The ad hoc Action Plan Group, with Professor K. Grasshoff as convener, has been created to prepare for the Working Group the first plan how this goal eventually can be achieved. Also it is expected that the Baltic Marine Biologists will pay particular attention to the immediate needs of the baseline studies, as requested by the Working Group.

(7) The urgency of the input and baseline studies has become most obvious through the new needs of scientific-technical advice on the different aspects of marine pollution at the intergovernmental level.

The needed scientific-technological advice has to cover (1) technological problems, such as the continuous inventory of waste input, and the introduction of new solutions to the waste treatment problems, (2) "Limnological-hydrological" studies for understanding of the inland and immediate coastal problems, and (3) problems of the actual marine pollution. To this last end advice will be available for instance as follows:

(1) The ICES through its Advisory Committee on Marine Pollution is the intergovernmental advisory body on the problems of the actual marine pollution in the region.

(2) The ICES/SCOR Working Group on the study of the Pollution of the Baltic, reorganized and with revised terms of reference, could be the scientific machinery to collect scientific data and results in its field of competence for the ICES Advisory Committee.

(8) The members of the joint ICES/SCOR Working Group unanimously hope that the role of SCOR be maintained also in the future since this gives access to a greatly expanded source of scientific expertize.

ANNEX VIII

AN INTERNATIONAL OCEANOGRAPHIC PROGRAMME FOR GATE

Introduction and recommendations from the report of the first meeting of SCOR WG 43, Miami, 5 - 10 February 1973

1. Introduction

The primary objective of GATE, an improved understanding of tropical convection in cloud clusters and its interaction with the large scale circulation, is strongly dependent on accurate determination of the heat, moisture, and momentum fluxes across the air-sea interface on the B-scale (GARP Special Report No. 6 - GATE). An oceanographic program in GATE would be highly desirable for the independent - and in many cases more accurate - determination of these fluxes from appropriate budget measurements in the mixed layer. At the same time GATE will provide a unique opportunity for investigating the response of the oceans to atmospheric forcing on various scales. Although less directly related to the main atmospheric program, it should be recognized that oceanic response studies are central to the GARP objective of developing coupled ocean-atmosphere models for extended forecasting and investigations of climate. It is, of course, also the primary motivation for the oceanographic involvement in GATE.

The concentration of mid-ocean platforms achieved during GATE will not likely be available again for many years, and it is therefore strongly recommended that the opportunity that GATE offers for studying the response of the ocean to the atmosphere be recognized and fully exploited in the planning of GATE.

Salinity and heat budget measurements are planned on the B-scale and within one of the B-scale grid triangles, which will be instrumented with a smaller network of oceanic instruments (C-scale). Oceanic response studies will include phenomena on the C-scale (interface, mixed layer and thermocline response, section 3), the B-scale (baroclinic adjustment, section 4) and A-scale (equatorial current system).

2. General Recommendations

The SCOR Working Group 43 recommends that:

2.1 This international oceanographic programme be incorporated in GATE.

2.2 The coordination of the meteorological and oceanographic programmes be the the responsibility of the ISMG; detailed logistic and scientific planning of the oceanographic programme should continue to be carried out by SCOR WG 43 in close cooperation with the ISMG.

2.3 The enclosed map of optimum ship positions and survey tracks for the oceanographic programmes during phases I, II, and III be considered as a basis for ship deployment compatible with the meteorological experiment.

2.4 Aircraft measurements required for the oceanographic programme be incorporated in the GATE aircraft programme.

2.5 The scientific programme of every ship in the B-scale and equatorial A-scale be directed on board by a qualified scientist with sea-going experience.

2.6 Provision be made for the assignment of scientific and technical personnel to ships of other nations as required by the oceanographic programme.

2.7 Oceanographic intercomparison be incorporated in the GATE programme for intercalibration tests.

2.8 IGOSS increase the density of observations in the GATE area during 1974 as specified in this document.

2.9 A strong surface radiation programme be established in support of the mixed-layer programme.

Membership of SCOR WG 43

G. Siedler (Chairman)(FRG), V.A. Burkov (USSR), W. Düing (USA), I. Galindo (Mexico), J.A. Gonella (France), C.R. Mann (IOC), G.T. Needler (Canada), F. Ostapoff (USA), M. Sturm (DDR), J.D. Woods (UK).

