes, such as JGOFS, LOICZ, GLOBEC and the new Ocean and Atmosphere Planning efforts within IGBP, WCRP, IHDP, DIVERSITAS, IOC and the Global Ocean Observing System (GOOS).
- To establish appropriate data management policies to ensure sharing and preservation of SOLAS data, taking into account policies of the sponsors.
- To report regularly to SCOR, IGBP and CACGP and to other bodies, such as WCRP, on the state of planning and accomplishments of SOLAS.

3.2 Panels

3.2.1 SCOR/IOC Ocean Carbon Dioxide Advisory Panel

The major task of the Ocean Carbon Dioxide Advisory Panel in 2001 was their contribution to the Global Ocean Carbon Observation System Initial Strategy for the Integrated Global Observing Strategy (IGOS), which is almost completed. The panel has begun activities related to their “watching brief” on ocean carbon sequestration. The panel’s Web site is now on line at www.ioc.unesco.org/iocweb/co2panel. The panel will convene next before the Ocean Sciences meeting in February 2002 in Hawaii. SCOR budgeted continuing support for the panel’s activities in 2002. Discussion of the panel’s potential involvement in the issue of ocean carbon sequestration is summarized in Section 3.3.2.

3.3 Scientific Activities under Development

3.3.1 SCOR/IGBP Planning Committee on Future Ocean Research in Earth System Science

The chair of the Ocean Futures Planning Committee, Peter Burkill, updated the Executive Committee about the committee’s activities in 2001 and plans for the future. The Planning Committee is composed of members serving in personal capacities and not representing existing projects, so the committee’s report will present an independent view of ocean science needs. SCOR and IGBP will use the eventual Ocean Futures Science Plan/Implementation Strategy to develop new projects for the second phase of IGBP/SCOR cooperative research. John Field expressed SCOR’s gratitude to Peter Burkill for the energy he has put into this enormous task and all present endorsed the sentiment.

The committee for this activity met in Baltimore in March 2001 to discuss the report from the Plymouth Workshop held in 2000 and to revise it. The committee worked well at the Baltimore meeting and created a new draft report. A subgroup of the committee held a meeting in the UK in June 2001 to work on the biology section of the report and cross-linkages among the three research areas recommended. The final full meeting of the committee is planned for Barcelona, Spain on 2-5 December 2001. The first day of the meeting will be devoted to discussions with representatives of JGOFS, GLOBEC, LOICZ, and other global change projects regarding the committee’s draft report. The committee’s report will be reviewed in a joint process by SCOR and IGBP in January 2002. Core themes that have emerged include “Twilight Zone” processes, comparisons between continental margin and open-ocean systems, changes in marine food webs on decadal to centennial time scales, integration of size spectra from viruses to fish, and coupling and decoupling of elemental cycles and its impact on biogeochemical cycling. The Executive Committee discussed potential missing elements, for example, social science, effects of the ocean on humans, physical oceanography, and biological effects beyond food webs. Peter Burkill assured meeting participants that their comments would be considered as the committee continues its work. Ed Urban noted that it will be difficult to change the report significantly at this stage and meet the proposed timetable; missing elements will have to be incorporated at the next stage of the activity.

According to the original charge to the committee from SCOR and IGBP, the committee's responsibilities will end with publication of their report. An Ocean Futures Transition Team will be appointed to specify how the research described in the report will either be added to the responsibilities of existing projects or new projects created. ICSU provided \$50,000 to SCOR and IGBP for an open science conference, which will occur in late 2002 or early 2003.

Wendy Broadgate presented draft terms of reference for the Ocean Futures Transition Team. These were considered and approved by IGBP Officers in the week prior to the Executive Committee meeting:

1. To invite comments from the international oceanographic community on the Draft Framework Report (Science Questions) produced in 2001.
2. To use comments from reviewers and the community to develop the science questions in the Framework Report that should form the basis for an Open Science Conference (planned for December 2002) to gather community input on how the science questions identified in the Framework Report could be implemented in the marine research element of IGBP II.
3. To use both the Framework Report and the results of the Open Science Conference to produce a Science Plan/Implementation Strategy for the new IGBP marine research element by the end of 2003.
4. To recommend projects and activities for implementation of the scientific questions within the IGBP II structure.

Broadgate also presented a list of scientific topics and program links that must be involved in the next committee, which should include 10-15 people.

Duce appointed a small group (Wendy Broadgate, Peter Burkill, John Field, Julie Hall, Ed Urban) to provide timelines for the actions laid out in the terms of reference and asked them to report back later in the meeting. Nominations were received for individuals to review the Framework Report and to serve on the Ocean Futures Transition Team.

Later in the meeting, Field reported back for the group. He cautioned that there should be some continuity of the Ocean Futures Transition Team with the Planning Committee. The committee identified reviewers and a mandate for them to receive the report by the end of January. The reviewers should look at omissions in the research questions and identify priorities. It is important for the revised report to be available well before the Open Science Meeting. Field's committee also identified some speakers to be approached by the end of February. The OSM must be held by late November or early December, in order to use the ICSU funding by the end of the grant. Possible sites were discussed. Peter Burkill emphasized the need to move quickly on planning the OSM.

The Executive Committee approved the proposed terms of reference for the Ocean Futures Transition Team and approved Julie Hall to chair the Team with a co-chair or vice-chair. SCOR and IGBP will develop a list for the committee. This committee will develop its Science Plan/Implementation Strategy

as a result of community input at the Open Science Meeting.

3.3.2 International Symposium on Carbon Sequestration in the Ocean

SCOR would like to take the lead on organizing an international symposium on ocean carbon sequestration, since it is an important and timely issue and well within SCOR's objectives and expertise. Such a symposium would require a great deal of planning, leadership, fund raising, and other work. There is a lot of controversy about this topic, as evidenced by a recent Policy Forum article in *Science*.¹ The North Pacific Marine Science Organization (PICES), International Council for the Exploration of the Seas (ICES), GESAMP, International Union for the Conservation of Nature (IUCN), ICES, and IOC should be contacted to ascertain their interests in co-sponsoring the activity and a National SCOR Committee might be willing to host such a symposium and provide local organization. The Executive Committee concluded that the SCOR/IOC Ocean Carbon Dioxide Panel would not be the appropriate group to serve as the planning committee for a symposium on this topic because broader expertise will be needed, although the panel should serve as an advisor for the activity. The symposium should include strong components of deep-sea biology and physical oceanography. The effects of ocean circulation and horizontal mixing at the ocean margins on the effectiveness of sequestration attempts are important issues. Predicting environmental impacts is also important.

Robert Duce tasked a subgroup of meeting participants to investigate the topic in greater detail and report back at the end of the meeting. Paola Rizzoli (Chair), Alex Bychkov, Fred Grassle, Ian Perry, Shizuo Tsunogai, and Umit Unluata formed the subgroup. They discussed the scientific issues, including the two approaches to ocean carbon sequestration that have been considered most widely: upper-ocean fertilization and deep-ocean direct injection. The subgroup could not define a goal for an international symposium in such a short period of discussion, but believes the workshop should include discussion of what we know now, what are the uncertainties, and predicting environmental impacts. Since the issue is urgent, SCOR should establish a study group or planning group to produce an organizational plan in a very short time. SCOR has the broad multidisciplinary leadership required to support such a symposium, but a committed individual will need to be identified to lead the planning and execution of the symposium. A very high profile chairman, with no vested interest in the topic, would give credibility to the activity. Names were suggested for a study group. Before forming such a group, it would be wise to investigate what is being done by other organizations, including a group at Princeton University, which has received several million dollars from oil companies to study potential sequestration strategies. The U.S. National Research Council is seeking U.S. funding for a consensus study of the issue, including policy recommendations. Robert Rutherford noted that SCAR held a biology symposium on the iron fertilization issue at one of its recent annual meetings.

Opinions were divided regarding the extent to which policy should be a topic for the symposium. There was some feeling that the symposium should be a science meeting as a first step, perhaps using an Intergovernmental Panel on Climate Change (IPCC) approach, assessing what we know and don't know, and making predictions about potential effectiveness and impacts of sequestration activities. However, inclusion of the policy community from the beginning could make the effort more accepted by

¹Chisholm, S.W., P.G. Falkowski, J.J. Cullen. 2001. Dis-crediting ocean fertilization. *Science* 294:309-310.

policy makers. If the meeting is primarily focused on science, it should include a synthesis for policy makers. SCOR staff and Executive Committee members agreed to speak with other individuals who have been involved in this topic recently to determine whether there is a role for an international symposium sponsored by SCOR.

3.4 Capacity-Building Activities

3.4.1 NSF Travel Support for Developing Country Scientists

Eight requests from meeting organizers for assistance for developing country scientists to travel to ocean science meetings and for short-term fellowships in 2002 were considered by the Executive Committee. SCOR will be submitting a new proposal to the U.S. National Science Foundation (NSF) for these grants in early 2002. In recent years, NSF has provided approximately \$75,000 per year for this purpose.

Alan Meyer commented that this type of support is especially important for young scientists, such as himself. A group of them met at the IAPSO/IABO meeting and developed a network for helping each other with information on sources of funding and other important career issues. (He himself was promoted by the South African SCOR Committee as a capacity-building candidate.) Meyer also expressed thanks to SCOR on behalf of Lynnath Beckley for the funding for the 6th Indo-Pacific Fish Conference.

The Executive Committee approved funding for the Training Course on Identification of Macrozooplankton, POGO Fellowships, the Committee on Space Research Scientific (COSPAR) Assembly, the World Ocean Circulation Experiment Final Conference, the GLOBEC Open Science Meeting/PICES 11th Annual Meeting, the NATO Advanced Study Institute on the Ocean Carbon Cycle and Climate, the Pan Ocean Remote Sensing Conference (PORSEC), and the Xth International Conference on Harmful Algal Blooms. A total of \$66,000 is committed from the new grant, if and when it is available.

Elizabeth Gross suggested that SCOR needs to develop a set of guidelines for organizations requesting SCOR support for these meetings, especially in the case of those that make repeated requests to SCOR. Groups like COSPAR, PORSEC, ICES, and PICES need to make a strong case each time for SCOR support rather than assuming that it will be available for each of their meetings. Ed Urban was asked to develop written guidelines for the travel grants.

3.4.2 Progress Report on A SCOR Initiative to Enhance Graduate Education in the Marine Sciences in Developing Countries, Using a Regional Approach

The SCOR Executive Committee meeting in Mar del Plata was an opportunity to bring together interested individuals from South American countries to discuss how a regional graduate school might be developed for South America. Individuals from 8 Latin American nations were invited to the special meeting on Oct. 27 in Mar del Plata, with an offer of partial financial support; unfortunately, the only

Latin American representation was from Chile, Mexico, Peru, and Uruguay. (Individuals from the United States, France, Japan, Monaco, and South Africa also participated.) Discussions focused on presentations about existing university programs in the region and answers to a questionnaire circulated before the meeting. Grant Gross gave a progress report about his activities to review teaching materials and techniques for regional graduate schools of oceanography in equatorial and Southern Hemisphere countries. Umit Unluata suggested that funds should be sought for a consultant to do a more accurate assessment of the Latin American system. There is potential funding from Japanese organizations. A small group was set up to follow-up on action items from the meeting.

3.4.3 POGO-IOC-SCOR Visiting Fellowships for Oceanographic Observations

Ed Urban described the mandate of POGO and the process for the fellowship program that was developed at the 2000 POGO meeting. SCOR and IOC contributed funding and the first round of 13 fellows was selected in mid-2001. POGO is developing a second call for applications and asked for a similar financial commitment from SCOR for 2002.

The fellowships constitute a different type of support than has been usual for the travel support from SCOR to developing country scientists, in that traditionally, the funds were used for individuals to attend scientific conferences. Most of the funds awarded in 2001 were used for this purpose. However, the POGO Fellowships will 1-3 month residencies. Comments were generally positive regarding POGO and using SCOR travel awards in this way. Ilana Wainer cautioned that the training described is in very sophisticated techniques and in some cases in emerging technology that might not exist in developing countries when the scientists return. Urban noted that this factor was taken into account in reviewing the applications. SCOR approved continued funding of the POGO Fellowships, subject to renewal of the NSF grant for travel funds.

3.5 Affiliated Programs

Reports were tabled, although a short time was available for discussions. The benefit of continued affiliation to SCOR is evaluated at each General Meeting. Reports are provided at Executive Committee meetings for information only.

3.5.1 Acoustic Monitoring of the Global Ocean—No discussion.

3.5.2 PAGES/SCOR International Marine Global Changes Study (IMAGES)— Laurent Labeyrie, current chair of IMAGES, noted that their Web site has been improved. William Curry was approved as the new chair, beginning on January 1, 2002.

3.5.3 InterRidge - International, Interdisciplinary Ridge Studies—Laurent Labeyrie commented that there is not enough contact of InterRidge with SCOR and asked that they be asked to make a presentation at the next SCOR meeting, in Japan, where the InterRidge office is located.

3.5.4 International Antarctic Zone (iAnZone) Program—No discussion.

3.5.5 International Ocean Colour Coordinating Group (IOCCG)—No discussion.

4.0 RELATIONS WITH INTERGOVERNMENTAL ORGANIZATIONS

4.1 Intergovernmental Oceanographic Commission (IOC)

4.1.1 Southern Ocean Research Coordination

IOC ended its Southern Ocean Commission (IOCSOC) at its General Assembly in July 2001. IOCSOC's monitoring responsibilities will be assumed by GOOS. IOC staff members have been charged to investigate a possible role for IOC, SCOR, SCAR, WMO, and other organizations in providing a mechanism to coordinate research activities in the Southern Ocean. An informal discussion took place immediately before the Executive Committee meeting, including representatives of the Climate Variability Study (CLIVAR), GLOBEC, International Antarctic Zone program (iAnZone), IOC, SCAR, SCOR, and SOLAS. Participants agreed that a mechanism to share information about Southern Ocean research plans could be useful, as long as it doesn't create new bureaucracy. Intergovernmental organizations should only be involved to the extent that they are needed. One idea was to have a Web site for exchange of information on cruise schedules, meetings, activities, where to find data sets, and other relevant information. Urban expressed his opinion that such a Web site should not be affiliated with a specific existing research program. Establishment of a new Web site would require some funds for a Webmaster. All participants will send URLs for existing sites and other information to Urban to see how the involved organizations might proceed with this activity. Contacts will be made with IMAGES, the Convention on Conservation of Antarctic Living Marine Resources (CCAMLR), and the Council of Managers of National Antarctic Programs (COMNAP) to find out whether they are conducting relevant activities and/or would like to be involved in the proposed activity.

4.1.2 Coastal Ocean Advanced Science and Technology Studies (COASTS) Meeting

SCOR contributed general support (included in the SCOR 2001 budget) and additional support for travel for developing country scientists to participate in the COASTS meeting. Julie Hall represented SCOR at the meeting and John Field also participated. Julie Hall reported that 60 individuals participated in the workshop. One series of presentations focused on interdisciplinary science and another series on regional aspects. Two volumes of *The Sea* will result from the workshop, which will complement the earlier two volumes of *The Sea* that focused on physical oceanography. There are no financial implications of this activity to SCOR in 2002.

4.1.3 Oceans 2020 and Follow-up

IOC, SCOR, and the Scientific Committee on Problems of the Environment (SCOPE) are conducting an International Assessment of Ocean Science for Sustainable Development, based on a meeting held in Potsdam, Germany in 1999, called *Oceans 2020*. Elizabeth Gross has continued working on this report, with Colin Summerhayes at IOC. The book will be published by Island Press in the United

States in 2002. Gross presented the report outline and John Field added information about the synthesis volume that should be available in time to be used by policymakers at the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa. The synthesis will be published by UNESCO. SCOR agreed to purchase copies of the full report for developing country libraries and Alex Bychkov stated that PICES could help with purchase of books for China, Russia, and Mexico.

