Intergovernmental Oceanographic Commission
Reports of Governing and Major Subsidiary Bodies

IOC Committee for the Global Ocean Observing System (GOOS)

First Session

Paris, 16-19 February 1993

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In this Series | *Languages*

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* For reasons of budgetary constraints, Annexes IV, V, VI and VII remain untranslated.

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1. OPENING

1 Dr. Gunnar Kullenberg, Secretary, IOC, opened the Session and welcomed the participants. He emphasized the importance of this Session in formulating IOC's overall policy, approach and mechanisms for Global Ocean Observing System (GOOS) planning and development. He referred to the decisions of UNCED - in particular Chapter 17, Section E of Agenda 21 - that call for systematic observations of the ocean and which support the IOC initiative to develop GOOS in co-operation with WMO, UNEP and other international organizations. He pointed out the increased awareness of the need for GOOS fostered by the UNCED. GOOS is also important for the implementation of the Framework Convention on Climate Change and the Convention on Biological Diversity.

2 Since GOOS is cross-sectoral and must serve several user communities, extensive co-operation with other agencies is required. However, there must be one organizational focal point. He pointed out that there are a number of ongoing international, regional and national activities that can and should be potentially regarded as part of GOOS. Referring to the decision of the Twenty-fifth Session of the IOC Executive Council, Dr. Kullenberg reported on the negotiations with ICSU, WMO and UNEP regarding future co-operation in GOOS planning and development and on the actions leading to the preparation of "The Approach to GOOS" document.

3 IOC leadership of GOOS means that Member States must make commitments for developing and implementing it. Dr. Kullenberg called on the meeting to prepare a statement or declaration on GOOS to be presented to the Assembly for submission to the Intergovernmental Meeting on the World Climate Programme (Geneva, April 1993). The full text of Dr. Kullenberg's statement is given in Annex IV.

4 Mr. Geoffrey Holland of Canada was invited and agreed to chair the meeting. Mr. Holland summarized his expectations of the meeting. Firstly, it is important to have an exchange of information on developments related to GOOS at international and national levels. Secondly, it is necessary to recommend to the IOC Assembly international co-ordination mechanisms required for GOOS design, planning, development and co-ordination and consider the relationships between that structure and existing international and intergovernmental groups. Lastly the Committee must decide on priorities and actions for GOOS planning and development. In his view particular initial attention should be given to further improvements in existing observing activities, bearing in mind the limited national resources available.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

5 The Agenda of the Session as adopted by the Committee is given in Annex I.

2.2 DESIGNATION OF A RAPPORTEUR

6 The Committee designated Ms. Muriel Cole (U.S.A.) as Rapporteur for the Session.

2.3 CONDUCT OF THE SESSION

7 Dr. Wolfgang Scherer, Director, GOOS Support Office, introduced the staff of the GOOS Support Office and reviewed the arrangements and documentation for the meeting.

8 The List of Participants is given in Annex III.

3. TERMS OF REFERENCE AND INITIAL TASKS OF THE IOC COMMITTEE FOR GOOS

9 The Chairman referred to Document IOC/EC-XXV/3, Extracts of the Report of the Twenty-Fifth Session of the IOC Executive Council, which contains Resolution EC-XXV.3 entitled International Mechanisms for GOOS Development. He reviewed the Terms of Reference given for the Committee as well as Initial Tasks listed in that Resolution.

4. FOLLOW-UP OF THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

4.1 AGENDA 21, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND UNITED NATIONS CONVENTION ON BIODIVERSITY

10 This agenda item was introduced by the Secretary IOC. He explained that IOC Member States and the Secretariat had been actively involved in the preparations for UNCED and in the Conference itself. He added that UNCED has recognized the importance of the ocean for the whole global environment and, in Agenda 21, has called for the establishment of a Global Ocean Observing System in particular. Agenda 21 recognizes that our knowledge of the ocean and the coastal zone is insufficient to predict the consequences of our actions and that this knowledge is a prerequisite to planning for sustainable development. The Committee's attention was brought to document IOC-XVII/8 Annex 1 - Draft Action Plan for IOC Follow-up to UNCED and Implementation of Agenda 21: Overall Strategy and Goals - which was to be submitted to the forthcoming session of the Assembly together with any comments of this Committee.

11 **The Committee** first **agreed** it was appropriate to consider the follow-up of Agenda 21 concurrently with the Framework Convention on Climate Change and the Convention on Biological Diversity, and therefore decided to treat the follow-up of UNCED as a whole. **The Committee further recognized** that Chapter 17 of Agenda 21, entitled Protection of the Oceans, All Kinds of Seas, Including Enclosed and Semi-Enclosed Seas, and Coastal Areas and Protection, Rational Use and Development of their Living Resources, could not be disassociated from other chapters such as those dealing with capacity-building in developing countries, international institutional arrangements, the scientific and technological community, etc. GOOS is to provide, within a global framework, for an "information base" on the ocean and coastal areas, which should be both as comprehensive as possible and responsive to the needs of a large variety of potential users. It will support the needs of Agenda 21 as well as needs identified in the two Conventions. These results of UNCED have given IOC Member States both the opportunity and the responsibility to carry GOOS forward.

12 **The Committee agreed** that regional bodies, either subsidiary bodies of the Commission or others, have a key role in providing specific inputs to GOOS. It **considered** that regional mechanisms need to play a key role in implementing GOOS.

13 **The Committee recognized** that one of the key issues in the implementation of UNCED decisions is funding. **It considered** this question should be dealt with at two levels: at the national level, on the one hand, possible donor agencies should be approached; national dialogues between those concerned with ocean- related questions and those having the ability to provide funds should be initiated since nothing can be done without strong national involvements and commitments. On the other hand, Member States, possibly in co-operation with IOC regional subsidiary bodies and the support of the IOC Secretariat, should consider approaching potential international funding sources, such as the Global Environment Facility of the World Bank and UNDP. The linkage between ocean affairs and economic development should be clearly demonstrated.

14 **The Committee recalled** that a number of systems/programmes/bodies/etc., such as IGOSS, GLOSS, IODE, WWW, DBCP, GIPME, TEMA, etc., are already established. They have set up mechanisms for the collection of data and communications; they have issued manuals and guides; they have worked on standards and intercalibration problems; they have developed the capabilities to prepare products; they have set up education, training and mutual assistance programmes; etc. The concept of GOOS building upon existing systems/bodies was emphasized, with the understanding that those systems/bodies should actively participate in GOOS undertakings.

15 Dealing finally with possible priorities, **the Committee recognized** that, among the goals defined on the basis of UNCED results, "Climate variability and impacts" and the "Role of oceans in climate and global systems" were potential areas for the first phase of GOOS development. **It nevertheless emphasized** that other needs, such as "Capacity building" and "Coastal integrated management for sustainable development" had to be addressed at the outset since they were of major concern to, *inter alia*, developing countries. As far as coastal questions were concerned, **the Committee stated** that national jurisdictions should be strictly adhered to, without prejudice to the basic principle of free exchange of data and information for global benefit.