ANNEX IX

REPORT OF SECOND MEETING OF SCOR WORKING GROUP 43 OCEANOGRAPHY RELATED TO GATE LONDON, 4 TO 8 JUNE 1973

1. List of participants

Working Group Members: G. Siedler (FRG)(Chairman), I. Galindo (Mexico) J.A. Gonella (France), C.R. Mann (IOC), G.T. Needler (Canada), F. Ostapoff (USA), M. Sturm (DDR), J.D. Woods (UK).

Other participants: C.J.M. Aanensen (ISMG*), K.F. Bowden (UK), R.A. Clarke (Canada), J.A. Ewing (UK), A.E. Gill (UK), K. Hasselmann (FRG), H.C. Hoeber (ISMG), D.D. Houghton (ISMG), R.F. Long (ISMG), T. McAndrew (UK), M. Miyake (ISMG), S.R. Petersen (ISMG), G. Peluchon (France), S.G. Philander (ISMG), R.T. Pollard (UK), W. Sell (FRG), J.H. Simpson (UK), R.I. Tait (UK), Y. Tarbeev (ISMG), S.A. Thorpe (UK), B.J. Thompson (IOC), R. Williams (USA).

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* ISMG = International Scientific and Management Group for GATE

2. Results of the discussions

2.1 The group was informed that the report including the recommendations prepared at the Miami meeting of SCOR WG43 in February 1973 had been approved by the SCOR Executive Committee. It had also been accepted as a basis for further planning by the TEB, and it was endorsed by JOC and IOC.

2.2 The group was informed by members of the ISMG about the present status of GATE planning and coordination, particular attention being paid to the central programme, data management and intercomparison experiments.

2.3 After an extensive discussion about the character of the GATE central programme, SCOR WG43 produced a statement about the relation between the central programme and the oceanographic programme (see paragraph 3).

2.4 Outlines of the data management and analysis systems used for JASIN and JONSWAP were given by R. Pollard and W. Sell as a basis for the discussion of similar tasks for GATE Oceanography.

2.5 The data expert from France, G. Peluchon, described the computer facilities at BNDO, CNEXO-COB, Brest, France. This institution was suggested as a possible GATE Oceanographic Subprogramme Data Centre by the French delegates at TEB-IV.

2.6 The group discussed in detail data management and analysis for the GATE oceanographic programme, the aircraft programme and routine and intercomparison measurements. The results of these discussions are presented in a revised version of the report prepared at Miami in February 1973.

2.7 The group agreed that the revised report including the additional chapters dealing with the data management and analysis, the aircraft programme and the intercomparison experiments, the routine measurements and the exchange of scientists should be distributed to GATE investigators and to the ISMG as soon as possible. This may be done by using mimeographed copies. It seems desirable, however, to have the report printed within a few months for further distribution. Following the recommendation of the SCOR Executive Committee, a publication in the GATE series was suggested.

2.8 It was agreed that the ISMG in cooperation with J. Woods and the chairman of SCOR WG43 will prepare a GATE Oceanographic Subprogramme document which will have a similar basic structure as other subprogramme documents. This document will be based on the SCOR WG43 report.

2.9 SCOR WG43 noted with great appreciation that the ISMG will have from now on a stronger oceanographic capability. Much of the operational and logistic planning for the oceanographic subprogramme can now be done by ISMG members. It was, however, considered essential for the success of the oceanographic experiments that ISMG and SCOR WG43 stay in close contact with each other in order to work jointly in the planning. To facilitate communication, the SCOR WG43 nominated three members to be responsible for certain components of the oceanographic programme:

J. Woods	C-scale experiment
F. Ostapoff	B-area experiment
W. Düing	Equatorial experiment

These members are available to be contacted by the ISMG to solve problems concerning the specific experiments. For questions concerning the experiment as a whole, the chairman of SCOR WG43 should be contacted.

2.10 After a discussion about intercomparisons of moored current meters, it was agreed that the results of earlier intercomparison experiments by SCOR WG21 should be made available to the members of SCOR WG43 and of the ISMG. It does not seem feasible to carry out such intercomparisons during GATE.

2.11 The group agreed that a preliminary list of principal investigators should be compiled. The members of SCOR WG43 from different countries were asked to send relevant information to the chairman by 20 June 1973.

2.12 It was the feeling of the group that another meeting of the whole SCOR WG43 would not be necessary before the GATE experiment. There is, however, a need for the participation of individual members of SCOR WG43 (or their representatives) in special meetings. Some of these meetings will have to be called at relatively short notice.

The results of the discussion are summarized in part 4.