4.1.4 IOC Policy on Access to Oceanographic Data

Umit Unluata reported that a working group on oceanographic data exchange policy met in May 2001 in Brussels, Belgium and submitted a statement to the IOC General Assembly on this topic. Ferris Webster served on the U.S. government delegation to the meeting and represented ICSU and SCOR. A lively discussion took place at the IOC Assembly, with ICSU and SCOR expressing strong concern that changes to the policy would contradict the fundamental principle of free and open exchange of scientific data for research and education purposes. The next step will be a meeting during the first quarter of 2002. Unluata thinks SCOR should be represented by an observer at the meeting.

4.1.5 Rio+10 Oceans and Coasts Meeting

IOC will convene a major meeting in Paris on 3-7 December 2001 to provide overall assessment of progress since the Rio de Janeiro meeting in 1992 and to prepare input on ocean policy for the WSSD. Unluata presented the agenda for the meeting. The meeting will result in a two-page statement for adoption as a declaration on behalf of IOC. Robert Duce will present a paper in the Health of the Oceans session. Urban noted that SCOR is providing input on ocean science to ICSU in its separate preparation for the WSSD.

4.2 Other Intergovernmental Organizations

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

Robert Duce reiterated his earlier remarks about GESAMP. The results of the review in which SCOR participated are being analyzed and will be implemented in 2002.

4.2.2 World Meteorological Organization (WMO)

WMO provided a written report on their Marine Meteorology and Associated Oceanographic Activities Program. The Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) was formally established in 1999 through a merger of the Commission for Marine Meteorology (CMM) and the Joint IOC/WMO Committee for the Integrated Global Ocean Services System (IGOSS). JCOMM is now the primary mechanism within WMO and IOC for the international coordination and management of operational marine activities. The first session of JCOMM took place in Akureyri, Iceland on 19-29 June 2001. The future work and sub-structure of JCOMM will be organized within four program areas, each managed by a Coordinator and Coordination Group: Services, Observations, Data Management, and Capacity Building. Within each program area, specific activities will be undertaken by a number of Expert Teams, Task Teams, and Panels. The Commission

elected Johannes Guddal (Norway) as its co-president for meteorology and Savi Narayanan (Canada) as its co-president for oceanography. JCOMM will meet next in Canada in 2005. A major priority for the coming intersessional period will be the implementation and maintenance of an operational ocean observing system to provide the data required to support global climate studies.

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

Wolfgang Fennel made a presentation on behalf of ICES. He reviewed links between ICES and SCOR, especially with relation to GLOBEC and GEOHAB. Cod and Climate Change (CCC) is an ICES contribution to GLOBEC and ICES runs an office for it. An ICES working group on Harmful Algal Bloom Dynamics and a new Baltic GEOHAB program also are operated under the auspices of ICES.

4.2.4 North Pacific Marine Science Organization (PICES)

Ian Perry made a presentation about PICES, which held its 10th anniversary meeting in October 2001. PICES has established an excellent scientific base for activities in the North Pacific region. Six nations participate in PICES, including the United States, Canada, China, Japan, Russia, Korea; efforts are being made to bring Mexico into the organization.

Perry presented ideas from PICES about ways to enhance the PICES-SCOR relationship. PICES is very active in GLOBEC; for example Climate Change and Carrying Capacity (CCCC) is a regional component of GLOBEC and includes an in-water observing program. The next PICES meeting will be coordinated with the GLOBEC Open Science Meeting in Qingdao, China in October 2002. PICES has some involvement in JGOFS through symposia. PICES WG 15 relates to GEOHAB, and would like to be involved in development of the GEOHAB Implementation Plan. PICES has a working group on ocean carbon and could provide important regional activities for the IOC/SCOR Ocean CO₂ Panel. The theme for the 2002 PICES meeting is on technological advances in marine scientific research and PICES will invite some WG 118 members to be speakers in Qingdao. PICES would like to have some observers from PICES nations attend WG 119 meetings, considering that PICES is developing a report on the status of North Pacific Ocean ecosystem.

SCOR has supported past PICES meetings through travel support for developing country scientists, both to annual meetings and special meetings. For example, in March 2000 SCOR provided support for the PICES meeting *Beyond El Niño*, which yielded a special volume of *Progress in Oceanography*. SCOR also supported scientists from developing countries to attend the 10th PICES meeting. PICES requested new support for travel of developing country scientists (see Section 3.4.3), which SCOR approved, pending receipt of NSF funds and cooperation with GLOBEC on selecting participants.

4.2.5 Global Bathymetric Chart of the Ocean (GEBCO)

SCOR has supported a liaison to GEBCO since 1973. Robert Duce suggested that the value of this liaison relationship needs to be re-examined. Elizabeth Gross reviewed the history of the relationship. Ed Urban noted that the SCOR funds for representational travel are very limited and that SCOR needs to limit use of its funds to sustain links to groups with which SCOR has a priority working relationship. The consensus of the Executive Committee was that SCOR should discontinue its support for travel to the annual GEBCO meetings, but should look for individuals who are attending GEBCO meetings anyway (with other funding) to represent SCOR. It was suggested that SCOR bring up the issue of travel support for the GEBCO at the IOC meeting in July.

A related issue is whether GEBCO is filling the needs of the scientific community. It was noted that bathymetry is critical for many fields of science, including for drilling, physical oceanography, and modeling. Large, but inaccessible, databases exist and GEBCO data are not easy to use. Alternative software and technologies are available, but most of them are at very low resolution. SCOR should promote easy availability and handling of bathymetric data. With the publication of WG 107's report and recommendations, it would be an appropriate time for SCOR to review the issue. Duce suggested that interested members of the Executive Committee review the WG 107 report and recommend appropriate future actions. Laurent Labeyrie, Cintia Piccolo, and Paola Rizzoli volunteered to consider the need for potential SCOR activities related to bathymetric data.

5.0 RELATIONS WITH NON-GOVERNMENTAL ORGANIZATIONS

5.1 International Council for Science (ICSU)

5.1.1 Scientific Committee on Antarctic Research (SCAR)

Robert Duce met with the SCAR President (Robert Rutford) in April 2001 to discuss potential cooperation between SCOR and SCAR. The Executive Committee approved a statement in early 2001 regarding cooperation between the two organizations (see Annex 5), which was forwarded to IOC and ICSU. Duce introduced Rutford by stating that increasing research activity in the Southern Ocean stimulates a need for closer liaison with SCAR. Rutford urged the re-establishment of a formal SCAR-SCOR working relationship. He noted that many discussions he heard at the SCOR Executive Committee meeting are very similar to those that take place at SCAR meetings, especially in regard to financial problems, data, and mapping. SCAR has an increased interest in oceanography, but it is reluctant to set up an oceanography working group when SCOR already exists as the expert organization in this field. SCAR also links to the Convention on Conservation of Antarctic Living Marine Resources (CCAMLR) and the Council of Managers of National Antarctic Programs (COMNAP). Rutford thinks that it would be useful for SCOR to send a representative to a SCAR meeting once to familiarize SCOR with SCAR, such as to the first week of the SCAR meeting in Shanghai, China on 14-26 July 2002. Week 1 is devoted to meetings of SCAR working groups, which are comprised of one scientist from each of the 25 SCAR member countries. The consensus of the Executive Committee

is that a closer liaison with SCAR is important because so many scientific questions of global importance have Southern Ocean implications, such as deepwater formation, CO₂ flux, iron enrichment, and paleoceanography and paleoclimate. The Executive Committee agreed that Robert Duce should be the first SCOR representative to attend a SCAR meeting, as SCOR's President. In the future, SCOR should appoint someone who conducts oceanography in the Southern Ocean to be the official liaison to SCAR. It was suggested that SCOR and SCAR send a joint letter to their national committees urging them to develop ties with each other. SCOR and SCAR could organize joint scientific meetings. Paola Rizzoli noted that one of the sessions to be held at IUGG General Assembly in Sapporo will focus on Southern Ocean research, and IAPSO could co-sponsor this session with SCOR and SCAR.

Rutford also commented that the Web site that was discussed earlier (see Section 4.1.1) would be very important to improve information exchange.

5.1.2 International Geosphere-Biosphere Program (IGBP)

SCOR is involved in four cooperative activities with IGBP, which were discussed previously. Robert Duce and Ed Urban attended the IGBP Science Committee's meeting in Thailand in February 2001. The major foci of the Thailand meeting were to continue the development of IGBP's Phase II plan and plan its Open Science Conference. IGBP is reforming into six projects: ocean, atmosphere, land, ocean-atmosphere, ocean-land, and land-atmosphere, plus two overarching activities: paleosciences and modeling.

The Ocean Futures activity is meant to develop the ocean element of the new structure, which includes GLOBEC. Wendy Broadgate added that IGBP and SCOR have a very positive relationship and continual communication among staff. Broadgate reviewed plans of IGBP for future structure and projects. IGBP Phase II should start in 2003. A new aspect of IGBP involves integrated regional studies, combining expertise from many disciplines to tackle important regional problems. The Large-scale Biosphere-Atmosphere Experiment in Amazonia is an example of these studies. Others focus regions being discussed include the Antarctic, Mediterranean, and Arctic. The Earth system approach requires good linkages and integration. The IGBP Science Series No. 4 publication, "Earth System Under Pressure," describes IGBP's new approach.

WCRP, the International Human Dimensions (of Global Change) Programme (IHDP), and DIVERSITAS have worked with IGBP as part of the Earth System Science Partnership to develop 3 joint projects, on carbon, food, and water. The Global Carbon Project (GCP) is the most advanced at this point. Broadgate reviewed GCP's goal and mission. It will draw on existing programs and only develop new activities where gaps exist among current projects. GCP has strong input from the ocean community through the membership of the committee, as well as links to the Integrated Global Observing System, Intergovernmental Panel on Climate Change, and other important organizations. Robert Duce noted that we will need to make sure there are links of SOLAS and Ocean Futures with GCP.

Broadgate reviewed the Global Environmental Change and Food Systems (GECAFS) project briefly. She identified the possibility of strong interactions with WG 119 in relation to fisheries interests of the GECAFS project, which already has some ongoing interactions with GLOBEC. Both the carbon and food projects have published prospectuses, which are available from their Web sites (linked to IGBP site).

5.1.3 World Climate Research Program (WCRP)

SCOR cooperates with WCRP in Working Group 110 on Intercomparison and Validation of Ocean-Atmosphere Flux Fields. WCRP also provides two members to the SOLAS Scientific Steering Committee.

5.1.4 Scientific Committee on Problems of the Environment (SCOPE)

Ed Urban suggested that SCOR appoint an Executive Committee member to follow SCOPE activities and be a point of contact with SCOPE, to help us pursue areas of common interest. The Executive Committee agreed to this idea. Cintia Piccolo was appointed as SCOR's representative to SCOPE.

5.1.5 International Union of Pure and Applied Chemistry (IUPAC)

Following the 2000 SCOR General Meeting, Robert Duce sent a letter to IUPAC thanking the organization for their cooperation in WG 109 and stressing the importance of the IUPAC book series. The primary recent interaction of SCOR with IUPAC has been through WG 109. IUPAC funded publication of the working group's book and SCOR participated with IUPAC in purchasing copies of the book to distribute to libraries in developing countries.

5.2 Affiliated Organizations

5.2.1 International Association for Biological Oceanography (IABO)

Elections were held at the IAPSO/IABO meeting that immediately preceded the Executive Committee meeting. Annelies Pierrot-Bults was elected to replace Fred Grassle as IABO's President and thus will replace Grassle on the SCOR Executive Committee. Jack Matthews will continue as IABO Secretary for now. IABO also agreed with enthusiasm to continue joint meetings with IAPSO. The Census of Marine Life project has been endorsed by IABO.

5.2.2 International Association for Meteorology and Atmospheric Sciences (IAMAS)

The current IAMAS President is not significantly involved in ocean science, so Robert Duce, Past President of IAMAS, represents him, as allowed by the SCOR Constitution. Duce reported that at the IAMAS Assembly held in 2001 few sessions (3-4) were ocean-oriented. Duce hopes that the relationship between IAMAS and SCOR will continue.

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

Paola Rizzoli, IAPSO President, reported that the IABO/IAPSO Assembly preceding the SCOR meeting was a great success. 430 individuals attended, which was significant given the cancellations that

could have occurred because of the Sept. 11 terrorist attacks in the United States. IAPSO and IABO were able to raise a great deal of funds (\$63,000) to assist scientists from developing countries (including funds from SCOR). This IAPSO meeting featured a session on the history of IAPSO and award of the first Prince Albert medal for physical oceanography, to Walter Munk. The medal will be given next at the 2003 Sapporo IUGG General Assembly. Rizzoli also reported that IAPSO will host a major session (Earth System and Global Change) at the IUGG General Assembly on "State of the Planet: Frontiers and Challenges." Rizzoli reviewed the content of the session. Design of the IAPSO science program for the General Assembly was a major item for the IAPSO Executive Committee in Mar del Plata. Another was location of 2005 meeting, which will be held in conjunction with IABO.

The IAPSO Sea Ice Commission was terminated; other IAPSO commissions are under review. The IAPSO by-laws and statutes will be reviewed by a task force that will also review IAPSO's aims and objectives, and will propose revisions to enable realistic strategies for the future. A major redesign of IAPSO is possible, including inclusion of a component of biological oceanography (IAPSO presently includes chemical oceanography), while recognizing the complementary roles of IABO, SCOR, and other ICSU bodies. Science is changing and is becoming much more interdisciplinary and IAPSO wants to be ready. Rizzoli believes that IAPSO's relationship with SCOR needs to be reinforced. She will seek comments from SCOR during the IAPSO re-evaluation process.

5.2.4 International Union of Geological Sciences (IUGS)

No report was offered. Ed Urban stated that he will contact IUGS regarding their future participation in SCOR meetings.

5.3 Other Organizations

5.3.1 Partnership for Observation of the Global Ocean (POGO)

Ed Urban presented a brief description of POGO's mission, summarizing a more detailed report in the meeting background book. The Executive Committee concluded that SCOR should keep a liaison with POGO, but that it is probably not necessary to send a SCOR representative to each of their annual meetings. John Field will be attending the upcoming POGO meeting in Nova Scotia to report on a biological observations workshop he chaired for POGO in June 2001, and will represent SCOR. Cintia Piccolo also will be attending.

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

The Ocean Studies Board (OSB) of the U.S. National Research Council/National Academy of Sciences has requested SCOR's help in planning an International Global Ocean Exploration Workshop. In 2001, the Executive Committee approved SCOR involvement. Elizabeth Gross and Ed Urban met with Academy staff in September 2001 and will attend the committee's first meeting in November. Gross has been involved already in the selection of a venue. Meeting participants suggested names of potential speakers, which will be forwarded to OSB staff. Urban added that it is unusual for SCOR to

assist a primarily U.S. effort, but that he believes that SCOR and the international oceanographic community ultimately will benefit from SCOR's involvement.

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

Fred Grassle reviewed the general goals of CoML and the history of development of the program during the past three years, including each of the major activities and initial research projects. National and regional activities are in different stages of development.

OBIS resulted from the need for a data assimilation framework for new and historical data amassed by the CoML. OBIS is concerned with the development of new databases and enhancement of existing ones to incorporate various kinds of data, including taxonomic data, fisheries data, species descriptions, environmental data, geographic distributions, and other data. OBIS will provide a dynamic, worldwide, inter-networked, interoperating ocean biogeographic information system.

6.0 ORGANIZATION AND FINANCE

6.1 2002 Election of SCOR Officers

The *Procedures for the Nomination and Election of SCOR Officers* specifies that SCOR establish a Nominating Committee of three Nominated Members at each SCOR Executive Committee meeting to prepare for elections at the SCOR General Meeting in the following year. The three Vice-President positions are up for election in 2002. Wolfgang Fennel and Shizuo Tsunogai each have served two 2-year terms and thus are not eligible to serve another term as Vice-President. Roberto Purini has only served one term as Vice-President and thus is eligible for re-election. The terms of Robert Duce (President) and Julie Hall (Secretary) run to the SCOR General meeting in 2004. At that time, a Secretary will be elected for a two-year term, to produce the staggering of terms envisioned by changes to the SCOR Constitution in 2000.