5. STATUS OF PLANNING OF THE GLOBAL OCEAN OBSERVING SYSTEM

5.1 INTERNATIONAL PLANNING

5.1.1 Joint GOOS Technical and Scientific Committee (J-GOOS)

16 **The Committee reviewed** the status and plans for establishing scientific and technical requirements for GOOS. In response to IOC Resolution EC-XXV.3, the Secretary has taken steps to form a GOOS Technical and Scientific Advisory Panel. The proposed name of the group, J-GOOS, reflects the potential interest in joint sponsorship of such a group. Negotiations for such arrangements have not been finalized. The following paragraphs describe specific actions taken to advance the plans for GOOS.

5.1.1.1 Development of the GOOS Module on the Assessment and Prediction of the Health of the Ocean

17 Dr. Chidi Ibe, IOC Technical Secretary for GIPME, summarized the status of an *ad hoc* Health of the Ocean Panel which began work in 1992 to address this module of GOOS, referring to Document IOC/GOOS-I/12. The first meeting is to be held in Paris, 22-26 February 1993. GIPME provides a mechanism for the assessment and monitoring of contamination, pollution and other types of degradation in the marine environment. As such, the programme provides: (i) a basis for authoritatively evaluating the state of health of the marine environment, both at regional and global levels, (ii) identifying instances in which corrective measures to prevent or ameliorate marine pollution are required; and, (iii) of instituting compliance and surveillance monitoring of conditions and effects in the marine environment. Accordingly, GIPME comprises research and monitoring (MARPOLMON) components conducted at regional and global levels. MARPOLMON, in fact, constitutes a credible, regionally based, on-going ocean observing system even though its optimal potential is yet to be realized. This shortcoming is being addressed in the context of the requirements for the strategic development of GIPME. An example of a current monitoring activity which is of direct relevance to GOOS is the GIPME International Mussel Watch Programme. He expressed the view that the early development of GOOS had tended to emphasize the physical aspects rather than chemical and biological aspects. Initially the Health of the Ocean Module will aim at providing basic information on the levels of contamination and on the sources, transport, fate and effects of contaminants in the marine environment. Preliminary emphasis will be on measurements being made in coastal regions and on the related biological effects including population changes, with the results being also useful in considerations on, inter alia, human health, seafood safety, and coastal and river/estuarine drainage basin land use and development.

18 The Delegate from Germany referred to the Committee on programmes of regional conventions, such as the Paris-, Oslo- and Helsinki Conventions for preventing ocean pollution. He expressed concern that no additional resources may be provided by countries which contribute to the regional conventions for extra GOOS activities. He, therefore, suggested that the Commission contact the Conventions in an effort to obtain their agreement for making their measurements freely available for GOOS purposes.

5.1.2 Report on "Approach to GOOS"

19 Reference was made to the Report of the International Meeting of Scientific and Technical Experts on Climate Change and Oceans (Malta, July 1991) (Document IOC/STECCO/3), a report of the IOC Blue Ribbon Panel for GOOS- The Case for GOOS (Document IOC/INF-915) and Document IOC-XVII/8 Annex 2, Toward a Global Ocean Observing System: "The Approach to GOOS". The document entitled "The Case for GOOS" was presented by Dr. John Woods, Chairman of a "Blue Ribbon Panel" which produced the report. The aim of the Panel was to find the best way to present GOOS to governments whose support will be needed to make it a success.

20 The Panel decided to focus on the end users of new products that would become available when GOOS is operational. GOOS will provide products that describe aspects of the ocean of concern to end users, with a view to reducing the uncertainty that now exists. Most end users are concerned with local phenomena, often in coastal seas. The models used which support their services almost invariably include open ocean boundary conditions. In the case of climate, the open boundary often lies at the base of the upper-ocean mixed layer which is closely coupled with the atmosphere. One of the greatest sources of uncertainty arises from unknown changes occurring beyond those open boundaries in the open

ocean, which have significant impact on the coastal and other regions of concern to end users. Through GOOS the state of the global ocean can be described periodically, from coast-to-coast, top-to-bottom, pole-to-pole in such a way that the uncertainties arising from these open-ocean boundary conditions are greatly reduced. In order to do so, GOOS must be a global system, aimed at serving regional concerns of end users. This global description is a prerequisite to ocean and climate forecasting.

21 The US Delegation noted that "The Case for GOOS" document contains many provocative and useful ideas that need exposure and thoughtful consideration but regret that time did not permit it to be discussed by the Committee. The Secretariat is to be commended, however, for establishing this Blue Ribbon Panel, which shows that flexible and rapid actions can be undertaken and are useful.

22 Dr. Wolfgang Scherer reviewed the document "The Approach to GOOS", prepared as a shorter explanatory document. GOOS is envisioned as operational data collection, data analysis, exchange of data and products, technology development and transfer and capacity building. It will cover the open ocean and coastal regions including enclosed and semi-enclosed seas and will include both remotely sensed and *in situ* data. GOOS observations must be long-term, systematic, relevant to the global system, routine and cost-effective; GOOS will be implemented through nationally-owned and operated facilities and services. He reviewed the five modules which are inter-related and which represent user interests:

(i) Monitoring of the Coastal Zone Environment and its Changes
(ii) Climate Monitoring, Assessment and Prediction
(iii) Marine Meteorological and Oceanographic Operational Services
(iv) Assessment and Prediction of the Health of the Ocean
(v) Monitoring and Assessment of Marine Living Resources

23 Initial areas of emphasis were proposed for each module as well as implementation phases, national actions and international actions. The Committee re-affirmed that GOOS must be operational in character, scientific in rationale, and national and regional in implementation. Training, education and mutual assistance to developing countries must be integrated into GOOS development and implementation. Member States should consider making use of existing IOC national co-ordination mechanisms in planning for national participation in GOOS.

24 Dr. Geoffrey Laurence, IOC Technical Secretary for Ocean Science in Relation to Living Resources, summarized the status of planning for a group to address the GOOS module on marine living resources. Initial thinking is that data must be operational and applied (rather than for research), global and reflective of needs identified by UNCED. Efforts must include developing countries. Attention must be given to potential climate change, ecosystem changes, biodiversity changes and resource sustainability.

25 Scientific progress may dictate that some modules will advance faster than others. Funding availability will also be a consideration. **The Committee agreed** that groups should be established to address scientific needs for the Marine Living Resources Module and the Coastal Module, discussed further below.