2.13 SCOR WG43 agreed that the SCOR Executive Committee be asked to add Dr R.R. Belevič as a second member from the USSR to SCOR WG43, as proposed by the Hydro-meteorological Service of the USSR. This seems desirable in view of the major involvement of the USSR in GATE.

3. SCOR WG43 statement on the relation between the GATE central programme and the oceanographic programme

3.1 SCOR WG43 welcomes the scheme now proposed by the ISMG which includes the oceanographic programme as an integral part of GATE.

3.2 The oceanographic programme represents an integrated set of experiments to study the response of the ocean to the atmosphere on a variety of scales. Although an "oceanographic" programme, it falls entirely within the objectives of GARP in being concerned only with atmospheric forcing.

3.3 SCOR WG43 emphasises the point of view expressed by SCOR WG43 in Miami, February 1973 and by JOC VIII in London, March 1973: ".... that the opportunity that GATE offers for studying the response of the ocean to the atmosphere be recognised and fully exploited in the planning of GATE". Thus the GATE oceanographic programme should be regarded as an integral subprogramme of GATE with priority equal to that of the other subprogrammes.

3.4 The oceanographic programme represents a mutually supporting set of experiments in which it would not be meaningful to set priorities.

3.5 Certain measurements of the oceanographic programme are essential not only for the coupled ocean - atmosphere problem, but also for purely meteorological questions. These apply to measurements of the sea - surface temperatures and surface waves at the interface itself. It is recommended that the dual significance of these measurements for both the meteorological and oceanographic programme be recognised in setting logistic and operational priorities.

4. Future meetings

Informal planning meeting on GATE Aircraft Programme, July 1973, Oberpfaffenhofen/F.D.R.
SCOR WG43 representative: J.D. Woods

Informal planning meeting on GATE Ship Programme, October 1973, Geneva/Switzerland
SCOR WG43 representative: W. Düing, G. Needler

Informal planning meeting on GATE Data Management, 3-7 September 1973, Moscow/USSR.

SCOR WG43 representative: F. Ostapoff

Informal planning meeting on GATE Oceanography Data Management, possibly August 1973, France.
SCOR WG 43 representatives:: R. Pollard (for J.D. Woods), W. Sell (for G. Siedler) scientist to be nominated (for W. Düing)

Meeting on GATE equatorial oceanographic experiment
Convener: G. Philander (ISMG)
Possibly September 1973, Europe
SCOR WG43 representatives: V. Burkov, W. Düing, I. Galindo, Hisard (for J. Gonella), M. Sturm, J. Meincke (for G. Siedler), S. Thorpe (for J.D. Woods).

Meeting on GATE C-scale oceanographic experiment
Convener: J.D. Woods (SCOR WG43)
Possibly October 1973, Canada
SCOR WG43 representatives: R. Belević, J. Gonella, G. Needler, F. Ostapoff G. Siedler, J.D. Woods

3 ad hoc meetings on planning of GATE oceanographic programme
Place not yet known, 1974
Approximately 4 members of SCOR WG43 to participate in each meeting

Third meeting of SCOR WG43
Place: At location of GATE Oceanographic Data Centre or of selected analysis institution
Time: April 1975
All Members of SCOR WG43

3 ad hoc meetings on evaluation of GATE oceanographic programme
Place not yet known, 1975
Approximately 4 members of SCOR WG43 to participate in each meeting.

ANNEX X

DISCUSSIONS ON OCEANOGRAPHIC PROGRAMMES RELATED TO GARP WHICH TOOK PLACE IN CONNEXION WITH JOC-VIII,

London, March 1973
B.J. Doos, Director J.P.S.

A. Ad-hoc Committee on an Oceanographic Programme in GARP

Prior to the JOC meeting (13 March) a small group of oceanographers (T. Barnett, H. Charnock, A. Gill, K. Hasselmann, C. Mann, H. Stommel) held an informal meeting to discuss means of activating an oceanographic programme related to the goals of GARP, in particular with respect to the Global Experiment and the second GARP objective. The committee made the following recommendations, which were adopted by JOC:

1. Development of an international oceanographic GARP programme should be the

responsibility of a SCOR working group established specifically for this purpose. The committee welcomes the initiatives already taken in this regard by IOC and supports the proposed presentations and discussions on the Global Experiment to be held during the IOC Assembly session in November 1973.

