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(of Unesco)

First Session of the IOC Ad hoc Group of Experts on a
Global Ocean Observing System
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SUMMARY REPORT

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1. INTRODUCTION AND REVIEW OF THE TERMS OF REFERENCE

1 Dr. D. J. Baker, Chairman of the IOC Committee on Ocean Processes and Climate, opened the meeting. Upon his invitation, Mr. G. Holland chaired the meeting.

2 Dr. A. Tolkachev introduced the documents for the meeting (Annex IV).

3 The Agenda, as given in Annex I, was approved by the participants.

4 The Chairman asked the participants to review the terms of reference of the ad hoc Group in order to identify specific tasks to be accomplished during the two day meeting. According to its terms of reference, adopted by IOC, the ad hoc Group shall advise the IOC, through the IOC/OPC, on the necessary actions to implement long-term systematic observations for monitoring and predicting environmental changes. In the near term, the group was instructed to assist the OOSDP in collating the existing identified needs for long-term systematic observations of the major climate-related programmes; assessing the present and potential capacity of the existing observational and data delivery systems to meet those needs and recommending to IOC, WMO, and their Members States actions that must be taken to begin to build an adequate system to meet the needs. The participants therefore agreed to concentrate on immediate tasks, bearing in mind that the IOC Executive Council at its Twenty-third session (March 1990) had requested the Group to prepare a status report on the immediate requirements for an ocean observing system as well as a plan to meet these requirements and to analyze the problems foreseen in the implementation of the system. The results of the work of the Group should be submitted to the Fourth Session of IOC/OPC and the Sixteenth Session of the IOC Assembly (7-22 March 1991) and the Second World Climate Conference (29 October-7 November 1990).

2. PRESENTATION AND REVIEW OF DRAFT DOCUMENT PREPARED ON PLANS FOR A GLOBAL OCEAN OBSERVING SYSTEM, REQUIREMENTS AND PRESENT CAPABILITIES

5 Dr. Christopher N.K. Mooers, IOC-WMO consultant, presented the document titled Draft Plan for the Development of a Global Ocean Observing System (IOC/GOOS-I/2). and highlighted major elements of the document. This document was prepared by Dr. C. Mooers with the assistance of Ms. M. Cole and Dr. A. Tolkachev, as the major working document for this meeting. Contributions to the relevant sections of the document have been received from senior scientists involved in major large scale research programmes: TOGA, WOCE, JGOFS, GEWEX, polar programmes as well as from the WMO secretariat. After a general exchange of views, the participants agreed that the document as revised could be considered as a status report, containing basic information and an analysis of the requirements from existing and planned major climate research programmes (TOGA, WOCE, JGOFS, GEWEX, polar programmes); assessment of present and potential capacity of existing ocean observational and data management programmes of IOC and WMO (WWW, IGOSS, GLOSS, DBCP, IODE) and act as a focus for future actions by the

(WWW, IGOSS, GLOSS, DBCP, IODE) and act as a focus for future actions by the scientific community, Member States, and international organizations.

6 The Group then decided to set up sessional working groups to fulfil the terms of reference and, in particular, to formulate proposals on the following issues: intergovernmental protocol on a global ocean observing system; inadequacies of present ocean observing systems; creative steps which can be taken for a global ocean observing system; and the content of the strategy document to be prepared on the basis of the status report for submission to the IOC, WMO and Second World Climate Conference. Conclusions are shown below.

2.1 INTERGOVERNMENTAL PROTOCOL

7 The ad hoc Group considered that, in order to maximize the commitment of Member States to ocean observations, a protocol should be developed for possible inclusion under the Framework Convention on Climate Change, prepared for adoption at the 1992 UN Conference on Environment and Development. At the September 1990 planning meeting convened by WMO/UNEP, the Secretary of the IOC should propose that this intergovernmental protocol on a global ocean observation system be included as an annex to the draft of the Framework Convention, with the full plan for the global ocean observing system eventually appended to this protocol. The Second World Climate Conference should be informed of the intention to implement government action on this topic through a protocol to be prepared by the IOC, working in cooperation with the WMO and UNEP.

8 The Secretary of IOC should also offer to prepare a draft of the proposed protocol to be presented at the 1992 UN Conference on the Environment and Development which would be available for consideration at the March 1991 IOC Assembly.

9 The draft for the protocol should draw attention to the WMO-UNEP Intergovernmental Panel on Climate Change (IPCC) requirement for an ocean observing system. It should outline the practical advantages of real observations for climate prediction. However, it should also explain that ocean observations are relevant to sustainable fisheries development, pollution monitoring, coastal zone management, and other marine operations. The results of large-scale scientific programmes, including TOGA and WOCE, will be available to design and interpret the products of an ocean observing system.

10 The protocol should then call on Member States to support the implementation and maintenance of a global ocean observing system. An implementation proposal must accompany the protocol and explain to Member States the elements of an ocean observing system that will be required. Member States should also commit to the free exchange of data and data products. The protocol should also confirm a commitment to providing assistance to developing countries for their observing systems and their use of the data so that they can fully participate and benefit from the system.

2.2 INADEQUACIES OF PRESENT OCEAN OBSERVING SYSTEMS

11 The ad hoc Group considered the relevant parts of the status

report containing descriptions of present ocean observing systems coordinated by IOC and WMO. The review of present systems such as IGOSS, GLOSS, DBCP, WWW made by the Group showed some inadequacies in present ocean observing systems, examples of which are shown below.

