

SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH



SCOR
Proceedings
Vol. 8, No. 2

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH

THE EXECUTIVE COMMITTEE

President: Professor Dr. H. Postma
Netherlands Institute for Sea Research
Postbus 59, Texel, NETHERLANDS

Past President: Professor Warren S. Wooster
Scripps Institution of Oceanography
P.O. Box 109, La Jolla, California,
92037, U.S.A.

Vice-Presidents: Professor A.S. Monin
Institute of Oceanology,
USSR Academy of Sciences
I, Letnyaya, Ljublino
Moscow, J-387, USSR

Dr. Klaus Voigt, Director
Institut für Meereskunde
Seestrasse 15
253 Warnemunde, GERMANY, GDR

Secretary: Mr. R.I. Currie
Dunstaffnage Marine Research Laboratory
P.O. Box No. 3
Oban, Argyll, SCOTLAND

Ex Officio: Dr. T.F. Gaskell
British Petroleum Co., Ltd.
Britannic House, Moor Lane
London, E.C.2, ENGLAND

Professor Dr. G. Hempel
Institut für Meereskunde
Universität Kiel
Dusternbrooker Weg 20
23 Kiel, GERMANY, FRG

Professor H. Lacombe
Laboratoire d'Océanographie Physique
Muséum d'Histoire Naturelle
43/45 rue Cuvier
Paris Ve, FRANCE

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS

**PROCEEDINGS
OF THE
SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH**

Volume 8, Number 2

15 December 1972
La Jolla, California

TABLE OF CONTENTS

Contents	Page
Members of the SCOR Executive Committee	Inside Front Cover
Proceedings	55
Annex I Participants in the 11th SCOR General Meeting Oban, 21-23 September 1972	70
Annex II A Members of SCOR as of 1 November 1972	75
II B National Committees for Oceanic Research affiliated with SCOR	76
Annex III Estimate of SCOR Finances (1 January through 30 September 1972)	78
Annex IV SCOR Working Groups, Membership and Terms of Reference	79
Annex V Progress Report on ICES/SCOR Nutrient Intercalibration Experiment	82
Annex VI Report on SCOR Working Group 21, Continuous Current Velocity Measurements; Current Meter Intercomparison Experiment, 24 August-4 September 1972	84
Annex VII Report of SCOR Working Group 23, Zooplankton Laboratory Methods; Meeting in Bath, 13-20 July 1972	87
Annex VIII Report of SCOR Working Group 32, Biological Data Inventories; Proposal for a Second Level Inventory System to Facilitate Dissemination and Exchange of Biological Oceanographic Data	90
Annex IX Report of SCOR Working Group 37, Marine Plankton and Sediments; Meeting in Montreal, 31 August - 1 September 1972.	96
Annex X Report on IAPSO Executive Committee Meeting, Edinburgh, 19-20 September 1972	98
Annex XI Report on IABO Activities in 1972	99
Annex XII Report on CMG Activities in 1972	100
Annex XIII Draft Statement on Oceanic Research, submitted to ICSU on 30 May 1972	103
Annex XIV Report on 12th Meeting of SCAR, Canberra, 14-19 August 1972	104
Annex XV Report on Productivity Marine Section of International Biological Program	105
Annex XVI Future Meetings of SCOR and Associated Organizations, 1973	108
List of Abbreviations Used	Inside Back Cover

PROCEEDINGS
of the
SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH

Report of the 11th General Meeting
Oban, 21-23 September 1972

The 11th General Meeting was held at Dunstaffnage Marine Research Laboratory, Oban, Scotland, 21-23 September 1972, with the President, Professor Wooster, in the chair. Participants were greeted by the Director of the Laboratory, Mr. Currie, and an opportunity was taken to visit the scientific facilities. The program also included a reception by the Provost and Councillors of Oban Town Council and a dinner by the Royal Society of London.

A list of those who attended the meeting is given in Annex I. The agenda of the meeting serves as an outline for the report which follows. Actions of the Executive Committee, which held a brief meeting on 23 September, are reported under the relevant items.

1.0 ORGANIZATION AND FINANCE

1.1 MEMBERSHIP

The Consejo Nacional de Ciencia y Tecnologia of Mexico had established a Comité de Ciencias y Tecnologías del Mar and proposed its affiliation with SCOR. This proposal was accepted by the General Meeting as were the Consejo nominations for members of SCOR. It was agreed that National Committees in other countries, as well as ICSU and its Unions and Committees, should be asked to confirm their nominations for members.

Keeping in mind the purposes of the category of Invited Member (see Proceedings vol. 7, p. 1), it was agreed to invite Professor Pierre Tardent of the Swiss Committee of Oceanography and Limnogeology to participate in this capacity. Appropriate candidates should be identified in Belgium and Yugoslavia; proposals for nominees in other countries were invited.

A list of SCOR Members in the various categories is given in Annex II A; National Committees for Oceanic Research are listed in Annex II B.

1.2 PUBLICATIONS

The volume on the Symposium on Biology of the Indian Ocean is now scheduled to be published within a few months. With regard to atlases of the International Indian Ocean Expedition, that dealing with geology and geophysics is well along and should be published in 1973. The General Meeting expressed the hope that proper acknowledgement of the roles of SCOR and IOC would be given in this publication. As for the volume concerned with phytoplankton production and related factors (formerly called "chemical biology"), Professor Postma and Mr. Jitts are continuing to assist the Chief Editor, Professor Krey, in completing the material for publication. In this connection, Mr. Jitts visited Kiel during several weeks in the summer of 1972.

The reports of several SCOR working groups have been published by UNESCO, and there was some discussion of the efficacy of this means of making the work known. The opinion was expressed that the UNESCO publications are too slow in appearing and that the method of distribution does not adequately reach the working scientists. Discussions with UNESCO officials concerning these problems should be continued. Distribution can be facilitated if the existence of publications is made known through announcements in appropriate scientific publications that are widely available to oceanographers.

1.3 BUDGET AND FINANCE

In accordance with the Constitution, an ad hoc finance committee was established to examine and report on financial statements and estimates; its members were Sir George Deacon, Professor Tchernia and Dr. Wolff. The committee found these documents in order. An estimate of finances for 1972 (to 30 September 1972) is given in Annex III.

1.4 ELECTION OF OFFICERS

A nominating committee was appointed, consisting of Drs. Stewart, Hempel and Gaskell. This committee, in reporting its recommendations, pointed out that the increasing activities of SCOR made it essential that the workload be distributed among the members of the Executive Committee and that a full-time administrative assistant be employed to work with the Secretary. The nominations were then accepted unanimously, the new elected officers being:

President:	Professor Dr. H. Postma (Netherlands)
Vice-Presidents:	Professor A.S. Monin (USSR) Dr. K. Voigt (GDR)
Secretary:	Mr. R.I. Currie (UK)
Past President:	Professor W.S. Wooster (USA)

Ex officio members of the Executive Committee continue to be Dr. T.F. Gaskell (CMG), Professor Dr. G. Hempel (IABO) and Professor H. Lacombe (IAPSO).

The Executive Committee was asked to work out details of the transfer of responsibility, records and funds. In this connection, it was agreed that a U.S. dollar banking account should be established for SCOR in London; Mr. Hemmen was asked to make the necessary arrangements.

2.0 WORKING GROUPS

A list of active and new working groups, together with their terms of reference and membership, is given in Annex IV.

2.1 FORMER GROUPS

A further progress report on the results of the ICES/SCOR intercalibration experiment on methods of nutrient analysis is given in Annex V. Data from 41 laboratories are tabulated and ready for statistical analysis, which should be completed by the spring of 1973. The ICES has decided to publish the final report and to ask SCOR for financial support for the printing.

2.2 EXISTING GROUPS

WG 10 Oceanographic Tables and Standards (with ICES, IAPSO and UNESCO): A second printing of vol. 1 of "International Oceanographic Tables" has been completed by the National Institute of Oceanography of Great Britain and UNESCO. The second volume, containing tables for dissolved oxygen and for chlorinity-salinity-chlorosity is expected by the end of 1972. The comparison of calculated density and measured specific gravity (to an accuracy of ± 5 in the 6th decimal place) is continuing at the Institut für Meereskunde, Kiel, and the results will be published early in 1973. This study will establish the reliability of the 3rd decimal place in routine salinity measurements and the corresponding calculated densities.

The working group has proposed a meeting in Kiel on 24-26 January 1973 to discuss the new Kullenberg formula for calculating the density of sea water, recent precision measurements of the specific gravity of sea water in the lower salinity range, results of the comparison measurements of real and calculated densities, sigma-t tables to be included in the UNESCO Tables, recent precision measurements of sound velocity in sea water, and the state of the art with regards to

determining the entropy of sea water. Continuation of the group, and the proposed meeting were approved by the General Meeting.

WG 15 Photosynthetic Radiant Energy (with IAPSO and UNESCO): The working group met in Copenhagen on 23-24 June 1972 and discussed recommendations to be made in accordance with the group's terms of reference. Draft recommendations are being circulated and will be distributed when agreement on them has been reached by the group. The chairman, Mr. Tyler, agreed to compile the data report of the DISCOVERER Expedition, this to contain sections on the methods used, data from all measurements on each station, and the evaluation of radiometric data from the calibration experiment. The group felt that interpretation of the data would be expedited if a final scientific symposium on the results were organized in 1974. Proposals were made for convenor, program and participation in such a symposium.

In discussing the status of this group, the General Meeting urged that the chairman obtain agreement on the recommendations as soon as possible so that they could be made available to interested scientists. It was considered preferable that the data report of the experiment be deposited with data centers rather than being published. The results in the form of scientific papers, on the other hand, should be published; however, the proposed symposium was not endorsed unless it were to be in conjunction with some other scientific meeting, and it was hoped that the chairman would give further thought to ways of expediting publication of results. It was agreed to discharge the group and to ask Mr. Tyler to continue to serve as editor of the WG 15 reports until such time as these were completed.

WG 21 Continuous Current Velocity Measurements (with IAPSO and UNESCO): A third intercomparison experiment was performed, from the Woods Hole R/V Atlantis II at Site D between August 24 and September 4, 1972. A description of the experiment is given in Annex VI. The General Meeting decided to continue the group until this important work had been completed.

WG 23 Zooplankton Laboratory Methods (with UNESCO): The second and final meeting of the group was held at Bath University, England, from 13-20 July 1972 in conjunction with a Symposium on the Fixation and Preservation of Marine Plankton. A report on the meeting and symposium is given in Annex VII. It was agreed by the General Meeting to discharge the group and to request the UNESCO Advisory Panel for International Marine Biological Centers to assume the responsibility for overseeing completion of the long-term experiments initiated by WG 23. With regard to the manual on Laboratory Methods in the Study of Marine Zooplankton, Drs. Hansen, Steedman and Beers should be asked to serve as an editorial group, and arrangements should be made for the manual to be published by UNESCO. In addition, a concise paper with the major findings and recommendations should be prepared for prompt and widespread distribution. Preferably, this should be published in the scientific literature; another possibility would be SCOR publication with IABO assistance in distribution.

WG 24 Estimation of Primary Production under Special Conditions (with IBP/PM): The final report of this group is in press (UNESCO), and it was agreed that the group should be discharged.

WG 27 Tides of the Open Sea (with IAPSO and UNESCO): Some changes were made in the membership of this group which it was agreed should continue in 1973 when its activity will concentrate on preparation and conduct of an intercomparison of sea bed pressure recorders. The announcement of this experiment follows:

Inter-calibration of pelagic tidal pressure sensors

Working Group 27 on 'tides of the open sea' intend to hold an inter-calibration exercise between 30 October and 15 December, 1973. Anyone who runs a sea-bed pressure sensor capable of a month's recording in shallow (170-200 m) or deep (2500-3000 m, or 4500-5000 m) water, is invited to apply to D.E. Cartwright, NIO, Wormley, Godalming, Surrey, UK, for full particulars of the exercise. Participation is not limited to members of Working Group 27, but there is of course a limit to the working space available on board the principal operating ship, 'Discovery'.

Some money will be available from SCOR for transport of personnel and equipment.

Briefly, the 1973 dates and places involved are:

30 October	Ship departs Southampton, for Brest
31 October	Meeting at Brest, for final plans
1-9 November	Instruments laid in three depth-zones, less than 1° apart, around the shelf edge at 47 1/2°N, 8°W.
12-14 November	Working session at NIO on 'methods of analysis of short tidal records'.
5-15 December	Recovery of instruments (Ports: Barry and Brest).

WG 28 Air-Sea Interaction (with IAMAP and IAPSO): The group plans to meet next during the scientific assemblies of IAMAP and IAPSO, in Melbourne, Australia, 14-25 January 1974; a IAMAP/IAPSO symposium on air-sea interaction is also scheduled at that time. It was agreed to continue the group.

WG 29 Monitoring in Biological Oceanography (with ACMRR, UNESCO and IBP/PM): Subsequent to the group's meeting in March, a draft final report has been prepared. It was agreed that this report should be completed and released as soon as possible; publication by SCOR would be appropriate. The working group should be discharged.

Members of the group have published the following paper on some aspects of their discussions:

Longhurst, A., M. Colebrook, J. Gulland, R. Le Brasseur, C. Lorensen and P. Smith. The instability of ocean populations. New Scientist of 1 June 1972, 500 - 502.

WG 32 Biological Data Inventories (with ACMRR): The group met in Edinburgh on 12-14 June 1972. Proposals for revision of the ROSCOP form produced by the IODE Task Team on International Exchange of Marine Biological Data and WDC-A Oceanography were considered; these were subsequently submitted to these bodies. In reviewing the work of the ROSCOP inventory and the activities of the IODE Task Team the group concluded that there was a need to supplement the proposed systems with an international inventory of the holdings, by institutes, agencies and individual workers, of developed data and results from field investigations in biological oceanography and marine pollution. A detailed argument and proposal for such a second-level inventory is reproduced in Annex VIII. The group recommended that the proposal be circulated to interested organizations; the chairman should be invited to the next meeting of IODE to discuss the proposal and to draw attention to its potential for application to other fields in oceanography. The group recommended that it be kept in existence, to assist relevant organizations, to prepare a definitive specification for the second-level inventory (tentatively called ROMBI- Results of Marine Biological Investigations) and to propose means for its implementation. The General Meeting agreed that the group should be kept in existence for these purposes and that the proposal for the second-level inventory should be made available through publication in Proceedings.

WG 33 Phytoplankton Methods (with IBP/PM): The final report of this group is in preparation, and it was agreed to discharge the group upon receipt of the report (expected by the end of 1972). The General Meeting noted that an important aspect of the problem was the methodology for preservation of phytoplankton, and it was agreed to ask IABO to consider the need for a working group on that problem.

WG 34 Oceanographic Basis of Ocean Monitoring and Prediction Systems: During the summer, members of the theoretical panel spent several weeks together at the MODE-I summer institute in Boulder, Colorado; the purpose of this institute was to develop dynamical models of eddies and to make specific recommendations for the design of a field experiment. Some attention was given to the development of plans for MODE-2, the subsequent field program which would involve broader international cooperation. Some initial but significant progress has already been made in the definition and understanding of the quasi-geostrophic oceanic eddies on the basis of results from the Soviet POLYGON Experiment and pilot data and studies for MODE-1.

It had been proposed that the Working Group organize a workshop in late 1973 to review the results of the POLYGON Experiment and preliminary results of MODE-1 and to make proposals for the development of the future MODE program; this proposal was endorsed by the General Meeting, and the Working Group chairman, Professor Stommel, was asked to initiate the necessary arrangements.

It was also agreed to defer action on the proposed instrument panel until the need was more clear and to strengthen and stimulate action of the recently established climate panel. The relation of the latter to the IDOE project NORPAX was noted.

WG 35 Methods in Quantitative Ecology of Coral Reefs: The chairman, Dr. Stoddart, reported that a series of position papers was being prepared by members of the group, with the intention eventually of preparing a handbook of methods and a dictionary of reef terminology. The group planned to meet at Heron Island, Australia, in June 1973, in connection with the Second International Symposium on Coral Reefs being organized by the Great Barrier Reef Committee and the Committee for International Symposia on Corals and Coral Reefs; the working group plan was endorsed by the General Meeting.

WG 36 Coastal Upwelling Processes (with ACMRR and ACOMR): Membership of the biological and physical panels has been established, and work has been initiated through correspondence. The General Meeting was informed that the results of a coastal upwelling experiment that took place off the Oregon coast in June - October 1972 would be discussed at an IDOE workshop in Tallahassee, Florida, 22-24 January 1973; it was agreed to encourage participation of members of the physical panel in this workshop. It was important, however, that the two panels work together, and it was proposed that a meeting be organized in the near future (for example, late March 1973) in order to stimulate the work.

WG 37 Marine Plankton and Sediments: The first meeting of this group was in Montreal, 31 August - 1 September 1972. Planning was initiated for the symposium to be held in Kiel in September 1974 (see Annex IX). It is likely that the lectures will be the basis for a book. Financial support for the symposium should be requested from IUGS and UNESCO as well as SCOR.

WG 38 Special Studies on Circumpolar Waters South of 40° S (with SCAR): The chairman, Sir George Deacon, reported that SCAR had compiled information on the regular routes of Antarctic relief ships which had facilitated the development of plans for investigations involving the use of drifting "beacons", to be launched from the relief ships and tracked by satellite. A pilot study is proposed for 1974, to be followed by a more elaborate program in 1977 during FGGE. This program is being developed by Dr. Arnold Gordon, and it was agreed to invite him to join the group. Proposals to use bottom pressure gauges for monitoring the Antarctic circulation should be reviewed by WG 27. It was noted that surface oceanographic information from the region will be urgently required during the First GARP Global Experiment in 1977 (see item 3.3). Accordingly, it may be necessary to strengthen the activities of WG 38 and to modify its membership when required. Further consideration should be given to the development of "black boxes" to be towed in ice-free waters by relief ships, and to this end cooperation between WG 38 and WG 34 would be desirable.

WG 39 Scientific Investigation of Pollution in the Marine Environment (with GESAMP, ACMRR and ACOMR): It was agreed that this group had completed its activities and should be discharged.

WG 40 Paleo-oceanography: Although it was decided to establish this group during the 16th Executive Committee Meeting, action was delayed while the extent of overlap with an ad hoc group on development of marine geological/geophysical data management (of the IOC Working Group on International Oceanographic Data Exchange) was examined. This problem arose because of the first term of reference of WG 40, "to prepare an inventory of available marine sediment core collections and to develop methods for their international use." Accordingly, discussions were held with the IOC group (during the International Geological Congress in Montreal). In view of

the progress being made, it seems appropriate for SCOR to assist the IOC group as required rather than to treat the inventory problem in its own group.