The Executive Committee appointed a Nominating Committee, which will be John Field (chair), Ilana Wainer, Wang Pinxian, and David Turner. The Nominating Committee will seek nominations from all national committees; individuals suggested must be Nominated Members of SCOR. Robert Duce reviewed the procedures and deadlines for various steps of the nomination and election processes. John Field reiterated the responsibilities of the Nominating Committee.

6.2 Membership

6.2.1 Category Changes

Ed Urban reported that two nations (Japan and Brazil) are still contemplating an increase in their membership category; Japan may increase to Category V in 2002 and Brazil may increase to Category II in 2003. Urban announced that Peru has applied for membership in SCOR. A representative from

Peru, Luis Icochea Salas, related that Peruvian scientists have been trying to convince Peruvian authorities for many years to join SCOR. Ed Urban and Tim Baumgartner made special visits to several agencies in Peru before the May 2001 GLOBEC meeting, which had a positive effect. Peruvian scientists met on October 18 and established a Peruvian National SCOR Committee with 15 members. Icochea thanked Urban for his effort and Robert Duce thanked Icochea for Peru's interest in joining SCOR. The Executive Committee approved Peru's membership.

Two member nations—Korea and the Philippines—will have accumulated 5 years of unpaid dues at the end of 2001, requiring action by SCOR to either write-off their dues or remove these two countries from membership in SCOR. Shizuo Tsunogai expressed his concern about Korea's inability to maintain its dues to SCOR. Korea has many departments of oceanography. However, the Korean SCOR Committee is dominated by the Korean Ocean Research and Development Institute (KORDI) and SCOR is not known outside KORDI. Tsunogai offered to make contact with his colleagues in Korea to encourage them to stay in SCOR. Elizabeth Gross noted that it is always a problem when a national committee is controlled by a single institute to the exclusion of other scientists in the country. She suggested that national SCOR committees should include broad national representation and ensure that SCOR dues are line items in annual budgets.

6.2.2 Proposed New Membership Policy

Ed Urban made a presentation about the need for a new SCOR membership policy. In general, the countries having problems with dues are in Category I and II. Urban drafted some ideas for changes in the membership policy, which he stated would need to be examined carefully before implementation. The Executive Committee adopted the following actions for immediate implementation:

- Forgive dues from 2000 and prior years for all countries in Categories I and II.
- Freeze dues for Category I and II members at the 2001 level for 2002. Many countries have experienced large increases in their dues because their currencies have declined in value in relation to the U.S. dollar, in which SCOR dues are collected.
- Provide a list to recipient countries of all individuals funded by SCOR for developing country scientist grants.
- Mobilize SCOR-involved individuals in each nation when dues are not paid promptly.
- Begin to contact nations beginning in July of each year regarding unpaid dues for that year.

In the longer term (6 months), the Executive Committee established an *Ad hoc* Committee on Membership Issues to report back by 30 April 2002. The committee, including Wolfgang Fennel (chair), Ilana Wainer, Björn Sundby, and John Field, will examine the effectiveness of the existing membership policies, as well as

- Developing new procedures for gradual loss of benefits when SCOR dues are not paid.
- Examining membership categories and the need for a new category with lower dues and lower benefits.

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

There was general consensus about the need to revise membership policies, but also comments from developing country members about the impossibility of paying dues when national economies are struggling and it is hard to make a case within such countries that SCOR dues are a priority. If a country doesn't pay, it may mean that there is no interest in the national government in international activities, even though the nation's scientists are interested. National committees need to push within each country to get the funds and motivate funding agencies to pay SCOR dues, emphasizing the need for strong national committees. Politicians respond to public awareness. Individual scientists need to take more responsibility for bringing science to the public through the media and other venues. Some participants expressed the opinion that any new policy should not focus on negative aspects (penalties), but instead should emphasize benefits of membership.

6.3 Publications Arising from SCOR Activities

The following are publications arising from SCOR activities since the 2000 General Meeting:

JGOFS Reports and Publications

Special Issues specifically dedicated to JGOFS:

Deep Sea Research II, 47, Number 3-4. 2000. A Canadian JGOFS Process Study in the Gulf of St Lawrence (Canada): Carbon Transformations from Production to Burial (edited by S. Roy and B. Sundby).

Deep Sea Research II, 47, Number 7-8. 2000. The 1994-1996 Arabian Sea Expedition: Oceanic Response to Monsoonal Forcing, Part 3 (edited by S.L. Smith).

Deep Sea Research II, 47, Number 14. 2000. Biogeochemistry of the Deep Arabian Sea (edited by O. Pfannkuche and K. Lochte).

Deep Sea Research II, 47, 15-16. 2000. The U.S. Southern Ocean Joint Global Ocean Flux Study (AESOPS) (edited by W.O. Smith and R.F. Anderson).

Deep Sea Research II, 48, 4-5. 2001. The Biological Oceanography of the North-East Atlantic: the PRIME Study (edited by G. Savidge and P.J. Le B. Williams).

Deep Sea Research II, 48, 6-7. 2001. The 1994-1996 Arabian Sea Expedition: Oceanic Response to Monsoonal Forcing, Part 4 (edited by S.L. Smith).

Deep Sea Research II, 48, 8-9. 2001. HOT and BATS: Interpretations of Open Ocean Biogeochemical Processes (edited by D.A. Siegel, D.M. Karl, and A.F. Michaels).

Deep Sea Research II, 48, 10. 2001. JGOFS Research in the North Atlantic Ocean: A Decade of Research, Synthesis and Modeling (edited by W. Koeve and H. Ducklow).

Deep Sea Research II, 48, 11-12. 2001. The Southern Ocean Iron Release Experiment (SOIREE) (edited by C.S. Law, P.W. Boyd, A.J. Watson).

Reports/Newsletters:

Baliño, B.M., M.J.R Fasham, and M.C. Bowles (eds.). 2001. *Ocean Biogeochemistry and Global Change: JGOFS Research Highlights 1988-2000*. IGBP Science No. 2. International Geosphere-Biosphere Programme, Stockholm, Sweden.

Fasham, M.J.R., B.M. Baliño, and M.C. Bowles (eds.). 2001. A new vision of ocean biogeochemistry after a decade of the Joint Global Ocean Flux Study (JGOFS). *Ambio Special Report 10*.

Newsletters US-JGOFS, 2000: 10(3), 10(4); 2001, 11(1), 11(2)

CD-ROMs:

JGOFS Canada Data Sets 1989-1998, v. 1, MDA-SDMM, Dec. 2000

JGOFS-related literature was also published in:

Deep Sea Research II, 47, Number 1-2. 2000. Benthic Processes in the Deep Arabian Sea (edited by J.D. Gage, L.A. Levin and G.A. Wolff).

Deep Sea Research II, 47, Number 9-11. 2000. Particle Flux and Its Preservation in Deep Sea Sediments (edited by G. Ganssen and G. Wefer).

Deep Sea Research II, 47, 5-6. 2000. Studies of the California Current System: Part II (edited by F.P. Chavez and C.A. Collins).

Deep Sea Research II, 48, 14-15. 2001. Ocean Margin Exchange in the Northern Gulf of Biscay: OMEX-1 (edited by L. Chou, R. Wollast, B. Avril and J. Huthnance).

GLOBEC Reports and Publications

In 2000/2001 the IPO published two reports and a third one is in press. In addition, three *Newsletters* were distributed to the 1500-address mailing list. This is in addition to the publications of the different scientists and research that are being collated by the IPO.

Checkley, D.M., Jr., J.R. Hunter, L. Motos, and C. D. van der Lingen (eds.). 2000. *Small Pelagic Fishes and Climate Change Program. Report of a Workshop on the Use of the Continuous Underway Fish Egg Sampler (CUFES) for Mapping Spawning Habitats of Pelagic Fish*. GLOBEC Report 14, 65 p.

Robinson, A.R. and P.F.J. Lermusiaux (eds.). 2000. *Workshop on the Assimilation of Biological data in Coupled Physical/Ecosystems Models*. GLOBEC Special Contribution No. 3. 152 p.

Willson, H. (ed.). 2001. *Report on the GLOBEC National, Multinational and Regional Programme Activities*. GLOBEC Special Contribution No. 4, 143 p.

GLOBEC Newsletter 6.1. April 2000

GLOBEC Newsletter 6.2. October 2000

GLOBEC Newsletter 7.1. April 2001

The IPO has also registered the domain name www.globec.org, coinciding with a major revamp of the project Web site. Apart from downloadable pdf documents, GLOBEC reports, *Newsletters* and minutes of meetings, the site includes presentation material on GLOBEC and will provide access to GLOBEC data inventories.

GLOBEC Brochure:

GLOBEC is preparing a brochure to be published as part of the IGBP Science Series, reviewing reasons for GLOBEC's existence, its achievements, and its future plans. More than 35 members of the GLOBEC community are currently writing the different sections of this document, which is expected to be published in 2002.

GEOHAB

GEOHAB. 2001. *Global Ecology and Oceanography of Harmful Algal Blooms Science Plan*. 2001. P. Glibert and G. Pitcher (eds.), Scientific Committee on Oceanic Research and Intergovernmental Oceanographic Commission, Baltimore and Paris.

Publications Arising from SCOR Subsidiary Bodies

WG 101: Jones, I.S.F., and Y. Toba (eds.). 2001. *Wind Stress Over the Ocean*. Cambridge University Press.

- WG 109: Turner, D.R., and K.A. Hunter (eds.). 2001. *The Biogeochemistry of Iron in Seawater*. IUPAC Series on Analytical and Physical Chemistry of Environmental Systems. Volume 7. John Wiley & Sons, Ltd., New York.
- WG 110: WCRP. 2000. Final report of the Joint WCRP/SCOR Working Group on Air-Sea Fluxes (SCOR Working Group 110). Intercomparison and validation of ocean-atmosphere energy flux fields. WCRP-112, WMO/TD-No. 1036.
- WG 114: Boudreau, B.P. et al. 2001. Permeable marine sediments: Overturning an old paradigm. *EOS, Transactions, American Geophysical Union* 82(11):133,135,136.

In addition, the SCOR Secretariat is responsible for communicating with the international ocean science and policy communities, and with sponsors of SCOR activities. A variety of means of communication are used:

- *SCOR Proceedings*—The *SCOR Proceedings* was sent to all Nominated Members, sponsors, and cooperating organizations in September 2001. The Executive Committee approved printing a smaller number of copies (500) than in previous years (1500) in favor of putting the *Proceedings* on the SCOR Web site in pdf format.
- SCOR Brochure—Ed Urban created a SCOR Brochure, which was translated into Spanish by Cintia Piccolo. The Spanish version was useful in discussions with Peruvian officials in May 2001 and was sent to scientists in several different South American countries that might have an interest in SCOR. The brochure is revised frequently and printed as needed.
- *SCOR Handbook*—Urban is in the process of moving much of the material from the *SCOR Handbook* to the SCOR Web site. He developed a proposal for eliminating the *Handbook*, which was accepted by the Executive Committee. Including information from the *Handbook* on the SCOR Web site will allow SCOR to keep the information more up to date. The address list will not be put on the Web site in downloadable form.
- SCOR Web site—Urban provided an update about the SCOR Web site. The arrangement with a graduate student at The Johns Hopkins University didn't work out, so Urban found a new Webmaster and the new Web site went online just prior to the Executive Committee meeting. The site will be expanded in 2002 and updated on a regular basis. Participants suggested that the Web site be put on a CD-ROM for distribution where Web access may be difficult.

6.4 Finances

The final 2000 post-audit financial statement is shown in Annex 7. Peter Burkill, chair of the *ad hoc* Finance Committee, reported that he likes the new layout of finances with differentiation of discretionary and flow-through funds. Burkill recommended approval of the revised 2001 budget. He noted that when the budget was broken out into discretionary and flow-through accounts, the original discretionary budget had a deficit of US\$95K; this has been reduced to \$10K through the year. Regarding the 2002

budget, the original draft had a \$44K deficit, but the Finance Committee worked this down to a nearly balanced budget, with a deficit of only \$5K (see Annex 6). The Executive Committee approved the revised 2001 budget and the proposed 2002 budget.

In terms of funding for 2003 and other financial issues, the Finance Committee recommended that SCOR investigate applying an overhead on flow-through funds for 2002 onwards. They also recommended that, for budgeting purposes, the SCOR Secretariat examine historical data to determine the level of national receipts that should be used for budgeting (i.e., what percentage of dues income is received in an average year?). The Finance Committee endorsed the recommendation that past arrears (2000 and prior) for Category I and II nations be eliminated and that Category I and II dues be frozen at the 2001 level for 2002. The Finance Committee recommended that 2003 dues be increased at the same level as ICSU dues. The Finance Committee endorsed the new banking arrangement: setting up a new interest-bearing account.

Burkill noted that the implication of the limited discretionary funds is that the number of working groups should be reduced significantly. John Field noted that perhaps we should create an expectation that SCOR funds are intended as seed money for their activities and that working groups need to seek other sources of support for their continuing operation.

7.0 FUTURE MEETINGS

7.1 Future meetings of SCOR

7.1.1 2002 General Meeting in Sapporo, Japan

The 2002 SCOR General Meeting will take place in Sapporo, Japan on 1-5 October 2002. The SCOR Executive Committee has approved a preliminary schedule for the event. Shizuo Tsunogai commented that he is pleased to have an the opportunity to expose Japanese science to SCOR members and for Japanese scientists to see SCOR in action. The General Meeting will be held in parallel with a meeting of the Japan Oceanography Society (JOS), which has 2200 members. Both meetings will be on the Hokkaido University campus in Sapporo, Japan. The event will last 5 days—6 half-days for SCOR and 4 half-days for joint disciplinary scientific sessions with JOS (some speakers will be recommended by SCOR), and will include a banquet and a one-day excursion. The local host of the meeting will be the chair of the Japanese National SCOR Committee, Akira Taniguchi.

7.1.2 2003 Executive Committee Meeting

SCOR has never held an annual meeting in Russia. We received a letter of invitation from the Russian Academy of Sciences for the 2003 Executive Committee meeting and have not received any other invitations. Andrey Kostianoy reiterated the invitation from Russia and presented various options for the meeting location. St. Petersburg/Pushkin (site of the Fedorov Symposium) was discussed as a possible site for the meeting. At the suggestion of the Russian National SCOR Committee, however, Moscow was selected as the site of the meeting to make the logistics of scientific presentations by Russian

scientists easier. Kostianoy recommended the earliest dates possible in order to have the best weather, for example, early September. The Russian SCOR Committee will organize a cultural program. The Executive Committee emphasized that there should be some kind of scientific presentations in conjunction with annual SCOR meetings, in this case, perhaps of Russian ocean science.

7.2 Other meetings of interest to SCOR

A list of other SCOR-relevant meetings was presented and is also maintained on the SCOR Web site (see Annex 8).

8.0 OTHER BUSINESS

The Open Executive Committee Meeting was adjourned with thanks from the Executive Committee to Cintia Piccolo and Gerardo Perillo for the facilities and hospitality they provided for two outstanding meetings. The Executive Committee held a short meeting in closed session following adjournment of the open meeting.