26 **Recommendations GOOS-I. 1 and 2, addressing the further development of and approach to GOOS, were adopted.**

5.1.3 Report of the Ocean Observing System Development Panel (OOSDP)

27 Mr. Arthur Alexiou, GOOS Support Office, summarized the status of the Ocean Observing System Development Panel (OOSDP), referring to Document IOC/GOOS-I/6. Established in 1990, the OOSDP has sought to involve the broad oceanographic community in its work by various means including the publication of background papers to generate feedback. The Panel is on schedule with the goal of completing its work by December 1994. An Interim Report will be distributed in March 1993 that conforms to the existing chapter outline to be used in the Final Report. The Interim Report provides recommendations for elements of the system that can be defined now and describes the strategy to be followed in specifying those elements which require consideration of the results of on-going research programmes (e.g., WOCE, TOGA, JGOFS). **The Committee agreed** that the OOSDP can be used as an example of efficiency and effectiveness by the Panel for the other modules in identifying GOOS requirements.

5.1.4 Pilot activities of the IOC-UNEP-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change

28 Dr. Albert Tolkachev, GOOS Support Office, led a presentation of reports on the progress in the development of the six pilot activities under the UNEP-IOC-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change endorsed by the IOC Assembly, at its Sixteenth Session, as described in Document IOC/GOOS-I/7.

29 Draft plans have been prepared for the following activities:

(i) Pilot Activity on Monitoring of Coral Reef Ecosystems; the UNEP-IOC Global Task Team on the Implications of Climate Change on Coral Reefs agreed to act as an expert advisory body to both UNEP and IOC for this project;

(ii) Pilot Activity on Monitoring of Mangrove Communities; the UNEP-UNESCO Task Team on the Impact of Expected Climatic Change on Mangroves agreed that its primary role would be to advise on the design, development and operation of the proposed pilot monitoring activity;

(iii) Pilot Activity on Monitoring Plankton Community Structure prepared by IOC Consultant Dr. John C. Gamble, Sir Alistair Hardy Foundation for Ocean Science, Plymouth Marine Laboratory, UK;

(iv) Pilot Activity on Coastal Circulation Monitoring initially in the Western Pacific Region prepared by IOC Consultant Dr. M. Wimbush, University of Rhode Island, USA;

(v) Pilot Activity on Monitoring of Sea Level Changes and Associated Coastal Impacts for the Indian Ocean Region prepared by IOC Consultant Dr. S. Shetye, NIO, India. The draft plan was reviewed and agreed upon by a Joint IOC-UNEP-WMO session held during the Third Session of the IOC Group of Experts on GLOSS.

The draft plans for those projects were made available to the participants as information documents.

30 With regard to the proposed pilot activity on Monitoring of Organic Carbon Accumulation in Surface Coastal Sediments, no plans have been prepared due to limited funds available by IOC and uncertainty as to the methodology for organic carbon analysis of sediments and selection of sites for pilot monitoring.

31 **The Committee noted broad satisfaction** that the pilot activities have been developed by joint efforts of IOC, UNEP and WMO, and that UNEP provided financial support for preparation of the implementation plans. IUCN has also contributed to the Coral Reef activity.

32 The Representative of WMO expressed continuing interest of WMO in supporting these pilot activities, particularly through National Meteorological Services. Some delegates emphasized the role of IOC regional bodies in the implementation of the pilot activities.

33 The Committee then discussed the potential input of the proposed pilot activities as well as other regional coastal activities to the GOOS Module on the Monitoring of the Coastal Zone Environment and Its Changes.

34 **The Committee recognized** that the most immediate benefit for Member States from GOOS will be in the coastal zone but the coastal observing and monitoring systems will need to be closely connected with the global system as regional and local models need to be connected with global models. **The Committee stressed** the need for an integrated approach in the global, regional and local elements of GOOS.

35 **The Committee agreed** that Coastal Module of GOOS requires an integrated approach, with regard to various aspects of the ocean observations needed for climate, living and non-living resources, pollution and information needed for integrated coastal zone management, but it may have a different approach in different geographical regions depending on practical interests of groups of countries.

36 Some delegates expressed the readiness of their countries to collaborate and assist in the implementation of coastal observing system.

37 **The Committee agreed** that within GOOS, high priority should be assigned to the development of observing systems in the coastal zone in view of particular practical interests and immediate benefits from GOOS to coastal states. Integrated coastal zone management and development was also stressed by the UNCED in the Agenda 21, Chapter 17.

38 Some delegates, referring to the Agenda 21 of UNCED, emphasized that the proposal to establish a special GOOS Trust Fund within the IOC Trust Fund should be based on the contributions of developed countries.

39 **The Committee noted** that the recent meetings of the IOC Regional bodies (IOCARIBE, IOCEA, IOCINCWIO, WESTPAC) gave particular consideration to GOOS development in their regions and provided constructive deliberations. **It recognized** that strong mechanisms should be developed for promotion and implementation of GOOS on a regional level and that regional bodies, on behalf of their Member States, should prepare project proposals for submission to GEF, UNDP and other international and national aid agencies for support for implementation of regional elements of GOOS.

40 **The Committee felt** that a Panel should be established to provide technical and scientific advice on the design, planning and the development of the GOOS module on Monitoring of Coastal Zone Environment and Its Changes. This Panel should work in close collaboration with OSLR, GIPME and other regional programmes and provide scientific/technical advice on the implementation of the pilot activities within the Joint IOC-UNEP-WMO Global Coastal Monitoring System.

41 The Representative of SCOR wished to emphasize the willingness of SCOR to co-operate with IOC in developing the coastal module of GOOS, particularly in connection with SCOR activities within IGBP on LOICZ, GLOBEC and sea-level studies.

42 **The Committee recognized** that further development of the pilot activities initiated jointly by IOC, UNEP and WMO would require substantial financial support and requested the Secretary to negotiate with UNEP and WMO on this matter and investigate possible use of extra-budgetary funds (GEF, national aid programmes) for their support.

43 **Recommendation GOOS-I.4 was adopted.**

5.2 GOOS NATIONAL PLANNING ACTIVITIES

44 Representatives of 19 Member States presented national reports, describing existing activities and plans for GOOS development and implementation over the next several years, including research efforts which will support GOOS. Reports were given by Argentina, Australia, Brazil, Canada, Chile, China, France, Germany, India, Japan, Netherlands, Norway, Poland, Portugal, Russian Federation, Spain, United Kingdom, United States of America and Venezuela. The Committee was pleased to see the level of effort in many regions. The Euromar SEAWATCH initiative is recognized as an interesting regional GOOS-type development. Technology now provides opportunities not available ten years ago. Satellite measurements, *in situ* capabilities (e.g., sensors placed on buoys for contaminant monitoring) and advances in automation all will foster GOOS. Reports made clear that research efforts provide an underpinning of GOOS, that Member States intend to examine and re-orient their relevant operational and research efforts to support GOOS, and that in many cases they are establishing national co-ordination between their national marine-related agencies in order to utilize fully the benefits of GOOS.

6. STATUS OF AND INTERACTION WITH EXISTING OCEAN OBSERVING SYSTEM COMPONENTS (IGOSS, GLOSS, DBCP, IODE, MARPOLMON, CPR)

45 Mr. John Withrow, GOOS Support Office, introduced Document IOC/GOOS-I/11, Reports of IOC Subsidiary Bodies on GOOS and Document IOC/INF-902, Global Ocean Observing System - Status Report on Existing Ocean Elements and Related Systems, 1992. The latter report reflects the significant amount of effort already underway.