The General Meeting approved the following statement on the matter:

During the past few decades, thousands of deep-sea geological samples have been collected by oceanographic expeditions. These form the material basis for a large proportion of marine geological research. Oceanographic institutions have developed satisfactory procedures for curating such collections and for distributing samples to researchers on request. The principal impediment to their effective utilization lies in the fact that general descriptions of the sediments and rocks are not routinely prepared and made available to interested researchers to provide a basis on which they can request samples appropriate for their investigations. Support for the preparation of basic descriptions of routinely collected geological samples is urgently required in order that these may be useful to the entire marine geological community.

In this connection, it was noted that the IOC group was developing lists of parameters for both rock and sediment samples which would facilitate standardization of the descriptions referred to above.

The proposed tasks of WG 40 were also considered by WG 37 which saw no important overlap between the work of the two groups. The General Meeting believed that the objectives of the two groups should be complementary and that the activities of WG 40 should include the organization of a symposium which would include a substantial contribution from geochemistry, physical oceanography, climatology, etc., which lie beyond the scope of WG 37. It was agreed to change the terms of reference as follows:

"To review and coordinate study of the geological time-scale evolution of oceanic circulation, climate and chemistry in relation to sedimentological, geochemical and paleontological evidence from marine sediments and to investigate procedures for promoting interdisciplinary and international cooperation in this field."

In view of these terms of reference, the Executive Committee should select an appropriate membership for the group.

WG 41 Morphological Mapping of the Ocean Floor: The chairman of the group, Dr. Ulrich, and Dr. Gaskell represented SCOR at the Tenth International Hydrographic Conference in Monaco (April 1972). The following proposal (P88A) was accepted:

"1. It is resolved that the International Hydrographic Organization shall cooperate with the Scientific Committee on Oceanic Research of the International Council of Scientific Unions on the subject of bathymetric charting of the oceans; and in particular that the International Hydrographic Bureau shall appoint a representative to membership of the SCOR Working Group No. 41 - known as the 'International Ocean Floor Morphology Working Group'.

In accordance with this recommendation, Commodore D.C. Kapoor has been appointed IHB representative on the group.

The group met on 21 August 1972 with Dr. Laughton as Acting Chairman and Drs. Fisher, Newson and Gaskell in attendance. It was proposed that E. Uchupi (USA), A.V. Ilyin (USSR) and an appropriate Japanese scientist should be added (this was approved by the General Meeting). Papers by Pascoe, and by Laughton, Roberts and Graves, for the ICA Symposium on Oceanic Cartography were discussed as was the present status of the GEBCO series.

The working group recommended that its first job was to evaluate critically a variety of world and oceanic series of bathymetric charts and to assess the requirements of a wide range of oceanographers. Various schemes for meeting these requirements were discussed but decisions were deferred until a later meeting. The group accepted the need for close collaboration with the ICA in the area of marine charting. D.W. Newson was asked to describe the activities of WG 41

at the ICA symposium on 23 August and to establish liaison with a view to avoiding duplication of effort. It was proposed to modify the terms of reference of WG 41 by eliminating reference to the ICA meeting (this was approved by the General Meeting).

D.W. Newson and R.L. Fisher attended the ICA Symposium on Oceanic Cartography on 23 August; a report by Mr. Newson is to be produced shortly. He has been asked to serve on the new ICA WG on Oceanic Cartography chaired by A.J. Kerr (Canada).

The General Meeting confirmed Dr. Laughton's appointment as acting chairman during Dr. Ulrich's illness. It was agreed that the group should meet again, in April 1973 in UK, and that particular attention should be given to the value of continuing the GEBCO 1:10 million series.

WG 42 Baltic Pollution (with ICES): The group held its first meeting in Lund, Sweden, 2-4 May; an extended report has been prepared by ICES (C.M. 1972/E:10, Fisheries Improvement Committee). A summary follows:

The main objective of the meeting was to stimulate the discussion among physical and biological oceanographers about possible ways to develop baseline studies and to monitor pollution in the Baltic. Basic research in physical and chemical oceanography is already relatively well coordinated by the activities of the Baltic Oceanographers. Cooperation and joint action in biological oceanography is presently activated by the Baltic Marine Biologists and its methodological working groups.

As in other areas, pollution research in the Baltic has to deal with the problems of transfer of toxic substances on their way through the food chain. In analogy to the recommendations of the ICES WG on the pollution of the North Sea, certain commercially important species were recommended for sampling, particularly herring, cod and blue mussel. A questionnaire was drawn up to solicit information on the sampling and analytical capacity of laboratories in countries bordering the Baltic. Major emphasis should be given to halogenated hydrocarbons. Advice regarding the sampling of representative species of lower levels of the food chain has come from the Plankton Committee of ICES and the Baltic Marine Biologists.

More difficult than the identification of toxic pollutants in the food chain is the detection of effects on living resources through disturbance of ecosystems either by lethal and sublethal effects on certain elements of the ecosystem or through the direct and indirect effects of eutrophication.

With regard to the budget of pollutants in the Baltic, information on the following is needed: input through rivers, etc. and from ships (questionnaire prepared); exchange with atmosphere and with the seabed; exchange and mixing of water masses through the Sound and the Belt; vertical transfer through the halocline; horizontal transfer within the open sea and between the coastal waters and the open sea; biological transfer and degradation of pollutants in various ecosystems.

These elements of information are essential for the production of a model of the Baltic. Discussions on the important elements of the model made extensive use of experience gathered in the Great Lakes.

Planning for an integrated baseline study of the present state of different kinds of pollution goes parallel to the development of special studies for models of Baltic ecosystems. It was emphasized at the meeting that the Baltic is of particular interest for the development of ecological models which serve the needs of biological oceanography and pollution research. Plans for a possible "International Baltic Pollution Study Year" were discussed.

An ad hoc meeting of the group is scheduled for 30 September during the ICES meeting; a full meeting is planned for early 1973.

2.3 PROPOSED GROUPS

WG 43 Oceanography Related to GATE: In its Resolution 5.6-1 (EC-I), the IOC Executive Council noted that an oceanographic program to be carried out during the GARP Atlantic Tropical Experiment (GATE) is being developed by SCOR and requested that SCOR transmit this program to the Executive Council for consideration at its second session (tentatively scheduled for May 1973). The GARP Tropical Experiment Board for GATE had also expressed the opinion that SCOR should consider means of achieving the necessary international planning.

Some oceanographic planning has been carried out under the initiative of the U.S. National SCOR Committee but with participation of scientists from a few other countries. It now seemed desirable to broaden and expedite this planning by establishing a SCOR working group. The General Meeting approved the establishment of such a group with the following terms of reference:

To develop plans for an oceanographic program to be associated with the GARP Atlantic Tropical Experiment; to propose means for its implementation and coordination.

It was agreed that members should be selected from the following countries already planning to participate in the meteorological programs of GATE: Canada, France, FRG, GDR, Mexico, UK, USA, USSR. These scientists should be in close contact with the GATE planning groups in their country, and the working group would need to work closely with the International Scientific and Management Group for GATE (ISMG). The Director of ISMG, Dr. Kuettnner, in welcoming establishment of the group, pointed out that there was considerable urgency in this work since key decisions on GATE had to be made during the coming six months. Oceanographic proposals should be available for consideration at the meeting of the Tropical Experiment Board to be held in March 1973.

WG 44 Tropospheric Transport of Pollutants (with ACOMR, IAMAP): In view of the evidence that major quantities of pollutants reach the ocean via the atmosphere, a working group on this topic had been suggested by WG 39. However, SCOR action was deferred while awaiting information on the relevant activities and plans of other organizations. The General Meeting decided that early action was desirable and instructed the Executive Committee to establish a group with the following terms of reference:

To evaluate the problems involved in studying the transport of organic and inorganic particles and gases through the troposphere and their transfer to the ocean, including the development of suitable sampling and analytical methods and to consider means for promoting their investigation.

WG 45 Marine Pollution Research: During its First Session, the IOC Executive Council, in its Resolution 6.1-1 (EC-I), established an International Coordination Group for the Global Investigation of Pollution in the Marine Environment (GIPME). The resolution called upon "the Commission's advisory bodies, in cooperation with other scientific bodies, to continue jointly to implement the scientific recommendations of the Joint Working Party for GIPME [i.e., WG 39] and to assist the International Coordination Group for GIPME as necessary."

The General Meeting considered that in response to this resolution it would be useful to pull together more effectively the relevant activities of the various international scientific groups and that this could be accomplished by establishing a working group with the following terms of reference:

To review the marine pollution research activities of international scientific organizations; to consider ways to promote and encourage such research and to improve its coordination, including the more effective exchange of pertinent information.

Members should be sought to represent ACMRR, ACOMR, ECOR and ICES; an observer from GESAMP should also be invited. The Executive Committee should establish the group promptly so that it can be represented at the first meeting of the IOC GIPME group.

WG 46 River Inputs to Ocean Systems (with ECOR, IASH, ACMRR and UNESCO): Both WG 39 and the Marine Geoscience Workshop had recognized the importance of this topic; at the suggestion of SCOR, the IOC Secretariat had taken initial steps to gather information on national and international programs of river discharge study and measurement, including the monitoring of river-borne pollutants. Some information had been provided by IOC Members and should be compiled and made available. In order to expedite the work, the General Meeting decided to establish a working group with the following terms of reference:

To review present knowledge of the transport of water and of dissolved and suspended substances from rivers to the ocean and the subsequent fates of these substances; to evaluate present methods and arrangements for monitoring these inputs, including those regarded as significant marine pollutants.

- - - - -

Other proposals for new working groups which were not supported at the present time included the following:

Dynamics of Marine Ecosystems - IABO had been requested to consider terms of reference and membership for a possible new group on this topic. The General Meeting accepted the recommendation of IABO that a first step in promoting this activity would be a proposed ACMRR-IABO group on the application of modern quantitative ecology to the management of living marine resources and their environment.

Transfer across the Pycnocline - a considerable amount of relevant research is going on, particularly on the physical processes of transfer, and it appeared that SCOR action was not required at the present time.

Biological Effects of Pollutants - this, together with the related problems of bio-assay techniques and toxicity tests, is to be considered by a new ACMRR-IABO working party; the need for SCOR action can be reviewed at a later date.

3.0 RELATION WITH INTERGOVERNMENTAL ORGANIZATIONS

3.1 ADVISORY MATTERS CONCERNING UNESCO AND IOC

Actions of the IOC Executive Council with regard to GATE and GIPME, and the complementary actions of SCOR, have been discussed above. A resolution concerning the Joint Oceanographic Assembly is discussed under item 5.3.

Note was taken of a recommendation of the Joint IOC/WMO Planning Group for IGOSS, concerning advice to be solicited from ACMRR and SCOR on suitable indicator species to be included in pollution monitoring programs and on methods to monitor the effects of pollutants on organisms and communities. The report of WG 29 would be responsive to this recommendation. Further action should await discussion with representatives of IGOSS and ACMRR.

3.2 RELATION WITH FAO/ACMRR

Despite continuing discussions on the necessity for updating the "International Directory of Marine Scientists", it is not evident that significant progress is being made toward that goal. It was agreed that a plan of action should be formulated by the appropriate office of FAO and that the Executive Committee should review that plan as soon as it is available.

With regard to the question of the role of oceanography in fishery development, raised in connection with the fishery development project in the Indian Ocean, it was agreed to take no direct action but to keep in mind the possibility of organizing a symposium on the topic during the next Joint Oceanographic Assembly (see item 5.3).

3.3 RELATION WITH WMO/ACOMR

A number of proposals related to oceanography arose from the joint ICSU-WMO Planning Conference (Geneva, 5-8 September 1972) on the First GARP Global Experiment (FGGE); implementation of FGGE is planned for 1977.

Extracts from the report of the conference (GARP Special Report No. 8, October 1972) on matters of oceanographic interest follow :

"The Conference recognized that with the increasing emphasis in FGGE on climatic variability, strengthening the oceanographic component of the experiment is essential. Basic to the goals of FGGE is the development of a program of oceanographic measurements designed to test the combined ocean-atmosphere models that will be available at the time. It seems unlikely that by 1977 the capability will exist to describe, on an ocean-wide basis, the currents and densities of the surface layer. Therefore, it is desirable to select one or more ocean areas for intensive study where the velocity and mass fields can be described in sufficient detail for the testing of the models concerned. These areas should be of suitable dimensions, perhaps 1000 km on a side, and should be carefully selected to match the requirements of the models. Areas to be considered include those in the North Pacific, North Atlantic, Antarctic and Arabian Sea.

"The design of oceanographic programs and the selection of areas requires early attention. With regard to the equatorial regions, it is recommended to WMO and ICSU that the results of the oceanographic investigations of GARP Atlantic Tropical Experiment of 1974 should be evaluated promptly to determine the need for further tropical oceanographic experiments during FGGE. It was further recommended to WMO and ICSU that arrangements for planning of the oceanographic program of FGGE be established by joint action of ICSU and WMO.

"Furthermore, the normal oceanographic activities that will be taking place during FGGE can be used to augment and strengthen the observational coverage of the experiment. Although IGOSS is now only in a pilot stage, its development by 1977 could provide essential support for FGGE in supplying global oceanic data. In that regard coordination will be required in designing and planning observational components in the world's oceans between IGOSS and FGGE which will be of benefit for both programs. The support of oceanographers in technological developments such as the design of moored and drifting buoys should also be made available. It is necessary to provide for the coordination of these oceanographic support activities, and it is recommended that, through WMO, the assistance of IOC be invited in this endeavor.

"The Planning Conference recommended to WMO and ICSU that the Secretary-General of WMO be requested to arrange in cooperation with the IOC, SCOR and the SCAR for an ad hoc working group on buoys, who all have made recommendations for an increased capability for buoy measurements applied to their own sphere of interest.

"In addition to the basic oceanographic program discussed above, there are undoubtedly other important oceanographic experiments that will benefit from the comprehensive background of atmospheric information that will be available during the period. For example, a study of the response of the Somali Current to monsoonal change in wind stress has already been proposed. It is recommended to WMO and ICSU that JOC encourage such oceanographic experiments by making the opportunities known to oceanographers and by establishing close working relations with their organizations such as SCOR."

The Planning Conference also recommended to WMO that the Secretary-General of WMO examine, with the assistance of the IOC and SCOR, the possible additional contributions of ships to FGGE.

In a discussion of these matters by the General Meeting, it was noted that oceanographers were represented on the GARP Joint Organizing Committee by Drs. Stewart and Hasselmann. It was agreed to cooperate with GARP but, in view of the complexity of the matter, to await the initiative of JOC. In the meantime, the FGGE recommendations should be brought to the attention

of relevant working groups such as WG 34.

3.4 RELATION WITH ICES

The status of cooperative activities, such as the nutrient intercalibration experiment and WG 42, was reviewed. Satisfaction was expressed concerning the SCOR-ICES relationship but no specific action was taken other than to invite ICES participation in the proposed new WG 45 on marine pollution research.

4.0 RELATION WITH NONGOVERNMENTAL ORGANIZATIONS

4.1 RELATION WITH AFFILIATED ORGANIZATIONS

The President of IAPSO reported that an Executive Meeting had been held the preceding week in Edinburgh; a summary report is given in Annex X. Items discussed included the joint meetings with IAMAP scheduled for 1974 in Melbourne (see item 2.2 WG 28) and plans for the IUGG General Assembly scheduled for the last two weeks of August 1975 in Grenoble.

The President of IABO reported on Executive Meetings in Kiel in July and in Edinburgh in September; a summary report is given in Annex XI. It was pointed out that financial support from SCOR would be required for the Symposium on the Early Life History of Fish, scheduled to be held in Oban on 17-22 May 1973.

The Chairman of CMG reported on recent activities including a recent meeting in Montreal; a summary report is given in Annex XII.

In view of the increasing cooperation of oceanographers and meteorologists in a number of SCOR working groups as well as in projects such as those arising in GARP, it seemed desirable to strengthen communications with meteorological organization. It was accordingly decided to invite the International Association of Meteorology and Atmospheric Physics (IAMAP) of IUGG to become an Affiliated Organization of SCOR.

4.2 RELATION WITH ICSU

The President had attended the 14th General Assembly of ICSU in Helsinki earlier in the week in order to participate in the discussion of several issues of concern to SCOR. Since the 16th SCOR Executive Meeting in January, comments on the role of the Scientific Committees in the structure of ICSU had been submitted to the ICSU President. Although representatives of the Committees were not permitted to participate in the Extraordinary Assembly during which new ICSU Statutes were approved, the following paragraph was ultimately accepted:

"44. A representative of a Special or of a Scientific Committee has the right to attend, as a non-voting observer, all meetings of the General Committee."

This provision constitutes an important step toward recognition of the part that the Committees play in achieving the goals of ICSU.

As agreed by the 16th SCOR Executive Meeting, a statement on oceanic research was submitted for endorsement by the ICSU General Assembly. The statement (see Annex XIII for text) had been reviewed by the Executive Committee and other Members of SCOR and by the National Committees for Oceanic Research; its submission was supported by more than two thirds of the Committees.

Based on the statement, the following resolution was adopted:

The 14 General Assembly of ICSU:

10. Recalling the position on fundamental research taken by the ICSU Bureau in 1954, and the resolution by the 8 General Assembly in 1958, on research on the continental shelf,

Noting that the scientists of all countries should be able to conduct open research in the ocean, on the understanding that in doing so they accept an obligation to the adjacent coastal states to ensure that these states shall be able to participate in the research and share fully in its benefits.

Recognizing that for many countries this will require that greater attention be paid and necessary assistance be provided to strengthen their capability to participate in the research and to utilize the results.

Recognizing further that there must be an improvement in the exchange and dissemination of scientific information and in the other means whereby scientific results are made available,

Recommends that in all cases, oceanic research should be conducted so as not to harm the environment or to interfere unjustifiably with other marine activities.

Urges that every nation concerned with developing the law of the sea give special consideration to the need for facilitating the conduct of open research in the ocean - research which is intended for everyone's benefit and is characterized by full and timely availability of research plans and results,

Requests its National Members to bring this important matter to the attention of their governments.

The General Meeting agreed that SCOR should encourage its National Committees to ensure that this resolution is made known to their governments. The resolution should be given wide publicity, and ICSU should be requested to transmit it to the Preparatory Committee for the Law of the Sea Conference.

In other actions, ICSU considered the proposals from IUGG and SCOPE for a special environmental period; this was not approved, but SCOPE was asked to define those environmental problems towards which ICSU can make a unique contribution and to present its findings to the 1973 meeting of the General Committee and to the next ICSU General Assembly. It was decided to re-constitute the Committee on Science and Technology in Developing Countries (COSTED). One COSTED term of reference is "to work with the Special and Scientific Committees of ICSU in order to facilitate the greatest possible participation in their programs by scientists of developing countries"; the Committees will be invited to name correspondents to COSTED.