ACRONYMS

AOSB	Arctic Ocean Sciences Board
CACGP	Commission on Atmospheric Chemistry and Global Pollution (IAMAS)
CCAMLR	Convention on Conservation of Antarctic Living Marine Resources
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)
COMNAP	Council of Managers of National Antarctic Programs
COSPAR	Committee on Space Research (ICSU)
CUFES	Continuous Underway Fish Egg Sampler
DIS	Data and Information Services (IGBP)
DMS	dimethyl sulfide
DMTT	Data Management Task Team (JGOFS)
ECOR	Engineering Committee on Oceanic Resources
ENSO	El Niño-Southern Oscillation
EPSG	Equatorial Pacific Synthesis Group (JGOFS)
FAO	Food and Agriculture Organization (UN)
GADOLIFE	Growth Dynamics and Regulation of Energy Allocation in Gadoids of Different Life History Strategies and in Different Environments
GAIM	Global Analysis, Interpretation, and Modelling (IGBP)
GCM	general circulation model
GCMD	Global Change Master Directory
GEBCO	General Bathymetric Chart of the Ocean (IOC)
GECAFS	Global Environmental Change and Food Systems (IGBP, WCRP, IHDP, and DIVERSITAS)
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)
GEWEX	Global Exchange of Water Experiment
GLOBEC	Global Ocean Ecosystems Dynamics project (SCOR, IGBP, and IOC)
GLOCHANT	Group of Experts on Global Change in Antarctica (SCAR)
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
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
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)
LOICZ	Land-Ocean Interactions in the Coastal Zone (IGBP and IOC)
LMR	living marine resources
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)
OSC	open science conference
OSM	open science meeting
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)
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
UNESCO	United Nations Education, Science, and Culture Organization
WCRP	World Climate Research Programme (WMO, IOC, and ICSU)
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WSSD	World Summit on Sustainable Development

ANNEX 1
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ANNEX 2
AGENDA

35th EXECUTIVE COMMITTEE MEETING OF SCOR

Mar del Plata, Argentina

29-30 October 2001

The meeting will open at 9:00 am on Monday, October 29 at Sheraton Mar del Plata Hotel at Alem 4221 in Mar del Plata, Argentina.

1.0 OPENING

- | | | |
|------------|--|--------------------|
| 1.1 | Opening Remarks and Administrative Arrangements | <i>Duce, Urban</i> |
| 1.2 | Approval of the Agenda | <i>Duce</i> |
| 1.3 | Report of the President of SCOR | <i>Duce</i> |
| 1.4 | Report of SCOR Executive Director | <i>Urban</i> |
| 1.5 | Appointment of an <i>ad hoc</i> Finance Committee | <i>Duce</i> |
| 1.6 | Appointment of an <i>ad hoc</i> Committee to Review the Disciplinary Balance of SCOR's Activities | <i>Duce</i> |

2.0 WORKING GROUPS

2.1 Working Groups

The Executive Committee Reporter for each working group will present an update on working group activities and progress, and will make recommendations on actions to be taken.

- | | | |
|-------|---|-----------------|
| 2.1.1 | WG 103—The Role of Wave Breaking on Upper Ocean Dynamics | <i>Fennel</i> |
| 2.1.2 | WG 106—Relative Sea Level and Muddy Coasts of the World | <i>Labeyrie</i> |
| 2.1.3 | WG 107—Improved Global Bathymetry | <i>Piccolo</i> |
| 2.1.4 | WG 108—Double Diffusion | <i>Purini</i> |
| 2.1.5 | WG 109—Biogeochemistry of Iron in Seawater | <i>Tsunogai</i> |
| 2.1.6 | WG 110—Intercomparison and Validation of Ocean-Atmosphere Flux Fields | <i>Duce</i> |

- 2.1.7 WG 111—Coupling Winds, Waves and Currents in Coastal Models *Mooers, Fennel*
- 2.1.8 WG 112—Magnitude of Submarine Groundwater Discharge and its Influence on Coastal Oceanographic Processes *Kontar, Duce*
- 2.1.9 WG 113—Evolution of the Asian Monsoon in Marine Records: Comparison between Indian and East Asian Subsystems *Labeyrie*
- 2.1.10 WG 114—Transport and Reaction in Permeable Marine Sediments *Tsunogai*
- 2.1.11 WG 115—Standards for the Survey and Analysis of Plankton *Hall*
- 2.1.12 WG 116—Sediment Traps and ²³⁴Th Methods for Carbon Export Flux Determination *Tsunogai*
- 2.1.13 WG 117—Synthesis of Decadal to Millennial Climate Records of the Last 80ky Years *Labeyrie*
- 2.1.14 WG 118—New Technologies for Observing Marine Life *Hall*
- 2.1.15 WG 119—Quantitative Ecosystems Indicators for Fisheries Management *Field*
- 2.1.16 WG 120—Marine Phytoplankton and Global Climate Regulation: The *Phaeocystis* Species Cluster As Model *Hall*
- 2.1.17 Miscellaneous

3.0 LARGE-SCALE SCIENTIFIC PROGRAMS

3.1 Committees

- 3.1.1 Joint Global Ocean Flux Study Scientific Steering Committee *Field*
- 3.1.2 Global Ocean Ecosystems Dynamics Scientific Steering Committee *Field*
- 3.1.3 Global Ecology and Oceanography of Harmful Algal Blooms Scientific Steering Committee *Fennel, Hall*
- 3.1.4 Development of a SCOR/IGBP/CACGP Surface Ocean-Lower Atmosphere Study *Duce*

3.2 Panels

- 3.2.1 SCOR-IOC Ocean Carbon Dioxide Advisory Panel *Unluata*
Workshop on Carbon Sequestration by the Ocean *Urban*

3.3 Scientific Programs under Development

- 3.3.1 SCOR/IGBP Planning Committee on Future Ocean Research in Earth System Science *Burkill, Urban, Broadgate*

3.4 Capacity-Building Activities

- 3.4.1 Progress Report on a SCOR Initiative to Enhance Graduate Education in the Marine Sciences in Developing Countries, Using a Regional Approach *Piccolo, Gross*
- 3.4.2 POGO-IOC-SCOR Visiting Fellowships for Oceanographic Observations *Urban*
- 3.4.3 NSF Travel Support for Developing Country Scientists *Gross, Urban*

3.5 Affiliated Programs – Reports to be tabled

- 3.5.1 Acoustic Monitoring of the Global Ocean
- 3.5.2 PAGES/SCOR International Marine Global Changes Study (IMAGES)
- 3.5.3 InterRidge - International, Interdisciplinary Ridge Studies
- 3.5.4 International Antarctic Zone (iAnZone) Program
- 3.5.5 International Ocean Colour Coordinating Group (IOCCG)

4.0 RELATIONS WITH INTERGOVERNMENTAL ORGANIZATIONS

4.1 Intergovernmental Oceanographic Commission

Unluata, Duce, Urban

- Joint SCOR-Activities Not Discussed Previously
- Southern Ocean Committee *Urban*
- COASTS Meeting *Hall*
- Oceans 2020 and Follow-up *Gross*
- IOC Activities of Interest to SCOR *Unluata*
- IOC Policy on Access to Oceanographic Data
- Rio+10 Oceans and Coasts Meeting

4.2 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) *Fennel*
- 4.2.4 North Pacific Marine Science Organization (PICES) *Perry, Bychkov*

5.0 RELATIONS WITH NON-GOVERNMENTAL ORGANIZATIONS

5.1 International Council for Science

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

5.2 Affiliated Organizations

- | | | |
|-------|--|----------------|
| 5.2.1 | International Association for Biological Oceanography (IABO) | <i>Grassle</i> |
| 5.2.2 | International Association for Meteorology and Atmospheric Sciences (IAMAS) | <i>Duce</i> |
| 5.2.3 | International Association for the Physical Sciences of the Ocean (IAPSO) | <i>Rizzoli</i> |
| 5.2.4 | International Union of Geological Sciences | |

5.3 Other Organizations

- | | | |
|-------|---|--------------|
| 5.4.1 | Partnership for Observation of the Global Ocean (POGO) | <i>Urban</i> |
| 5.4.2 | Ocean Studies Board, U.S. National Academy of Sciences
International Global Ocean Exploration Workshop | <i>Urban</i> |

6.0 ORGANIZATION AND FINANCE

6.1 2002 Election of SCOR Officers

Field

6.2 Membership

- Category Changes
Proposed New Membership Policy

Field, Urban

6.3 Publications Arising from SCOR Activities

- Publications from Working Groups and Major Programs
SCOR Proceedings
SCOR Brochure
SCOR Handbook
SCOR Web site

Urban

- 6.4 Finances** *Finance Committee, Urban, Gross*
- 6.5 New Interactions with Other Organizations** *Urban*
- 6.6 The Disciplinary Balance Among SCOR Working Groups** *Disciplinary Balance Committee*
- 6.7 Miscellaneous**

7.0 FUTURE MEETINGS

- 7.1 Future meetings of SCOR**
- 7.1.1 2002 General Meeting in Sapporo, Japan *Tsunogai*
- 7.1.2 2003 Executive Committee Meeting *Urban*
- 7.2 Other meetings of interest to SCOR** *Urban*

8.0 OTHER BUSINESS

ANNEX 3
JOINT GLOBAL OCEAN FLUX STUDY (JGOFS)

**Annual Progress Report
(9/2000-8/2001)**

Submitted on behalf of Hugh W. Ducklow, JGOFS Chair, and the Scientific Steering Committee

Introduction

This year's report provides a short summary of the achievements from JGOFS fieldwork, future and planned synthesis and modelling activities, Scientific Steering Committee, Regional Synthesis Groups and Task Teams, the International Project Office, and JGOFS funds and budgets.

Scientific Highlights

One of the most important achievements of the JGOFS global CO₂ survey and other field programs is that we now have a picture of how the ocean "breathes" in different parts of the globe. In their seminal papers, Takahashi *et al.* (1997 and 1999) showed the average annual exchange of CO₂ across the sea surface for all regions of the ocean. The observations suggest that the CO₂ "bulge" in the equatorial Pacific Ocean releases 0.8-1 Pg C into the atmosphere during a normal year. It is the largest continuous natural source of CO₂ in the ocean. The primary cause is the vigorous upwelling that occurs along the equator, driven by the divergence of surface currents. The cold upwelling water comes from relatively shallow depths, a few hundred metres at most. As it warms on its journey to the surface, it holds less CO₂. The gas trapped in the water escapes into the air. Another important cause of the outgassing of CO₂ in the equatorial Pacific Ocean is the relatively low level of biological activity. Although the upwelling water brings abundant nutrients to the surface, the phytoplankton lack sufficient iron to make full use of the nutrients. Dense "blooms" of large, fast-sinking phytoplankton seldom occur, and the export of carbon from surface waters to the depths is generally low. On the other hand, the North Atlantic Ocean is the most intense region for CO₂ uptake in the global ocean. As the Gulf Stream and the North Atlantic Drift transport warm water northward, it cools and releases heat into the atmosphere. The cooler water is more able to absorb CO₂. The North Atlantic Ocean is also one of the most productive ocean regions because of an abundant supply of nutrients, including iron. Therefore, in contrast to the equatorial Pacific Ocean, biological and physical factors combine to create a substantial, though seasonal, net flux of CO₂ from the atmosphere into the North Atlantic Ocean. Less well understood are the patchy, but significant, areas of CO₂ uptake in the Southern Ocean. Like the equatorial Pacific Ocean, there is generally a low level of biological activity in the Southern Ocean despite the presence of abundant nutrients. Both experimental and observational studies strongly suggest that iron limitation is again the cause, and that the patches of CO₂ uptake may be due to the delivery of iron via atmospheric transport from the continents upwind.

Planktonic algae in the well-illuminated surface ocean take up nutrients and CO₂ through the process of photosynthesis, which forms the basis for the "biological pump" that removes CO₂ from the atmosphere and stores the carbon deeper in the ocean. In most areas of the ocean, the strength of the biological pump is controlled by the availability of macronutrients such as nitrate, phosphate, and silicate in the upper layers of the ocean. This is not the case, however, in the subarctic Pacific Ocean, the equatorial Pacific Ocean, and the Southern Ocean. These regions, often characterised as "high nutrient-low chlorophyll (HNLC)" waters, comprise about 30% of the global ocean. An alteration in the magnitude of the biological pump in HNLC regions could significantly affect the ocean's capacity to take up CO₂. Because algae require iron for the synthesis of enzymes involved in photosynthesis, respiration, and nitrogen fixation, an insufficient supply of iron may result in low cell growth and, hence, lower capability to take up CO₂. Palaeo-records obtained from the Vostok ice core in Antarctica provide tantalising evidence of an inverse relationship between iron supply to the ocean and atmospheric CO₂ levels (Martin 1990, Petit *et al.* 1999). Does

iron supply control the magnitude of algal biomass and dynamics in HNLC regions? Major improvements over the last decade in the precision and accuracy of methods for measuring very small amounts of iron and the availability of sulphur hexafluoride as an inert tracer have made it possible to carry out *in situ* iron fertilisation experiments in the open ocean. Following on from the two iron fertilisation experiments in the eastern equatorial Pacific Ocean (Coale *et al.* 1996), in January 1999 an international JGOFS team conducted an *in situ* test of the iron limitation hypothesis in the Southern Ocean 2,500 kilometres southwest of New Zealand. Although the response of the biota was much slower in the frigid Antarctic waters than in the equatorial region, participants in the Southern Ocean Iron Release Experiment (SOIREE) obtained clear evidence of enhanced planktonic growth as a result of iron addition (Boyd *et al.* 2000), consistent with the results for the equatorial Pacific Ocean. Future plans are underway by national programs to continue these experiments in the Southern Ocean and monitor the fate of resulting blooms (export, transport, etc.).

JGOFS Synthesis and Modelling Phase²

At its annual meeting in Cape Town, South Africa, in April 1998, members of the JGOFS Scientific Steering Committee (SSC) accepted responsibility for integrating regional synthesis and modeling activities and for maintaining links to other ocean observing programs. The JGOFS planning groups responsible for coordinating field studies were transformed into regional synthesis groups responsible for encouraging data submission and sharing, meetings, and publications, as well as the development of regional biogeochemical ocean models. Later that year, JGOFS initiated a coordinated program of synthesis at a workshop held at the Southampton Oceanography Centre in the United Kingdom. At that meeting, the JGOFS SSC (under the leadership of then chairman Michael Fasham) laid out a plan for international synthesis of JGOFS field observations and for participation in the program-level synthesis planned by the International Geosphere-Biosphere Programme along with other IGBP core projects. At its annual meeting in Durham, New Hampshire, in October 2000, the Executive Committee of the JGOFS SSC assessed progress and plotted its course toward the final synthesis goals for JGOFS' concluding years. Figure 1 presents the overall structure of the JGOFS synthesis program and some of its current and planned products.

The JGOFS synthesis is divided into three phases. The first phase covers the completion of regional and thematic syntheses by JGOFS synthesis groups. The second phase comprises program-wide synthesis events and activities that are designed to blend the products of the regional syntheses. The third phase is intended to focus on a global synthesis that will conclude JGOFS efforts to develop an integrated and quantitative understanding of the biogeochemical fluxes of carbon in the ocean and their role in the global carbon cycle. JGOFS groups responsible for regional and/or disciplinary syntheses are the North Atlantic Synthesis Group (NASG), the Equatorial Pacific Synthesis Group (EPSG), the Indian Ocean Synthesis Group (IOSG), the Southern Ocean Synthesis Group (SOSG), the North Pacific Synthesis Group (NPSG), the Continental Margins Task Team (CMTT), and the Paleo-JGOFS Task Team (PJTT). Several of these groups are working on synthesis volumes or special issues of *Deep-Sea Research, Part II*. Other activities include a series of continental margins workshops on specific coastal systems, such as the Eastern and Western Boundary Currents, each to culminate in a book. This ambitious project is directed by the CMTT, which is a joint JGOFS and Land-Ocean Interactions in the Coastal Zone (LOICZ) committee. This project is supported, in part, by an award from the Intergovernmental Oceanographic Commission (IOC), a valuable supplement to the core funding that the Scientific Committee on Oceanic Research (SCOR) provides to JGOFS for synthesis work.