Observing Aspects

(i) Equipment (probes, tide gauges, hardware) and training will be required in addition to the existing systems and research programmes in place

(ii) Existing ocean observing platforms are not effectively distributed according to "anticipated" requirements

(iii) Lack of salinity data is a major deficiency

(iv) Measuring devices (current meters, etc) need to be improved and problems resolved

(v) The operational availability of remotely-sensed ocean data (with the possible exception of sea-surface temperature) is inadequate for future needs

Communication Aspects

(i) Links between ARGOS and Global Telecommunications System are not transparent

(ii) Loss of data due to potential deficiencies in the relevant satellite communication network is very likely

(iii) The requirements for existing data has not been clearly identified by Member States

Data Processing Aspects

(i) The control of data quality is not consistent

(ii) Global and regional data products are not available to users

(iii) Specific recommendations on the improvement of the present ocean observing systems are given in Annex II. The ad hoc Group recognized that, despite certain inadequacies, the present systems now provide the international mechanism for participation of Members States in a global ocean observing system and should be fully used and improved. The present observing systems (WWW, IGOSS, DBCP, GLOSS, IODE) focus on basic physical variables that are required for climate monitoring purposes (heat content of the upper ocean, salinity, sea level, meteorological variables). Improved coordination is, however, required both on national and international levels, between national and international organization dealing with various components of the ocean observing system (IGOSS, GLOSS, DBCP, IODE, WWW, CBS, CMM,

etc.). This matter should be further addressed by IOC, WMO, and UNEP governing and relevant subsidiary bodies.

2.3 OCEAN OBSERVING SYSTEM AND NUMERICAL MODELS

12 A discussion of creative steps to be taken centered on the following considerations:

Climate Change

13 Climate change affects all nations, large or small, developed or not. All will benefit from accurate predictions. It is the task of scientific programmes (TOGA, WOCE, JGOFS, etc.) to develop and refine this skill.

14 The prediction of climate change requires coupled global ocean-atmosphere models. These are presently the subject of scientific research, but they will become increasingly operational in nature in the next 10-20 years. These models run by advanced computers, need data for initialization, testing, and routine updating by data assimilation. There is a consensus view that the ocean is grossly under sampled for most modelling requirements.

15 Even though few national agencies can, or need to, operate coupled models, many, if not all, national ocean agencies can, and need to contribute to a Global Ocean Observing System (GOOS). The implementation of such a system is a major task to be faced by IOC and other cooperating agencies.

Regional Models

16 Global ocean models will provide boundary conditions for regional models which facilitate preparation of data products for fisheries, coastal zone management, etc. Governments will thus see important incentives for participating.

17 Further points were made: (i) the climate modelers have not yet defined the minimal ocean data requirement; (ii) existing ocean observing systems, some of which are in place for other purposes (for short term forecasting, for fisheries, for pollution, for scientific research, and for local issues), can and will form a starting base for the GOOS; (iii) there will remain an unfilled gap in GOOS unless additional resources are found to implement new components and improve existing systems of IOC and WMO, and; (iv) IOC and WMO need to coordinate the WWW and the GOOS so that the total ocean observational network is facilitated, continuously tested, and improved.

18 The *ad hoc* Group emphasized that technological development, process-oriented research, monitoring, and modeling are joint and necessarily co-existing and mutually supportive efforts. Consequently, cooperative efforts are required between those involved in research programmes and those involved operational meteorological and oceanographic activities.

2.4 THE DEVELOPMENT OF A STRATEGY DOCUMENT

19 The ad hoc Group considered the form and the content of the document to be presented to the Second World Climate Conference (29 October - 7 November 1990) and the Fourth Session of the IOC Committee on Ocean Processes and Climate and Sixteenth Session of the IOC Assembly (March 1991). In considering this matter the ad hoc Group recalled the decisions of the Fifteenth Session of the IOC Assembly and Twenty-third Session of the IOC Executive Council.

20 The Fifteenth Session of the IOC Assembly in July 1989 by Resolution XV-4 established an IOC ad hoc Group of Experts "to work with and support the proposed Ocean Observing System Development Panel of the CCCO-JSC to develop a plan for the system. The plan will include requirements, techniques, and an initial implementation strategy."

21 An Annex to that resolution called "Criteria and Approach for the Development of a Global Integrated Ocean Observing System" included the following wording:

22 A detailed plan for the next generation of a Global Integrated Ocean Observing System must be developed under IOC as a matter of urgency. The plan must take into account:

(i) completed or ongoing studies in this field
(ii) the existing operational systems of IOC and WMO which include elements such as IGOSS, IODE and WWW
(iii) the known requirements for climate monitoring research-forecasting, as well as other operational applications

23 The plan will form the basis for the formulation of IOC strategy for the progressive development of such a system.

24 The plan will be defined by the proposed CCCO-JSC OOSDP with the assistance of an ad hoc Group of Experts designated by the Secretary IOC in consultation with the Secretary-General of WMO and based on recommendations of the Chairman, TC/OPC.