46 Presentations were given by representatives of each of the existing systems who emphasized that:

(i) the existing components were the backbone of the Global Ocean Observing System (GOOS);

(ii) the existing components should be involved intimately in the design and implementation of the GOOS; and

(iii) the GOOS should exploit all of the existing elements of IOC in its implementation including the regional bodies of the IOC.

47 All of the existing components expressed their support for the GOOS and many pointed to ongoing activities and others that could be undertaken in support of the GOOS. However, many components noted that their interaction with and response to the GOOS would expand as the definition of the GOOS crystallized.

48 The meeting welcomed the support of the existing systems for the GOOS. The meeting requested that the existing components summarize their perception of how well they were meeting the needs of their users and advise the GOOS on where it should move in filling the gaps and meeting needs that were currently not possible to meet. Based on the results of the discussion **the Committee adopted Recommendation GOOS-I.5.**

49 The Chairman of the IOC Group of Experts on GLOSS reported on the outcome and recommendations of the Third Session of the Group (13-15 October 1992) (Document IOC/GE-GLOSS-III/3). **The Committee approved Recommendation GOOS-I.3** on GLOSS.

7. DEVELOPING A CAPACITY BUILDING AND TEMA COMPONENT OF GOOS

50 Prof. Michel Vigneaux, Chairman of TEMA, and Dr. Kazuhiro Kitazawa, Senior Assistant Secretary for TEMA, reviewed IOC's approach to TEMA and recent activities. TEMA efforts are integrated into all IOC programmes in recognition of the need to build capacities in developing countries in both marine science and operational efforts. Member States need to identify existing gaps at regional and national levels; both short-term and long-term education and training should be given attention. The IOC Voluntary Co-operation Programme may be a vehicle for providing needed equipment for TEMA-GOOS.

51 The Committee determined that GOOS priority requirements for TEMA support need to be elucidated. **The Committee agreed** that GOOS implies the need for a much stronger and more systematic TEMA effort and substantial external funding in order to adequately include developing countries in GOOS implementation. Emphasis was given to the necessity to support education, training and mutual assistance as well as reinforcement of physical infrastructures for scientific and marine technological development for GOOS. **The Committee also agreed** that investments in human resources are essential for global participation and emphasized regional scientific and technical co-operation, which concentrates on coastal zone areas. The European Community co-operation was cited as an example.

52 **Recommendation GOOS-I.6 was adopted.**

8. INTERACTION WITH OTHER PROGRAMMES

8.1 GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

53 Dr. Jacques Merle, GCOS Support Office, summarized the objectives and strategy of GCOS. GCOS, co-sponsored by WMO, IOC, UNEP and ICSU, will use existing systems, progressively implementing more sophisticated capabilities. A Joint Scientific and Technical Committee (JSTC) has met twice in April 1992 and January 1993. Task Groups provided plans for Atmospheric Processes, Land and Hydrological processes, and Ocean processes (OOSDP).

54 GCOS is an integrated comprehensive global system oriented toward climate objectives involving, in close co-ordination, atmospheric, oceanic and land observing systems.

55 **The Committee emphasized** that GCOS and GOOS planning and co-ordination should avoid duplication but rather close co-operation should take place.

56 Development of GCOS, at national and international levels, must include consideration of the whole climate system. GOOS, which will incorporate biological

and chemical observations as well as physical, is needed for this holistic coverage.

8.2 COMMITTEE ON EARTH OBSERVATION SATELLITES (CEOS)

57 Mr. John Withrow, GOOS Support Office, reviewed IOC and GCOS participation as affiliates of CEOS, summarized in Document IOC/GOOS-I/9. CEOS is an international organization of agencies that operate satellites. IOC's involvment is to assist in the development of ocean related remote sensing activities and promote space based ocean sensors. IOC is concerned with data policy, requirements for remotely sensed data, assistance and awareness building such that all countries can benefit from this data source. **The Committee expressed** the need to foster such avenues to promote further the importance of remote sensing in GOOS.

9. SETTING PRIORITIES AND PLAN OF ACTION FOR 1993-1995

58 **The Committee recommended** that the following actions be brought to the attention of the IOC Assembly and **entrusted to the Chairman of the IOC Committee for GOOS:**

(i) to ensure the blending of advice and concerns provided by input from the scientific and technical community, including ICSU/SCOR, from the user/customer community, from existing GOOS-related programmes with the IOC and elsewhere, and from IOC and I-GOOS;

(ii) to work with ICSU/SCOR, to review the programme of OOSDP and HOOP and other scientific and technical panels as may be established and to provide to these panels input as needed for the goals and operations of GOOS;

(iii) to inform ICSU/SCOR and the other co-operating organizations of the GOOS progress at appropriate intervals.

10. ELECTION OF CHAIRMAN AND VICE-CHAIRMAN OF THE COMMITTEE

59 Dr. Michel Glass, France, was elected Chairman of the Committee. Two Vice-Chairmen, Dr. Grant Gross, U.S.A. and Mr. B.N. Krishnamurthy, India, were also elected.

11. NEXT SESSION OF THE COMMITTEE

60 Due to the rapid development of events affecting the planning for GOOS, **the Committee expressed** the need to meet again in about one year.

12. ADOPTION OF THE REPORT

61 **The Committee reviewed** and **adopted** the Summary Report and the attached Recommendations for submission to the Seventeenth Session of the IOC Assembly.

13. CLOSURE OF THE SESSION

62 The Session was closed at 16.15 hours on 19 February 1993.

ANNEX I

AGENDA

1. **OPENING**

2. **ADMINISTRATIVE ARRANGEMENTS**

2.1 ADOPTION OF THE AGENDA

2.2 DESIGNATION OF A RAPPORTEUR

2.3 CONDUCT OF THE SESSION

3. **TERMS OF REFERENCE AND INITIAL TASKS OF THE IOC COMMITTEE FOR GOOS**

4. **FOLLOW-UP OF THE 1992 UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT**

4.1 AGENDA 21

4.2 UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

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5. **STATUS OF PLANNING OF THE GLOBAL OCEAN OBSERVING SYSTEM**

5.1 INTERNATIONAL PLANNING

- 5.1.1 **Joint GOOS Technical and Scientific Committee (J-GOOS)**
- 5.1.2 **Report on "Approach to GOOS"**
- 5.1.3 **Report of the Ocean Observing System Development Panel (OOSDP)**
- 5.1.4 **Pilot activities of the IOC-UNEP-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change**

5.2 GOOS NATIONAL PLANNING ACTIVITIES

6. **STATUS OF AND INTERACTION WITH EXISTING OCEAN OBSERVING SYSTEM COMPONENTS (IGOSS, GLOSS, DBCP, IODE, MARPOLMON, CPR)**