This summer, thematic synthesis continued with a workshop on the transport of carbon dioxide (CO₂) in the ocean, which was held at the Southampton Oceanography Centre. This event, hosted by the International Project Office of the World Ocean Circulation Experiment (WOCE), is a joint JGOFS/WOCE activity with additional financial support obtained from IOC, NOAA, WCRP, and the UK Global Environmental Committee (Royal Society). It is intended to build on WOCE results and on the global survey of CO₂ in the ocean carried out by JGOFS scientists on WOCE Hydrographic Programme cruises. This workshop launched a unique effort to blend diagnoses of ocean circulation with extensive analyses of ocean dissolved inorganic carbon to estimate intra- and inter-basin carbon transports.

² After Hugh W. Ducklow, JGOFS Interim Report. *US JGOFS News* 11,2 (2001).

Program-wide synthesis began at the Southampton Synthesis Workshop and was defined at the JGOFS Open Science Conference "Ocean Biogeochemistry: A New Paradigm" held in Bergen, Norway, in April 2000. Keynote speakers at the Bergen conference have submitted draft chapters for a book to be edited by Fasham and published by Springer-Verlag in the IGBP Global Change series in early 2002. Most of the chapters have been or are being reviewed. There are several other notable products of the program-wide synthesis phase as part of the IGBP-wide synthesis effort. At its Southampton workshop, the SSC commissioned a number of JGOFS scientists to draft brief synthetic reports on the components of the program: its regional process studies, the CO₂ survey, remote sensing, the time-series programs, data management, and modeling. A longer version, directed at the wider scientific audience, was published in May as a special report in *Ambio*. A shorter version of the *Ambio* report has been published as the second volume in the *IGBP Science Series*. This version, intended for policymakers and the interested public, describes the operation and role of the ocean carbon cycle in global change. Both documents provide an in-depth summary of more than a decade of JGOFS research and lay the groundwork for planning new efforts in ocean biogeochemistry. A final piece of the program-wide synthesis will be the third JGOFS Open Science Conference, which will be hosted by the U.S. JGOFS Planning and Implementation Office. It will be held at the National Academy of Sciences in Washington, D.C. on 5-8 May 2003. As with the first and second conferences, a final book is expected and will be published by Springer-Verlag in the IGBP Global Change Science series.

A new working group, called the Global Synthesis Working Group (GSWG) and formed under the leadership of Reiner Schlitzer of the Alfred Wegener Institute for Polar Research, Bremerhaven, Germany, will lead the third phase of JGOFS synthesis activity. The idea for this group came out of discussions among JGOFS scientists who attended the IGBP Global Carbon Cycle Synthesis Workshop in Durham last fall. While exploring different ideas around which the JGOFS global synthesis could begin to focus, JGOFS Executive Committee member Robert Anderson (USA) described a presentation that Schlitzer had given at the Southern Ocean Synthesis Workshop in Brest, France, last summer. Schlitzer showed the results of inverse solutions to a global model of ocean biogeochemistry, focusing on export production in the Southern Ocean. The inverse solution Schlitzer described reproduces a very large data set of measurements of nutrients, CO₂, and oxygen in the full water column. Its representation of the distribution and magnitude of the export flux differs significantly, however, from that given by estimates of export derived from maps of primary productivity based on remote-sensing measurements and algorithms relating export and primary production. Which set of maps is correct? In the sense that each is derived from and shows fidelity to one or more of the largest global biogeochemical data sets, they are both "right." The reasons they do not agree are not obvious. JGOFS scientists decided that this problem was intriguing and certainly central to the original program goals. The GSWG will also work with the JGOFS Data Management Task Team (DMTT), which is responsible for amassing JGOFS data sets in national repositories and facilitating access to them and with the International Ocean Colour Coordinating Group (IOCCG). Another new task team has been formed jointly between JGOFS and another IGBP programme element, the Global Analysis, Integration and Modeling (GAIM) initiative, to support global synthesis efforts on ocean carbon modeling. The JGOFS-GAIM Task Team (JGTT) oversees the ongoing effort of the Ocean Carbon-cycle Model Intercomparison Project (OCMIP), which focuses on advancing the development of ocean biogeochemical models.

Scientific Steering Committee

The Scientific Steering Committee held its 16th Meeting before the IGBP Open Science Conference in Amsterdam, The Netherlands on 7-8 July 2001. The committee decided at its 2000 meeting in Bergen that at-large members would be asked to serve until 31 December 2003, the sunset date for JGOFS. The aim is to maximize the momentum and continuity throughout the synthesis and modelling phases (see **Figure 1**). In Amsterdam, Ducklow tabled the decision to address the composition until he determined the needs of future steering committees and all rotating at-large members confirmed their interests to serve until the sunset date. The committee presently stands at 19 members: 8 at-large members and 11 activity chairs (**APPENDIX I**). JGOFS recommends the replacement of one rotating at-large member (Dennis Hansell for Paul Falkowski) and to request the block extension of all at-large members' terms to 31 December 2003. The proposed new slate is given in **APPENDIX II**. The Executive Committee presently consists of Hugh Ducklow (USA), Bronte Tilbrook (Australia), Véronique Garçon (France), Toshiro Saino (Japan), and Robert Anderson (USA).

The Synthesis Groups and Task Teams will continue until they complete their Terms of Reference. When disbanded, the activity chairs will remain on the SSC until the sunset date to maintain the knowledge base and continuity through synthesis. The SSC acted on several changes in the group memberships: (1) the committee accepted the resignation of Peter Burkill (UK) as Chair of the IOSG and approved Sharon Smith (USA) as the new IOSG Chair and that Burkill will remain in the synthesis group; (2) the SSC approved the SOSG recommendation to add Philippe Pondaven (France) to the synthesis group; (3) the SSC recognized a change in LOICZ's co-chair of the CMTT from Shu Gao (China-Beijing) to Larry Atkinson (USA) and that Gao will remain in the group; (4) the committee approved a change in the JGTT membership: Ray Najjar (USA) will replace Nicolas Gruber (USA), who is now a member of the new GSWG; and finally (5), the SSC accepted the recommendation of the North Pacific Task Team to rename the activity as a synthesis group, now called the North Pacific Synthesis and Modelling Group (NPSG).

In November 2000, the Executive Committee appointed Reiner Schlitzer (Germany) as the new Chair of the GSWG, and in February 2001 they approved the nominees for membership of the GSWG. They are Michael J. Behrenfeld (USA), Gerhard Fischer (Germany), Nicolas Gruber (USA), Richard A. Jahnke (USA), Edward Laws (USA), Richard J. Matear (Australia), Patrick Monfray (France), Andreas Oschlies (Germany), Yasuhiro Yamanaka (Japan), and Andrew Yool (United Kingdom). Schlitzer presented a draft of the Terms of Reference for comment, which will be revised for SSC approval. The Working Group links with the JGTT via the common membership of Patrick Monfray.

Meetings

The SSC in 2000 approved the activity calendar for Year 2001 Meetings. **APPENDIX III** gives the most recent update on the schedule of meetings. Note that several dates and meetings have changed, slipped or been added since approval. Next year the site of the 17th Meeting of the JGOFS SSC will be Concepción (Chile) alongside a training course on ocean biogeochemistry. In Amsterdam, the committee received requests from all groups and teams for synthesis meetings in 2002 (**APPENDIX IV**). Tentatively, the following meetings will receive priority for financial support in 2002: SSC Meeting and the Concepción Training Course, JGTT, GSWG, DMTT, PJTT, and CMTT. JGOFS will seek additional support for the NASG, NPSG, EPSG and IOSG (undetermined) meetings.

International Project Office (IPO)

Since the last report, IPO staff focused considerable effort and time in the support of SSC synthesis activities, such as 2000/2001 meetings, publication of the *Ambio* article (May 2001) and the IGBP Science Series (July 2001), assistance with the Springer-Verlag textbook (expected publication date is 2002), and production of two posters and presentations at the IGBP Open Science Conference (Amsterdam). The posters are now online at the JGOFS Web site. The Springer-Verlag expenses for 2001 are estimated at \$28K and remaining ICSU funds will go to cover the publication cost of the *Ambio* article and the new Global Synthesis Working Group meeting in July. In addition, the IPO has seen a staff change. Beatriz Baliño moved to the Bjerknes Center for Climate Research at the University of Bergen as the new project coordinator for the Center, and we completed a search for a new Assistant Executive Officer in February 2001. The new Assistant is Bernard Avril (France), who came from the OMEX project in Belgium. The Office also hired a half-time financial officer, Reidun Gjerde, to assist Judy Stokke, who has returned half time after an extended illness.

In 2000, the project completed an operating budget, exclusive of the Open Science Conference (Bergen), of \$328,955 from the Research Council of Norway (NRC), SCOR, University of Bergen (UiB), and IGBP. The final expenses for the Conference totalled \$167,000. Project funds covered administration costs, overhead for the project and facilities, publications, committee and group meetings, workshops, and symposia. In 2001, project funds from NRC, SCOR, IOC, ICSU UiB, and IGBP, including the carry over of Year 2000 assets, totalled \$437,346. With changes in project activities, such as the cancellation of the JGTT Workshop, cost reduction of the CO₂ Transport Workshop and other activities, the expected expenditure for Year 2001 is \$437,108. As of July 2001, the balance is \$238 and remaining funds will be carried over to Year 2002. At present, the Year 2002 requests for JGOFS support exceed Year 2002 support from NRC, SCOR, UiB and IGBP. The SSC set priorities for JGOFS financial support, and the IPO will seek addition support for Year 2002 activities.

Other Activities

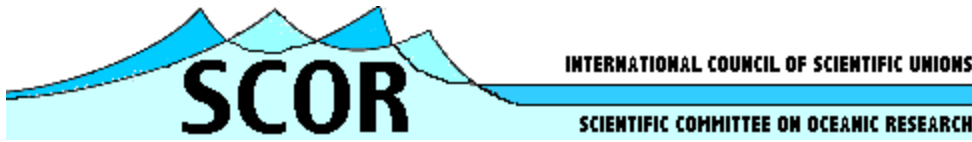
As the JGOFS project completes its final Synthesis period, the Data Management Task Team (DMTT) and the JGOFS IPO are in the process of documenting and compiling all data collected under the JGOFS umbrella. Avril has taken over the work started by Baliño and the DMTT in compiling all JGOFS research projects and cruises from each contributing country since 1988. This compendium also includes aspects of national data management, that is, the location and archiving 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 data sets. In addition, Avril is building upon the metadata catalogue started by Baliño of the datasets from those national activities lacking data management support. The metadata will be archived in the Global Change Master Directory (GCMD) at NASA. The SSC and IPO are giving high priority to building this catalogue. The ultimate purpose will be to provide scientists with a comprehensive biogeochemical data set, in a common file and data format, to be included in the JGOFS Master Data Set, for use not only in current studies, but also as a JGOFS legacy for future global change studies. It is the responsibility of the DMTT and IPO to ensure the future availability and long-term archiving of these valuable data sets. It is planned that the JGOFS Master Data Set be deposited at the World Data Center for Oceanography (WDC-A, Silver Spring, USA). Principal investigators (and their institutions) who submit data will be given full credit for their data within the JGOFS Master Data Set and will have priority access to it.

Since the JGOFS project is in its final phase, the international JGOFS Web site (www.uib.no/jgofs/jgofs.html) is currently being revised, updated, and formatted with two main concerns in mind: first, to be more directly useful to all within and outside the JGOFS community at the present time, and second, when JGOFS comes to an end, to facilitate the transfer of the JGOFS Web site to the IGBP Secretariat with minimal support needed in the future.

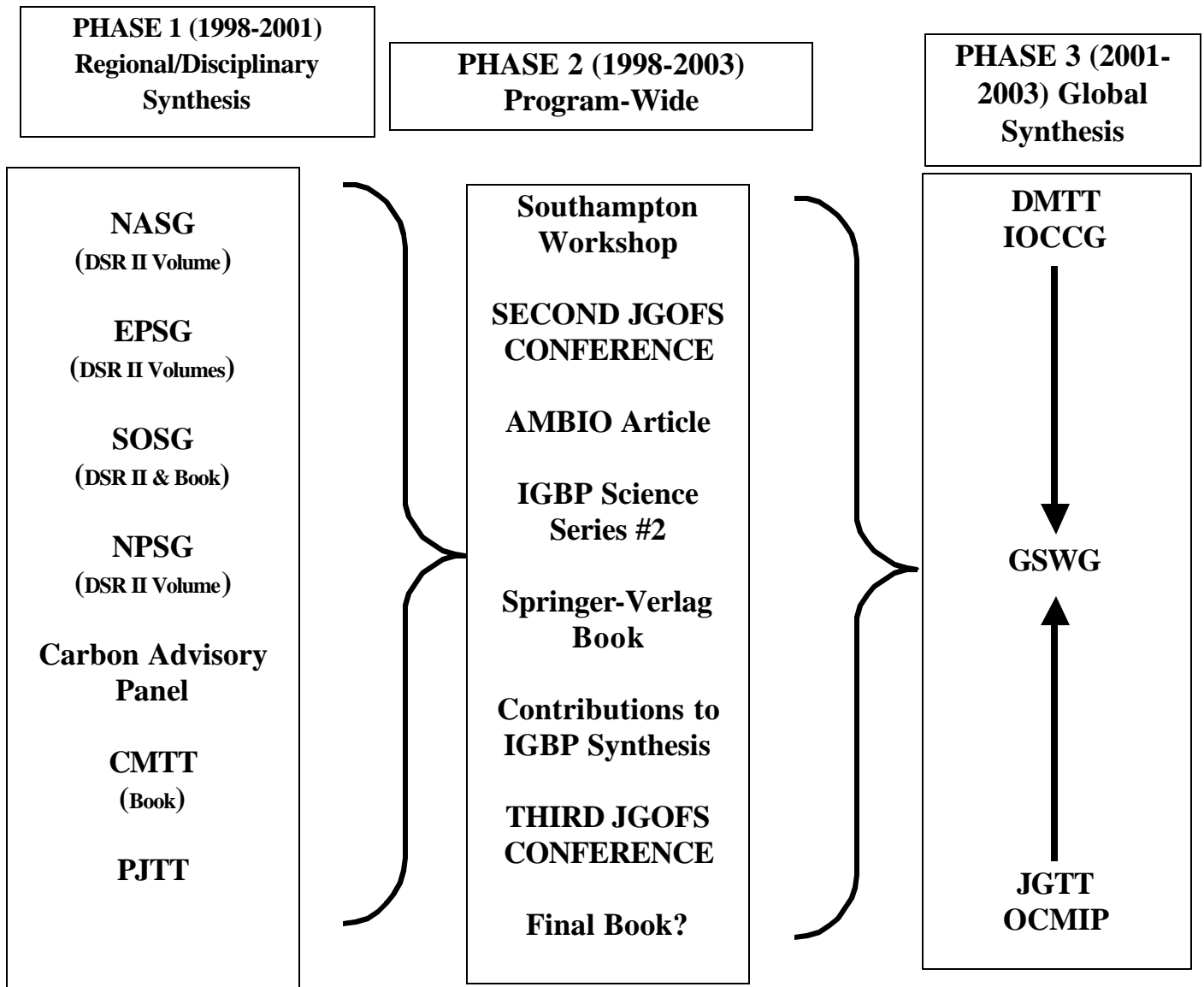
The Norwegian JGOFS database project, fostered by the IPO and financed by the Norwegian Research Council, continues with the aim to centralise all JGOFS data gathered by Norway at the Institute of Marine Research (IMR) and further publication on CD-ROM. Quality controlled data sets derived from JGOFS-Norway research in the Nordic Seas between 1990 and 1997 will be archived in a database developed by IMR. 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. Avril will assist Baliño and IMR in the collection of data sets.

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, Bergen High-Technology Centre, 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>.

Figure 1.