2. With the possible exception of a chairman, nomination of members to the working group should be postponed until individual nations have developed concepts for a feasible oceanographic GARP programme. It is recommended that GARP national committees arrange regional meetings of oceanographers this year to consider

   (a) possible oceanographic programmes utilizing the observational system of the Global Experiment for studies of ocean-atmosphere interactions, and

   (b) means of furthering oceanographic programmes in general which are relevant to the objectives of GARP (e.g. studies of long-term, large-scale, ocean-atmosphere interactions).

3. Provision should be made for a discussion of an oceanographic programme within the Global Experiment during the IAPSO/IAMAP meeting in Melbourne, January 1974. This would also be a suitable occasion for the nomination of members to the SCOR working group.

4. To assist in the development of an oceanographic programme, an oceanographer should be invited as consultant to the JPS.

5. To generate a wider awareness among oceanographers of the potentialities of the Global Experiment and GARP generally for their studies, a review article on the subject, published in a widely read journal, would be very helpful. Professors Stommel and Charnock have agreed to undertake this task.

Beside the above recommendations on planning, JOC concurred with the ad hoc committee that intensified work is needed in a number of areas in order to develop a successful oceanographic GARP programme:

1. Dynamical models of the response of the ocean to the atmosphere should be extended to include not only the motions but also the heat and salinity distribution, in particular in the upper layers of the ocean.

2. Observational systems for monitoring the ocean need further development to achieve the level of reliability required for studies of the long-term, large-scale interactions relevant to extended range weather prediction or studies of climate.

3. The scales of variability of the ocean need to be determined more precisely in order to resolve aliasing questions arising in the deployment of such observational systems.

4. A series of interaction experiments, such as currently planned in GATE, AMTEX, JASIN, MODE, CUE, ACE, JONSWAP and other projects, will continue to be needed in limited regions of the ocean in order to arrive at suitable parameterizations of the many multi-scale processes governing the coupling at the air-sea interface and within the ocean.

5. Data banks for collecting world-wide oceanographic data, both historical and current, are essential for systematic long-term, large-scale ocean interaction studies. The efforts in this direction by the IOC Working Group on International Oceanographic Data Exchange are very valuable and deserve all support.

B. Cooperation between GARP and Oceanographic Programme

In addition to the recommendations of the ad hoc committee, JOC feels that a stronger communication should be established between GARP and existing oceanographic programmes immediately related to the objectives of GARP (such as NORPAX). JOC would be glad to receive planning reports of such projects in order to be able to suggest means for a closer interaction. This is particularly relevant to oceanographic experiments already being considered which could be conducted during the Global Experiment.

In view of the highly appreciated initiative on the part of oceanographers in developing an oceanographic programme in coordination with GARP, JOC intends to reserve one day of its coming IXth session in Melbourne, January 1974, for a joint discussion with the SCOR working group to be formed at that time in Melbourne.

C. Oceanographic Programme for GATE

JOC welcomes the oceanographic experiment proposed for GATE by SCOR Working Group 43 (Report February 1973) as a multi-scale ocean-atmosphere interaction experiment central to the goals of GARP, both with respect to the immediate GATE objective of improving the parameterization of tropical processes and with regard to the general problem of parameterizing ocean-atmosphere interactions for extended range forecasting and a better understanding of climate. JOC therefore endorses the statement in the SCOR WG 43 report that "The concentration of mid-ocean platforms achieved during GATE will not likely to be available again for many years, and it is therefore strongly recommended that the opportunity that GATE offers for studying the response of the ocean to the atmosphere be recognized and fully exploited in the planning of GATE".

The proposed oceanographic programme appears compatible with the meteorological programme except in aircraft deployment; the flight patterns required for the oceanographic C-scale work during phase III differ to some extent from the envisaged meteorological flight tracks and make it difficult to utilize the better instrumented meteorological research aircraft effectively within the oceanographic programme. To alleviate this situation, JOC recommends that the French DC7 be equipped with a laser altimeter for surface wave measurements and an infrared sea-surface temperature sensor.

D. Oceanographic Programmes and Climate Modelling

JOC requests the assistance of SCOR in determining the steps necessary for encouraging those programmes required to make climatic modelling. JOC expects that both theoretical and observational programmes will be needed. A particular need is for greatly improved understanding of those time-dependent oceanic processes which determine variations in sea surface temperature. Not only vertical processes, which redistribute heat in the upper layer, but horizontal advection and diffusion processes must be dealt with if the problem of climatic variation is to be successfully tackled. The objective would be to bring understanding to a level so that these processes may be parameterized in a coupled atmosphere-ocean model suitable for the study of climate and of fluctuations in climate.