4.3 RELATION WITH UNIONS AND COMMITTEES

The 12th Meeting of SCAR was held in Canberra on 14-19 August 1972; a brief report is given in Annex XIV.

The President has been serving as the liaison with SCOPE. This arrangement should be reviewed by the new Executive Committee.

The Chairman of IBP/PM reported on the terminal phase of IBP which is concerned with writing up of results and allocation of its continuing programs to other organizations (see Annex XV). IABO is particularly interested in those projects related to productive mechanisms, and several SCOR working groups are also relevant.

The representative of COSPAR referred to the COSPAR Symposium on Approaches to Earth

Survey Problems through the Use of Space Techniques, to be held in Konstanz (FRG) in May 1973. It was desirable that SCOR identify speakers who could discuss the significance and potential for oceanographic observations from space. The General Meeting agreed to invite the National Committees of the United Kingdom and of the Federal Republic of Germany to nominate speakers respectively for the physical and biological aspects.

5.0 FUTURE MEETINGS

5.1 SYMPOSIA

Professor Dunbar reported on planning for the Polar Oceanography Conference, to be held at McGill University, Montreal during the first half of September 1973. A steering committee has been established with the following members: M. Dunbar, K. Hunkins, R. Currie, E. Dahl, A. Gordon, P. Mosieev. The meeting will last four or five days. All speakers and formal discussants are to be invited; it is estimated that attendance will not exceed 150. The general theme is the relation between special physical conditions, both past and present, in the polar oceans and their consequences for life; topics to be discussed include polar water masses, ice, productivity, and climatic change. Financial support will be needed from SCOR and SCAR and from other sources. The steering committee should consult as required with interested organizations, including ACMRR and FAO, ACOMR and WMO, UNESCO, IOC, ICES and ICNAF. Representatives of the Affiliated Organizations and other participants in the General Meeting offered to send suggestions for possible speakers to Professor Dunbar. The steering committee should explore the possibility of publishing the major papers.

5.2 BUSINESS MEETING

The Executive Committee agreed to hold its 17th meeting in Texel in May 1973. The steering committee for the Joint Oceanographic Assembly will also meet at this time (see below).

5.3 JOINT OCEANOGRAPHIC ASSEMBLY

A meeting to initiate planning for the Joint Oceanographic Assembly had been held in Kiel on 30 June 1972. Participants were Professor Wooster and Dr. Voigt, SCOR; Professor Lacombe, IAPSO; Professor Hempel, IABO; Dr. Gaskell, CMG. Discussion of the recommendations of that meeting and consideration of the relative advantages of holding the Assembly in 1976 or 1977 led to the following decisions by the General Meeting:

1. In view of the invitation of the Royal Society of London, the Assembly should take place in the United Kingdom in 1976.

2. With regard to the General Assemblies of IUGG and IUGS scheduled respectively in 1975 and 1976, it was essential that there be close liaison between the JOA Steering Committee and those planning the programs of the other meetings.

3. A Steering Committee for JOA 1976 was established, with representatives of SCOR, IAPSO, IABO, CMG, ACMRR, ACOMR, ECOR and the Royal Society of London. This Committee should meet initially at eight-month intervals, at the time of the regular meetings of the SCOR Executive Committee. The Past President of SCOR was asked to chair the Steering Committee.

4. The Steering Committee would maintain close contact with sponsors and cooperating organizations, such as UNESCO, IOC, FAO and WMO. At an appropriate time, a Logistics Committee would be established with representatives of these organizations, of the Steering Committee, and of the Royal Society of London.

5. The Joint Oceanographic Assembly of 1976 would also be designated OCEAN WORLD II. The sessions would require eight days with the following schedule:

Monday:	Registration; Steering Committee
Tuesday through Friday:	Sessions
Saturday through Sunday:	Unscheduled
Monday through Thursday:	Sessions
Friday:	SCOR Executive Committee

Sessions would consist of general symposia, special symposia, contributed papers, and meetings of organizations. General symposia would be of interdisciplinary interest and would usually include three speakers per half-day; no concurrent sessions would be scheduled. Special symposia would be of broad, but more specialized, interest and would usually include six speakers per half-day; two such symposia could be scheduled concurrently. In the case of contributed papers, as many as three sessions could be scheduled at the same time. Thus, of the 16 half-days available for sessions, the following allocations would be made:

General Symposia:	6 (6 sessions, 1 at a time)
Special Symposia:	5 (10 sessions, 2 at a time)
Contributed Papers:	3 (9 sessions, 3 at a time)
Meetings of Organizations:	2 (divided among SCOR, IAPSO, IABO, CMG).

General Symposia would be organized by SCOR; Special Symposia would be organized by the associations, either individually or jointly; sessions of contributed papers would also be handled by the associations.

6. Arrangements should be made for prepublication of abstracts, particularly of invited papers for the general and special symposia. The assistance of FAO in this would be particularly helpful.

7. Organizers of the general and special symposia should explore the question of publication for the papers in these sessions. In general, it seems better for such publication to be selective and arranged separately for the individual symposia. The possibility should also be explored of publishing selected papers from the general and special symposia in a special volume.

8. Early plans should be made in each country for the allocation of funds to ensure the participation of their scientists, including those invited to convene symposia or to present papers. International support will be required for the organization of the meeting, including the preparation of abstract volumes, and for the travel and subsistence of selected young scientists, especially those from the developing countries. At present it appears that for these purposes, international support of the order of \$100,000 might be required. In addition, international organizations may wish to support one or another of the symposia of special interest to them.

The General Meeting noted with appreciation that the IOC Executive Council at its First Meeting (Hamburg, 3-8 July 1972) had adopted the following resolution (5.6-2: EC-I).

"The Executive Council,
Recalling Resolution VII-2 in which the Commission endorsed the holding of the next Joint Oceanographic Assembly in 1976 and requested the scientific bodies concerned to proceed with organization of the programme,

Being informed that representatives of some of these scientific bodies had met recently and had initiated planning for the Assembly, the programme for which would include a number of scientific symposia on topics directly related to GIPME, IGOSS, LEPOR and other programmes of the Commission,

Further noting that in addition to the national cost for sending scientists to the meeting, international support would be needed, not only for selected symposia but also for organization of the meeting and for facilitating the participation of young scientists, especially from the developing countries, and that the latter expenses had been estimated at \$100,000,

Encourages the scientific bodies to continue developing plans for the Joint Oceanographic Assembly; and

Reiterates its invitation to Member States and non-Member States and to UNESCO, FAO, WMO and other organizations of the United Nations system and other interested organizations and institutions, to support the Assembly including the making of adequate budgetary provisions.

A list of future meetings of SCOR and associated organizations is given in Annex XVI.

The Proceedings regrets to record the death, on 2 October 1972, of Professor Gunter Dietrich, former Director of the Institut für Meereskunde of the University of Kiel. Since SCOR's inception, Professor Dietrich has been a major participant in its activities; at the time of his death, he was serving as Chairman of the Panel on Climate of WG 34. SCOR and international oceanography as a whole are the poorer for the loss of this distinguished oceanographer.

11th SCOR GENERAL MEETING
Oban, 21-23 September 1972

List of Participants

MEMBERS OF THE EXECUTIVE COMMITTEE

Professor Warren S. Wooster	(U.S.A.)	President
Captain Luis R.A. Capurro	(Argentina)	Past President **
Professor Dr. H. Postma	(Netherlands)	Vice President
Dr. Klaus Voigt	(GDR)	Secretary
Dr. T.F. Gaskell	(IUGS/CMG)	Ex Officio
Professor Dr. G. Hempel	(IUBS/IABO)	Ex Officio
Professor H. Lacombe	(IUGG/IAPSO)	Ex Officio

OTHER PARTICIPANTS

Academician L.M. Brekhovskikh * (ICSU)	Professor B.R. Morton * (Australia)
Dr. C.v.d.M. Brink (South Africa)	Sir David Martin (UK)
Dr. D. Cartwright * (WG 27)	Mr. H.J. van der Merwe (South Africa)
Dr. J.M. Colebrook * (WG 32)	Dr. C. Palomo * (Spain)
Mr. B.K. Couper (U.S.A.)	Dr. G. Parrilla (Spain)
Mr. R.I. Currie (UK)	Mr. A. Preston (UK)
Professor J.H. Day (South Africa)	Capt. Tavorn Pongsapippatt * (Thailand)
Sir George Deacon * (UK)	Professor J.E.G. Raymont * (UK)
Mr. J. Deeble (Australia)	Admiral Ritchie (IHB)
Dr. L. Dickie * (Canada)	Dr. M. Ruivo (FAO, ACMRR)
Professor M.J. Dunbar * (SCIBP)	Dr. S. Ruttenberg * (COSPAR)
Professor B.M. Funnell (UK)	Professor E.S.W. Simpson * (South Africa/CMG)
Professor E.D. Goldberg * (U.S.A.)	Dr. J.H. Steele (UK)
Mr. G.E. Hemmen (UK)	Dr. R.W. Stewart * (Canada/ WMO)
Dr. A.C. Heron (Australia)	Dr. D.R. Stoddart * (WG 35)
Dr. D.E. Hurley (New Zealand)	Dr. O.G. Tandberg * (Sweden)
Dr. J.P. Kuettner (WMO)	Professor P. Tchernia * (France)
Dr. E.C. LaFond * (IAPSO)	Professor R. Vaissiere * (Monaco)
Mr. J. Lassig * (Finland)	Dr. J. Vargas * (Mexico)
Dr. A.S. Laughton * (UK)	Mr. R.C. Vetter (U.S.A.)
Dr. J. Leonard (U.S.A.)	Dr. Torben Wolff * (IABO)
Dr. A. Longhurst * (WG 29)	Professor K. Yoshida * (Japan)
Dr. C.E. Lucas (UK)	

* SCOR Members

** also represented IOC and UNESCO

MEMBERS OF SCOR
(as of 1 November 1972)

- ATAIDE, Cmdr. J.E. de, Oceanographic Department, Rua das Trinas 49, Lisbon-2, Portugal (1)
- AYALA CASTANARES, Dr. A., Director, Instituto de Biología, Universidad Nacional Autónoma de México, Apartado Postal 70-233, México 20, D.F., México (1)
- BATTAGLIA, Prof. B., Institute di Zoologia e Anatomia Comparata, Università di Padova, via Loredan 10, 35100 Padova, Italy (1)
- BERTELSEN, Dr. E., Director, Danmarks Fiskeri-og Havundersøgelser, Charlottenlund Slot, 2920 Charlottenlund, Denmark (1)
- BRAARUD, Prof. T., Institute of Marine Biology B, P.O. Box Blindern 1069, Oslo 3, Norway (1)
- BREKHOVSKIKH, Academician L.M., USSR Academy of Sciences, Head: Department of Oceanology, Physics of Atmosphere & Geography, Leninsky Prospekt 14, Moscow, V-71, USSR (2-ICSU)
- BRODIE, Mr. J.W., Oceanographic Institute, P.O. Box 8009, GPO, Wellington, New Zealand (1)
- BULLARD, Sir Edward, Department of Geodesy & Geophysics, Madingley Road, Madingley Rise, Cambridge, UK (2-IUPAP)
- BURDON-JONES, Prof. C., School of Biological Sciences, James Cook University, P.O. Box 999, Townsville, Queensland, 4810, Australia (1)
- CARRANZA FRAZER, Dr. J., Comité de Ciencias y Tecnologías del Mar, Consejo Nacional de Ciencia y Tecnología, Ap. Post. 20-033, Insurgentes Sur 1677, México 20, DF, México (1)
- CARTWRIGHT, Dr. D., National Institute of Oceanography, Wormley, Godalming, Surrey, UK (2-WG 27)
- CHARNOCK, Prof. H., Director, National Institute of Oceanography, Wormley, Godalming, Surrey, UK (2-WG 28)
- CHEOSAKUL, Dr. P., Secretary-General, National Research Council, 196 Paholyodhin Road, Bangkok, Bangkok, Thailand (1)
- CHU, Prof. T.Y., Director, Institute of Oceanography, National Taiwan University, Taipei, Taiwan (1)
- COLEBROOK, Dr. J.M., Oceanographic Laboratory, 78 Craighall Road, Edinburgh 6, Scotland (2-WG 32)
- COMSTI, F.A., Asst. Director, Bureau of Mines, Chairman of the NCMS, Herran, Manila, Philippines (1)
- COSTLOW, Dr. J.D., Duke University, Marine Laboratory, Beaufort, North Carolina, 28516, USA (1)
- CURRIE, Mr. R.I., Dunstaffnage Marine Research Laboratory, P.O. Box No. 3, Oban, Argyll, Scotland PA34 4AD (1)
- DAHL, Prof. E., Zoological Institute, Helgonavagen 3, University of Lund, S-223 62, Lund, Sweden (1)

DEACON, Sir George, National Institute of Oceanography, Wormley, Godalming, Surrey, UK (1)

DICKIE, Dr. L.M., Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute, Dartmouth, N.S., Canada (1)

DORRESTEIN, Prof. Dr. R., Royal Netherlands Meteorological Institute, De Bilt, Netherlands (1)

DUNBAR, Prof. M., Marine Sciences Branch, Environment Canada, Atlantic Oceanographic Laboratory, Bedford Institute, Dartmouth, N.S., Canada (2-SCIBP)

DYRSSEN, Prof. D., Department of Analytical Chemistry, University of Gothenburg, S-402 20, Gotenburg, Sweden (1)

FEDOROV, Dr. K.N., Institute of Oceanology, USSR Academy of Sciences, I, Letnyaya, Ljublino, Moscow, J-387, USSR (1)

FISHELSON, Dr. Z., Department of Biology, Tel Aviv University, Ramat Aviv, Israel (1)

GASKELL, Dr. T.F., The British Petroleum Co., Ltd., Britannic House, Moor Lane, London, E.C.2, UK (2-IUGS/CMG)

GOLDBERG, Prof. E.D., University of California, Scripps Institution of Oceanography, P.O. Box 109, La Jolla, California, 92037, USA (1)

GOMEZ, Dr. J., Instituto Espanol de Oceanografia, C/Alcala 27, 4º, Madrid (14), Spain (1)

GRASSHOFF, Prof. Dr. K., Institut fur Meereskunde, Universitat Kiel, Dusternbrooker Weg 20, 23 Kiel, Germany, FRG (2-WG 10)

GUILCHER, Prof. A., Universite de Bretagne Occidentale, Faculte des Lettres, B.P. 860, 29 N Brest, France (2-IGU)

HECHT, Dr. A., Oceanographic & Limnological Research Company, P.O. Box 699, Haifa, Israel (1)

HELA, Prof. Dr. I., Institute of Marine Research, Box 14166, Helsinki 14, Finland (1)

HEMPEL, Prof. Dr. G., Institut fur Meereskunde, Universitat Kiel, Dusternbrooker Weg 20, 23 Kiel, Germany, FRG (1 and 2-IUBS)

HERRERA, Capt. R., Director del Instituto Hidrografico de Armada, Casilla 324, Valparaiso, Chile (1)

HEYDORN, Dr. A.E.F., Oceanographic Research Institute, P.O. Box 736, Durban, South Africa (1)

HOLTEDAHL, Prof. H., Geological Institute, University of Bergen, 5000 Bergen, Norway (1)

HUMPHREY, Dr. G.F., Marine Biochemistry Unit, CSIRO, Botany Bldg., Sydney University, Australia, NSW, 2006 (2-WG 45)

IGNATIUS, Dr. H., Geological Survey, Otaniemi, Finland (1)

JERLOV, Prof. N., University of Copenhagen, Institute of Physical Oceanography, Haraldsgade 6, 2200 Copenhagen N, Denmark (1)

JUAN, Dr. V.C., Chinese Committee for Oceanic Research, c/o College of Science, National Taiwan University, Taipei, Taiwan (1)

- KNOX, Prof. G.A., Department of Zoology, University of Canterbury, Private Bag, Christchurch, New Zealand (1)
- KROG, Dr. J., Institute of Zoophysiology, University of Oslo, Box 1050 Blindern, Oslo, Norway (2-IUPS)
- LACOMBE, Prof. H., Laboratoire d'Océanographie Physique, Museum d'Histoire Naturelle, 43/45 rue Cuvier, Paris Ve, France (2-IAPSO)
- LA FOND, Dr. E.C., Naval Undersea Research & Development Center, San Diego, California, 92132, USA (2-IAPSO)
- LAL, Dr. D., Tata Institute of Fundamental Research, Homi Bhabha Road, Bombay-5, India (1)
- LASSIG, Mr. J., Institute of Marine Research, Box 14166, Helsinki 14, Finland (1)
- LONARDI, Dr. A.G., Instituto Argentino de Oceanografía, Avenida Golon 30, Bahía Blanca, Argentina (1)
- MANANSALA, Mr. M.C., Bureau of Coast & Geodetic Survey, 421 Barraca, Binondo, Manila, Philippines (1)
- MARUMO, Prof. R., Ocean Research Institute, University of Tokyo, 1-15 Minamidai, Nakano-ku, Tokyo 166, Japan (1)
- MIYAKE, Dr. Y., Department of Chemistry, Tokyo Kyoiku University, Bunkyo-ku, Tokyo, Japan (1)
- MONIN, Prof. A.S., Institute of Oceanology, USSR Academy of Sciences, 1, Letnyaya, Ljublino, Moscow, J-387, USSR (1 and 2-IUGG)
- MORELLI, Prof. C., Osservatorio Geofisico Sperimentale, Viale Romolo Gessi 4, 34123 Trieste, Italy (1)
- MORTON, Prof. B.R., Department of Mathematics, Monash University, Clayton-Victoria, Australia, 2168 (1)
- MOSBY, Prof. H., Geophysical Institute, University of Bergen, 5000 Bergen, Norway (1)
- MUNN, Dr. R.E., Meteorological Service, 315 Bloor Street W, Toronto 5, Ontario, Canada (2-SCOPE)
- NEEV, Dr. D., Geological Survey of Israel, 30 Malchei Israel Street, Jerusalem, Israel (1)
- PALOMO, Dr. G., Instituto Espanol de Oceanografía C/Alcala 27, 4°, Madrid (14), Spain (1)
- PANIKKAR, Dr. N.K., Director, National Institute of Oceanography, Miramar, Panaji-GOA, India (1)
- PHONGSUWANA, Mr. U., Senior Fisheries Biologist & Director, Marine Fisheries Laboratory, Department of Fisheries, Ministry of Agriculture & Cooperative National Research Council, Bangkok 9, Thailand (1)
- PHONGSAIPATT, Capt. T., Chief, Oceanographic Division, Hydrographic Department, Royal Thai Navy, Dhonburi, Thailand (1)
- POSTMA, Prof. Dr. H., Netherlands Institute for Sea Research, Postbus 59, Texel, Netherlands (1)