7. **DEVELOPING A CAPACITY BUILDING AND TEMA COMPONENT OF GOOS**

8. **INTERACTION WITH OTHER PROGRAMMES**

8.1 GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

8.2 COMMITTEE ON EARTH OBSERVATION SATELLITES

9. **SETTING PRIORITIES AND PLAN OF ACTION FOR 1993-1995**

10. **ELECTION OF CHAIRMAN AND VICE-CHAIRMAN OF THE COMMITTEE**

11. **NEXT SESSION OF THE COMMITTEE**

12. **ADOPTION OF THE REPORT**

13. **CLOSURE OF THE SESSION**

ANNEX II

RECOMMENDATIONS

Recommendation GOOS-I.1

FURTHER DEVELOPMENT OF THE GLOBAL OCEAN OBSERVING SYSTEM GOOS) AND CO-ORDINATION MECHANISMS FOR SCIENTIFIC ADVICE AND INTER-AGENCY CO-OPERATION

The IOC Committee for the Global Ocean Observing System,

Noting:

(i) IOC Resolutions XV-4, EC-XXIII.5, XVI-8 and EC-XXV.3 on GOOS, which call for the IOC to develop GOOS and establish the necessary international co-ordination mechanisms,

(ii) WMO Resolutions 11 (EC-XLI), 9 (Cg-XI) and 21 (Cg-XI) which express WMO support for GOOS development and relevant co-operation with the IOC,

(iii) UNEP Governing Council Decisions 16/26, 16/27 and 16/41 which express UNEP support for actions which will meet the needs to be addressed by GOOS,

(iv) the intergovernmental decisions made by UNCED, including the two Conventions and Chapter 17, Section E, of Agenda 21 which calls for systematic collection and exchange of ocean data needed to apply integrated management approaches and to predict impacts of environmental change,

(v) the negotiations underway to establish a GOOS Technical and Scientific Advisory Panel (or equivalent body),

Considering:

(i) the large variety of tasks implied in designing, developing and implementing GOOS,

(ii) the need to ensure close co-operation among the various intergovernmental and international bodies involved in the above tasks,

Requests the Chairman of the IOC Committee for GOOS, in co-operation with ICSU/SCOR, the Chairmen of existing concerned operational bodies, other co-operating agencies and the GOOS Support Office, undertake the intersessional activities required to initiate GOOS, as given in the Summary Report of the First Session of the IOC Committee for GOOS within available resources;

Recommends that the Secretary IOC be instructed to complete the negotiations leading to the signature of a Memorandum of Understanding on the co-sponsorship of a GOOS Technical and Scientific Advisory Panel (including the possible re-naming of such a body) by concerned organization(s) and to facilitate the establishment of this body as quickly as possible;

Requests that the Chairmen of the IOC Committee for GOOS and of the afore-mentioned technical and scientific body consult immediately after the latter is established in order to co-ordinate the work of their respective bodies;

Calls upon ICSU/SCOR to assist the IOC in the establishment of scientific design panels for the GOOS modules, as a matter of urgency;

Recommends also that the ICSPRO mechanism be used for inter-agency co-ordination, information exchange and co-operation amongst organizations concerned with the initial stages of the formation of GOOS.

Financial implications for 1994-95:
Required

Meetings of 5 Panels (2) - $330K
Ad hoc Meetings (4) - $110K
Total: $440K
Expected net shortfall: **$290K**

Anticipated 27/C5
(Doc.IOC-XVII/8)

GOOS (6.1.1) $150K

Recommendation GOOS-I.2

THE APPROACH TO GOOS AND NATIONAL COMMITMENTS

The IOC Committee for the Global Ocean Observing System,

Noting:

(i) IOC Resolutions XV-4, EC-XXIII.5, XVI-8 and EC-XXV.3 on GOOS, which call for the IOC to develop GOOS and establish the necessary international co-ordination mechanisms,

(ii) WMO Resolutions 11 (EC-XLI), 9 (Cg-XI) and 21 (Cg-XI) which express WMO support for GOOS development and relevant co-operation with the IOC,

(iii) UNEP Governing Council Decisions 16/26, 16/27 and 16/41 which express UNEP support for actions which will meet the needs to be addressed by GOOS,

(iv) the intergovernmental decisions made by UNCED, including the two Conventions and Chapter 17, Section E, of Agenda 21 which calls for systematic collection and exchange of ocean data needed to apply integrated management approaches and to predict impacts of environmental change,

(v) the negotiations underway to establish a GOOS Technical and Scientific Advisory Panel (or equivalent body),

Having reviewed the document "The Approach to GOOS" (IOC-XVII/8 Annex 2), which is based on information from the Report of the IOC Blue Ribbon Panel for GOOS (IOC/INF-915), the GOOS Draft Development Plan (IOC/EC-XXV/8 Annex 1) and the Report of the International Meeting of Scientific and Technical Experts on Climate Change and the Oceans (IOC/STECCO/3),

Recognizing that GOOS as a global system for systematic, long term observations of the World Ocean requires long term commitments of Member States for long-term support of GOOS planning, development and maintenance as well as close partnership among Member States in capacity building in developing countries, including the development of increased knowledge; education, research, infrastructure, equipment and expertise,

Recommends that:

(i) **the IOC Assembly approve** the document "The Approach to GOOS" (properly taking into account amendments required so that it concurs with the conclusions of the First session of the IOC Committee for GOOS) as a strategy for GOOS planning and development;

(ii) "The Approach to GOOS" document be published by IOC and given wide circulation to Member States and international organizations concerned;

(iii) the GOOS Support Office conduct public and information activities to promote GOOS;

(iv) **Member States be urged** to review and respond to the national actions as proposed in the document "The Approach to GOOS";

(v) WMO and UNEP be invited to co-sponsor jointly with IOC, the IOC Committee for GOOS and to provide their contributions to GOOS planning and implementation;

(vi) **the IOC Assembly approve** the establishment of a GOOS Trust Fund as part

of the IOC Trust Fund to support the costs of the planning and development phase of GOOS, and provide resources for some of the GOOS operational activities, education and training/capacity building;

(vii) **Member States**, especially developed countries as proposed in Agenda 21, **should be urged** to contribute to the GOOS Trust Fund.

Financial implications for 1994-95:
Translation/Publication of the Document and GOOS Brochure - **$30K**

Recommendation GOOS-I.3

GLOBAL SEA LEVEL OBSERVING SYSTEM (GLOSS)

The IOC Committee for Global Ocean Observing System,

Noting the decision of the Twenty Fifth Session of the IOC Executive Council that the Group of Experts on GLOSS should be a subsidiary body of the IOC Committee for GOOS,

Recognizing that GLOSS constitutes a major existing observational element of Global Ocean Observing System,

Having reviewed the report of the Third Session of the IOC Group of Experts on GLOSS,

Noting with satisfaction the joint efforts of the IOC Secretary and the Instituto Ocanografico, Universidade of Sao Paulo of Brazil to organize a sea level training course in Brazil, 1-20 February 1993,

Noting also with satisfaction the support provided by the USA, in the installation of a new generation of tide gauges in some key GLOSS locations,

Adopts the report and plan of action of the 3rd session of the Group of Experts on GLOSS;

Recommends that:

(i) the Secretary be instructed to arrange, through appropriate means and in consultation with Member States, for the position of a Technical Secretary for GLOSS as part of the GOOS Support Office in order to promote and fully support GLOSS development;

(ii) Chairmen of the IOC regional subsidiary bodies be invited in co-operation with Regional Co-ordinators for GLOSS to promote the development of GLOSS and to maintain contact with the GLOSS Technical Secretary on all aspects related to GLOSS.