25 The Twenty-Third Session of the IOC Executive Council in March 1990 by its Resolution EC-XXIII.5 requested: "(i) its ad hoc Group to prepare a status report on the immediate requirement for an ocean observing system, as well as a plan to meet these requirements, and to analyze the problems foreseen in the implementation of a long-term systematic ocean observing system; (ii) the Secretary, in consultation with the officers of the Committee on Ocean Processes and Climate (OPC), to bring the results of the work of the ad hoc Group, as substantial agenda items, to the IOC/OPC and Assembly at their forthcoming sessions, as well as to the attention of the SWCC and the preparatory committee for the 1992 UN conference."

26 An initial draft document (considered as a Status Report on the development of the Global Ocean Observing System - IOC/GOOS-I/2) was prepared for the ad hoc Group. This document included a discussion of objectives, a description of requirements from existing and planned large-scale climate research programmes, a proposed listing of variables and

processes to be monitored, a description of present and planned ocean observing and data management systems, and recommended some actions.

27 It was decided that, immediately following the meeting, a document describing the strategy for a global ocean observing system be finalized and given a wide distribution. To be addressed to governments, it will include benefits, rationale, and identification of clientele. It will include general elements, steps, and approaches. It will be titled "Toward a Global Ocean Observing System: A Strategy". This document will be available to the Secretary of IOC to use at his discretion at the SWCC.

28 The ad hoc Group recommended that the IOC/OPC seek IOC Assembly approval for preparation of an implementation plan by the end of 1991. Such a proposal will support the proposed ocean monitoring protocol by identifying actions and responsibilities to be taken by participating countries. The implementation plan will include an analysis of actions required to augment present systems to meet presently identified needs-networks of observations required for numerical models, their frequency and accuracy levels; a data management and exchange system; a proposal for the intergovernmental institutional structure; international/regional centers to prepare products; satellite systems needed; commitments needed; and budget requirements. Both short-term and long-term actions will be covered. The details of the final system will await the results of the CCCO-JSC Observing System Development Panel (OOSDP). This Panel, according to its terms of reference, is formulating "the conceptual design of an operational observing system "..." in step with the development of TOGA, WOCE and JGOFS systems, to provide progress reports to the two committees at appropriate (in principal annual) intervals, and to produce its final report no later than 31 December 1994."

29 Although the major objective of the system is to provide systematic long-term ocean observations for monitoring and predicting environmental changes as a part of a global system with initial emphasis on climate monitoring and prediction, the ad hoc Group emphasized that it will serve many other practical interests of many countries dealing with the exploration and exploitation of living and non-living resources; marine pollution problems; rational coastal zone management; marine transportation etc. It is therefore, important that the plan for development of the system include these aspects of ocean monitoring and preparation of ocean data products for the international community.

Implementation

30 It was recognized that, in order to make the system truly global, most Member States of IOC and WMO should participate in and contribute to the global system. Cooperative efforts of Member States and relevant international organizations will be necessary to provide assistance on a long-term basis to developing countries in transferring the required technology and training of specialists, and providing data products to be utilized by various oceanographic centers. The ad hoc Group also suggested that an analysis of present and future requirements of Member States for operational oceanographic applications be made in order to adequately satisfy national interests when designing and planning global ocean observing systems.

31 The ad hoc group also emphasized the importance of insuring close coordination with the monitoring programme presently being initiated for the coastal zone. The global ocean observing system will ultimately include relevant coastal interactions and pollution monitoring. Conversely, the local/regional coastal studies and monitoring will need global input. It is therefore of great importance that sub-systems be developed in close harmony to avoid duplication of efforts both on national and international levels.

32 The future global ocean observing system will need to establish and/or to reinforce the national operational oceanographic services systems which either do not exist yet or are not well organized in many countries as are national meteorological agencies within the WMO. They should have strong links with national marine user communities and scientific communities. Furthermore, the research community and other national organizations that deal with oceans should be encouraged to make oceanographic data available in real time.

33 The ad hoc Group discussed a proposal to initiate a pilot observing system project. Some participants felt, however, that the experience of TOGA can be used as a good demonstration of future global systems. It was also noted that TOGA is successful because it has demonstrated the prediction capabilities of atmospheric and ocean phenomena which are of practical interest for many Pacific countries and because it is based on existing systems. The ad hoc Group agreed that the CCCO-JSC OOSDP could perhaps advise as to the desirability of a pilot project.

34 The ad hoc Group noted that there are a number of international groups and activities within IOC, WMO, UNEP, and ICSU dealing with coordination and planning of various ocean observing systems, either operational or in support of research programmes. This is shown diagrammatically in Annex VI. In order to avoid duplication of effort and make maximum use of available resources from both the national and international levels, the Group felt that an interagency/intersecretariat coordination group should be established jointly by IOC, WMO, and UNEP, in order to ensure the required coordination. A recommendation on this subject was adopted (Annex II).

35 The ad hoc Group agreed that database management is a vital aspect of a global ocean observing system. A database management system should be of a much higher level of performance than presently available. The future international data management system can include a variety of specialized data centres and a hierarchy of real-time centres together with delayed-mode data centres. The global ocean observing system may need new types of operational centres similar to ECMWF, NMC, etc. At present, there are a number of centres within the IODE, IGOSS, TOGA and WOCE programmes. It is critical to insure the efficient archival, retrieval, and availability of data and data products. The ad hoc Group noted that some actions have been already been taken by IODE and IGOSS Committees to improve the present data management system in support of large-scale research programmes, GTSPP development in particular. The ad hoc Group invited the IOC Committee on IODE to consider possible actions for the design of a next generation data base management scheme.