PUNJANAN, Mr., Naval Hydrography Office, Jalan Gunung Sahari 87, Djakarta, Indonesia (1)

RAGHU PRASAD, Dr. R., Asst. Director-General, Indian Council of Agriculture Research, Krishi Bhavan, New Delhi-1, India (1)

RAPAIRE, Dr. J.L., Chef de Recherches au Laboratoire de Radioactivite Appliquee, Musee Oceanographique, Monaco (1)

RAYMONT, Prof. J.E.G., Department of Oceanography, The University of Southampton, Southampton, S09 5NH, UK (1)

ROCHE, Prof. J., Laboratoire de Biochimie, College of France, Place Marcellin-Berthelot, Paris VI, France (2-IUB)

ROCHFORD, Mr. D.J., CSIRO Marine Laboratory, P.O. Box 21, Cronulla, NSW Australia, 2230 (1)

RUTTENBERG, Mr. S., c/o JPS/WMO, Case Postale 1, 1211 Geneva 20, Switzerland (2-COSPAR)

SCHNESE, Prof. Dr. W., Section of Biology, University of Rostock, Freiligrathstrasse 7, DDR-25, Rostock, Germany, GDR (1)

SEIBOLD, Prof. Dr. E., Geologisches Institut, Universitat Kiel, Olshausenstrasse 40/60, 23 Kiel, Germany, FRG (1)

SELLI, Prof. R., Laboratorio di Geologia Marina, via Zamboni 67, 40127 Bologna, Italy (1)

SIEDLER, Prof. Dr. G., Institut fur Meereskunde, Universitat Kiel, Dusternbrooker Weg 20, 23 Kiel, Germany, FRG (2-WG 43)

SIEVERS, Sr. H.A., Instituto Hidrografico de la Armada, Casilla 324, Valparaiso, Chile (1)

SIMPSON, Prof. E.S.W., Department of Geology, University of Cape Town, Rondebosch, Cape Province, South Africa (1 and 2-CMG)

SORGENFREI, Prof. Th., Institute of Technical Geology, Lundtoftevej 100, 2800 Lyngby, Denmark (1)

STEWART, Prof. R.W., Environment Canada, 1230 Government Street, 5th Floor, Victoria, B.C., Canada (1)

STODDART, Dr. D.R., Department of Geography, Cambridge University, Downing Place, Cambridge, UK (2-WG 35)

STOMMEL, Prof. H., Department of Meteorology, Room 54-1416, Massachusetts Institute of Technology, Cambridge, Mass., 02139, USA (2-WG 34)

STRASHEIM, Dr. A., Director, National Physical Research Laboratory, CSIR, P.O. Box 395, Pretoria, South Africa (1)

STUARDO, Dr. J., Instituto Central de Biologia, Universidad de Concepcion, Casilla 1367, Concepcion, Chile (1)

SUGIARTO, Dr. A., National Institute of Oceanology, P.O. Box 580/DAK, Djakarta, Indonesia (1)

SWALLOW, Dr. J.C., National Institute of Oceanography, Wormley, Godalming, Surrey, UK (2-WG 21)

- SZYMBORSKI, Prof. S., Director of the Marine Station of the Polish Academy of Sciences,
Mickiewicza 14, Sopot, Poland (1)
- TAN, Dr. E.O., National Committee on Marine Sciences, National Science Development Board,
P.O. Box 3596, Manila, Philippines (1)
- TANDBERG, Dr. O., Royal Academy of Sciences, Fack S-104 05, Stockholm 50, Sweden (1)
- TARDENT, Prof. P., Commission d'Océanographie et de Limnologie de la Société Helvétique
des Sciences Naturelles, Zoologisches Institut der Universität Zürich, Kunstlergrasse 16,
Zürich 8006, Switzerland (3)
- TCHERNIA, Prof. P., Laboratoire d'Océanographie Physique du Muséum, 43/45 rue Cuvier, Paris
Ve, France (1)
- ULRICH, Dr. J., Institut für Meereskunde, Universität Kiel, Dusternbrooker Weg 20, 23 Kiel,
Germany, FRG (2-WG 41)
- VAISSIERE, Prof. R., Centre Scientifique de Monaco, 16 Boulevard de Suisse, Monaco (1)
- VAN ANDEL, Prof. Tj., School of Oceanography, Oregon State University, Corvallis, Oregon,
93771, USA (2-WG 40)
- VARGAS, Dr. J.A., Consejo Nacional de Ciencia y Tecnología, Apartado Postal 20-033,
Insurgentes Sur 1677, Mexico 20, D.F., Mexico (1)
- VATRICAN, Mr. A., Charge de Recherches à l'Observatoire de Séismologie et de Météorologie
de Monaco, Musée Océanographique, Monaco (1)
- VOIGT, Dr. K., Director, Institut für Meereskunde, Seestrasse 15, 253 Warnemünde, Germany,
GDR (1)
- WOLFF, Dr. T., Universitet Zoologiske Museum, Universitetsparken 15, Copenhagen Ø,
Denmark (2-IABO)
- WOOSTER, Prof. W.S., University of California, Scripps Institution of Oceanography, P.O. Box
109, La Jolla, California, 92037, USA (1)
- YOSHIDA, Prof. K., Geophysical Institute, Faculty of Science, Tokyo University, Hongo, Bunkyo-
ku, Tokyo 113, Japan (1)

(1) Nominated Members; (2) Representative Members; (3) Invited Members

NATIONAL COMMITTEES FOR OCEANIC RESEARCH
AFFILIATED WITH SCOR

Comite Nacional de Oceanografia
Attn: Ingeniero Ascensio C. Lara
Consejo Nacional de Investigaciones
Cientificas y Tecnicas
Rivadavia 1917-T, 46-4429
Buenos Aires, ARGENTINA

Australian National Committee on
Oceanic Research
Attn: Professor Bruce Morton
Department of Mathematics
Monash University
Clayton-Victoria, AUSTRALIA, 3168

Canadian Committee on Oceanography
Attn: Dr. L.M. Lauzier
c/o Fisheries Research Board
Postal Code K1A 0H3
Ottawa, CANADA

Chilean Committee for Oceanic Research
Attn: Captain R. Herrera
Instituto Hidrografico de la Armada
Casilla 324
Valparaiso, CHILE

Chinese National Committee on Oceanic
Research
Attn: Dr. V.C. Juan, President
c/o College of Science
National Taiwan University
Taipai, Taiwan

Danish Committee for Oceanic Research
Attn: Professor Nils Jerlov
Universitetets Institut for Oceanografi
Solvgade 83
1307 Copenhagen K, DENMARK

National Committee for Finland
Attn: Dr. J. Lassig, Secretary
Institute of Marine Research
Box 14166
Helsinki 14, FINLAND

French National Committee for Oceanic
Research
Attn: Professor H. Lacombe, Secretary
Laboratory of Physical Oceanography
43 rue Cuvier
Paris Ve, FRANCE

German Committee for Oceanic Research
Attn: Professor Dr. G. Hempel
Institut für Meereskunde
Universität Kiel
Dusternbrooker Weg 20
23 Kiel, GERMANY, FRG

SCOR Commission of the German
Democratic Republic
Attn: Dr. Klaus Voigt
Institut für Meereskunde
Seestrassse 15
253 Warnemunde, GERMANY, GDR

Indian National Committee for SCOR
Attn: Dr. N.K. Panikkar
National Institute of Oceanography
Miramar, Panaji-GOA, INDIA

National Committee on Marine Research
Attn: Dr. Sujatno Birowo
National Institute of Oceanology
Djalan Aquarium, Pasar Ikan
P.O. Box 580/DAK
Djakarta, INDONESIA

Israel National SCOR Committee
Attn: Professor E.D. Bergmann
The Israel Academy of Sciences and
Humanities
P.O. Box 4040
Jerusalem, ISRAEL

Italian National Committee for Oceanographic Research
Attn: Professor Giuseppe Macchi
Consiglio Nazionale delle Ricerche
Programma Speciale per l'Oceanografia
7 via Cornelio Celso
00161 Rome, ITALY

National Committee for SCOR
Attn: Dr. Yoshio Sugiura
Meteorological Research Institute
Koenji Kita 4-35-8, Suginami
Tokyo 166, JAPAN

Comite de Ciencias y Tecnologias del Mar
Attn: Ing. Eugenio Mendez
Consejo Nacional de Ciencia y Tecnologia
Insurgentes Sur No. 1677
Ap. Post. 20-033
Mexico 20, D.F., MEXICO

Monaco National Committee on Oceanic
Research
Attn: President Arthur Crovetto
Centre Scientifique de Monaco
16 Boulevard de Suisse,
MONACO

Netherlands National Committee for Oceanic
Research
Attn: Director, Royal Netherlands Academy
of Arts and Sciences
Kloveniersburgwal 29
Amsterdam-C, NETHERLANDS

New Zealand National Committee for Oceanic
Research
Attn: Mr. G.K. Neville
The Royal Society of New Zealand
P.O. Box 12249
Wellington, NEW ZEALAND

Norwegian SCOR Committee
Attn: Professor T. Braarud, Chairman
Institute of Marine Biology B
P.O. Box Blindern 1069
Oslo 3, NORWAY

National Committee on Marine Sciences
Attn: Dr. Elvira O. Tan
National Science Development Board
P.O. Box 3596
Manila, PHILIPPINES

Polish National SCOR
Attn: Professor Dr. S.M. Heuckel
Komitet Badan Morza P.A.N.
Ulica Abrahama NR.18
Sopot, POLAND

Portuguese National Committee on Oceanic
Research
Attn: Cdmr. Jose Emilio de Ataida
Instituto Hidrografico
Rua das Trinas 49
Lisbon-2, PORTUGAL

South African National Committee for
Oceanographic Research
Attn: Mr. C.G. Hide
Science Cooperation Division, CSIR
P.O. Box 395
Pretoria, SOUTH AFRICA

Spanish National Committee to SCOR
Attn: Sr. D. Damaso Berenguer
Instituto Espanol de Oceanografia
C/Alcala 27, 4º
Madrid (14), SPAIN

Swedish SCOR Committee
Attn: Dr. Olof G. Tandberg
The Royal Academy of Sciences
Fack S-104 05
Stockholm 50, SWEDEN

Thailand National Marine Science
Committee
Attn: Mrs. Sakuntala Bhodhiprasart
c/o National Research Council
196 Paholyodhin Road
Bangkhen, Bangkok, THAILAND

British National Committee on Oceanic
Research
Attn: Mr. G. Hemmen, Executive Secretary
The Royal Society
6 Carlton House Terrace
London, S.W.1, ENGLAND

U.S. National Committee to SCOR
Attn: Mr. R.C. Vetter
Ocean Affairs Board
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C., 20418, U.S.A.

National Committee Soviet Oceanography
Attn: Academician L.M. Brekhovskikh
USSR Academy of Sciences
Head: Department of Oceanology, Physics
of Atmosphere and Geography
Leninsky Prospekt 14
Moscow, V-71, USSR

ESTIMATE OF SCOR FINANCES
(1 January thru 30 September 1972)

BALANCE AS OF 1 January 1972

In Rome	\$ 2,819.23 *
In La Jolla	<u>26,963.34</u>
* \$219.23 in Indian Rupees	\$ 29,782.57

INCOME

National Contributions	30,358.29	
UNESCO Contracts	10,000.00	
Savings Account, Interest	<u>877.47</u>	<u>41,235.76</u>
		\$ 71,018.33

EXPENSES

Office		4,619.88
Publications		668.99
Working Groups		
WG 10	299.00	
WG 15	4,954.45	
WG 21	2,496.00	
WG 23	9,081.50	
WG 29	4,466.47	
WG 34	150.00	
WG 37	2,401.32	
WG 40	406.00	
WG 41	581.21	
WG 42	<u>914.45</u>	25,750.40
Executive Expense		1,167.29
Representatives, Other Meetings		4,248.76
Support, ICES Symposium		500.00
Support, IAPSO Symposium		1,000.00
Support, New Zealand 'Dating Symp.'		<u>500.00</u>
 TOTAL EXPENSES		 \$ 38,455.32

BALANCE AS OF 30 September 1972

In Rome	\$ 1,219.23 *
In La Jolla	<u>31,343.78</u>
* \$219.23 in Indian Rupees	<u><u>\$ 32,563.01</u></u>

SCOR WORKING GROUPS,
MEMBERSHIP AND TERMS OF REFERENCE

WG 10. Oceanographic Tables and Standards (with ICES and UNESCO)

Terms of Reference: To carry out all the necessary preparatory work for publishing new oceanographic tables; to advise on the certification of the standard sea water; to advise on such further investigations as may be desirable.

Members: nominated by SCOR: K. Grasshoff, FRG (Chairman); F. Fisher, USA; J. Gieskes, USA; N.P. Fofonoff, USA; W. Kroebel, FRG. nominated by ICES: F. Herman, Denmark; O. Saelen, Norway. nominated by UNESCO: G.N. Ivanoff-Frantzkevich, USSR, M. Menache, France.

WG 21. Continuous Current Velocity Measurement (with UNESCO)

Terms of Reference: To design, and propose means of carrying out an intercomparison at sea of the principal current measuring systems now employed for the continuous recording of current velocity on moored stations.

Members: nominated by SCOR: J.C. Swallow, UK (Chairman); K.A. Chekotillo, USSR; F. Webster, USA; T. Kvinge, Norway; G. Siedler, FRG; E. Francke, GDR. nominated by UNESCO: N.P. Fofonoff, USA; B. Shekhvatov, USSR.

WG 27. Tides of the Open Sea (with UNESCO)

Terms of Reference: To encourage and assist with the design of instruments for measuring tides on the continental shelf and in the deep sea; to establish criteria concerning precision, sampling times and related considerations; to coordinate the observational programs and ultimately to bring about some uniform analyses of the deep sea data.

Members: nominated by SCOR: D. Cartwright, UK (Chairman); R. Radock, Australia; T. Teramoto, Japan; F. Schott, FRG; C.G. Dohler, Canada; W.H. Munk, USA (B.D. Zetler, USA, alternate for W.H. Munk). nominated by UNESCO: S.S. Voit, USSR; J.L. Hyacinthe, France (M. Eyries, France, alternate for J.L. Hyacinthe).

WG 28. Air-Sea Interaction (with IAMAP)

Terms of Reference: To review the requirements and foster research within the field of atmosphere-ocean interaction; to provide advice on this subject, on request, to individuals as well as to national and international organizations; to consider the need for an international symposium on atmosphere-ocean interaction to be held at or before the next General Assembly, and to organize such a symposium; to ensure coordination with governmental organizations (WMO and IOC) and with non-governmental organizations outside of IUGG on subjects related to the work of the Joint Committee, and in particular to solicit their participation or co-sponsorship of any future symposium (organized under preceding term) for which such participation appears advantageous.

At the 10th SCOR General Meeting, the following recommendation was made to WG 28 on Air-Sea Interaction:

It was recommended that the working group give special attention to the question of direct eddy flux measurements of the water vapor transport. The adequacy and intercomparability of existing instrumentation should be evaluated, as should the distribution of measurements needed to establish reliable estimates of evaporation for any place on the surface of the world ocean.

Members: H. Charnock, UK (Chairman); J. Namias, USA; E.L. Deacon, Australia; A.S. Monin, USSR; R.W. Stewart, Canada; P. Welander, Sweden. Co-opted: K. Bryan, USA; S.S. Zilitinkevich, USSR.

WG 32. Biological Data Inventories (with ACMRR)

Terms of Reference: To assist organizations concerned with marine biological data inventories and information retrieval in national, regional and world data centers; to prepare definitive specifications for second level inventories and to propose means for their implementation.

Members: nominated by SCOR: J.M. Colebrook, UK (Chairman); G. Hempel, FRG. nominated by ACMRR: B. Zeitschel, FRG; S. Saila, USA. ex-officio: A.R. Picciolo, WDC-A; E. Akyuz, FAO.

WG 34. Oceanographic Basis of Ocean Monitoring and Prediction Systems

Terms of Reference: To identify the scientific problems related to the design and use of systems for the monitoring and prediction of oceanic conditions, including problems of sampling, general circulation and the development of predictive models, and to indicate relevant investigations in progress or being planned; to consider the desirability and possible design of a mid-ocean dynamics experiment to determine whether the dynamics of the general circulation of the ocean is similar to, or very different from, that of the atmosphere.

Members: H. Stommel, USA (Chairman)

Theoretical Panel: A. Robinson, USA (Chairman); A. Gill, UK; K. Hasselmann, FRG; P. Welander, Sweden; L.M. Fomin, USSR; N.A. Phillips, USA.

Panel on Ocean Climate: J. Namias, USA; J. Smed, Denmark; R.R. Dickson, UK; P. Hupfer, GDR; S. Tabata, Canada.

WG 35. Methods in Quantitative Ecology of Coral Reefs

Terms of Reference: To identify the major scientific problems in the quantitative ecology of coral reefs; to evaluate and test existing methods for the quantitative description of abundance, composition and distribution of benthic invertebrate communities on reefs; to recommend standard field techniques suitable for the problems identified under the first term; to consider the need for a future symposium on the quantitative ecology and productivity of coral reefs.

Members: D.R. Stoddart, UK (Chairman); F.H. Talbot, Australia; M. Pichon, France; R.E. Johannes, USA; G. Scheer, FRG; Y. Loya, Israel; K. Konishi, Japan.

WG 36. Coastal Upwelling Processes (with ACMRR and ACOMR)

Terms of Reference: To review present knowledge of the physical, chemical and biological processes involved in coastal upwelling; to evaluate strategies for the investigation of these processes and recommend appropriate investigations; to examine the application of these recommendations in the upwelling region off north-west Africa.

Members: K.N. Fedorov, USSR (Chairman)

Biological Panel: nominated by ACMRR: R. Dugdale, USA (Chairman); D.H. Cushing, UK; R. Margalef, Spain. nominated by SCOR: G. Hempel, FRG; H. Minas, France; Y.I. Sorokin, USSR; D. Nehring, GDR.

Physical Panel: nominated by SCOR: K. Yoshida, Japan (Chairman); R.L. Smith, USA; B. Saint-Guily, France; E. Mittelstaedt, FRG. nominated by ACOMR: H. Charnock, UK.