Financial implications for 1994-95

Required	Anticipated 27/C5 (Doc.IOC-XVII/8)
Preparation and publication of the GLOSS up-dated Handbook - $20K Meeting of GE/GLOSS - $30K Sea-level training courses (2)- $40K Position of GLOSS Technical Secretary - $100K Staff travel $5K	
Total: $195	GLOSS (6.1.2) $100K
Expected net shortfall: **$95K**	

Recommendation GOOS-I.4

UNEP-IOC-WMO LONG-TERM GLOBAL MONITORING SYSTEM OF COASTAL AND NEAR-SHORE PHENOMENA RELATED TO CLIMATE CHANGE

The IOC Committee for Global Ocean Observing System,

Recalling Resolution XVI-10 of the IOC Assembly by which the Assembly approved a set of pilot activities under the UNEP-IOC-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change,

Also recalling WMO Resolutions 11 (EC-XLI), 9 (Cg-XI) and 21 (Cg-XI) and UNEP Governing Council Decisions 16/26, 16/27, and 16/41 which express the support of these organizations for co-operating in ocean and coastal monitoring relevant to climate change,

Noting the decisions of the 16th Governing Council of UNEP and 45th WMO Executive Committee by which UNEP and WMO agreed to co-operate and to support the pilot activities,

Noting with satisfaction the progress in developing the implementation plans and initiation of the pilot activities on monitoring of coral reef ecosystems, mangrove communities, plankton community structure, sea level changes and associated coastal impacts and coastal circulation,

Noting also that the Chapter 17 of Agenda 21 calls for systematic coastal observations and the development of procedures for comparable analysis in order to address critical uncertainties for the management of the marine environment and climate change,

Noting however with concern that the available and planned budget of IOC will not allow it to cover the cost of the proposed pilot activities,

Recognizes that the proposed pilot activities can be considered as an important contribution to the development of the GOOS module on Monitoring of the Coastal Zone Environment and its Changes,

Recommends that:

(i) the proposed Joint GOOS Technical and Scientific Panel, in particular, and any scientific and technical sub-group established to address the needs for monitoring the coastal zone environment and its changes, be **invited to review** the pilot activities and provide advice on their implementation in the context of overall strategy of GOOS, taking into account other relevant programmes of IOC, particularly OSLR, OSNLR, GIPME, coastal circulation on the continental shelf, and of UNESCO, particularly COMAR, and of ICSU/SCOR, particularly LOICZ and GLOBEC;

(ii) **Member States** be urged to consider, and inform the Secretary on, their participation in the pilot activities as well as on their possible support of and contribution to the implementation of the pilot activities;

(iii) the IOC Assembly invite UNEP and WMO, as **co-operating agencies**, to continue their support for the implementation of the pilot activities;

(iv) **the Assembly instruct the Secretary** to negotiate with UNEP and WMO for possible joint support for the implementation of the pilot activities, particularly for:

  (a) meetings of the Global Task Teams on Coral Reefs and Mangroves;
  (b) preparation and publication of the methodology manuals for the pilot activities;
  (c) organization of workshops and seminars on the pilot activities with a view to organizing the possible establishment of new task teams for other pilot studies;

(v) the IOC Committee for GOOS keep under review the progress in the implementation of the pilot activities and provide advice to the GOOS Support Staff on actions required by IOC Member States and co-sponsoring agencies.

Financial implications for 1994-95

Required	Anticipated 27C5 (Doc. IOC-XVII/8)
Meetings of the Task Team on Coral Reefs (2) - $50K Meetings of the Task Team on Mangroves (2) - $50K Meetings of experts on Sea Level Project in the Indian Ocean (2) - $50K Meetings of experts on Coastal Circulation project (2) - $50K Preparation and publication of methodology manuals - $30K Workshop on coastal plankton community structure monitoring - $40K Consultancy services to advise countries on projects implementation and related training - $100K Staff travel - $20K Total: $390K Expected net short fall: **$290K**	GOOS coastal (6.1.3) $100K

Recommendation GOOS-I.5

GOOS LINKAGE WITH EXISTING PROGRAMMES/ACTIVITIES

The IOC Committee for the Global Ocean Observing System,

Recognizing that the IOC and other international organizations through concerted efforts of their Member States have developed research programmes and ocean services activities which have laid down a foundation and a basic infrastructure for design, planning and development of the Global Ocean Observing System,

Recognizing also that the regional subsidiary bodies established by Member States of the Commission provide an important linkage of particular practical and scientific interests of coastal states to the global programmes and that sub-regional and regional co-operations is emphasized in Chapter 17 of Agenda 21,

Noting that the Sixteenth Session of the Assembly by Resolution XVI-8 recognized that GOOS must be built as far as possible on existing programmes and capabilities and must be continually updated and improved in response to the results of ocean research programmes and the development of new technology,

Noting also that the Eleventh Meteorological Congress by Resolution 21 (Cg-XI) also agreed that the GOOS implementation should be effected as much as possible through a strengthening of existing systems such as the WWW and IGOSS, with the addition of oceanographic satellites and other new technology as it becomes available,

Recognizing the limited human and financial resources available for the GOOS planning and development,

Noting also that "The Approach to GOOS" (Doc.IOC-XVII/8 Annex 2) calls for the establishment of links and consultations with the various bodies dealing with ocean observing and data management systems of IOC , WMO and joint IOC/WMO activities (e.g. GLOSS, IODE, CBS, CMM, IGOSS, DBCP,) as well as research programmes, particularly WCRP, IGBP, OSLR, OSNLR and GIPME/MARPOLMON,

Recommends that:

(i) the IOC Assembly recognize as a priority for GOOS development the strengthening and accelerated development of existing ocean observational and data management activities, particularly IGOSS, GLOSS, DBCP, IODE, MARPOLMON, Musselwatch and CPR and the TEMA components of these programmes and the vital need for adequate support through the provision of required staff and funds;

(ii) the Chairman of the IOC Committee for GOOS arrange for regular consultations with the Chairmen of IOC Technical and Regional subsidiary bodies, particularly IGOSS, DBCP, GLOSS, IODE, GIPME/MARPOLMON, OSLR, OSNLR and TEMA with regard to the design, planning and development of GOOS in general and its modules;

(iii) the Chairmen of IGOSS, IODE, GLOSS, DBCP, GIPME, TEMA, OSLR and OSNLR consider the potential input of their relevant programmes and bodies to the design, planning and implementation of the specific GOOS modules with the view to *inter alia* optimizing the use of existing systems to serve the goals of GOOS,and enhancing these programmes to meet the expected demands of user communities and bring their views to the attention of the Chairman of the IOC Committee for GOOS and Secretary IOC;

(iv) the Chairmen of IGOSS, IODE, GLOSS, DBCP, GIPME, TEMA, OSLR and OSNLR consult with Officers of the IOC regional bodies and advise the IOC Committee for GOOS on the more efficient use of the regional subsidiary bodies for implementation of relevant ocean observational and data management programmes and for the promotion and formulation of project proposals for regional and sub-regional projects to be implemented under the extra budgetary funds (UNDP, GEF and national donor programmes) .