Synthesis Plan



Appendix I: 16th Scientific Steering Committee: List of Members-2001

	Country	Activity	Status	Executive	Term Ends	2001	2002	2003 ³
Ducklow, Hugh	USA	NASG ⁴	At-large	Chair	2002	SSC	SSC	
Anderson, Robert	USA	SSC	At-large	Executive	2001	SSC		
Saino, Toshiro	Japan	SSC 2 nd , NPSG	At-large	Executive	2002	SSC	SSC	
Tilbrook, Bronte	Australia	SSC 2 nd	At-large	Executive	2001	SSC		
Garçon, Véronique	France	NASG		Executive	2001	Chair		
Falkowski, Paul	USA	SSC	At-large		2001	SSC		
Haugan, Peter	Norway	CAP, OOPC	At-large		2002	SSC	SSC	
Hong, Huasheng	China-Beijing	SSC 2 nd	At-large		2001	SSC		
Wallace, Douglas	Germany	CAP	At-large		2001	SSC		
Burkill, Peter	UK	IOSG			2001	Chair		
Bychkov, Alex	Canada	NPSG			2001	Chair		
Platt, Trevor	Canada	IOCCG			2001	Chair		
LeBorgne, Robert	France	EPSG			2001	Chair		
Conkright, Margarita	USA	DMTT			2002	Chair	Chair	
Monfray, Patrick	France	JGTT			2003	Chair	Chair	Chair
Lochte, Karin	Germany	PJTT			2003	Chair	Chair	Chair
Quiñones, Renato	Chile	CMTT			2003	Chair	Chair	Chair
Tréguer, Paul	France	SOSG			2003	Chair	Chair	Chair
Schlitzer, Reiner	Germany	GSWG			2003	Chair	Chair	Chair

³ 31 December 2003 is the sunset date for JGOFS.

⁴ Acronyms: **CAP**—SCOR/IOC Ocean Carbon Dioxide Advisory Panel, **CMTT**—Continental Margin Task Team, **DMTT**—Data Management Task Team, **EPSG**—Equatorial Pacific Synthesis and Modelling Group, **IOCCG**—International Ocean Colour Coordinating Group, **IOSG**—Indian Ocean Synthesis and Modelling Group, **GSWG**—Global Synthesis and Modelling Working Group, **JGTT**—JGOFS/GAIM Task Team, **NASG**—North Atlantic Synthesis and Modelling Group, **NPSG**—North Pacific Synthesis and Modelling Group, **OOPC**—Ocean Observation Panel on Climate, **PJTT**—Paleo/JGOFS Task Team, **SOSG**—Southern Ocean Synthesis and Modelling Group.

Appendix II: Recommended JGOFS Scientific Steering Committee
1 January 2002 to 31 December 2003

Name	Country	Function	Status	Term	2002	2003 ⁵
Ducklow, Hugh	USA	Chair, North Atlantic SG	At-large	2003	SSC	
Haugan, Peter	Norway	SSC, CO ₂ Advisory Panel	At-large	2003	SSC	SSC ⁶
Saino, Toshiro	Japan	SSC 2 nd , North Pacific SG	At-large	2003	SSC	SSC
Anderson, Robert	USA	SSC	At-large	2003	SSC	SSC
Hansell, Dennis	USA	SSC	At-large	2003	SSC	SSC
Hong, Huasheng	China-Beijing	SSC 2 nd term	At-large	2003	SSC	SSC
Tilbrook, Bronte	Australia	SSC 2 nd term	At-large	2003	SSC	SSC
Lochte, Karin	Germany	Palaeo JGOFS TT		2003	Chair	Chair
Monfray, Patrick	France	JGOFS-GAIM TT		2003	Chair	Chair
Quiñones, Renato	Chile	Continental Margins SG		2003	Chair	Chair
Schlitzer, Reiner	Germany	Global Synthesis WG		2003	Chair	Chair
Tréguer, Paul	France	Southern Ocean SG		2003	Chair	Chair
Wallace, Douglas	Germany	CO ₂ Advisory Panel		2003	Chair	Chair
Conkright, Margarita	USA	Data Management TT		2003	Chair	Chair ⁷
Bychkov, Alex	Canada	North Pacific SG		2003	Chair	Chair
Garçon, Véronique	France	North Atlantic SG		2003	Chair	Chair
LeBorgne, Robert	France	Equatorial Pacific SG		2003	Chair	Chair
Platt, Trevor	Canada	Intl Ocean Color C Group		2003	Chair	Chair
Smith, Sharon	USA	Indian Ocean SG		2003	Chair	Chair

⁵ 31 December 2003 is the sunset date for JGOFS.

⁶ Bold **SSC** indicate proposed block extensions for at-large members, unless otherwise directed by IGBP and SCOR.

⁷ Bold **Chair** indicate proposed extensions of group chairs on the SSC, unless otherwise requested by the group Chairs.

Appendix III: List of 2001 Meetings

15-16 January	North Atlantic Synthesis Group Meeting, Arcachon, France.
7-11 May	JGOFS/LOICZ/IOC Continental Margins Workshop on Polar Margins, TBD.
7-9 June	Indian Ocean Synthesis Group Meeting (editors), Miami, USA.
27-29 June	JGOFS/WOCE/IOC CO ₂ Transport Workshop, Southampton Oceanography Centre, Southampton, UK.
6, 9 July	Global Synthesis Working Group Meeting, Amsterdam, The Netherlands.
7-8 July	16 th JGOFS Scientific Steering Committee Meeting, Amsterdam, The Netherlands.
28-30 September	JGOFS/LOICZ/IOC Continental Margins Workshop on Marginal Seas, Taipei, Taiwan, ROC. International Symposium on Biogeochemical Fluxes in Marginal Seas and Tropical Coastal Zones, International Conference Center (Taipei).
2-3 October	Data Management Task Team Meeting, Washington, D.C.
21-28 October	Joint IAPSO-IABO Assembly, Mar del Plata, Argentina. <i>An Ocean Odyssey</i> . Symposium session.
October	North Pacific Synthesis Group Meeting, Victoria, BC, Canada.
12-17 November	Paleo-JGOFS Task Team and Workshop, Germany or France.

APPENDIX IV: Tentative List of 2002 Meetings (as of July 2001)

- 29-30 January **Data Management Task Team Meeting**, Washington DC,
- 11-15 February During the forthcoming **2002 Ocean Sciences Meeting** organised by AGU and ASLO, special sessions or meetings are sponsored by JGOFS for the **SOSG (OS04. The Cycle of Carbon in the Southern Ocean)**, chaired by Paul Tréguer, Ulrich Bathmann, Tom Trull, Phillip Boyd, and Stéphane Blain), the **EPSG (Robert Le Borgne)** and the **NASG (Véronique Garçon)**. Other sessions might be of interest to JGOFS Scientists. Honolulu, Hawaii, USA
as of 29 November
- 16-17 February **SOSG Synthesis Workshop: "The Cycle of Carbon in the Southern Ocean"**, Honolulu, HI, USA
A short report of the SOSG meeting is available at
http://ads.smr.uib.no/jgofs/Meetings/SOSG_Hawaii2002.pdf
- 16-18 April **Continental Margin Task Team Workshop on Subpolar Regions**, Southampton, UK
- 22-26 April During the **European Geophysical Society 27th General Assembly**, a special session "OAS. **Biogeochemistry of the carbon cycle of the Atlantic Ocean**", chaired by W. Koeve, J. Aiken and V. Garçon is sponsored by JGOFS for the **NASG**. Nice, France
- 24-27 June Joint Workshop of the **Global Synthesis Working Group** and **JGOFS/GAIM Task Team** on 3D Ocean Carbon Modelling and Analysis, Ispra, Italy. Contacts: Reiner Schlitzer, Alfred Wegener Institute for Polar and Marine Research, Dept. of GeoSystem, P.O. Box 120161, D-27515 Bremerhaven, GERMANY, Tel. (49) 471 48311559, Fax. (49) 471 48311149; Patrick Monfray, Institut Pierre Simon Laplace, Laboratoire des Sciences du Climat et de l'Environnement, Orme des Merisiers, F-91191 Gif sur Yvette, FRANCE, Tel. (33) 1 69 08 77 24, Fax. (33) 1 69 08 77 16
- 17-19 September **Equatorial Pacific Synthesis Meeting and Workshop**, Orono, ME, USA Contact: Robert Le Borgne, Centre IRD, B.P. A5, F-98848 Nouméa Cedex, Tel. (33-4) 9104 1657, Fax. (33-4) 9104 1635, FRANCE; Fei Chai, School of Marine Sciences, University of Maine, Orono, ME 04469-5741, USA, Tel. (1-207) 581 4317, Fax. (1-207) 581 4388
- 23-25 September **17th JGOFS Scientific Steering Committee Meeting**, Concepción, Chile Contact: Roger Hanson, JGOFS International Project Office, SMR, University of Bergen, PO Box 7800, 5020 Bergen, Norway. Tel: (+47-555) 84244, Fax: (+47-555) 89687
- 1-2 October **North Pacific Synthesis Group Meeting and Symposium** for the North Pacific synthesis, Sapporo, Japan. Contact: Toshiro Saino, Institute for Hydrophobic-Atmospheric Science, Nagoya University, Furo-cho, Chigusa-Ku, Nagoya 464-8601, Japan, Tel. (81-52) 789 3487, Fax. (81-52) 789 3436
- late Fall **North Pacific Synthesis Group editorial meeting for an issue of the Journal of Oceanography on JGOFS NP synthesis**. Sidney, B.C., Canada. Contact: Toshiro Saino, Institute for Hydrophobic-Atmospheric Science, Nagoya University, Furo-cho, Chigusa-Ku, Nagoya 464-8601, Japan, Tel. (81-52) 789 3487, Fax. (81-52) 789 3436

4-6 December

Continental Margin Task Team Workshop for the **Global Synthesis** of the 5 Regional Syntheses, Washington DC, USA. Contact: *Larry Atkinson, Center for Coastal Physical Oceanography, Old Dominion University, Norfolk, VA 23529-0276, USA, Tel. (1-757) 683 4926, Fax. (1-757) 683 5550; Renato Quiñones, Departamento de Oceanografía, Universidad de Concepción, Casilla 160-C, Concepción CHILE Tel. +56-41-203861, Fax. +56-41-256571; Richard Jahnke, Skidaway Institute of Oceanography, University System of Georgia, 10 Ocean Science Circle, Savannah, Georgia 31411, USA, Tel. +1 912 598 2491, Fax. +1 912 598 2310*

ANNEX 4
GLOBAL OCEAN ECOSYSTEM DYNAMICS (GLOBEC)

**Report of the SCOR/IOC/IGBP GLOBEC International Project for 2001
to the Scientific Committee on Oceanic Research
Mar del Plata, Argentina, October 2001**

Manuel Barange
Director GLOBEC International Project Office
Plymouth Marine Laboratory, UK
m.barange@pml.ac.uk

1. Research activity highlights for 2000/01 and plans for 2001/02

In this report we provide brief information on the achievements and future plans of the GLOBEC project. These are presented for the Foci WGs, and National and Regional Programmes.

Focus 1 WG: Retrospective Analysis and Time-Series Studies

The general objective of this Focus is to identify and understand the characteristic natural modes of physical forcing and marine ecosystem variability over a range of temporal and spatial scales. The second meeting of this working group took place in Lima, Peru on 27-28 May 2001, under the chairmanship of Ian Perry. The following are selected actions of the group over the past 12 months and action items identified for activation in the current year:

- A GLOBEC/CLIVAR/PAGES Intersection meeting was held in Sidney, BC, Canada on 24-26 September 2000, to outline a common research agenda among the three programmes, under the thrust: “to identify the role and consequences of climate as a forcing mechanism for changes in marine ecosystems...” (Report available at www.globec.org).
- As a result of the above meeting a workshop on “Climate Forcing of Oceanic Ecosystems: Are Significant Biological Feedbacks Possible on Interdecadal Timescales?” was held at the Scripps Institution of Oceanography, USA on 18-20 April 2001. The workshop resulted in a review paper (under development) and a poster presented at the IGBP Open Science Conference, July 2001.
- To encourage this research link between climatologists and GLOBEC researchers, Tim Baumgartner and Neil Ward will prepare a *GLOBEC Newsletter* article providing problem-oriented examples that could benefit from collaborative CLIVAR/GLOBEC research.
- The WG will host a workshop on “Climate, Ecosystems and Fisheries in the Pacific: Seeking Fresh Approaches to Key Research Issues,” in Honolulu, Hawaii, November 2001, co-sponsored by GLOBEC and IRI (USA).
- Benjamin Planque continues developing a review paper that describes the value of, and the extra information gained from, long time-series data, commissioned by the WG.
- The WG will host a GLOBEC-sponsored methodological workshop to agree on techniques in the analysis of paleoceanographic data, in Munich, Germany on 10-13 October 2001.
- Finally, the WG participated at the IGBP OSC in Amsterdam in July 2001, by presenting a poster describing the objectives and approach of the Focus.
- Juergen Alheit was nominated as new Chair of the WG, replacing Ian Perry.

The third meeting of the WG will take place in Qingdao, China, October 2002, coinciding with the GLOBEC OSM.

Focus 2 WG: Process Studies

The first meeting of the Focus 2 WG took place in Roscoff, France on 11-14 September 2000 under the leadership of Serge Poulet (GLOBEC SSC). Through this working group GLOBEC expects to investigate specific mechanisms that are thought to link ecosystem responses with environmental variability. Specifically, the group will attempt to provide guidance on

- Research on life history and trophodynamics and their modelling in ecosystems.
- Identification and understanding of multiscale physical-biological interactions.

The group decided to initiate activities through the publication of a number of position papers, along three lines of research:

1. Identify key species and define key biological and physical processes.
 - 1.1. Types of criteria to determine key zooplankton species and key processes. Authors: Baamstedt U., Bathmann U., Nicol S., Roy S., St. John M.
 - 1.2. The paradox of phytoplankton: Relevance to zooplankton life cycle, recruitment and global change in the oceans. Authors: Poulet S., Kleppel G., Baamstedt, U., Kattner G.
2. Define interactions between physical and biological processes.
 - 2.1. Zooplankton behaviour interactions with their physical environments. Authors: Mackas D., Nicol S., Bathmann U.
 - 2.2. Whale-zooplankton-ecosystem interactions: A review and suggested approach for future work to contribute to GLOBEC and IWC objectives. Authors: Thiele D., Hofmann E., Poulet S., Bathmann U.
3. Incorporate biochemical markers and description in future field studies.
 - 3.1. The marine food web: Combined population dynamics and biochemical approaches. Authors: Kattner G., Kleppel G., Gifford D., St. John M.

Papers 3.1, 1.1 and 2.1 will be started first. The target date for drafts is December 2001. The activities of the group for 2001 will be limited to bring co-authors together to write these papers. The next full sitting of the group will be at the GLOBEC OSM in Qingdao in October 2002.

Focus 3 Predictive and Modelling Capabilities

This WG is expected to understand and predict how populations of marine animal species respond to natural and anthropogenic changes in global climate. The group met for the first time in Chapel Hill, North Carolina, USA on 10-12 July 2000, led by Cisco Werner. The second meeting was held coinciding with the IGBP OSC in July 2001. As the report for this meeting is not yet available, we will review the activities of the group as envisaged before the July meeting.

- The WG held a workshop in Tromso, Norway on 17-20 June 2001 on the use of optical particle counter and particle size instrumentation, to address issues relevant to knitting together size spectra from different instruments. Thirty-two scientists from 10 countries participated. An article will be published in the October 2001 *GLOBEC Newsletter* and a full GLOBEC Report will follow.
- The WG will kick off the planning of GLOBEC's integration activities by participating in the planning synthesis/comparisons of the U.S. GLOBEC programme.
- The WG will follow these synthesis/comparative initiatives by hosting a future meeting on model comparisons in Eastern Boundary Currents (SPACC regions).
- The WG decided to follow some of its mandates through position papers that would influence the community and drive the science. The first one [Incorporating higher trophic level behaviour into models], by O Fiksen and G Huse, was published in the *GLOBEC Newsletter* of April 2001. A second paper "Adaptive (genetic algorithms and dynamic programming) techniques as a way of representing behaviour of higher trophic levels in models" is presently under development.
- The WG participated in the IGBP Open Science Conference through a group presentation delivered by M. Heath, to

highlight the WG's approach and objectives. They also hosted a half-day workshop with GAIM and JGOFS to discuss approaches to basin-scale modelling that will incorporate numerical modelling (WOCE), biogeochemical modelling (JGOFS), and species-processes interactions (GLOBEC).