WG 37. Marine Plankton and Sediments

Terms of Reference: To discuss the principles of systematics, stratigraphy and environmental interpretation of planktonic remains in marine sediments, including biological remains in varved sediments as indicators of recent ocean conditions; to compare submarine stratigraphy with that on land; to prepare a symposium on these topics.

Members: E. Seibold, FRG (Chairman); H. Bolli, Switzerland; B.M. Funnell, UK; W. Riedel, USA; Y. Takanayagi, Japan; A.P. Jouse, USSR; A. Be, USA.

WG 38. Special Studies on Circumpolar Waters south of 40°S (with SCAR)

Terms of Reference: To examine the feasibility of conducting oceanographic studies in Antarctic circumpolar waters by relatively simple observation programs from resupply vessels and other ships of limited oceanographic capability, and to recommend methods and strategies whereby such programs could be developed and carried out.

Members: Sir George Deacon, UK (Chairman); A. Gordon, USA. other members to be determined.

WG 40. Paleo-Oceanography

Terms of Reference: To review and coordinate study of the geological time-scale evolution of oceanic circulation, climate and chemistry in relation to sedimentological, geochemical and paleontological evidence from marine sediments and to investigate procedures for promoting interdisciplinary and international cooperation in this field.

Members: Tj. van Andel, USA (Chairman); other members to be determined.

WG 41. Morphological Mapping of the Ocean Floor (with IHB)

Terms of Reference: To determine a rational scheme for reduction and presentation of sounding data that would constitute a framework in which the international geological mapping of the sea floor could proceed; to recommend further action to be taken by SCOR.

Members: nominated by SCOR: J. Ulrich, FRG (Chairman); A.S. Laughton, UK; V.F. Kanaev, USSR; R.L. Fisher, USA; J.W. Brodie, New Zealand; E. Uchupi, USA; A.V. Ilyin, USSR; D.W. Newson, UK. nominated by IHB: D.C. Kapoor, Monaco.

WG 42. Baltic Pollution (with ICES)

Terms of Reference: (a) to identify from the point of view of pollution the need for further basic hydrographical, biological, biochemical and biogeochemical studies; (b) to coordinate appropriate surveys of the open Baltic, making use of existing groups of experts whenever possible; (c) to coordinate and develop programs for biological monitoring stations with such indicators of changes in the environment as, (i) benthic microorganisms, (ii) benthic macro-flora and fauna, (iii) plankton; (d) to develop plans for coordination of the studies of the level of toxic substances in food fish and the marine environment; (e) to cooperate with the corresponding North Sea Group in shipboard and laboratory intercalibration tests of sampling, storage and analysis methodology for toxic substances; (f) to develop a scheme for continuous collection and analysis of all pertinent information on input of pollutants into the Baltic sea and on the changes in its degree of stagnation brought about by organic waste.

Members: nominated by SCOR: I. Hela, Finland (Chairman); H.J. Brosin, GDR; A. Aitsam, USSR; E. Dahl, Sweden; C.H. Mortimer, USA. (other members are nominated by participating ICES members).

WG 43. Oceanography Related to GATE

Terms of Reference: To develop plans for an oceanographic program to be associated with the GARP Atlantic Tropical Experiment; to propose means for its implementation and coordination.

Members: G. Siedler, FRG (Chairman); other members to be determined.

WG 44. Tropospheric Transport of Pollutants (with ACOMR, IAMAP)

Terms of Reference: To evaluate the problems involved in studying the transport of inorganic and organic particles and gases through the troposphere and their transfer to the ocean, including the development of suitable sampling and analytical methods and to consider means for promoting their investigation.

Members: to be determined.

WG 45. Marine Pollution Research

Terms of Reference: To review the marine pollution research activities of international scientific organizations; to consider ways to promote and encourage such research and to improve its coordination, including the more effective exchange of pertinent information.

Members: G.F. Humphrey, Australia (Chairman); other members to be determined.

WG 46. River Inputs to Ocean Systems (with ECOR, IASH, ACMRR and UNESCO)

Terms of Reference: To review present knowledge of the transport of water and of dissolved and suspended substances from rivers to the ocean and the subsequent fates of these substances; to evaluate present methods and arrangements for monitoring these inputs; including those regarded as significant marine pollutants.

Members: to be determined.

ANNEX V

PROGRESS REPORT ON ICES/SCOR
NUTRIENT INTERCALIBRATION EXPERIMENT

In the first progress report two years ago preliminary results from 36 laboratories were given. Samples were distributed to 55 institutes, and several attempts have been made to get the missing results, without great success. Today data are available from 44 laboratories; of these 41 sets can be used in the statistical treatment. It is most regrettable that no data from the Soviet Union have been sent in.

In a short report to SCOR early this year the evolution of the intercalibration experiment was outlined as follows:

Draft to Table of Content:

- Introduction
- Participating laboratories
- Description of the Study
 - Preparation of the samples
 - Analytical methods
 - Glossary of terms

Results

Tabulating of all data including statistics
Results in figures
Discussion and conclusions
Acknowledgements

All data are now tabulated and available for computer treatment. The final arrangement will be discussed during the ICES meeting.

Already now the following general conclusions can be drawn:

PHOSPHATE: The Murphy and Riley mixed reagent method was used in 28 laboratories, and the same method with ascorbic acid added separately in 8 laboratories. Stannous chloride as the reducing agent was used in 5 experiments.

From the data the relative error of accuracy, equal to the mean error expressed as a percentage of the true value, can be estimated:

At the low level, $0.2 \mu\text{gat. dm}^{-3}$; the accuracy is $\pm 15\%$, with a predominant negative trend.

At the medium level, $0.9 \mu\text{gat. dm}^{-3}$; the accuracy is $\pm 6\%$, with the same negative trend, and

At the high level, $2.8 \mu\text{gat. dm}^{-3}$; the relative error in accuracy is $\pm 2\%$, with the same trend to negative values.

In very few cases the error was greater than 20 percent.

Between the various methods no significant difference could be traced.

SILICATE: This nutrient was determined (i) by measuring the yellow color of silicomolybdic acid formed, and (ii) by reducing the last mentioned complex with methol to a blue complex. Only 6 laboratories used the "yellow" method. Between the two modifications no difference in accuracy was observed.

At the low level, $4.5 \mu\text{gat. dm}^{-3}$; the relative error of accuracy was $\pm 4\%$, favoring positive values,

At the medium level, $45 \mu\text{gat. dm}^{-3}$; the relative error was $\pm 2.5\%$, with no significant trend to positive or negative values, and

At the high level, $150 \mu\text{gat. dm}^{-3}$; about 6% in relative error was observed with a trend towards low values.

As in phosphate experiment an error exceeding 10 percent was observed in few determinations only.

NITRITE: In all laboratories the method based on the classical Griess reaction was used.

At the low level, $0.2 \mu\text{gat. dm}^{-3}$; the relative error of accuracy was $\pm 5\%$,

At the medium level, $0.9 \mu\text{gat. dm}^{-3}$; the error was ca 2.5%, and

At the high level, $1.8 \mu\text{gat. dm}^{-3}$; the relative error of accuracy was also ca 2.5%.

At all levels a slight positive trend was observed.

NITRATE: In 23 laboratories nitrate was reduced in a column filled with copper treated cadmium. Nine laboratories used amalgamated cadmium, 5 laboratories the hydrazine reduction method, in 2 laboratories nitrate was reduced with zinc powder, and in one the old strychnidine method was used. For the three last mentioned methods the data are too few to make a comparison with the Cd-reduction methods possible. A skilled chemist, familiar with these old methods, can get good results; however, one must keep in mind that the samples were artificial.

In general the relative error of accuracy has been rather good:

Low level, $0.5 \mu\text{gat. dm}^{-3}$; about 2%.

Medium level, $9.0 \mu\text{gat. dm}^{-3}$; about 3%, and

High level, $30.0 \mu\text{gat. dm}^{-3}$; about 3%.

The percentages given are valid for all laboratories at the low level, but only for about half of the material at the medium and the high level, where the error in many cases exceeded 10 percent.

Several laboratories reported that they have had trouble with their columns and a further study of the reduction with cadmium is urgently needed.

In the intercalibration experiment there was an intention to study the effect of phosphate in the determination of silicate and vice versa. The data are available. However, the treatment of the material is complicated because of the fact that there is definitely silicate in various amounts in the phosphate samples and it is impossible to decide whether the response of the silicate reaction to the phosphate samples is due to the phosphate or to the silicate dissolved from the walls of the ampoules. At this moment it seems that this study must be abandoned.

Already in 1970 the ICES Working Group on chemical analysis of seawater discussed the use of nutrient standards from the Sagami Chemical Research Center in Japan in future international expeditions, and it was agreed that these standards will form a much more uniform basis for future nutrient analysis.

Folke Koroleff

Karsten Palmork
September 1972

ANNEX VI

REPORT ON SCOR WORKING GROUP 21 CONTINUOUS CURRENT VELOCITY MEASUREMENTS

Current Meter Intercomparison Experiment, 24 August - 4 September 1972

A third current meter intercomparison experiment under the auspices of SCOR Working Group 21 was performed from the Woods Hole research vessel Atlantis II at Site D between August 24th and September 4th 1972.

The intercomparison involved the use of four types of current meters Alexaev (USSR), Geodyne type 850 (USA), LSK (GDR), VACM (USA), and two types of mooring, one with surface buoyancy (463) and the other subsurface (464). A diagram showing the mooring positions and the deployment of the instruments is attached. Both moorings were set anchor first on August 24th. All the instruments were attached to the mooring line by their normal method. During the course of the experiment a set of 9 hydrographic stations was occupied, one station close to the mooring and the others at distances of 10 and 20 km, north, south, east and west of the mid point.

The Alexaev current meters recorded once every 15 minutes; the LSK's recorded speed every 10 minutes and direction every 5. The Geodyne and VACM meters were able to record at much faster rates and periods of 225 and 56.25 seconds respectively were used. Several other recorders were deployed in order to monitor mooring performance and meteorological conditions. There was a wind recorder on the surface buoy and a recording tensiometer at a depth of 45 m below the toroidal buoy. The upper end of the subsurface buoy had a depth recorder capable of resolving depth changes of 50 cm and at the nominal 500 m level on each mooring was a TENSAC (tension and acceleration recorder).

The horizontal separation of the two moorings was less than had been intended and there was some apprehension that the moorings might at some stage during the experiment become tangled. When the subsurface buoy was recovered, (on September 4th) there was damage to the instruments and to the mooring line at the 200 m level. On the surface buoy there was damage to instruments at all levels and again to the wire near 200 m. The damage to the instruments at

50 and 1000 m on the surface buoy is not likely to have been caused by tangling of the two mooring lines and must have been due to severe mooring motion.

A summary of instrument performance is given in the Table together with the depths at which the current meters settled. There is a considerable mismatch (~ 40 m) between the depths of the 200 m instrument groups on the two moorings. Measurement of the lengths of wire rope used on mooring 464 shows that one of the 500 m lengths in mooring 464 was in fact 6% too long due to an error made by the manufacturers. Evidence from the current depth and tension records that have been analysed up to the present time suggest that the tangling may have occurred within the last 2 days of the experiment.

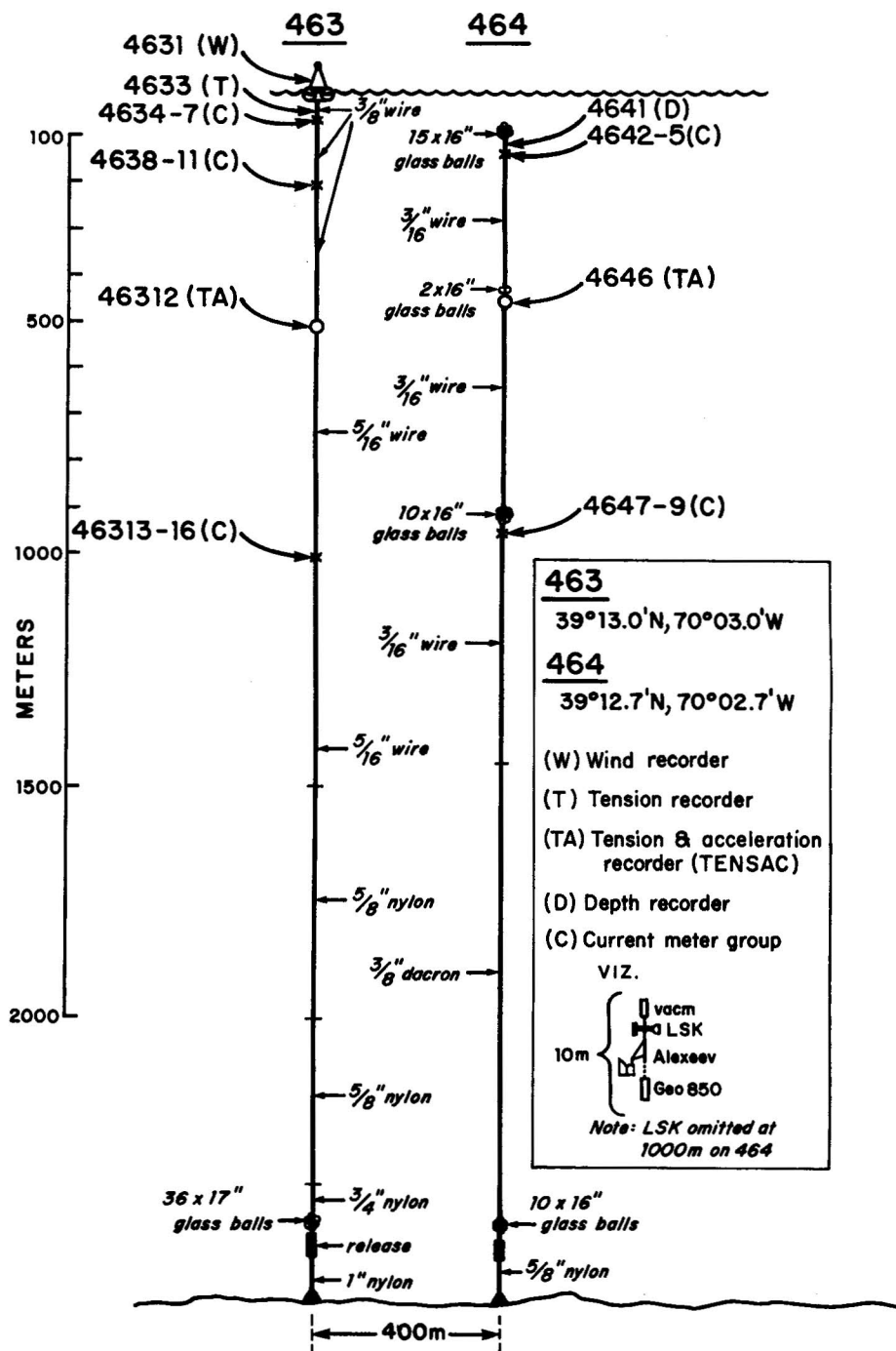
The performance of the current meters has been good and calibration tests are now in progress at Woods Hole.

SCOR WG 21

Current Meter Intercomparison, Woods Hole, Aug-Sept 1972

		Depth (m)	<u>Surface Buoy (463)</u>
4631	(W)	0	Record very noisy but readable
4632	(T)	2	Telemetry tensiometer
4633	(T)	45	Recording tensiometer. Good record
4634	(V)	47	No damage. Good record
4635	(L)	48	Propeller and vane missing. Recorded for whole period of mooring
4636	(A)	49	Fins missing from current meter and damage to rotor cage. Record bad from 1815Q 2-IX; Stops 1915Q 2-IX
4637	(G)	53	Damage to paint. Good record
4638	(V)	197	Rotor out of bearings 0200Q 4-IX. Vane missing from 1800Q 2-IX otherwise good
4639	(L)	198	Meter had slipped down the wire. Propeller missing and damage to vane. Recorded for whole period
463,10	(A)	199	Fins missing. Damage to suspension and rotor and rotor cage. Records stops 1815Q 2-IX. Otherwise good
463,11	(G)	203	Damage to paint. Good record
463,12	(TA)	501	TENSAC flooded. No record
463,13	(V)	999	No damage. Good record
463,14	(L)	1000	Propeller and vane missing. Recorded for whole period
463,15	(A)	1001	Severe damage to fins. Stop 2330Q 28-VIII. Otherwise good
463,16	(G)	1005	No damage. Good record
<u>Subsurface Buoy (464)</u>			
4641	(D)	160	Good record. Settled at 130 m.
4642	(V)	162	Paint chafed off pressure case. Good record
4643	(L)	163	Current meter had moved up the wire. Evidence of damage. Good record. Piece of wire jacket found in clamp
4644	(A)	164	Damage to rotor cage. Record stops 2300Q 3-IX. Otherwise good
4645	(G)	168	Rotor missing 0230Q 4-IX. Damage to rotor cage. Good record
4646	(TA)	457	Good record
4647	(V)	1002	No damage. Good record
4648	(A)	1003	No damage. Good record
4649	(G)	1007	No damage. Good record

<u>Code</u>	(W)	Wind recorder	(D)	Depth recorder
	(T)	Tension recorder	(L)	LSK current meter
	(V)	Vector Averaging current meter	(A)	Alexaev current meter
			(G)	Geodyne type 850 current meter
			(TA)	Tension and acceleration records



REPORT ON SCOR WORKING GROUP 23
ZOOPLANKTON LABORATORY METHODS

Meeting in Bath, 13-20 July 1972

The second and final meeting of Working Group 23 was held at Bath University, Bath, England from July 13-20, 1972, in conjunction with a Symposium on the Fixation and Preservation of Marine Zooplankton. The following members of WG 23 participated:

Chairman V. Kr. Hansen (Denmark), J.R. Beers (USA), H.J. Flugel (FRG), B. Kimor (Israel), H.F. Steedman (UK), T. Tokioka (Japan).

Dr. M.E. Vinogradov (USSR) sent his apologies for being unable to attend.

Activities 1968 - 1972

A report issued following the first meeting of WG 23 in Washington, D.C. (March 25-30, 1968) was published in the SCOR Proceedings, volume 4. The Interim Recommendations on Methods of Fixation Preservation and Biomass Determination given in the report have been further studied by the Working Group through experiments and discussions. Revisions to the interim recommendations will be published in the manual on Laboratory Methods in the Study of Marine Zooplankton under the relevant sections (ref. below). The Proposals for Future Activities made by WG 23 at the meeting in 1968 have all been implemented.

Report on the Meeting in Bath

The Symposium program included the following lectures:

Dr. H.F. Steedman: Fixation and preservation in liquids. I. Aldehydes. II. Alcohols, glycols and other reagents. III. General physical and chemical properties of preserving reagents - osmotic properties, pH, etc.