Financial implications for 1994-95
None

Recommendation GOOS-I.6

TEMA IN RELATION TO GOOS

The IOC Committee for the Global Ocean Observing System,

Taking into account and **supporting** Resolution EC-XXV/3 on International Mechanisms for GOOS Development, Annex 1 (iv) concerning training education and technical assistance in the framework of TEMA,

Recalling Agenda 21 (Section E, Chapter 17) of UNCED, which recommended the establishment of a Global Ocean Observing System (GOOS) by IOC in co-operation with WMO, UNEP and other international organizations, and emphasized the need for IOC to develop fully the strategy for providing training, education and technical assistance for developing countries through its Training, Education and Mutual Assistance (TEMA) programme,

Noting also that the results of UNCED Agenda 21 Chapter 34, Capacity Building, expressed the need for endogenous capacity building, particularly in developing countries ..., through (i) human resources development and (ii) strengthening of institutional capacities for GOOS programme implementation,

Recommends that:

(i) TEMA efforts in this regard be directly related to the GOOS programme;

(ii) TEMA strategy in this regard be primarily directed toward a) building long-term commitments and partnerships between developing and developed countries; b) external sources of support, such as donor agencies which usually handle bilateral agreements, be identified by the Chairman of the TEMA Committee and the Secretary of IOC as potential new sources of TEMA multilateral support;

(iii) the existing programmes and activities related to GOOS such as GLOSS, IGOSS, IODE, GIPME, CPR, and DBCP identify their TEMA needs in relation to their ongoing operational programmes including medium- and long-term education, training, equipment needs and requirements;

(iv) developing countries identify their needs for human resource development and infrastructure in relation to GOOS programmes;

(v) the developing countries identify their existing training facilities and institutions for participation in the GOOS TEMA efforts;

(vi) preference be given to utilizing the expertise, infrastructure and facilities already existing in developing countries which in addition to being cost-effective, provide encouragement to developing countries for greater participation in GOOS;

(vii) equal importance be given to mutual assistance (MA in TEMA) particularly in making available state of the art instruments and equipment simultaneously with training and education of personnel from developing countries;

(viii) the IOC Assembly approve the establishment of the GOOS TEMA Trust Fund as part of the IOC Trust Fund in order to support the activities of TEMA within GOOS.

ANNEX III

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ANNEX IV

OPENING STATEMENT OF GUNNAR KULLENBERG, SECRETARY IOC

Mr. Chairman, Delegates,

It is my pleasure to welcome you to this First Session of the IOC Committee for GOOS. This is a very important meeting for the cause of developing GOOS. It is of course also important for IOC, but I would like to emphasize the cause for GOOS!

Let me reflect back a bit. GOOS was adopted by the IOC Assembly in 1989. It was assessed and evaluated in the preparations for the Second World Climate Conference, and was adopted by that Conference in Geneva in October 1990. This was a very important step in putting GOOS on the international as well as national agendas. The IOC Secretariat worked on formulating a structure and outline of a strategy for the development of GOOS and prepared status reports on the existing components. The one for 1992 is in front of you.

Simultaneously, the IOC worked in the preparations for the United Nations Conference on Environment and Development (UNCED), strongly emphasizing the role of the oceans for the conditions of our Earth. The Sixteenth Session of the IOC Assembly prepared and adopted a statement for UNCED with a declaration on the Global Ocean Observing System. This was transmitted to the preparatory committee for UNCED and helped to create awareness. The IOC obtained acknowledgement from UNCED that proper management of natural resources and the environment requires an information basis which has been obtained through a reasonably scientific approach and with scientifically valid methods. This includes adequate data. UNCED also recognized the need to develop GOOS, and GOOS is specifically mentioned in Chapter 17, Part E, of Agenda 21. The IOC is also identified therein as the lead agency for the development of GOOS, working in co-operation with WMO, UNEP and other relevant international organizations. I would like to emphasize this since it acknowledges the role of the IOC as an organization. Please note that the IOC should not be confused with the IOC Secretariat. I would like to stress that the IOC is a body with Member States, Governing Bodies, a Secretariat housed here in UNESCO, and with statutes and rules of procedure, as well as a manual specifying how the Organization operates and what the roles are of its different components. Agenda 21 is directed to the governments of Member States. It has been agreed upon by the Governments themselves, although it does not constitute a commitment. However, the Governments have agreed to work through the IOC in the development of GOOS. Since GOOS is cross-sectoral and must serve several user communities, it is clear that there must be co-operation in order to ensure that the interests of the different sectors are properly taken into account. This could imply that modules or parts thereof could be developed by other organizations. However, there must be one focal point, one reference point. GOOS is also of great importance for the implementation of the Framework Convention on Climate Change and the Convention on Biological Diversity.

Considerable interest for GOOS has been developed. I consider it is very important for us to realize that many activities are materializing which can and should be regarded potentially as parts of GOOS. One example is Seawatch Europe, another is the International Mussel Watch, and the CPR, quite apart from GLOSS, IGOSS and IODE. I think it is very important that we acknowledge this interest as it raises the issue of the funding of GOOS. We have emphasized from the start the need to work with the customers and establish a dialogue with users and producers of GOOS. This must also include industry and interests of that sector. The importance of support from the industry sector has been well demonstrated by the setting up of Seawatch Europe and Seawatch components in other regions. It is also necessary to establish a linkage between the governmental mechanism and the private industry mechanism as well as the various national institutions. This is also one of our tasks.

For GOOS to be developed successfully, I consider it necessary that we keep it together. We must view the ocean in a holistic way. Last year, the IOC Executive Council agreed on an international mechanism for GOOS development, including the establishment of this Committee as the intergovernmental part, and a scientific and technical body for GOOS as the expert part (IOC-EC-XXV, Resolution XXV.3).

The Executive Council also instructed the Secretary IOC to undertake negotiations with ICSU and SCOR and other appropriate bodies to facilitate the establishment of the scientific and technical advisory body. These negotiations have been carried out and a MOU has been prepared involving WMO, ICSU, and possibly UNEP, as well as IOC. This is in accordance with the decisions of the Assembly (IOC-XVI.8). At the same time, we have advanced in the establishment of special panels for the development of modules, following expert consultations. The OOSDP already exists, and we have, in addition, aimed at establishing panels for the health of the ocean module, for the living marine resources module and for the coastal zone module. We have advanced considerably with the panel for the health of the ocean module.