3. RECOMMENDATIONS FOR FURTHER DEVELOPMENT OF PLANS AND PRESENTATIONS TO THE SECOND WORLD CLIMATE CONFERENCE AND FOR IOC AND WMO

36 Recommendations concerning further development of plans are described under Agenda Item 2 above. The ad hoc Group formulated a number of additional proposals and recommendations, addressed to IOC and WMO, for obtaining governmental support for the global ocean observing system; improving present observing systems; preparing the implementation plan; and strengthening coordination among agencies in designing, planning, and implementing the global ocean observing system. The recommendations are found in Annex II.

4. CO-ORDINATION WITH OOSDP

37 The ad hoc Group examined item (ii) of the terms of reference which concerned the relationship between the ad hoc Group and the OOSDP. It was noted that OOSDP's role is to formulate the scientific basis and conceptual design of an operational observing system to monitor and predict climate and that, in relation to the OOSDP, the ad hoc Group's role was to facilitate the implementation of that design. It was felt that sub-heading (a), (b), and (c) of item (ii) adequately described specific means by which the ad hoc Group could fulfil its role of service to the OOSDP. However, item (iib) could be made more specific by noting that "assessment" refers not to the scientific evaluation of existing systems, but to the adequacy of the present data and operational services (e.g. IGOSS, GLOSS, DBCP, etc) to meet the needs of present and potential climate programmes.

38 It was also felt that the ad hoc Group could coordinate other future related ocean systems that may be complementary to, but distinct from, that being developed by the JSC/CCCO OOSDP related to climate. A complete ocean observing system would provide products and services beneficial to fisheries, pollution and the coastal zone. Those systems should be designed in such a way that they can be integrated into an overall global system. It was recognized, however, that the present opportunity was climate-related.

5. FUTURE WORK OF THE AD HOC GROUP

39 The ad hoc Group prepared a Work Plan, covering the period September 1990 to March 1991, that included the presentation of a strategy document to the Second World Climate Conference, its review by various IOC and WMO subsidiary bodies, and its presentation with the recommendations of the ad hoc Group to the Fourth Session of the IOC Committee on Ocean Processes and Climate and the Sixteenth Session of the IOC Assembly.

40 Other activities were identified for the period 1991-1992. The ad hoc Group felt, however, that future actions should be determined by the IOC/OPC and the IOC Assembly in view of the proposals for preparation of the implementation plan (with the assistance of a consultant and/or small group of experts) and for establishing an Interagency/Intersecretariat Coordinating Group (IOC, WMO and UNEP) on a Global Ocean Observing System.

41 While recognizing that the ad hoc Group would remain in existence until a decision was made by the IOC/OPC, the Group did not make any recommendations regarding future membership. It was felt that the IOC/OPC should specify the future work plan and composition of the Group.

ANNEX I

AGENDA

1. INTRODUCTION AND REVIEW OF THE TERMS OF REFERENCE

2. PRESENTATION AND REVIEW OF DRAFT DOCUMENTS PREPARED ON PLANS FOR A GLOBAL OCEAN OBSERVATION SYSTEM, REQUIREMENTS AND PRESENT CAPABILITIES

3. RECOMMENDATIONS FOR FURTHER DEVELOPMENT OF PLANS AND PRESENTATIONS TO THE SECOND WORLD CLIMATE CONFERENCE

4. CO-ORDINATION WITH OOSDP

5. FUTURE WORK OF THE AD HOC GROUP

ANNEX II

RECOMMENDATIONS OF IOC AD HOC GROUP OF EXPERTS ON AN OCEAN OBSERVING SYSTEM

1. **EXISTING SYSTEMS**

It was recognized that, even if fully developed in accordance with their implementation plans, existing systems by themselves cannot meet all of the basic measurements required for climate monitoring. However, initial implementation of the global ocean observing system will be facilitated by strengthening the existing operational systems of IOC and WMO and by improving the national and international coordinating mechanisms for these activities; therefore, it was recommended:

(i) **That Member States be urged to strengthen their involvement in existing systems in order to make them fully operational, through long-term commitments for data acquisition and exchange and analyses.**

(ii) That additional Member States participate in the IGOSS-IODE Global Temperature-Salinity Pilot Project which demonstrates the concept of end-to-end data management, i.e., the management of data and information from sensor to archive to access, fostering the rapid availability of high quality data, with emphasis on salinity data.

(iii) That high priority be given to the results of the IGOSS Products Seminar on Oceanographic Products in Support of Global Change Studies to be held in Tokyo 15-19 April 1991, so that the benefits of the ocean data can be better understood.

(iv) That the Joint IGOSS-CMM Group of Experts on Remote Sensing be requested, as a matter of urgency, to: a) collate and review plans and proposals for ocean satellites or ocean remote sensing instruments on other satellites (e.g., the operational meteorological orbiting satellite); b) examine and provide advice on formats and procedures for the transfer in real-time of remotely sensed ocean data to relevant agencies.

(v) That the Joint Working Committee for IGOSS request Member States to clearly identify their present needs for GTS data distribution, and that these requirements be addressed through WMO to the relevant GTS data distribution centers (RTH's, NMC's) for updating of existing oceanographic data routing channels.