Dr. F.J.R. Taylor: Fixation, preservation and documentation of non-photosynthetic unicellular marine plankton.

Dr. Ruth Turner: Fixation, preservation and storage of marine boring mussels.

Dr. M. Omori: Variations in dry weight, organic matter, and concentrations of carbon, nitrogen, and hydrogen in freshly prepared and in fixed zooplankton.

Dr. J.R. Beers: Methods for estimation of plankton biomass.

Dr. K.W. Petersen: Preservation of medusae, siphonophora, ctenophora and special techniques used for identification of preserved specimens.

In addition, demonstrations were given on the following topics:

Data processing of marine zooplankton collected by the Hardy continuous plankton recorder (Dr. Hunt).

Identification of marine zooplankton by electronic measuring devices - "Quantimet" (Mr. Fawell).

Laboratory utensils for handling and sorting marine specimens - containers, labels, catalogs, etc. (Dr. Fehlmann).

Deep freeze drying of marine organisms in the field and in museums (Mr. Harris).

Identification, labelling, processing and data recording methods (Dr. Faber).

The Working Group conducted meetings during the morning of July 13, between sessions of the Symposium, and on July 19. The final drafting of this report was on July 20.

The principal topics of the WG 23 discussions during its meetings at Bath University were concerned with:

1. The preparation and publication of a manual on zooplankton laboratory methods.
2. Continuation of the current experiments on the fixation and preservation of zooplankton, and
3. The initiation of new activities relevant to the above.

Recommendations

1. Manual on Zooplankton Laboratory Methods

UNESCO has agreed to publish a manual on zooplankton methods compiled by WG 23. In this connection, it is recommended that:

- (i) the title of the manual should be Laboratory Methods in the Study of Marine Zooplankton.
- (ii) the manual should be in loose-leaf style with a durable hard cover
- (iii) each numbered section should be paginated separately to allow for substitutions of new or replacement parts
- (iv) each numbered section should be followed by its pertinent reference
- (v) an Editorial Board be responsible for the preparation of the manual. It should consist of Drs. Beers, Hansen, Steedman and Mr. Griffiths, a planktologist who is currently engaged in collecting, and represents the viewpoint of the user of the book
- (vi) UNESCO make available to the Editorial Board the technical advice of a professional layout man from their staff
- (vii) Dr. Steedman be the Chief Editor to be responsible for communicating with UNESCO
- (viii) for Section 8 dealing with the various taxonomic groups there should be a Special Editor, Dr. K.W. Petersen, to ensure uniformity of presentation and to prevent duplication of information
- (ix) UNESCO seek funds to enable Dr. Petersen to consult with authors when the Editorial Board deems it necessary
- (x) following publication of the manual, a permanent editor should be appointed by UNESCO to be responsible for the updating of and additions to the book
- (xi) specific details regarding processing and handling of zooplankton samples under different climatic and hydrographic conditions be provided in the manual
- (xii) a list, with current prices, of suppliers of chemicals, glassware and other equipment from as many countries as possible be included, and
- (xiii) condensed reports of about 10 pages each on the experiments carried out at the IOBC, Cochin, India and in Japan, together with the edited symposium lectures of Drs. D. Jones, M. Omori, and M. Vinogradov be published with the manual. If this proves to be impossible for financial reasons they should be published together in an appropriate periodical with reference to the manual and with an introduction to the Bath University Symposium.

2. Proposals for the Continuation of the Current Experiments on the Fixation and Preservation of Zooplankton

2.1 Observations of the experiments on the preservation of zooplankton which were initiated under WG 23 auspices must be continued at least until 1979 in order to prove the effectiveness

of the preservatives over long periods of time. Series of experiments, started in 1969, are being conducted at the Smithsonian Oceanographic Sorting Center (SOSC), Washington, D.C., USA; Bath University, England; and the Seto Marine Laboratory, the Faculty of Fisheries of Hokkaido University, and the Ocean Research Institute of Tokyo University, Japan.

It is recommended that SCOR should approach these institutions requesting them to provide support and suitable financial aid for the technical assistance that will be required to ensure the continuation of the observations.

It is further felt desirable that a co-ordinator be selected to establish exchange of information between these institutions.

2.2 Other series of experiments have been undertaken at the Indian Ocean Biological Center, Cochin, India and the Regional Marine Biological Center, Singapore.

It is recommended that UNESCO continues support of these programmes currently in progress, and examines whether the Advisory Panel for UNESCO-Sponsored International Marine Biological Centres would be the appropriate coordinating body for these two programmes.

3. Proposals for Further Desirable Activities

3.1 The technique of freeze-drying for the preservation of zooplankton and other marine organisms was demonstrated during the Symposium. Results with this method for long-term preservation seem very promising, and much interest was expressed in this as an excellent method with numerous advantages for the planktologist. To date we have only very limited experience with this technique.

It is recommended that detailed observations on the chemical and morphological effects of freeze-drying should be made relative to preservation of marine zooplankton. It would be an advantage if this were conducted at the Smithsonian Oceanographic Sorting Center, where a part of this work has already been done and where there is already the machinery available.

3.2 The need was expressed for new experimental studies to confirm and expand the work on fixatives-preservatives completed under WG 23 as well as to examine such additional parameters as the use of narcotising agents in zooplankton fixation in more depth than has been possible to date.

It is recommended that SCOR seek the initiation of such studies at the SOSC, Washington, D.C., under the direction of a competent chemist-biochemist to be appointed to their staff. It was felt desirable that a coordinator be selected to establish exchange of information between these institutions.

3.3 The experiments organised by WG 23 have dealt with the chemistry of fixatives and preservatives and the practical aspects of their use for zooplankton. Following consultation with the observer from WG 33 present at the Bath Symposium it is suggested that the methods be examined in regard to phytoplankton studies.

3.4 In open discussion during the Symposium it was noted that some important aspects with regard to the study of zooplankton in the laboratory and the handling of data were not considered by the Working Group 23. It was suggested by delegates at the Symposium that immediate consideration be given to extending the scope of the manual to include such topics as:

- (i) enumeration and subsampling methods including relevant statistical analyses
- (ii) microscopy, with special emphasis on the preparation of material for transmission and scanning electron microscopy
- (iii) chemical/biochemical analytical techniques and the estimates of values for energy flow and production modelling

- (iv) photographic methods of recording for taxonomic, behavioral, and morphological purposes and long-term environmental changes with suggestions on documentation and retrieval of both still and cine film
- (v) basic statistical techniques and parameters for use in plankton studies, and the
- (vi) suitability of freeze-drying for biological archives.

While the Working Group is sympathetic with regards to the needs for the examination of certain of the above-listed topics, others seem to have been adequately covered for the present in recent publications. In either case, the Working Group 23 feels that these subjects are outside their terms of reference. It does, however, suggest that SCOR examines the need for forming working groups to study these subjects, in particular nos. ii, iii, iv and vi. Working Group 23 does recommend that any future working groups issuing manuals on these topics consider the use of the loose-leaf style for their publications.

3.5 Working Group 23 expressed the hope that on the basis of the information obtained through the activities of this group and the need for additional experience, UNESCO would organize courses and programmes in plankton laboratory methods.

3.6 Dr. A. Fehlmann reported that he had arranged for the compilation of more than 3,000 references in the field of fixation and preservation of biological material including methods applied in industry. The Working Group took note of this information and expressed the hope that the Smithsonian Oceanographic Sorting Center would, in due time, make these references available to interested marine biologists.

ANNEX VIII

REPORT OF SCOR WORKING GROUP 32 BIOLOGICAL DATA INVENTORIES

Proposal for a Second-Level Inventory System to Facilitate Dissemination and Exchange of Biological Oceanographic Data

1. Introduction

The objectives of any system to facilitate the dissemination and exchange of marine biological data are:

- (i) To provide Institutes and individual workers with any available information which can supplement their own observations.
- (ii) To facilitate the compilation of comparative data from different regions.
- (iii) To provide individual workers with information about possible sources of material for taxonomic and other studies.
- (iv) To assist in local, national and international programme planning by making it possible to identify gaps in existing information and to provide a convenient source of information on the form and status of current work in a given area.

It is generally recognized that the traditional means of information exchange, by reference to and exchange of publications, no longer provides an adequate means of obtaining data. There is a growing need for improved handling and accessibility of biological data. The number of large international projects, FAO projects and other investigations in biological oceanography is growing. The amount of data being collected by continuous measuring and sampling devices is rapidly increasing. There is a growing need for long-term monitoring of marine communities for pollution, conservation and management studies and in relation to these there is a growing interest in eco-system modelling.

In many instances it is not practical to meet the needs for data management with respect to these developments through the medium of publication and it seems necessary to look for an alternative. Despite repeated and continuing efforts to standardize methods, most biological data still require detailed information to be available on the methods of collection and analysis. The interpretation of the data is often influenced by these considerations. Therefore, the submission of raw data to an agency and subsequent retrieval based on a centralized data bank cannot be regarded as a satisfactory basis for data dissemination in many fields of marine biology.

What is required is a method of establishing communication between a user and those agencies and institutions which hold data that might be of interest to the user. The centralized storage of inventories of the data holdings of institutions supported by a retrieval system adequate to meet the needs of the majority of users would appear to be, at present, the most generally applicable means of information exchange.

It seems reasonable that the institutional basis for any system should be the national and international oceanographic data centres. It would appear that the referral concept is playing an important and increasing role in the activities of these centres. An interdisciplinary (including biology and pollution) data inventory system based on the ROSCOP reporting form is being developed which is designed to provide an immediate report that observations have been made. In most disciplines the data reported by means of the ROSCOP system should be immediately available for exchange. A large proportion of biological observations, however, take the form of samples of organisms which have to be sorted and counted or at least require fairly extensive treatment in the laboratory subsequent to their collection. The time lag between collection and the production of exchangeable data, other than the material itself, is commonly several months and may extend to several years.

In addition, the considerable diversity of biological data and the associated comparability problems means that most users require, at least for a first look, developed statements of the results of observations rather than simple listings of raw data.

Taking all these factors into consideration it is believed that there is a need to supplement the initial reports that observations have been made, the ROSCOP system, by a second-level inventory system the objective of which is to provide a medium for the reporting and centralized banking of information about the structure and format of the results of biological observations.

It is visualised that the main banking agency for the second-level inventory will be WDC-A, Oceanography. Reports of data and requests for information will probably be channeled through national oceanographic data centres or designated national agencies. These may wish to provide limited banking facilities.

2. The Proposed Inventory System

2.1 Content and Structure

The basic aim of any data inventory is to establish communication between a user and all the holders of all the data which might be of value to the user.

The inventory must contain information required for search and select processes in response to an inquiry by a user. This information must satisfy the question WHO did WHAT and WHERE and WHEN was it done?

In addition the inventory must contain information to enable the data holder to identify the data set and further information for the user to assist him in selecting, from data sets listed in response to a formal WHAT, WHERE, WHEN inquiry, those which are likely to provide him with the information he needs. For this purpose the user needs to know about methods and sampling program, availability, data structure and data format.

2.1.1 Search and Select

2.1.1.1 WHO?

Each inventory entry must contain a reference to the title and full postal address of the institute or agency responsible for holding the data.

2.1.1.2 WHEN?

This should be reported by listing the dates of the first and last days on which the observations covered by the entry were taken or, in the case of monthly or yearly summaries, the time span in months and years. The inventory entry need only include month and year references.

2.1.1.3 WHERE?

This is probably the most difficult question. For the benefit of users the location of the observations should be defined as closely as possible. To allow efficient retrieval the area definition should be as simple as possible. Reporters require a versatile system which can cope with a wide variety of data acquisition systems.

The only obligatory area report system proposed for the ROSCOP inventory is by 10° squares. It is the view of WG 32 that this will not meet the requirements of a large number of users. This view is supported by the U.S. NODC from their experience with NAMDI; the FAO fisheries data centre, because most fishery data relate to areas considerably smaller than 10° square; and ICES, due to their interest in the North Sea and the Baltic Sea.

A uniform grid fine enough to satisfy the user would probably be a 1° square. From the data centres' view the search procedure may have to be stratified but is not basically different from one based on 10° squares. The reporter, however, will have difficulty in recording long-linear tracks which are likely to be involved to an increasing extent as under-way data acquisition systems continue to be developed.

Probably the most useful system from the points of view of the reporter and the user is based on a reporting system which permits differentiation between stations, lines and areas, positions being reported in terms of Lat. and Long. to the nearest minute. The position of stations may be reported individually or if a number of closely grouped stations are involved an area may be reported by means of the positions of the corner points of a delimiting polygon. A single line may be reported by the positions of start, altered course and end points. A network or set of lines may be reported as an area.

Given this reporting system the user can define his area of interest by giving the positions of the corner points of a delimiting polygon.

This system clearly presents problems for the retrieval system. The search procedure would very probably have to be stratified and the fine level search would be mathematically more complicated than for a search based on a uniform grid. The basic process involved can be reduced to one of determining whether or not two lines intersect.

WG 32 strongly recommends that this system be given serious consideration and, if it should prove unacceptable for technical reasons, at least the reporting system should be retained with the inventory containing references to 1° squares. The user would then be able to define his area of interest in terms of a rectangle of 1° squares.

2.1.1.4 WHAT?

The inventory must contain a reference to the subject of the observations. Perfect subject classifications do not exist and the number of classes that can be incorporated in a

practical report system is strictly limited. This was probably the weakest aspect of the original ROSCOP inventory and, in order to overcome some of the shortcomings, the IODE Task Team introduced additional lists of studies to supplement the subject classes.

A considerable improvement in subject definition can be achieved if the study list is used to qualify a specific subject, defining a sub-set. For example, the subject PELAGIC FISHES could be qualified by MARKING AND/OR TAGGING. And, if the report covered trials of a new fish tag the subject could be further qualified thus, PELAGIC FISHES, MARKING AND/OR TAGGING, EQUIPMENT TRIALS and STUDIES.

This system is suggested for the second-level inventory and a provisional list of study headings is incorporated in the proposed report form.

Provided reasonable AND/OR logic is applied it seems likely that retrieval will be possible on a single pass search and the system should not produce any major problems for the data centre.

2.1.2 Data Identification

The inventory must contain information to enable the data holder to identify the data set from amongst his own holdings in response to a request for a user.

The proposed report form contains entries for a form reference number, to be allocated by the reporting institute; a program name or title, if applicable; the name or title of an individual, team or department within the reporting institute; an originators' reference number allocated by the reporter, which might be a cruise number; the type of platform used for making the observations and the identification of the platform, these will commonly be an oceanographic ship and her name.

Reporters should be encouraged to complete as many of these entries as possible because it is believed that this is an area in the inventory where some redundancy will do no harm.

2.1.3 Additional Information for the User

The user should be provided with as much information as possible, within the framework of an inventory concept, to assist him in selecting data sets which are likely to contain the information he needs.

The proposed report form contains entries for the nature of the area covered by the observations, indicating whether it is an estuary or the open ocean, etc., and the IHB area code. Sections of the form cover sampling gear, sampling program, analytical methods, data structure and data format, availability and deposition of the data. Also, reporters are encouraged to supply supplementary information in the form of cruise tracks, station lists, species lists, specimen data lay-outs, etc.

2.2 Integration into the International Oceanographic Data Inventory System

The proposed biological second-level inventory can be implemented as a stand-alone system. It is believed, however, that the value both of this system and the ROSCOP inventory would be greatly enhanced if they were integrated.

The machine retrievable sections of the proposed second-level system have been designed to be compatible with what WG 32 would like to see in the ROSCOP inventory, and it would be an advantage from the reporters point of view if the relevant sections of the report forms were made identical.

The integrated system, from the data centre's point of view, might work as follows:

ROSCOP reports are received indicating that observations have been made. After a

lapse of time, second-level reports would be received which would contain a reference to the ROSCOP report or reports up-dated by the second-level report.

If necessary the data centre could periodically (say, 4-monthly) search the ROSCOP inventory and retrieve all reports of biological observations that have not been updated and requests for second-level reports could be channelled through NODC's and DNA's to Institutes.

In response to a request for biological information from a user the second-level inventory would be searched followed by the first level inventory but, in this search, only those entries not marked as having been updated would need to be retrieved.

The user gains a virtually automatic search of both first and second-level inventories in response to a single request.

The reporter gains from the similarity of not inconsiderable sections of the two report forms.

The data centre gains from the fact that the coding and retrieval systems for the two inventories are virtually identical. The only additional requirement is a system for marking updated ROSCOP entries.

WG 32 believes that the benefits, in terms of service to users, to be gained from integration of the first- and second-level inventories are considerable, and, although the process of achieving compatibility between the two report forms might involve some delay in the implementation of ROSCOP, it is considered that the advantages will more than compensate for this.

WG 32 would also like to draw attention to the fact that the proposed biological second-level inventory system could be applied to other disciplines: there is very little in the system, apart from the subject lists, which refer specifically to biological data.

In particular, it is believed that the section on data structure and data format could be carried over unmodified to other disciplines and all that might be necessary is to extract the relevant subject list from the ROSCOP report form and modify the section on sampling gear and analysis methods.

3. The Inventory Report Form

3.1 Design and Layout

There are advantages in aiming for compatibility with machine printing systems including typewriters, teletypes and line-printers. This implies a fixed line and column spacing and a separate page layout.

The advantages are:

- (1) Forms may be completed in typescript.
- (2) Reporters may produce complete forms on a teletype or line-printer during routine data processing procedures and the results would closely resemble the printed version.
- (3) The reply to a user's request could consist of machine produced pages mixed with xerox copied pages with no marked inconsistencies in style and format.
- (4) Separate page layout facilitates copying on xerox and other machines.
- (5) Separate page layout facilitates the publication of complete, or sections of, report forms (see, for example, the ICES publication of ROSCOP forms).
- (6) Flexibility in the structure of reports.

For example, more than one data structure report could be attached to a single data identification section.

It would appear that the commonest spacings on machine printing systems are 1/6 inch line spacing and 1/10 inch column spacing. The maximum length of a line is set by teletypes at 72 characters and the maximum number of lines is set by line-printers at 60 lines (leaving 3 line margins at top and bottom). These give a printed area of 7.2 by 10 in. and a page size of about 8 by 11 in. Such a size can be copied on a wide range of document copiers and can be filed easily in normal folders.

It is probable that the form will frequently be completed in manuscript and a space of 1/5 in. by 1/3 in. (four times the printed character area) should be allowed for each manuscript character wherever possible.

A trial form was provided using a multiaccess teletype and divided into 60 line pages. Any developed version should retain the same spacings of entries but greater clarity could be introduced by varying the size and font of the printed headings. The form might be produced as a set of tear-off pads and possibly in concertina continuous form for typed entries.