- Finally, a position paper will be developed over the next year defining a synthesis or “grand challenge” question on possible changes to marine ecosystems in response to global changes on both long and short time scales.

The next meeting of the WG will coincide with the GLOBEC OSM, Qingdao, October 2002.

Focus 4 WG: Feedback from Changes in Marine Ecosystem Structure

At the Lima GLOBEC SSC meeting it was decided to activate this Focus through a small planning group that will develop a position paper on relevant issues. The planning group will consist of I Perry, R Ommer, P Lehodey (from the GLOBEC SSC), plus 2-3 others. The position paper will concentrate on two case studies:

- A well-developed case: South Pacific Tuna
- An important but innovative case: The Arctic ecosystem.

following the pathway: physical/biological variability → marine ecosystem responses → impacts to human systems.

The group is expected to meet in November/December 2001 and publish its report in the March 2002 *GLOBEC Newsletter* in preparation for a full activation of the group following the 2002 GLOBEC OSM.

Other GLOBEC and GLOBEC-related activities relevant to this Focus are

- Global Environmental Change and Food Systems (GECAFS) - An international programme of research to investigate the vulnerability of human food systems to, and interactions with, Global Environmental Change. GLOBEC has actively participated in the planning of GECAFS, and nominated Dagoberto Arcos to the Executive Committee of the programme.
- SCOR/IOC WG 119 Quantitative Ecosystem Indicators for Fisheries Management – GLOBEC considers that the work of this WG is of relevance to this Focus and will follow its activities closely.

Regional Programmes I: Small Pelagic Fishes and Climate Change Programme (SPACC)

The SPACC implementation strategy is based on four research lines. The activities of the programme are described along these lines:

- i) Long-term changes in ecosystems (leaders: J Alheit/ T Baumgartner)**
Hosted two meetings, on (1) “Turning Points in the Benguela” on 12-16 February 2001, Cape Town, South Africa (co-sponsored by BENEFIT, Namibia, and MCM, South Africa), and (2) “Long Time Series in the Americas” on 29 May-1 June 2001 in Lima, Peru (co-sponsored by IAD). Both meetings resulted in scientific publications that are in preparation.
- ii) Comparative Population Dynamics (leader: M Barange)**
Hosted one meeting, co-sponsored by IOC, of the Study Group on Use of Environmental Indices in the Management of Pelagic Fish Populations on 2-5 September 2001 in Cape Town, South Africa. Completed one publication: Jacobson et al. 2001. Surplus production, variability and climate change in the great sardine and anchovy fisheries. *Can J. Fish. Aquat. Sci.* (in press).
- iii) Reproductive Habitat Dynamics (leaders: C Roy / D Checkley)**
Hosted one meeting, co-sponsored by IRD (France) on “Spatial Approaches of the Dynamics of Coastal Pelagic Resources and Their Environment in Upwelling Areas” on 6-9 September 2001 in Cape Town, South Africa. Published one report: Checkley et al. 2000. *Report of a Workshop on the Use of the Continuous Underway Fish Egg Sampler (CUFES) for Mapping Spawning Habitats of Pelagic Fish.* 9-11

February 2000, San Sebastian, Spain. GLOBEC Report 14.

iv) Economic Implications of Climate Change (J Hunter)

There have been no activities along this line in the past year.

In addition, a meeting on “Causes and Consequences of Climate-Induced Changes in Pelagic Fish Productivity in East Asia” took place in Kobe, Japan on 25-27 August 2001, co-sponsored by APN. The meeting brought together scientists from Japan, Korea, China, Russia, and Indonesia to co-ordinate their SPACC research. Finally, the SPACC Executive Committee will meet in 2002 to review the achievements of the programme and plan the next implementation phase.

Regional Programmes II: Southern Ocean GLOBEC

Southern Ocean GLOBEC is designed to study the year-round life cycle of Antarctic zooplankton, with a particular focus on krill. The programme is a co-ordinated attempt to understand the interactions of biological and physical dynamics by developing relationships among the evolution of the Antarctic winter ice and snow cover, biological habitat variability, and the seasonal progression of marine ecological processes. The overall goals are to elucidate shelf circulation processes and their effect on sea ice formation and krill distribution, and to examine the factors that govern krill survivorship and availability to higher trophic levels, including penguins, seals, and whales. Germany, the International Whaling Commission (IWC), and the United States have initiated Southern Ocean GLOBEC programmes that are detailed below. Australia, Japan, Korea, South Africa, and the United Kingdom are each planning their participation in the SO GLOBEC programme, but details of their activities have not yet been finalised.

i) Germany

Field expeditions on the research vessel *Polarstern* to 70°S are being carried out in the area 10°E to 75°E. In addition, laboratory experiments on the British Antarctic Station Rothera will be conducted in co-operation with Dr. Angus Atkinson (BAS). The main objectives of this research project are to establish (a) If, when, and what do larvae and adult krill feed on during late autumn and winter? and (b) What are the available food sources and specific ingestion and assimilation rates for specific developmental stages of *E. superba* present during the time of investigation?

ii) IWC

The IWC Southern Ocean Whale and Ecosystem Research (SOWER) programme involves collaborative research with GLOBEC and CCAMLR. In the first half of 2001 the IWC will participate in GLOBEC studies to be conducted by national programs from the United States (Gould mooring deployment and *Palmer* survey cruise) and Germany (*Polarstern* survey cruise). Cetacean observers from the IWC Scientific Committee will conduct sighting surveys alongside the multidisciplinary national programs involved in the GLOBEC year-round study. These platforms will be used to produce a time series of continuously collected cetacean data simultaneous with krill and other physical and biological data suites. The long-term aim of the programme is to define how spatial and temporal variability in the physical and biological environment influence cetacean species. Three specific objectives have been identified: (a) Characterise foraging behaviour and movements of individual baleen whales in relation to prey characteristics and physical environment; (b) relate distribution, abundance, and biomass of baleen whale species to same for krill in a large area in a single season; and (c) monitor interannual variability in whale distribution and abundance in relation to physical environment and prey characteristics.

iii) USA

The focus of the U.S. contribution to the international SO GLOBEC program is on winter processes, conducting field experiments in the vicinity of Marguerite Bay, on the western side of the Antarctic Peninsula. The main questions and hypotheses are

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

Draft Ship Schedule: December 2000 - January 2002

2000	December	AWI (Alfred Wegner Institute)
2001	January	CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources)
	February	CCAMLR - co-ordinated by S. Kim
	March	CCAMLR
	April	US }
	May	US } - about 6 weeks in this 3-month period
	June	US }
	July	US }
	August	US } - about 6 weeks in this 3-month period
	September	US }
	October	BAS (British Antarctic Survey)
	November	BAS
	December	to be determined
2002	January	to be determined

Regional Programmes III: ICES Cod and Climate Change Programme (CCC)

The CCC is half way through its 5-year plan. The 7 major components of the programme are

- i) incorporation of environmental information into fisheries management,
- ii) retrospective analysis,
- iii) zooplankton-cod linkages,
- iv) comparative analysis (between stocks and regions),
- v) climate and atmosphere-ocean linkages,
- vi) data availability and management, and
- vii) synthesis.

A basic hypothesis of the programme is that the environment regulates cod larvae growth, both directly and through zooplankton growth and survival. The CCC held a workshop on the dynamics of growth in cod, in May 2000, and organised a session on "Condition in Gadoid Stocks and Implications for Sustainable Management" at the ICES Annual Science Conference. Results

from this theme session will be combined with the workshop proceedings and will be published as an ICES Cooperative Research Report. The CCC has since operated by correspondence, as it meets only once every two years. The following initiatives have been carried out in the past year:

- Two linked research initiatives on the growth of gadoids were submitted for funding to Canada and the EU. The Canadian Growth Dynamics and Regulation of Energy Allocation in Gadoids of Different Life History Strategies and in Different Environments (GADOLIFE) proposal was funded but the EU GADOLIFE proposal was not, although they have been encouraged to re-submit this year.
- Keith Brander is planning a proposal to use stored otoliths to back-calculate growth and temperature histories, with the aim of fitting individual temperature/growth relationships. Temperatures are derived from oxygen isotope ratios.
- Planning continues on a Workshop on Transport of Cod Larvae. This is presently scheduled for the spring of 2002 in Copenhagen. It will attempt to determine the mechanisms responsible for the transport of cod larvae and generate transport indices that perhaps could be used for fisheries management purposes.

Last year the CCC started a synthesis phase in the form of a book. Although delayed by over-commitment of the leader, a draft structure is ready and was discussed at the NORWATE meeting in Dartmouth in June 2001. A meeting of the lead authors (probably 10) will be held in late 2001.

Regional Programmes IV: PICES Climate Change and Carrying Capacity (CCCC)

The CCCC consists of 4 Task Teams (TT): BASS (Basin Scale Study), REX (Regional Experiment), MODEL, and MONITOR. The activities in 1999/2000 and plans for 2000/2001 for each TT are briefly described as follows:

- BASS. During 2000 the TT continued the delineation and planning of iron fertilisation experiments in the western gyre (2001), Station P (2002), and the open ocean (2003).
- REX. A workshop on "Trends and Trophodynamics in Herring Populations" was held at the PICES ASC in Hakodate, Japan, October 2000. A compilation of relevant sampling strategies and methods has been produced.
- MODEL. Conducted a workshop on "Strategies for Coupling Higher and Lower Trophic Level Models" in Hakodate, at the Annual Meeting. Will host a workshop on "Strategies to Couple Lower and Higher Trophic Models (Nemuro+Ecopath)" in Hawaii, March 2001.
- MONITOR. Established an advisory panel on CPR (Continuous Plankton Recorder) to assist in a pilot CPR project. A workshop on "Progress in Monitoring the North Pacific" was held at the PICES Annual Meeting in Hakodate. A data inventory workshop will be held in Hawaii, March 2001.

Integration and interaction among the four TTs is a current priority of PICES-CCCC, emerging from the recognised importance of interactions between coastal and open-ocean processes. At the PICES Annual Meeting in Hakodate, Japan, a session on "GLOBEC and GLOBEC-like Programmes in the North Pacific" was held, to pursue this agenda.

National activities

GLOBEC Special Contribution 4, published in 2001, reviews the present status of all GLOBEC national, multinational, and regional activities. This 143-page document is a reflection of GLOBEC's influence worldwide. The following countries have national and multinational GLOBEC programmes: Brazil, BENEFIT (Angola, Namibia and South Africa), Canada, Chile, China (Beijing), European Union (TASC, LIFECO), France, Germany, Italy, Mexico, Netherlands, Norway, Portugal, Turkey, Ukraine, United Kingdom, and the United States. GLOBEC intends to update this document every 2-3 years, to become an on-line reference of its implementation and synthesis.

In the past 12 months scientists from India and China (Taipei) have expressed their intention to initiate GLOBEC activities in their countries. Spain will also host their 1st GLOBEC National Conference in November 2001, with a view of establishing a national programme.

3. International Project Office

The GLOBEC IPO continues its activities from its headquarters at the Plymouth Marine Laboratory, UK. The main achievements of and challenges for the IPO are described below.

Funding issues

In 2001 ICSU will phase out its annual contribution to GLOBEC through SCOR. This decision effectively reduces the support to activities of the GLOBEC SSC by almost 30%. The IPO continues to work with the UK IGBP Committee and the UK Royal Society Global Change Research Committee to try to secure a more established and balanced support for the IPO. Presently, personnel costs are funded by UK-NERC through GLOBEC research allocations, and by the University of Plymouth. These allocations do not cover operating expenses, which have to be covered by external funds. These shortcomings limit the effectiveness of the implementation strategy of the programme. Discussions are being held with IGBP and SCOR with a view of rectifying the funding shortfall before the start of the 2nd phase of IGBP in 2003.

The IPO has been successful in generating additional funds for GLOBEC in 2001. New allocations from the Asian Pacific Network for Climate Change Research (APN) and from IOC, as well as SCOR, have been essential in ensuring that the commitment of GLOBEC to bring developing country scientists onboard is maintained. In this regard, SCOR's assistance has proven invaluable.

<i>IGBP-GLOBEC Income 2001</i> [@]	<i>US \$</i>	<i>Objective</i>
UK -NERC	102,866	IPO support (until 2004)
PML (minus overheads)	-9,107	IPO support (until 2004)
University of Plymouth	24,191	IPO support (until 2002)
co-sponsors (IGBP, SCOR, IOC)	36,500	SSC activities (annual; SCOR ends 2001)
NSF (USA) – through SCOR	117,677	Programme activities (annual)
Other <i>ad-hoc</i> (APN, IOC, SCOR)	62,700	Programme activities (2001)
TOTAL	\$334,827	

[@] not including national programmes

Data Management

GLOBEC has been addressing data issues from the onset of the programme. All GLOBEC activities are requested to complete metadata inventories describing their activities, using DIF files. DIF is the format of metadata entries accepted by the Global Change Master Directory (GCMD), which is the steward of GLOBEC metadata. A GLOBEC portal has been activated to search GLOBEC data from the GCMD directly from the GLOBEC Web site.

The GLOBEC IPO intends to continue populating its inventories over 2001 and 2002, and produce a CD of GLOBEC metadata for distribution at the 2nd GLOBEC Open Science Meeting in Qingdao, October 2002. Regular updates of these inventories will assist GLOBEC scientists and working groups during the synthesis phase of their activities.

Future Ocean Research in Earth System Science

GLOBEC has followed the development of this SCOR/IGBP activity over the last year, and has participated in discussions over its scope and objectives. At the most recent meeting of the GLOBEC SSC in Lima, Peru, the SSC expressed its support for the aims of this group as well as its concern to ensure that GLOBEC is integrated in the final report. At the same time it is expected that GLOBEC will be allowed to continue its implementation until its sunset clause of 2009. GLOBEC is ready to take a more

active role in the “Futures” group should this be necessary.

4. Publications

In 2000/2001 the IPO published two reports and a third one is in press. In addition three *GLOBEC Newsletters* were distributed to the 1500-address mailing list. This is in addition to the publications of the different scientists and research groups in the form of peer-reviewed publications, which are being collated by the IPO.

Checkley, D.M., Jr, J.R. Hunter, L. Motos, and C. D. van der Lingen (eds.). 2000. *Small Pelagic Fishes and Climate Change Program. Report of a Workshop on the Use of the Continuous Underway Fish Egg Sampler (CUFES) for Mapping Spawning Habitats of Pelagic Fish*. GLOBEC Report 14, 65 p.

Robinson, A.R. and P.F.J. Lermusiaux (eds.). 2000. *Workshop on the Assimilation of Biological Data in Coupled Physical/Ecosystems Models*. GLOBEC Special Contribution No. 3. 152 p.

Willson, H. (ed.). 2001. *Report on the GLOBEC National, Multinational and Regional Programme Activities*. GLOBEC Special Contribution No. 4, 143 p.

GLOBEC Newsletter 6.1. April 2000

GLOBEC Newsletter 6.2. October 2000

GLOBEC Newsletter 7.1. April 2001

The IPO has also registered the domain name www.globec.org, coinciding with a major revamp of the project Web site. Apart from downloadable PDF documents, GLOBEC reports, *Newsletters* and minutes of meetings, the site includes presentation material on GLOBEC and will provide access to GLOBEC data inventories.