(vi) That a Global Current Meter Pilot Project be initiated under the auspices of IGOSS and IODE to encourage and facilitate the transmission of all current meter data in real-time via GTS, provide summaries of the real-time data stream on a regular basis, and improve and promote awareness of the availability of current meter data for climate studies, recognizing that a) the flow of data in real-time is essential for assessing the current state of the climate system and for developing ocean models for climate prediction, b) ocean velocity is a key variable for characterizing the general circulation and its impact on climate, and c) there are now ocean velocity measurements programmes from ocean buoys, research vessels, and ships-of-opportunity, some of which submit data in real-time via Service Argos.

2. **STRATEGY DOCUMENT**

Toward the development of a global ocean observing system, it was recommended that the Status Report prepared for discussion at the meeting be revised to include and emphasize the benefits and rationale and condensed to form a strategy and rationale for the GOOS. The revised document should be distributed to relevant subsidiary bodies of the IOC and WMO for comment and its findings made available through the Secretary, IOC, for the Second World Climate Conference, the IPCC, UNEP, the UNCED Secretariat, as well as IOC and WMO governing bodies.

3. **PROTOCOL**

A protocol for the global ocean observing system is necessary. It was recommended:

(i) That the IOC request the Second World Climate Conference to include an ocean monitoring system as an annex to the draft framework convention on climate change. The SWCC should be asked to recognize that a comprehensive ocean observing system will not be fully operational without substantial new governmental commitments. Subsequently, the IOC should prepare a protocol for possible adoption at the 1992 UN Conference on Environment and Development in order to promote and facilitate the participation of and new commitments from governments.

(ii) Following the IOC Assembly in 1991, that a comprehensive implementation proposal be prepared which will support the proposed protocol by identifying the elements of a GOOS to be undertaken by participating countries. The implementation proposal will include an analysis of actions required to fully utilize existing national and intergovernmental systems to meet presently identified needs; illustrate types of observations required for numerical model inputs, their composition and expected accuracy levels; technologies to be developed and utilized, data management and exchange activities; a proposal for the intergovernmental institutional structure; identify satellite commitments needed; and budget projections. Actions will be divided into short-term and long-term tasks. Details and design

characteristics will be obtained from the OOSDP as they become available. It is suggested that this document be prepared by a consultant and/or a group of experts.

4. CO-ORDINATION

The ad hoc Group recommended that an Interagency/Intersecretariat Co-ordinating Group on an Ocean Observing System be established to include representatives of IOC, WMO, and UNEP. An annual status report on the ocean observing system should be prepared by this group, which could also call for the designation of national coordinators to facilitate national integration of various ocean observing systems.

5. TEMA COMPONENTS

The ad hoc Group recommended that attention be given to ways and means of providing instrumentation to developing countries, as well as training their specialists in ocean observations and applications of data for research and practical purposes.

6. RELATION TO OOSDP

That the CCCO-JSC Ocean Observing System Development Panel be relied on for scientific guidance and the design of GOOS through close interaction, wider scientific group involved in planning, and the coordination of major ocean climate research programs. The OOSDP will be requested to advise on the desirability for a pilot observing system project in some oceanic regions.

7. WMO CBS SUB-GROUP ON OCEAN DATA

That the WMO be requested to form a sub-group of CBS for ocean data that will be responsible for addressing problems and opportunities for increasing the distribution of ocean data and data products on the GTS.

8. DATABASE MANAGEMENT

That the IOC Committee on IODE in cooperation with the JWC/IGOSS be requested to consider actions aimed at designing a next generation database management system required for the global ocean observing system.

ANNEX III

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ANNEX IV

LIST OF DOCUMENTS

Document Code	Title
Working Documents	
IOC/GOOS-I/1	Provisional Agenda
IOC/GOOS-I/2	Draft Plan for Global Ocean Observing System
IOC/GOOS-I/3	Summary Report of the Meeting
IOC/GOOS-I/4	"Not allocated"
IOC/GOOS-I/5	Provisional List of Documents
IOC/GOOS-I/6	Terms of Reference of the IOC ad hoc Group of Experts on OOS and the CCCO-JSC Ocean Observing System Development Panel
IOC/GOOS-I/7	Proposed Work Plan of the ad hoc Group
IOC/GOOS-I/8	List of Participants
Reference/Information Documents	
Overview and Conclusions - Intergovernmental Panel on Climate Change	
Policymakers Summary - Working Group I, Intergovernmental Panel on Climate Change	
Policymakers Summary - Working Group II, Intergovernmental Panel on Climate Change	
Policymakers Summary - Working Group III, Intergovernmental Panel on Climate Change	
UNEP-IOC-WMO/GCNSMS-I/6 Draft Proposal for a Global Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Global Climate Change	

N.B. This list is for reference only. No stocks of these documents are maintained, except for the Summary Report.

ANNEX V

WORK PLAN AND TIMETABLE FOR THE PLANNING AND DEVELOPMENT OF THE GLOBAL OCEAN OBSERVING SYSTEM

DATES - PLACE	MEETINGS	ACTION REQUIRED	ORGANIZATION/BODY
1990			
1. 06-08.90 Washington, D.C.		Preparation of the Status Report	IOC
2. 6-7.09.90 Washington, D.C.	1st Session of the IOC Ad hoc Group of experts on the Ocean Observing System	Review the status report on the development of the global ocean observing system and preparation of the strategic plan	IOC/IGOSS
3. 12-14.09.90 Washington, D.C.	1st Session of the CCCO-JSC OOSDP	Review and comments on proposal and status report (P&SR) (requirements for research programmes)	CCCO-JSC OOSDP
4. 10-14.09.90 Geneva, Switzerland	5th Session of CMM WG on Basic Marine Meteorological Services	Review and comment on relevant sections of P&SR (marine meteorological observations and practical applications)	WMO CMM/MMS
5. 17-19.09.90 Brest, France	1st Session of Guiding Group on GTSPP	Review and comment on relevant section of P&SR (GTSPP)	IOC-WMO/IGOSS-I-ODE