4. The Inventory Request System

The system is adequately described by the proposed form and completion instructions are available separately with the exception that the final version should contain some statement on any charges involved. This will obviously depend on policy decisions by WDC-A and national agencies.

5. Implementation of the System

Resistance to the scheme is anticipated from some potential reporters who may see it as just another useless and admittedly rather complicated form to be filled in, and also from some who may be reluctant to make available to other users developed data and results over which they have expended much time and effort.

The best way of overcoming this kind of resistance is to show that the system works and is successful in meeting the needs of users.

Publicity exercises, probably at national level and mounted by national data agencies, are going to be needed to launch the scheme and see it through the early stages of development.

It seems probable that periodic publication of extracts of the inventory entries will help in publicising and selling the system.

National data agencies will also have to be responsible for seeing that all the institutes producing relevant data are asked to submit returns. The inclusion of a section on pollution observations means that a wider range of institutes (including river and harbour authorities and some public health authorities) will be involved than was envisaged in the original ROSCOP proposal.

6. Conclusion

WG 32 would like to stress their belief in the need and value of an international data referral system for biological oceanographic (including estuarine and marine pollution) data.

It is inherent in any such scheme that it can provide a really valuable service only after the passage of several years when the inventory will contain a reasonable number of entries.

The working group are forecasting that users will need the system and that their needs will be met by the system proposed in this report.

REPORT ON SCOR WORKING GROUP 37
MARINE PLANKTON AND SEDIMENTS

Meeting in Montreal, 31 August - 1 September 1972

The Working Group held its first meeting in Montreal, August 31 - September 1, 1972. Participants were: BE, BOLLI, FUNNELL, RIEDEL, SEIBOLD (Chairman), and TAKANAYAGI; J.D. HAYS as an observer. Written and oral comments were sent by JOUSE, BERGER, and SCHRADER.

After discussion of the new advances mentioned in the revised terms of reference (SCOR Proceedings, vol. 8, no. 1) WG 37 recommends that the planned symposium in Kiel University (first half of September 1974) should consist of three parts:

- (1) Meetings of consultant groups; (2) Invited lectures; (3) Shorter contributions to the "3rd Planktonic Conference".

We recommend that the language should be English. Discussion in other languages should be translated into English by colleagues.

Provisional Program

1. Meetings of consultant groups

It is proposed that about 6 - 12 researchers of each of 6 different planktonic organism groups should meet in Kiel during three days preceeding the presentation of lectures.

(a) To discuss such topics as "High Level Taxonomic Systems", "Standardisation of Species Identification", "Shell Formation", "Stratigraphic Correlation", "Data Processing and Analysis".

(b) To comment on manuscripts of appropriate invited papers; these comments to be added to the planned symposium volume.

(c) To prepare summaries of their activities, recommendations, etc., for presentation at the symposium and for inclusion in the planned symposium volume.

The following consultant groups were suggested:

Planktonic Foraminifera, Pteropods, Radiolarians, Diatoms + Silicoflag, Dinoflagellates, Coccoliths.

2. Invited lectures

Invited lectures on the following topics are suggested (45 minutes each):

- A. Biogeography
 - (1) Oceanographic Factors Influencing the Distribution of Plankton in Space and Time
 - (2) Factors Determining Diversity and Dominance in Planktonic Foraminifera
- B. Microfossils in Deep Sea Sediments
 - (3) Mechanical Processes Influencing the Distribution of Pelagic Sediments
 - (4) Processes Controlling Calcareous Biogenous Deposits
 - (5) Processes Controlling Siliceous Biogenous Deposits
 - (6) Quaternary Paleo-ecological Problems in Plankton

- C. Biogeography and Evolution of Plankton in Cenozoic and Mesozoic Deep Sea Sediments
 - (7) Cenozoic and Mesozoic Pelagic Sediment Distribution Patterns
 - (8) Diagenesis in Pelagic Sediments
 - (9) Occurrence and Causes of Major Hiatuses in Pelagic Sediments
 - (10) Problems in Neogene and Paleogene Correlations based on Planktonic Microfossils
 - (11) New Information on Cenozoic Planktonic Biogeography and Evolution
 - (12) Biogeography of Mesozoic Planktonic Foraminifera
 - (13) Late Mesozoic and Cenozoic Isotope Paleotemperatures
- D. New Results from Plankton Groups
 - (14) Results of Consultant Group Meetings
 - (15) Evolutionary Studies in Cenozoic Radiolarians
 - (16) Cenozoic Diatom Stratigraphy
 - (17) Paleo-Ecology, Preservation and Stratigraphy of Cenozoic Calcareous Nannoplankton
- E. General Methods
 - (18) Probability Stratigraphy
 - (19) Integration of Biostratigraphical Information from Numerous Sequences
 - (20) Statistical Paleo-Ecology
 - (21) Physical Methods in Dating Pelagic Sediments

3. Shorter Contributions

As in the 2nd Planktonic Conference this part should be open for non-invited speakers. Probably parallel sessions would be necessary.

4. Time Table

Thursday - Friday - Saturday: 9 - 12/14 - 18 meeting of consultant groups

Sunday: Preparation of summaries

Monday - Friday: 08.30 - 10.30 Invited lectures

11.00 - 13.00 Invited lectures

14.30 - 15.30 Demonstrations: Exchange, examination and discussion of materials in university laboratories

15.30 - 19.00 Shorter contributions, partly parallel sessions

5. Publication

(a) Abstracts of invited and non-invited lectures should be available at the beginning of the symposium.

(b) Preprints of invited lectures should be available to members of WG 37, the other invited lecturers and consultant groups 3 months before the symposium.

(c) Revised manuscripts, together with important comments on the invited lectures and group summaries should be available not later than 2 months after the symposium. These manuscripts (but not the shorter contributions) are planned to be published in a symposium volume of 300 - 400 pages, illustrations included. The non-invited papers should be published in appropriate journals.

6. Deadlines

We plan to send a first circular, as an announcement, in February 1973.

- (1) to interested colleagues on our list of active workers

- (2) to national committees of SCOR and IUGS
- (c) to other interested international organizations (IABO, IGCP, etc.)

The second circular which will include a preliminary program - with names of speakers for invited lectures - and registration forms, will be sent in October 1973. Abstracts for papers have to be sent to Kiel up to April 1, 1974. The third circular will contain the final program, final registration, etc., and will be circulated in May 1974.

7. Finances

At the moment uncertain, because they depend to a high degree on acceptance of invited speakers and consultant group chairmen. Estimated: Slightly higher than Cambridge-Symposium SCOR WG 19, 1967.

8. Final Remarks

We expect the symposium will provide a major opportunity to synthesize results of the Deep Sea Drilling Project and very significant micropaleontological work on ocean sediments undertaken since 1967.

ANNEX X

REPORT ON IAPSO EXECUTIVE COMMITTEE MEETING

Edinburgh, 19-20 September 1972

1. The IAPSO Procès-Verbaux No. 11, pertaining to the General Assembly held in Tokyo, has been issued and Procès-Verbaux No. 12, pertaining to the General Meeting in Moscow, is being distributed to all National Correspondents, committee members, and officers of associated organizations.

2. IAPSO Symposia

- (a) Aspects of Optical Oceanography, Copenhagen, 19-20 June 1972, was convened by Professor Nils Jerlov.
- (b) Contributions of Deep-Sea Drilling to Geology, (sponsored by IUGS and IUGG) was convened by Drs. M.N.A. Peterson and B.C. Heezen, in Montreal, 23-24 August 1972.
- (c) Physical Oceanography of the Red Sea, (sponsored by UNESCO and SCOR) was convened by Professors H. Lacombe and P. Tchernia in Paris, 9-10 October 1972.

3. The newly formed ad hoc Working Group on Ocean Optics held its first meeting in Copenhagen, 23 June 1972. The core members attending were:

N.G. Jerlov (chairman)
A. Ivanoff
Yu.E. Ochakovsky
J.E. Tyler

Co-opted members were:

G. Kullenberg
A. Morel
R.C. Smith
R.V. Zaneveld

4. IAPSO Representatives/Observers at Meetings

- (a) Dr. A.E. Gilmour represented IAPSO at the International Symposium on the Oceanography

of the South Pacific, sponsored by the Royal Society of New Zealand and UNESCO, and convened in Wellington, 9-15 February 1972. A report on the Symposium is contained in the IUGG Chronicle.

- (b) Professor K. Grasshoff was IAPSO Observer at the UN Conference on the Human Environment, convened in Stockholm, 5-16 June 1972. His report on this Conference will be published in the Chronicle.
- (c) Ing. M. Eyries represented IAPSO at the International Hydrographic Conference, held in Monaco, 11-22 April 1972. His report on this Conference will be published in the Chronicle.
- (d) Professor K. Grasshoff was IAPSO representative at the Conseil International pour l'Exploration de la Mer (ICES), convened in Helsinki, 25 September - 4 October 1971.
- (e) Professor E. Eriksson was IAPSO representative to the 8th Session of the ICSU Scientific Committee on Water Research (COWAR), convened in Rome, 4-6 May 1972. His report on this meeting will be published in the Chronicle.

5. IAPSO members nominated to the IUGG Inter-Association Commission to Study Natural Catastrophies were:

G.W. Lennon, for Variations in Sea Level
B. Zetler, for Tsunamis
Masamori Miyazaki, for Typhoons

6. Future Assemblies

- (a) A Joint IAMAP/IAPSO Scientific Assembly is scheduled for Melbourne, Australia, 14-24 January 1974. The IAPSO scientific program will stress Air-Sea Boundary Layers. The First IAMAP Circular has been distributed and the First IAPSO Circular will be issued in November 1972.
- (b) An IAPSO General Assembly, to be held in connection with the IUGG General Assembly, is scheduled for Grenoble, France, in August 1975. A tentative list of topics and conveners was proposed.

ANNEX XI

REPORT ON IABO ACTIVITIES IN 1972

The Executive Officers of IABO met on 11 January, 1 July and 20 September to review current and future activities. IABO was represented at the Executive and General Meetings of SCOR in January and September 1972, and of SCAR in August, as well as at the 60th Statutory Meeting of ICES in September. IABO Officers participated in various international scientific meetings, including the Pacific Science Congress and the European Marine Biology Symposium.

Working Groups

A considerable number of SCOR Working Groups related to biological problems were established in consultation with the IABO Executive and with IABO National Correspondents. The Working Groups as listed in SCOR Proceedings are under continuous revision by SCOR, again in consultation with IABO.

Three IABO Working Groups were jointly established with ACMRR or are under preparation. They deal with the following problems:

- On marine aquaculture (first report to be issued in October 1972)
- On application of ecological theory to management of fisheries resources and environment
- On bio-essays and toxicity tests in aquatic environmental studies.

IABO Symposium

In collaboration with ICES, ACMRR, SCOR and ICNAF, IABO will hold a Symposium on the early life history of fish, Oban, Scotland, 17-22 May 1973. About 150 participants and 120 papers were announced. A Steering Committee (Chairman: J.H.S. Blaxter, Oban) was set up by IABO and the co-sponsoring organizations, and met on 24 September, to review the programme and in particular to develop a policy for reducing the number of contributions. Financial contributions by the co-sponsoring organizations are required for travel funds for participants, particularly from developing countries, and for the production of meeting documents.

New Projects

At the meetings of the IABO Executive and through correspondence, the following fields of biological oceanography were identified for future activities, being the possible themes of future working groups and/or symposia.

- Productivity of mangrove and other sheltered warm water habitats.
- Chemical factors influencing phytoplankton.
- Long-term changes in fishery resources in relation to environmental changes
- Standardization and further development of quantitative methods in certain fields of microbiology.

Proposals for working groups on the dynamics of ecosystems and microdistribution of marine organisms will be the subject of further discussions and correspondence.

The limited means available require the establishment of priorities, therefore, the proposal for a symposium on the use of electron-microscopy for identification of marine organisms was declined for the time being. The same holds for a symposium on indicator species and communities for identification of water masses, pollution and climatic changes, which are themes of various working groups and seminars under preparation by SCOR and ACMRR.

Detailed information on IABO's previous activities is given in IABO Proceedings, vol. 1. The second volume will be issued in early 1973 by the IABO Secretary, Dr. T. Wolff, Zoological Museum, Universitetsparken, Copenhagen Ø, DENMARK.

ANNEX XII

REPORT ON CMG ACTIVITIES IN 1972

1. Meetings

The fifth meeting of the Commission for Marine Geology was held on 28 August 1972, during the XXIV International Geological Congress in Montreal.

Further informal discussions took place 21-23 September 1972, during the XI Meeting of SCOR in Oban, Scotland.

2. Membership

The names of CMG members as of 30 September 1972, are as follows:

T.F. Gaskell (Chairman), UK; E.S.W. Simpson (Secretary), South Africa; P.L. Bezrukov, USSR; J.M. Harrison (Associate Member), Canada; B.C. Heezen, USA; A.S. Laughton, UK; A.E. Maxwell, USA; N. Nasu, Japan; E. Seibold, FRG; G.B. Udintsev, USSR; S. Uyeda, Japan.

The Commission accepted with regret the resignation of Dr. Xavier le Pichon.

3. Relationship with other bodies

(a) SCOR. Both the Chairman and Secretary of CMG attended the XVI meeting of the SCOR Executive Committee in Copenhagen, 10-12 January 1972, and the XI meeting of SCOR in Oban, Scotland, 21-23 September 1972.

(b) IAPSO/IUGG. The Secretary of CMG attended meetings of the IAPSO Executive Committee in Edinburgh, 19-20 September 1972, during the Challenger Centenary Celebrations and Symposium on the History of Oceanography.

(c) ICG. Professor Seibold attended meetings of the Inter-Union Commission on Geodynamics in Montreal, August 1972, and presented the report of WG 8 (Structural Connections between Continents and Ocean Basins) on behalf of the Chairman, Professor Simpson.

(d) ECOR. The Chairman of CMG has established and will maintain, on behalf of SCOR and CMG, liaison with the Engineering Committee on Oceanic Research.

(e) IHB. The Chairman of CMG attended the International Hydrographic Bureau meeting in Monaco during April 1972, to foster official cooperation between hydrographers and marine geologists concerned with morphological mapping of the ocean floor.

(f) IGCP. Professor Seibold submitted a written report on the activities of CMG for the International Geological Correlation Programme report.

4. CMG Special Projects

(a) Handbook on National Programmes and Facilities

The CMG Handbook listing the marine geoscientific programmes and facilities of many (but by no means all) countries was produced and distributed in 1971. The feasibility of producing a second and hopefully more comprehensive edition is being investigated, and comments on this proposal will be welcomed by the Secretary of the Commission.

(b) Marine Geological/Geophysical Inventories

In terms of an IUGS/UNESCO contract for the development and compilation of an international inventory of marine geological and geophysical coverage, the Commission for Marine Geology:

- (i) has completed the priority assignment to develop, print and widely distribute among marine geoscientists, formats for the reporting of post-1970 marine geological/geophysical coverage to World Data Centre A (Oceanography).
- (ii) is now engaged in the long task of entering on specially constructed charts (scale 1:5,000,000) stations and tracks where geological and/or geophysical data were collected during the period prior to 1970. Responses to requests for the necessary information have been good in some cases and completely negative in

others, in spite of repeated pleas. It is the intention of UNESCO to publish the completed charts in atlas form for the practical benefit of all marine geoscientists. Further information and copies of the blank plotting sheets are obtainable from the Secretary of the Commission. This project cannot be successfully completed without the cooperation and support of all who have collected geological and geophysical data at sea, particularly during the past 25 years.

5. Status of CMG Symposia

(a) The status of the nine symposia for which the Commission was wholly or partly responsible between 1969 and 1972 is reflected in the report for the period of 1968-72.

(b) The following CMG-sponsored symposia were held during the XXIV International Geological Congress in Montreal, August 1972:

(i) "The Geology of the Indian Ocean" (Convenor, E.S.W. Simpson; Chairman, T.F. Gaskell). Seven papers were invited, of which all have been published in Abstract and two in full (Section 8 of the Proceedings of XXIV ICG).

(ii) "The Contribution of Deep-Sea Drilling to Geology" (CMG/ICG/IAPSO: Convenors, B.C. Heezen and M.N.A. Peterson). Arrangements are being made for early publication of the ten invited contributions.

(iii) "Sedimentary Basins of the Indian Ocean Coast of Africa" (ASGA/CMG: Convenors, J. Lombard and E.S.W. Simpson; Coordinator, J. Blant). The eleven invited contributions are being prepared for publication by the Association of African Geological Surveys.

(c) The following proposed CMG symposia are being arranged or are under consideration:

(i) SCOR/CMG WG 37. Symposium on "Precise Methods for Stratigraphic Correlation of Marine Sediments", Kiel, FRG, September 1974.

(ii) CMG Mediterranean Marine Geology Conference, Palma, Majorca, September 1974.

(iii) XXVI General Assembly of IAPSO/IUGG (France, 1975):

- Present Status of Plate Tectonics
- Review of Deep-Sea Drilling Results and their Interpretation

(iv) Pacific Science Congress (Vancouver, 1975)
Proposals awaited.

(v) XXV International Geological Congress (Australia 1976)

- Economic Geology of the Sea Floor (except fuels).
- Active Plate Boundaries of the Western Pacific.
- Circum-Antarctic Marine Geology.

(vi) Second Joint Oceanographic Assembly (United Kingdom, 1976)

- Palaeo-Oceanography
- Geochemistry of Interstitial Water and Chemical Exchange across the Sediment/Water Interface
- Geology of the South Atlantic between South America and Africa, with special reference to Continental Margins and Plate Tectonics
- Deep-Water Sediment Transport

6. CMG Representatives

SCOR Executive: T.F. Gaskell (Chairman CMG, ex officio)

SCOR: E.S.W. Simpson (Secretary CMG, ex officio)
SCOR Working Groups: 37, E. Seibold
40, Tj. H. van Andel
41, J. Ulrich
ECOR: T.F. Gaskell
IOC/GELTSPAP: J.M. Harrison, E. Seibold, X. le Pichon
IAPSO Executive: E.S.W. Simpson
IAPSO Commission on Marine Geophysics and GEBCO Committee: G.B. Udintsev,
B.C. Heezen, A.S. Laughton
UNESCO Indian Ocean Geological/Geophysical Atlas Editorial Board: G.B. Udintsev,
A.S. Laughton, R.L. Fisher, E.S.W. Simpson
CGMW: B.C. Heezen, E.S.W. Simpson
ICG: X. le Pichon, E.S.W. Simpson (Chairman WG 8)
IHB: T.F. Gaskell

ANNEX XIII

DRAFT STATEMENT ON OCEANIC RESEARCH Submitted to ICSU on 30 May 1972

The International Council of Scientific Unions reiterates the position first taken by its Bureau in 1954, that fundamental research by any nation carried on with the intent of open publication is in the interests of all. The Council urges that every nation concerned with developing the law of the sea give special consideration to the need for facilitating the conduct of open research, defined as that which is intended for everyone's benefit and is characterized by the full and timely availability of research plans and results.