GLOBEC Brochure

GLOBEC is preparing a brochure to be published as part of the IGBP Science Series, reviewing reasons for GLOBEC’s existence, its achievements, and its future plans. More than 35 members of the GLOBEC community are currently writing the different sections of this document, which is expected to be published in 2002.

5. Calendar of activities

GLOBEC is in full implementation, and as such is not planning synthesis activities at this stage. However, some of its regional programmes have reached a degree of maturity and are planning synthesis. This is particularly relevant for the GLOBEC/ICES Cod and Climate Change Programme (CCC). The CCC plans to publish a synthesis book in 2003, and will plan its activities in the next two years accordingly. For reference, we include here a preliminary list of GLOBEC activities for 2001.

Provisional Calendar of GLOBEC Activities, 2001-2002

This calendar includes GLOBEC meetings as well as relevant meetings with GLOBEC IPO/SSC presence. The programme for 2002 has not been drawn, with the exception of the Open Science and satellite meetings.

2001

- | | |
|----------------|--|
| 8-10 January | Southern Ocean GLOBEC Planning team meeting—Arlington, USA |
| 12-16 February | SPACC Meeting: Turning Points in the Benguela System—Cape Town, South Africa |
| 2-6 April 2001 | BENEFIT Annual Forum—Swakopmund, Namibia |

23-26 May GLOBEC SSC Meeting—Lima, Peru

27-28 May Focus 1 WG Meeting—Lima, Peru

29 May-1 June SPACC – Retrospective Data Analyses meeting—Lima, Peru

17-20 June GLOBEC Optical Plankton Counter Workshop—Tromsø, Norway

25-27 August SPACC Causes and consequences of climate-induced changes in pelagic fish productivity in East Asia--Kobe, Japan

3-5 September IOC/SPACC Study Group on the Use of Environmental Indices in the Management of Pelagic Fish—Cape Town, South Africa

6-8 September SPACC - Spatial approaches of the dynamics of coastal pelagic resources and their environment in upwelling areas—Cape Town, South Africa

10-13 October SPACC/GLOBEC Paleoceanography Workshop—Munich, Germany

21-28 October IAPSO/IABO Symposium (GLOBEC Session)—Mar del Plata, Argentina

November IRI/GLOBEC - Climate, Ecosystems and Fisheries of the Pacific: Seeking Fresh Approaches to Key Research Issues—Honolulu, Hawaii

28-30 November 1st Symposium GLOBEC-Spain—Cadiz, Spain

2002

11-15 February SO GLOBEC session on Physics and Biology of Antarctic Continental Shelf Waters - Ocean Sciences Meeting—Honolulu, Hawaii.

8-12 April BENEFIT 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. Invitation Only.

13-14 May GLOBEC Executive Committee Meeting—Dartington, UK. Invitation Only.
Contact: GLOBEC IPO, globec@pml.ac.uk

26-28 June Focus 4 WG Meeting: 'Global Changes in Marine Ecosystems and Coastal Communities: Who done it?'--
Dunsmuir Lodge, Sidney, Canada
Contact: Ian Perry, perryi@pac.dfo-mpo.gc.ca or GLOBEC IPO, globec@pml.ac.uk

1-5 July BENEFIT-SAMSS Symposium
Swakopmund, Namibia
Contact: BENEFIT Secretariat, skapepu@mfmr.gov.na

- 13-14 October GLOBEC WG Meetings—Qingdao, P.R. China. Invitation Only.
Contact: GLOBEC IPO, globec@pml.ac.uk
- 14 and 19-20 October GLOBEC SSC Meeting—Qingdao, P.R. China. Invitation Only.
Contact: GLOBEC IPO, globec@pml.ac.uk
- 15-18 October OSM2 - 2nd GLOBEC Open Science Meeting—Qingdao, P.R. China
- 19 October Joint GLOBEC Foci WG/PICES Task team Meetings—Qingdao, P.R. China
Contact: GLOBEC IPO, globec@pml.ac.uk or PICES Secretariat, secretariat@pices.int
- December IOC/SPACC Study Group Workshop on the Use of Environmental Indices in the management of pelagic fish.
TBA. Invitation Only
Contact: Manuel Barange, m.barange@pml.ac.uk

6. GLOBEC SSC 2001

The 6th GLOBEC SSC met in Lima, Peru on 23-26 May 2001. Full Minutes of the SSC meetings are available on the GLOBEC Web site (<http://www.globec.org>), or by request to the Plymouth Office.

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

		2001	2002	2003
Dr Jürgen Alheit	Germany			
Dr Tim Baumgartner	Mexico			
Dr Roger Harris (Chair)	UK			
Prof Eileen Hofmann	USA			
Dr Patrick Lehodey	New Caledonia			
Dr Celia Marrase	Spain			
Dr Steve Nicol	Australia			
Dr Rosemary Ommer	Canada			
Dr Geir Ottersen	Norway			
Dr Ian Perry	Canada			
Dr Serge Poulet	France			
Dr Ramiro Sanchez	Argentina			
Dr Takashige Sugimoto	Japan			
Dr Cisco Werner	United States			
1 Vacancy				

ANNEX 5

SCAR, SCOR, AND OCEANOGRAPHY IN THE SOUTHERN OCEAN

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

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

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

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

Relative to the second topic, we both agreed that increased coordination between SCAR and SCOR is important and could be beneficial to both groups. We agreed to approach our respective Executive Committees to discuss the possibility of having liaison people attend each other's General and Executive Committee meetings, perhaps an officer or Executive Director/Secretary. We also agreed that at some time in the future it could be beneficial to both SCAR and SCOR if our Executive Committees could hold occasional joint meetings.

Robert Rutherford
President, SCAR

Robert Duce
President, SCOR

GLOBEC	Global Ocean Ecosystems Dynamics project
IABO	International Association of Biological Oceanography
IAPSO	International Association for the Physical Sciences of the Ocean
IOC	Intergovernmental Oceanographic Commission
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Oceanic Research
SOLAS	Surface Ocean Lower Atmosphere Study
WCRP	World Climate Research Programme
WMO	World Meteorological Organization

ANNEX 6
AD HOC FINANCE COMMITTEE REPORT⁸

1. General Comments

- a. The layout of information in the reformatted financial statements has made auditing very much easier.
- b. Through-Flow and Discretionary budget lines were differentiated explicitly from 2001 onward.
- c. The committee thanks Ed Urban and Elizabeth Gross for instituting these changes.

2. 2000 budget

- a. The 2000 budget has been audited by Accountants Kahn, Berman, Solomon, Taibel & Mogol in Timonium, Maryland, USA.

b. Budget	US\$K
Income	691
Expenses	706
Income less	
Expenses	-15

3. 2001 budget

- a. Using the new Flow-Through & Discretionary format, the budget for 2001 approved in 2000 was out of balance. The application of the new format immediately altered the bottom line from a surplus of US\$5K to a deficit of US\$95K.
- b. Decision was made by the Executive Committee that no new WGs would be formed in 2001.
- c. During the year, SCOR Executive Committee & Secretariat have worked hard to reduce the budget deficit, which now stands at US\$10K

c. Budget	Approved	Approved 2000	Revised	Revised 2001
	2000 Total	Discretionary	2001 Total	Discretionary
Income	771	304	790	306
Expenses	766	399	800	316
Income less				
Expenses	5	-95	-10	-10

- d. Recommendation: that these revisions be approved.

⁸Peter Burkill, Adolfo Gracia Gasca, Ilana Wainer

4. 2002 budget

a. Pre-meeting 2002	<u>Budget</u>	<u>Discretionary</u>	<u>Flow-Through</u>	<u>Totals</u>
	Income	291	495	786
	Expenses	335	495	830
	Income less			
	Expenses	-44	0	-44
b. At-meeting 2002	<u>Budget</u>	<u>Discretionary</u>	<u>Flow-Through</u>	<u>Totals</u>
	Income	291	495	786
	Expenses	296	495	791
	Income less			
	Expenses	-5	0	-5

ANNEX 7
POST-AUDIT FINANCIAL STATEMENT FOR 2000

INCOME	Budget			Actual			Difference	
	Disc. ⁹	F-T	Total	Disc.	F-T	Total	Disc.	F-T
Membership Contributions	248,955		248,955	219,055		219,055	(29,900)	
ICSU Grant - JGOFS		10,000	10,000		10,000	10,000		-
ICSU Grant - GLOBEC		10,000	10,000		10,000	10,000		
IOC Contracts	15,000	10,000	25,000	5,000	20,000	25,000	(10,000)	10,000
ICSOS Grant Carry Forward					100	100		100
Rockefeller Fn - Grad. Educ'n					8,000	8,000		8,000
Sloan Foundation - WG 118		50,000	50,000		21,589	21,589		
IGBP Grant - SOLAS		5,990	5,990		5,990	5,990		-
IGBP grant - FOBGC		10,000	10,000		7,801	7,801		
NSF Grants - Travel Awards		85,000	85,000		102,195	102,195		17,195
NSF Grants - Science	40,000	160,000	200,000	18,065	237,849	255,914	(21,935)	77,849
NASA Grant - GEOHAB		25,000	25,000		25,500	25,500		500
Totals Income	303,955	365,990	669,945	242,120	449,024	691,144	(61,835)	83,034
EXPENSES	Disc.	F-T	Total	Disc.	F-T	Total	Disc.	F-T
WG 98 - Sardines &				110		110	110	
WG 109 - Iron in Seawater				2,200		2,200	2,200	
WG 112 - Groundwater	15,000		15,000	14,962		14,962	(38)	
WG 118 - Technologies		35,000	35,000		21,589	21,589		
JGOFS		90,000	90,000		90,515	90,515		515
GLOBEC		85,000	85,000		110,679	110,679		25,679
FOBGC - Plymouth Workshop	8,000	35,000	43,000	98	40,079	40,177	(7,902)	5,079
SOLAS	8,000	20,000	28,000	8,590	17,210	25,800	590	
CO ₂ Panel	8,000		8,000	6,865		6,865	(1,135)	
GEOHAB		50,000	50,000	(544)	58,656	58,112	(544)	8,656
General Assembly	25,000		25,000	31,175		31,175	6,175	
Representational Travel	7,500		7,500	10,748		10,748	3,248	
Publications	10,000		10,000	7,886		7,886	(2,114)	
NSF Travel Awards		85,000	85,000		102,195	102,195		17,195
AOSB Symposium				5,059		5,059	5,059	
ICSOS publicity					100	100		100
Graduate Education Initiative					8,000	8,000		8,000
Executive Director Search	7,100		7,100	7,104		7,104	4	
Salaries & Benefits	140,000		140,000	136,957		136,957	(3,043)	
Outside Services				1,400		1,400	1,400	
Less Salaries Allocated to				(18,100)		(18,100)	(18,100)	
Miscellaneous	4,500		4,500	4,949		4,949	449	
Communications	4,500		4,500	7,324		7,324	2,824	
JHU - Indirect Expenses	19,500		19,500	21,185		21,185	1,685	
Office Equipment	1,500		1,500	1,530		1,530	30	
Audit & Accounting Services	7,500		7,500	7,362		7,362	(138)	
Bank Charges	400		400	494		494	94	
Total Expense	266,500	400,000	666,500	257,354	449,024	706,377	(9,146)	49,024
Total Surplus (Deficit)	37,455	(34,010)	3,445	(15,233)	0	(15,233)		

⁹Disc. = discretionary funding; F-T = flow-through funding; all values are in U.S. dollars

ANNEX 8
SCOR-RELATED MEETINGS
(2001-2004)

2001

January 15-17	WG 114 - Permeable Marine Sediments	Hawaii, USA
January 23-26	IOCCG	La Jolla, USA
February 20-23	SC-IGBP and IPO meeting	Chaing Mai, Thailand
March 11-16	GRC on Polar Marine Science - Physical-Biological Coupling	Ventura, USA
April 3-7	GEOHAB SSC Meeting	Shanghai, China
April 2-5	The Oceanography Society Scientific Meeting	Miami, USA
April 6-11	WG 111 – Coastal Models Workshop	Miami, USA
April 23-25	ASLO Workshop to Identify the Scientific and Legal Questions Behind Fertilization of the Ocean to Sequester Atmospheric Carbon Dioxide	Washington, D.C., USA
May 7-11	WG 113 – Asian Monsoons	Beijing, China
May 20-25	Indo-Pacific Fish Conference-2001	Durban, South Africa
May 21-25	WG 110 - SCOR/WCRP Workshop on Air-Sea Fluxes	Washington, D.C., USA
May 23-26	GLOBEC SSC	Lima, Peru
May 23-27	WG 117 – Decadal to Millennial Climate Records	Santa Barbara, USA
May 29-31	1 st Meeting of the Intergovernmental Working Group on IOC Oceanographic Data Exchange Policy	Brussels, Belgium
June 11-15	WG 112 – Groundwater Discharges	Sicily, Italy
June 24-27	Ocean Futures Planning Committee	Southampton, UK
July 3-7	IOC Assembly	Paris, France
July 7-8	JGOFS SSC	Amsterdam, The Netherlands
July 8-10	WG 116 – Sediment Traps & ²³⁴ Th	Amsterdam, The Netherlands
July 10-13	IGBP Open Science Meeting	Amsterdam, The Netherlands
August 8-11	IOC-COASTS Workshop	Paris, France
September 16 - 21	International Conference on Paleoceanography	Sapporo, Japan
October 1-5	6 th International CO ₂ Conference	Sendai, Japan
October 5-6	WG 119 – Quantitative Indicators	Reykjavik, Iceland
October 7-17	PICES-2001	Victoria, Canada
Oct 21-28	IAPSO/IABO joint meeting	Mar del Plata, Argentina

Oct 27	Meeting of WG 118 Subgroup with Census of Marine Life Pilot Project Leaders	Mar del Plata, Argentina
Oct. 27	Regional Graduate Schools of Oceanography Focus Meeting on Latin America	Mar del Plata, Argentina
October 29-30	SCOR Executive Committee	Mar del Plata, Argentina
November 4-8	Estuarine Research Foundation	St. Petersburg, USA
November 27-29	POGO-3	Nova Scotia, Canada
December 2-4	Ocean Futures Planning Committee	Barcelona, Spain
December 14-17	SOLAS SSC	San Francisco, USA
2002		
January 10-12	IOCCG	Villefrance, France
Feb. 9-10	Ocean Carbon Dioxide Panel	Honolulu, USA
Feb 11-15	Ocean Sciences Meeting	Honolulu, USA
Feb. 16-17	WG 115 – Standards for the Survey and Analysis of Plankton	Honolulu, USA
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	34 th 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, The 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.	WG 113 – The Evolution of the Asian Monsoon in Marine Records: Comparison Between Indian and East Indian Monsoon Subsystems	Aix-en-Provence, France
Sept. 23-25	JGOFS SSC	Concepcion, Chile
Sept. 24-28	ISCU General Assembly	Rio de Janeiro, Brazil
Oct. 1-5	SCOR General Meeting	Sapporo, Japan
Oct. 10-19	34 th COSPAR Scientific Assembly	Houston, USA
Oct. 13,14,19	GLOBEC SSC Meeting	Qingdao, China
Oct. 15-18	2nd GLOBEC Open Science Meeting	Qingdao, China
Nov. 18-22	WOCE Final Conference	San Antonio, USA
Nov. 24-26	SOLAS SSC Meeting	Gif, France
Dec. 4-6	WG 119 – Quantitative Indicators	Cape Town, South Africa

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January 7-10	Ocean Biogeochemistry and Ecosystems Open Science Meeting	Paris, France
January 20-24	International Geosphere-Biosphere Programme Science Committee	Punta Arenas, Chile
May 5-8	Third JGOFS Open Science Conference	Washington, D.C., USA
June 15-20	Gordon Research Conference on Permeable Sediments	Waterville, Maine, USA
June 19-25	Third IGBP Congress	Banff, Canada
June 30-July 11	SOLAS Summer School	Corsica, France

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March 31-April 3	WG 119 Conference	Paris, France
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