6. 16-26.10.90 Melbourne, Australia	6th Session of the WMO-IOC Drifting Buoy Co-operation Panel	Review and comment on relevant actions of P&SR (drifting buoy programme)	IOC-WMO DBCP
7. 22-25.10.90 Paris, France	1st Session of IOC-WMO Intergovernmental WOCE Panel	Member States participation in the WOCE Observing Programme	IOC-WMO/IWP WOCE
8. 22-26.10.90 Miami, Fl. USA	2nd Session of IOC Group of Experts on GLOSS	Review and comment on relevant sections of P&SR (sea-level observations)	IOC/GLOSS
9. 10.90		Send P&SR to Chairmen of IOC and WMO relevant subsidiary bodies for comments and suggestions	IOC, WMO
10. 17-19.10.90	15th Session of CCCO-JSC Scientific Steering Group on WOCE	Review and Comments	JSC-CCCO WOCE
11. 29.10-7.11.90	2nd World Climate Conference	Present P and proposal for the development of the Ocean Observing System	WMO-ICSM-UN-EP-Unesco-IOC SWCC
12. 12-16.11. Paris, France	2nd Session of IGOSS Group of Experts on Operations and Technical Applications (jointly with IODE/TADE)	Review relevant section of P&SR (IGOSS, technology and operational aspects)	IOC-WMO, IGOSS/IOCE

13. 10-14.12.90 Paris , France	IOC-WMO-UNEP Technical Experts Meeting on Development of Coastal Observing Systems	Review P&SR and comment on future interaction between GOOS and GCOS	IOC-WMO-UNEP GCOS
1991			
1. 8-11.01.91 Geneva, Switzerland	4th Session of WMO-IOC Intergovernmental TOGA Board	Review and comments on P&SR	IOC-WMO TOGA
2. February 1991		Prepare summary of comments and suggestions of IOC and WMO subsidiary bodies	IOC-WMO
3. February 1991		Preparation of draft protocol	IOC
4. 27-.02-1.03.91 Paris, France	4th Session of WMO-IOC Committee on Ocean Processes and Climate	Review P&SR and comments and recommendations of the Ad hoc Group on on further actions for IOC Assembly	IOC
5. 7-12.03.91 Paris, France	16th Session of IOC Assembly	Review and approve, in principle, P and recommendations of IOC/OPC on future actions for its preparation and presentation to 1992 Conference on the Environment and Development (protocol)	IOC

Further Related Meetings

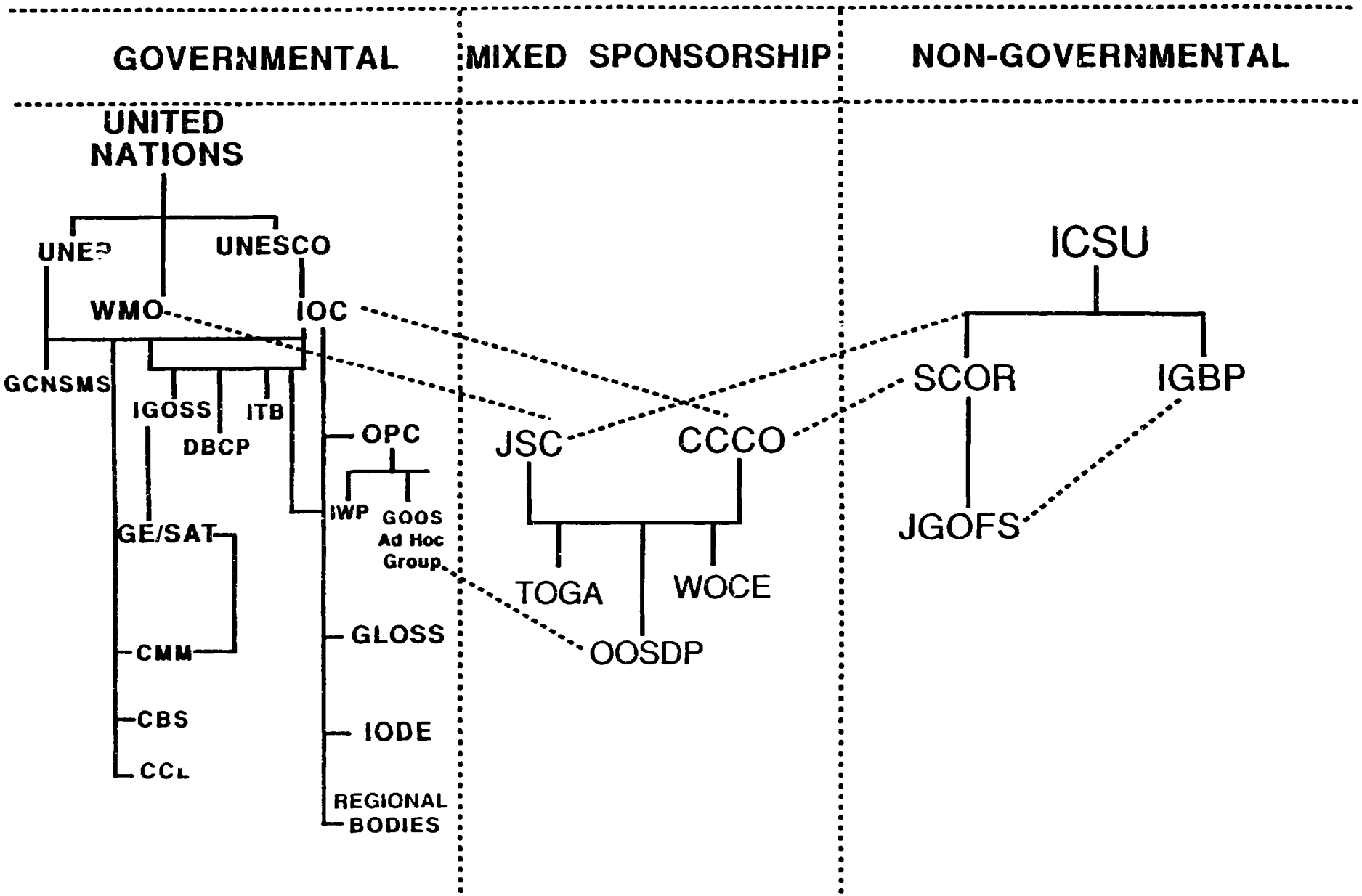
6. March 1991	11th Session of WMO-ICSU Joint Scientific Committee on WCRP	ICSU-WMO JSC
7. Spring 1991	12th Session of SCOR-IOC CCCO	SCOR-IOC CCCO
8. April-May 1991 Paris, France		IOC, GOOS
9. 15-19.04.91 Tokyo, Japan	IOC-WMO Seminar on IGOSS Products	IOC-WMO, IGOSS
10. 6-13.05.91 Geneva, Switzerland	11th WMO Congress	WMO
11. 7-9.05.91 Halifax, Nova Scotia, Canada	16th Session of CCCO JSC SSG for WOCE	CCCO-JSC, WOCE
12. 1991	JGOFS-CCCO CO2 Panel	JSC-CCCO
13. Summer 1991	2nd Session of CCCO-JSC OOSDP	CCCO-JSC, OOSDP
14. Autumn 1991	17th Session of CCCO-JSC SSG for WOCE	CCCO-JSC, WOCE