Full knowledge of the ocean and understanding of its role on this planet constitute basic cultural goals. Moreover, rational use of the ocean and its resources, perfection of oceanic and atmospheric forecasting, and protection of the marine environment, are highly dependent on scientific understanding of oceanic features, populations and processes. Thus it is in the common interest of all nations to participate and cooperate in ocean research, and to facilitate it to the fullest extent possible.

Such knowledge and understanding can only be obtained through vigorous and continuing research programs, many of which must be conducted at sea. Oceanic phenomena seldom correspond in location with national boundaries, and their understanding often requires them to be studied wherever they extend or move. Ease of access and flexibility of movement are necessary for the effective conduct of oceanic research. Yet, because of the distributions of resources and of man's activities and their effects on the environment, much of this research must take place within a few hundred kilometers of the coast, on the seabed and in the waters increasingly subject to national jurisdiction.

Research in the territorial waters of another state requires the consent of that state; early notification of cruise plans must be given and arrangements must be made for the participation of scientists from the coastal state and for sharing the resulting data and samples. To assist the coastal state in benefiting from the research, special attention must be given to strengthening its capability to participate in the research and to utilize its results. There must also be improvement in the exchange and dissemination of scientific information and in the other means whereby scientific results are made available.

Investigations included in international cooperative scientific programs, and other programs of open research, should be encouraged and should not require consent when beyond the limits of territorial waters. In all cases, oceanic research should be conducted so as not to harm the environment or to interfere unjustifiably with other marine activities.

REPORT ON 12TH MEETING OF SCAR
Canberra, 14-19 August 1972

Items of interest to SCOR which were considered at the Twelfth Meeting of SCAR (August 1972) were as follows:

1. At the Oslo meeting, SCAR agreed to arrange and finance the publications of the papers presented at the short symposium being sponsored by SCAR during the Joint Oceanographic Assembly in September 1970. The publication, entitled Antarctic Ice and Water Masses was published by SCAR in October 1971, in a form and style similar to Antarctic Oceanography (1966), to which it is regarded as a supplement. Copies have been distributed without charge to purchasers and other recipients of the 1966 publication.

2. SCAR welcomed the initiative of SCOR in organizing a "Polar Oceans" symposium in 1973 and offers continuing support and every possible assistance in organizing this meeting and is prepared to offer a financial contribution to support invited participants.

3. SCAR has compiled information on the tracks and facilities of all relief ships which regularly traverse the southern oceans and this information has been made available to SCOR WG 38 and interested individuals. Lately SCAR has been discussing with the GARP Joint Planning Staff possible contributions from the Antarctic to the FGGE. The need has been identified by GARP planning groups for information from the data sparse areas of the southern oceans. Since these areas are affected by persistent cloud cover, straightforward satellite observations are not practicable and, following the discussions at the 14th SCOR Executive Meeting, consideration has been given to the development of a network of satellite monitored drifting buoys. This activity is now being developed under SCOR WG 38. The SCAR survey and relief ship tracks showed a network surrounding the continent that could prove helpful to those planning the buoy programmes. At its twelfth meeting, therefore, SCAR agreed to urge its National Committee to comply with any specific requests which might be made for relief ships to devote time and facilities to the initial deployment of buoys both for the proposed preliminary experiment in 1974 and for the main experiment during FGGE in 1977.

4. At an intergovernmental conference held in January 1972, agreement had been reached on the text for a convention for the conservation of Antarctic seals. It is particularly interesting that this convention specifically called upon SCAR to provide various scientific advisory services in connection with the analysis of returns of seals killed or captured and catch limitations on commercial sealing and to forecast (from the returns) when in any season those limits would be reached. SCAR accepted the responsibilities and established a group of specialists on Seals to provide the required expertise. This group will not only be responsible for the tasks specified in the Convention, but will also be concerned with the coordination of seal research and marking programmes. It will maintain liaison with other international organizations concerned with marine mammals and FAO will be invited to nominate a member.

5. The Biology Working Group discussed the current interest in the possibility of exploiting Antarctic living resources, such as krill, cephalopods and fishes taking note of the interests which had been expressed by other organizations such as IABO, GELTSPAP, ICGSO and ACMRR. The Working Group considered that any future development in exploitation must be considered in the context of the total ecosystem, in which krill plays a key role, and believed itself to be well suited to advance this viewpoint. The Group established a new subcommittee on Antarctic Marine Resources with Dr. S.Z. El-Sayed as convener and with the following terms of reference:

1. To assess the present state of our knowledge of the Antarctic marine ecosystem from the point of view of structure, dynamic functions and biomass of the organisms at different trophic levels.

2. To encourage and stimulate investigations of the ecology and population dynamics of the organisms at different trophic levels with particular reference to Antarctic krill, squid, fishes and whales.

3. To establish liaison between SCAR and relevant international organizations such as SCOR, FAO, IOC and IABO, by bringing matters concerning the exploitation of marine resources of the Southern Ocean to the attention of SCAR Working Groups on Biology and Oceanography, and by conveying the views of SCOR or its working groups, to appropriate international organizations.

4. To offer assistance to SCOR, FAO, IOC and other organizations in the formulation of advice on matters concerning the living resources of the Southern Ocean.

5. To cooperate with such organizations as FAO, in proposing guidelines for any further commercial exploitation.

6. The planning by the U.S. Steering Committee of a project for drilling through the Ross Ice Shelf to sample the shelf, the underlying water column and sediments is proceeding and is being related to the Glomar Challenger programme of drilling in the Ross Sea in 1973. The main discussions by the SCAR Group of Specialists on Ice Shelf Drilling during the SCAR meeting were concerned with methods of maintaining an open hole that would be 'clean' for biological studies and criteria for selecting the location of the first drilling site. The SCOR member of the SCAR Group of Specialists, Professor E. Seibold, will be kept informed as plans progress.

7. The SCAR Working Group on Biology agreed to invite IABO to appoint a representative member to the Group.

G.E. Hemmen

ANNEX XV

REPORT ON PRODUCTIVITY MARINE SECTION INTERNATIONAL BIOLOGICAL PROGRAM

(1) With the exception of work under theme D (Marine Mammals), field work is now completed, and the Section is now devoting its energies to the preparation of the Synthesis Volumes. The budget for 1973 will be devoted entirely to that objective. The results and records of the Working Conference in Rome, held in October 1971, will be used as part of the material for the Synthesis Volumes. Four volumes are proposed, one for each theme. The Marine Mammal volume may be somewhat delayed; the Marine Mammal theme developed very late in the career of Section PM.

(2) The editors for the Synthesis Volume have been approached and have accepted: namely, Dr. Dugdale (theme A), Dr. Pearce and Dr. Walford (theme B), Dr. Bayne (theme C), and Dr. Ray (theme D).

(3) The Inter-ocean Canal Symposium was held in Monaco as planned, in September, organized by Dr. Oren, as part of the final International Congress of Zoology. The meeting on Grey Mullet, proposed for 1973, has been put off to the spring of 1974, to be held in Israel, on the occasion of the opening of the Limnology and Oceanography Institute building. This is also being arranged by Dr. Oren. A meeting on problems of the Eastern Mediterranean is being arranged for September 1973, to be held probably in Rome, and organized by Dr. Neil Hulings. The Symposium on Seals, organized by Dr. Keith Ronald, and sponsored by ICES, IBP and IABO, was held as planned at Guelph University, Canada, in September 1972.

(4) Section PM was represented at the Section PF meeting in Reading, UK, in September 1972, by Dr. Kenneth Mann. The Section will be represented at the PP (photosynthesis) meeting in Aberystwith in April 1973, probably by Dr. John Cooper, and at the nitrogen fixation (PP) meeting in Edinburgh, September 1973, by Dr. David Patriquin.

(5) The Convener of Section PM is a member of the Steering Committee of the First International Ecological Congress, 1974, to be held in the Netherlands. IBP is arranging 5 sessions of symposia for that occasion.

(6) At the general assembly in Seattle, September 1972, a joint "Aquatic Group" met to discuss projects which were of interest to IBP and which the group recommended to other organizations as part of their programs following on the phasing out of IBP itself. The record of this meeting follows.

M.J. Dunbar
Convener, IBP/PM

The "Aquatic Group" met on 5 September 1972, during the 5th General Assembly of SCIBP. Participants were:

Neuhold, USA; Hasler, USA; Noble, South Africa; Tarzwell, USA; Canagaratnam, Ceylon; Crisp, UK; Oren, Israel; Bonetto, Argentina; Sioli, FRG; Vik, Norway; Dunbar (Chairman), Canada.

I. The meeting discussed future work in aquatic biomes, recommended to other organizations to take over. Some of the projects listed here were planned to take place under IBP auspices, but failed to materialize; others are new ideas.

(1) The study of drainage basins as whole systems, and including coastal sea water and the land - work which in IBP terms would involve PT, PF, and PM. Land effluents into lakes: allochthonous materials of all sorts into lakes; pollutant transport; fresh water inflow into coastal waters. This should also include the effects of engineering work on fresh water and on forests, sand and gravel quarries, harvesting of mineral deposits; the disappearance of beaches due to the damming of rivers, and effects of fresh water control on marine coastal productivity.

(2) The study of lagoons of all sorts, and other shallow coastal waters. Possibilities for aquaculture, e.g., fish and prawn production. Accessibility makes such waters highly vulnerable to man's activities. This work should include all climatic zones, and it should involve geologists and chemists as well as biologists.

(3) The investigation of the harvesting and control of "nuisance" plants in fresh waters and in coastal sea water. Up to now, control has been by chemical means only; but these plants constitute a potential crop - the weeds will then cease to be weeds. Biological control by useful animals is another possibility.

(4) The study of economically exploited fishes not as individual species (as is done now) but in terms of their interrelations with other species; so that fishing pressure can be turned from one species to another in the interest of maintaining the highest sustainable yield, and so that the present practice of poisoning undesirable single species, a practice which is dangerous and which has been shown to be ineffective, may be abandoned in favor of finding uses for such species as lampreys, carp, alewives, etc.

(5) The study of "pests" where they are pests and where they are not, species for species; also the history of their becoming pests by natural or man-made ecological changes. This project overlaps somewhat with (3 & 4) above, and as (3), it would involve Section HA in the IBP context. It would include the "Crown of Thorns" predation on coral reefs.

(6) Project Aqua Marina. This project probably cannot be completed within IBP lifetime, but its continuation must be assured under other auspices, e.g., IUCN.

(7) The study of the effects of industrial energy plants in coastal areas. Since such plants affect the marine "commons", their study and control become international problems. There is an urgent need for base line studies of the effects of these plants in different situations, so that individual decisions on the siting of new plants may be made well in advance of construction with reference to such studies, and not almost at random as at present.

(8) The study of endangered and declining marine homotherms, especially the sea-birds, which have been neglected.

(9) The study of the role of the sea in climatic cycles, which are of immense economic importance and which affect biological resources critically. There is also a special need for the study of the natural sulphur cycle; also CO_2 , CO , O_2 and PO_4 .

(10) The study of "black waters" (humic waters), found in both tropical and temperate regions; their chemistry and their biology.

II. The meeting had doubts about the readiness of other organizations to take over IBP projects which will need sponsorship at the close of IBP. The chairman undertook to bring this matter to the notice of SCOR at the meeting in Scotland this month. But the question is general.

III. There was unanimous opinion that the freshwater - salt water interface was in danger of being ignored. There was consideration of setting up of a new acronym group to organize studies in this zone on an international basis. Suggestions included 'WAP' - "World Aquatic Program"; and 'CLAM' - "Coastal Lagoons and Mariculture." This was not a frivolous or trivial suggestion.

FUTURE MEETINGS OF SCOR AND ASSOCIATED ORGANIZATIONS, 1973

8 - 13 January	Paris	IOC ad hoc WG Rationalizing Structure, 2nd Ses.
9 - 10 January	Paris	ICSU Exec. Board
11 - 13 January	Paris	SCOPE 5th Meet.
24 - 26 January	Kiel	SCOR WG 10 Oceanogr. Tables Standards
5 - 10 March	Paris	IOC WG Education, Training Mutual Assist.
March	USA	SCOR WG 36 Coastal Upwelling Proc.
March	?	WMO/ICSU Trop. Exper. Brd.
9 - 14 April	Vienna	GESAMP 5th Ses.
April	UK	SCOR WG 41 Morphol. Map. Ocean Floor
2 - 7 April	London	IOC Int. Coord. Grp. GIPME 1st Ses.
8 - 14 April	Charlottesville USA	IUTAM/IUGG Symp. Turbulent Diffusion Environ. Poll.
April or May	Bangkok	IOC Int. Coord. Grp. CSK 9th Ses.
2 - 12 May	Paris	IOC/WMO Joint Grp. Exp. IGOS Tech. Sys. Design Devel. Serv. Req. (ITECH) 1st Ses.
7 - 12 May	Paris	IOC Exec. Coun. 2nd Ses.
7 - 13 May	Cambridge	ICSU Exec. Brd.
14 - 16 May	Texel	SCOR Exec. Comm. 17th Meet.
17 - 22 May	Oban	IABO/FAO/ICES/ICNAF symp., Early Life History Fish
May	Rome	ACMRR 7th Ses.
End May	? Monaco	IOC Grp. Tech. Coord. CIM 13th Meet.
23 May - 7 June	Konstanz, FRG	COSPAR XVI Meet., symp. Approaches Earth Surv. Prob. Space Tech.
29 May - 10 June	Heron Is. Australia	IABO WG Great Barrier Reef Com., symp. Corals Coral Reefs; SCOR WG 35 Meth. Quant. Ecol. Coral Reefs
2nd half June	Cartagena	IOC Int. Coord. Grp. CICAR 6th Ses.
June	?	ICES/SCOR WG 42 Baltic Pollution 2nd Ord. Ses.

9 - 13 July	New York	IOC WG Oceanogr.Data Exch.(IODE) 7th Ses.
13 - 17 August	Geneva	IOC/WMO Joint Plan.Grp.IGOSS (IPLAN) 2nd Ses.
20 - 21 September	Leningrad	ICSU Gen.Comm.
24 - 28 September	Paris	IOC Grp.Exp. Oceanogr.Res. IGOSS (IRES) 4th Ses.
September	Montreal	SCOR/SCAR Polar Oceanogr. symp.
September	? Lisbon	ICES/FAO/IOC Joint Coord.Grp. Planning Execution CINECA 3rd Ses.
30 October - 15 December	at sea (UK)	SCOR WG 27 Tides Open Sea, intercal.
5 - 17 November	Paris	IOC, Exec.Coun, 2nd Ses.; Assembly, 1st Ses.
12 - 19 December	Geneva	WMO/IOC Joint Grp.Exp. Telecomm. 4th Ses.

ABBREVIATIONS

ACMRR	Advisory Committee on Marine Resources Research (of FAO)
ACOMR	Advisory Committee on Oceanic Meteorological Research (of WMO)
ASGA	Association des Services Géologiques Africains (of IUGS)
CGMW	Commission for the Geological Map of the World (of IUGS)
CICAR	Cooperative Investigation of the Caribbean and Adjacent Regions
CIM	Cooperative Investigation of the Mediterranean
CINECA	Cooperative Investigation of the Northern Part of the Eastern Central Atlantic
CMG	Commission on Marine Geology (of IUGS)
COSPAR	Committee on Space Research (of ICSU)
COSTED	Committee on Science and Technology in Developing Countries (of ICSU)
COWAR	Committee on Water Research (of ICSU)
CSIR	Council for Scientific and Industrial Research (South Africa)
CSK	Cooperative Study of the Kuroshio and Adjacent Regions (of IOC)
DNA	Designated National Agency [for data exchange]
ECOR	Engineering Committee on Oceanic Resources
FGGE	First GARP Global Experiment
GARP	Global Atmospheric Research Program (of WMO/ICSU)
GATE	GARP Atlantic Tropical Experiment
GEBCO	General Bathymetric Chart of the Ocean
GELTSPAP	Group of Experts on Long Term Scientific Policy and Planning
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
GIPME	Global Investigation of Pollution in the Marine Environment
IABO	International Association for Biological Oceanography (of IUBS)
IAMAP	International Association of Meteorology and Atmospheric Physics (of IUGG)
IAPSO	International Association for the Physical Sciences of the Ocean (of IUGG)
IASH	International Association of Scientific Hydrology (of IUGG)
IBP/PM	International Biological Programme/Productivity Marine
ICA	International Cartographic Association (of IGU)
ICES	International Council for the Exploration of the Sea
ICG	Inter-Union Commission on Geodynamics (of IUGG/IUGS)
ICGSO	International Coordination Group for the Southern Ocean (of IOC)
ICNAF	International Commission for the Northwestern Atlantic Fisheries
ICSU	International Council of Scientific Unions
IGCP	International Geological Correlation Program
IGOSS	Integrated Global Ocean Station System (of IOC)
IGU	International Geographical Union (of ICSU)
IHB	International Hydrographic Bureau
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data Exchange (Working Group of IOC)
IUB	International Union of Biochemistry (of ICSU)
IUBS	International Union of Biological Sciences (of ICSU)
IUCN	International Union for the Conservation of Nature and Natural Resources
IUGG	International Union of Geodesy and Geophysics (of ICSU)
IUGS	International Union of Geological Sciences (of ICSU)
IUPAP	International Union of Pure and Applied Physics (of ICSU)
IUPS	International Union of Physiological Sciences (of ICSU)
IUTAM	International Union of Theoretical and Applied Mechanics (of ICSU)
JOC	Joint Organizing Committee for GARP
LEPOR	Long-Term and Expanded Program of Oceanic Research
MODE	Mid-Ocean Dynamics Experiment
NAMDI	National Marine Data Inventory
NIO	National Institute of Oceanography (UK)
NODC	National Oceanographic Data Center (USA)
NORPAX	North Pacific Experiment
ROSCOP	Report of Observations or Samples Collected by Oceanographic Programs
SCAR	Scientific Committee on Antarctic Research (of ICSU)
SCIBP	Special Committee for International Biological Programme (of ICSU)
SCOPE	Scientific Committee on Problems of the Environment (of ICSU)
SOSC	Smithsonian Oceanographic Sorting Center (USA)
VACM	Vector Averaging Current Meter
WDC-A	World Data Center A - Oceanography