15. November 1991 Paris, France	6th Session of IOC-WMO Committee on IGOSS	IOC-WMO, IGOSS
16. October 1991 Washington, D.C. USA	IOC Workshop on Ocean Climate Data	IOC, IODE
17. Second half 1991 USSR	2nd International Symposium on Integrated Global Ocean Monitoring	IOC-WMO-UNEP, USSR
18. October 1991 Paris, France	7th Session of WMO-IOC DBCP	IOC-WMO, DBCP
19. October-November 1991	3rd Session of IOC Group of Experts on GLOSS	IOC, GLOSS

1992

1. March 1992	25th Session of IOC Executive Council	IOC
2. May-June 1992	WMO Executive Council	WMO
3. 1992	UN Conference on the Environment and Development	IOC-WMO

Participation of International Organizations & Their Bodies in the Ocean Observing & Data Management Systems



ANNEX VII

TERMS OF REFERENCE AND COMPOSITION OF THE IOC AD HOC GROUP OF EXPERTS ON A GLOBAL OCEAN OBSERVING SYSTEM AND THE CCCO-JSC OCEAN OBSERVING SYSTEM DEVELOPMENT PANEL (OOSDP)

1. INTERACTION AND RESPONSIBILITIES OF THE IOC AD HOC GROUP OF EXPERTS AND THE CCCO-JSC OOSDP

The IOC Executive Council at its 23rd session endorsed the proposal on future interaction and responsibilities of the IOC ad hoc Group of Experts and the CCCO-JSC Ocean Observing System Development Panel (OOSDP).

The CCCO-JSC OOSDP will formulate the conceptual design of an operational observing system for monitoring physical and other properties that determine the ocean circulation, the response of the ocean to climate change and the initial-value inputs for climate predictions. The design will proceed in step with the development of TOGA, WOCE and JGOFS programmes. The Panel will provide progress reports to the CCCO and JSC on annual intervals and is to produce its final report no later than 31 December 1994.

The IOC ad hoc Group, as a subsidiary body of IOC/OPC, will advise IOC through IOC/OPC on the necessary actions to implement long-term systematic ocean observations for monitoring and predicting environmental changes. In the near term the ad hoc Group will concentrate on collating existing identified needs for long-term systematic observations of the major climate-related programmes (TOGA, WOCE, JGOFS, GEWEX, WDCP and others as appropriate); assess the present and potential capacity of the existing observational and data delivery systems to meet those needs; and recommend actions to be taken to begin to build an adequate system to meet the needs.

It was also agreed that both groups would require liaison with existing systems or bodies of IOC and WMO (IGOSS, DBCP, GLOSS, IODE, CBS, CMM, CCI, and relevant IOC regional bodies).

2. IOC AD HOC GROUP OF EXPERTS ON A GLOBAL OCEAN OBSERVING SYSTEM

2.1 TERMS OF REFERENCE OF THE AD HOC GROUP OF EXPERTS ON A GLOBAL OCEAN OBSERVING SYSTEM

The ad hoc Group of Experts on an Ocean Observing System is established as a subsidiary body of the IOC Committee on Ocean Processes and Climate (OPC) in recognition of the need for the development of a permanent ocean observing system as part of an overall programme for monitoring and predicting global environmental change. The initial focus will be on those physical processes that strongly influence global climate change. Later considerations will include a wider range of biogeochemical observations.

In carrying out its work, the ad hoc Group shall assist the CCCO-JSC Ocean Observing System Development Panel (OOSDP) by focussing on the implementation issues identified in the formulation of the conceptual design of a system for global operational ocean measurements.

The ad hoc Group shall be appointed by the Secretary IOC in consultation with the Secretary-General of WMO and based on recommendations of the Chairman and Vice-Chairman OPC, and the Chairman of the IOC ad hoc group of Experts. The Chairman OPC shall consult with the CCCO, JSC and OOSDP in making the nominations for membership. The terms of reference shall be to:

(i) advise the IOC through the OPC on the necessary actions to implement long-term systematic ocean observations and efficient data management and delivery as part of a global system for monitoring and predicting environmental changes, and on international mechanisms for co-ordination and management of the system;

(ii) in the near term, to provide assistance to the OOSDP by:

(a) collating the existing identified needs for long-term systematic observations of the major climate-related programmes (TOGA, WOCE, JGOFS, GEWEX, WCDP and others as appropriate),

(b) assessing the present and potential capacity of the existing observational and data delivery systems to meet those needs,

(c) recommending to IOC, WMO and their Member States actions that must be taken to begin to build an adequate system to meet the needs;

(iii) in parallel with the near-term tasks, to identify those actions necessary to implement a permanent global systematic ocean observing system on the basis of the concept design formulated by the OOSDP and to recommend procedures by which the progress of implementation can be reviewed;

(iv) liaise and co-operate with the relevant IOC and WMO subsidiary bodies (Joint IOC-WMO Committee for the Integrated Global Ocean Services System, Drifting-Buoy Co-operation Panel, IOC Group of Experts on the Global Sea Level Observing System, IOC Committee on International Oceanographic Data and Information Exchange, WMO Commissions for Marine Meteorology, for Basic Systems and for Climatology and relevant IOC regional bodies).

The ad hoc Group shall keep IOC and WMO informed of the progress in the implementation of long-term systematic ocean observations at the meetings of the respective Executive Councils in 1990, and shall prepare draft proposals for near-term implementation strategy shall be presented to the Fourth Session of the OPC in 1991.

2.2 MEMBERSHIP OF THE AD HOC GROUP OF EXPERTS

The composition of the Group should include representatives of resource and funding institutions; experts familiar with TOGA, WOCE, JGOFS, GEWEX and polar programmes; experts representing certain fields of expertise and the liaison members representing IOC/IODE, IOC/GLOSS, IOC-WMO/IGOSS and WMO-IOC/DBCP, WMO/CMM and WMO/CBS as well as representatives of satellite agencies. It was also agreed that members of the Group should be elected by the Secretary IOC in consultation with the Secretary General of WMO and based on recommendations of the Chairman and Vice-Chairman of the IOC/OPC, and the Chairman of the IOC ad hoc Group of Experts.

3. CCCO-JSC OCEAN OBSERVING SYSTEM DEVELOPMENT PANEL (OOSDP)

3.1 TERMS OF REFERENCE

From the perspective of global climate change, systematic long-term observations of the world ocean are needed for several purposes. The key to predicting the rate of change of global climate will be found in observations of the ocean circulation and transport of heat and salt. Predictions of climate change will eventually need to be carried out from initial descriptions of the atmospheric and oceanic circulations determined from observations. Furthermore, changes in oceanic biogeochemical processes may be induced by the evolution of climate and could, in turn, influence climate. To achieve adequate monitoring of the oceanic circulation and climate-related processes, a permanent ocean observing system is indispensable. For this purpose, CCCO and JSC will co-sponsor an Ocean Observing System Development Panel (OOSDP), with the following terms of reference:

(i) To formulate the conceptual design of an operational observing system to monitor physical and other properties that determine ocean circulation and the response of the ocean to climate change and to provide initial-value inputs for climate predictions,

(ii) To co-operate as appropriate with the planners of other scientific or operational programmes related to climate and climatic change and to collate relevant data requirements and observing system specifications,

(iii) To liaise with responsible scientific institutions and agencies, including environmental administrations and space agencies, to ensure the compatibility of the proposed global ocean observing system development programme with the long-term plans of these organizations.

The CCCO and JSC further agree that the Panel should give first priority to consideration of measurements of dynamic and thermodynamic paramenters and chemical tracers that determine ocean circulation and transport of heat and salt, based on the findings of TOGA and WOCE. They also agree that the plans to be developed should take into account the possible future incorporation of a wider range of biogeochemical observations, subject to separate consideration and planning within or outside the OOSDP framework.

JSC and CCCO request the Panel to proceed with the preparation of its first plan for a global ocean observing system in step with the development of TOGA, WOCE and JGOFS systems, to provide progress reports to the two committees at appropriate (in principle annual) intervals, and to produce its final report no later than 31 December 1994.

3.2 COMPOSITION OF THE OOSDP

Dr. Worth Nowlin (Chairman)
Dr. Liliane Merlivat
Dr. Neville Smith
Dr. Peter K. Taylor
Dr. Robert Weller