GOOS is aiming to be an operational international programme or system, including already existing parts as IGOSS, GLOSS etc. Thus it is a service.

We have also prepared an action paper called "The Approach to GOOS", Document IOC-XVII/8 Annex 2. This should be one of the main documents for you to consider. A larger document has also been prepared called 'The Case for GOOS' which is available here as a reference document. This was prepared on the basis of an expert consultation and subsequent write-up by a few editors with Dr. Flemming as the lead editor. This paper will not be reviewed here, but rather used as a reference document.

The IOC Secretariat has also, to the extent possible, participated in the preparatory work for the Intergovernmental Meeting on the World Climate Programme, also referred to as the Climate Agenda, Geneva, 14 to 16 April 1993. The papers for that meeting have been drafted by consultants and the special secretariat established for the meeting. We have commented on them, but it has been very difficult to obtain support for our views. This is reflected in particular by the tone of the document on "Future directions: the response to UNCED" which includes a section on Dedicated Observations of the Climate System, referring only to GCOS. It states as follows:

"4.1.6 With regard to the ocean, GCOS will develop the climate components in partnership with the Global Ocean Observing System (GOOS). GOOS, being developed under the aegis of IOC of UNESCO, will develop the comprehensive ocean observation system necessary to address a large number of critical societal issues in the ocean. GCOS will focus specifically on the climate module of GOOS and will take responsibility for its design and implementation".

and furthermore, as part of the GCOS objectives:

"4.3.4 Objective 4: To develop the climate component of the Global Ocean Observing System

4.3.4.1 The climate components of GOOS are the responsibility of the GCOS. They will be developed in concert with the GOOS planning activity. For the initial operational observing system, elements of high priority have been identified above. The resources needed to provide support for planning, expert meetings and consultants is US $0.5 million per year".

I am informing you about this matter, now at the outset, so that you will be aware of it. I consider that these formulations are at odds with earlier agreements and with the specific role and tasks as regards Agenda 21 given to the IOC by governments. They also seem at odds with the MOU on GCOS which we have signed as well as with WMO policy. For example, the Secretary-General of WMO, Professor Obasi, in his statement to the JSTC-GCOS, April 1992, said:

"The Global Ocean Observing System is presently under development, primarily by the IOC", and in relation to the need for ocean observations: "To meet such needs, a climate module of the Global Ocean Observing System (GOOS) is being developed under the auspices of the IOC in co-operation with ICSU, WMO and UNEP". It is extremely important that GCOS will essentially address the physical components and atmospheric chemistry. However, the climate module of GOOS must also include other elements related to biology, biogeochemistry and related interactions. This is why it appears most logical that the development and design of the GOOS climate module be done under the auspices of the IOC and not GCOS.

I have proposed that a statement or declaration on GOOS be prepared and adopted by the Assembly for transmittance to the Intergovernmental Meeting, and I consider this to be relevant now as the IOC must confirm its position. A starting point for such a declaration is the Executive Summary in the paper, "The Approach to GOOS" (Doc. IOC-XVII/8 Annex 2). It is also important that the IOC confirm its role in relation to the FCCC and possibly the protocol which was once considered.

As I said, Mr. Chairman, this is a very important meeting for the development of GOOS. You are the Member States' representatives, and you must take your responsibilities in formulating and paving the path for the GOOS planning phase and recommend this path to the IOC Assembly, including resource requirements.

Dr. J. Baker was invited by the EC to serve for the transition of this Committee and as its first Chairman. However, last week Dr. Baker informed that he would not be able to come since he was expecting nominations as Head of NOAA. Consultations with him and Chairman IOC have pointed at Mr. G. Holland as Chairman of this Session and since Mr. Holland is willing, I proposed that he serves this Session.

ANNEX V

NATIONAL PROGRAMMES RELEVANT TO GOOS

ARGENTINA

Reports on National GOOS Planning and Identification of National Resources for GOOS
(submitted by the Delegation of Argentina)

Argentina receives with satisfaction the initiative from IOC to create the "Global Ocean Observing System". The growing national interest on global change and environmental protection led to the creation (in 1991) of the National Commission for the Global Change, chaired by the Secretary of State for Science and Technology, oceanographic matters being one of its priorities.

The National Commission's main subject of concern is the setting up of the Interamerican Institute for the Global Change, and an intense activity of research and monitoring in ocean and coastal zones, particularly within an increasing co-operation with other regional countries, is foreseen.

Argentina has also established its National Commission for IOC, in order to facilitate the action towards IOC. Institutes and researchers participating in IOC programmes and/or projects are represented in it. Actually, within different degrees, Argentina is participating in GLOSS, GIPME, GEBCO, IODE, IGOSS, OSLR and OSNLR programmes. In the same way, the oceanographic community acts in national and international programmes, such as WOCE, and those corresponding to SCOR, CCAMLR, etc.

Within the terms imposed by budgetary restrictions and with the support from international co-operation mechanisms, the development of certain infrastructural projects aimed, amongst other things, to fulfil GOOS purposes, is being implemented. A new building having new instrumental equipment is being built for the National Institute for Fisheries Research and Development. Other examples are the modernization of an Environmental Chemical Laboratory, emphasizing ocean aspects, and the setting-up of new facilities for research and observation in Patagonic and Antarctic coasts.

It is presently foreseen that Argentina's participation in GOOS be materialized through the IOC National Commission.

Regarding the particular outlines of GOOS, the following points are of special concern to Argentina:

(i) To avoid the multiplication of programmes and initiatives which aim to similar goals because they risk to be scattered in their efforts.

(ii) To tend towards the fact that GOOS be a tool of oceanographic growth for all the participating countries.

(iii) To allow real periods of exchange of opinions in the planning, programming and fulfillment of GOOS plans.

AUSTRALIA

Australia Participation in GOOS
(submitted by Ms. B. Dixon, Bureau of Meteorology, Melbourne)

Considerable enthusiasm is evident amongst Australian scientists and marine and oceanographic agencies for participation in GOOS. The benefits to Australia in both scientific and economic terms are clear and it is recognized that Australia is well positioned to make a considerable contribution to the international effort.

The national sponsorship of GOOS reflects the international arrangements, with the Heads of (Commonwealth) Marine Agencies (HOMA) representing the Director of Meteorology as Permanent Representative for Australia with the WMO (World Meteorological Organization) and the Australian Academy of Science for ICSU (International Council of Scientific Unions). Recognizing the benefits of maintaining close co-ordinating links between planning for GOOS and GCOS (Global Climate Observing System), a single, formal mechanism for co-ordinating Australian participation in both of the programmes has been established. Accordingly, a Steering Committee, which will maintain communication with the international sponsors and with government, has been formed, comprising senior representatives of the above Australian agencies together with the Department of the Arts, Sport, the Environment and Territories (DASET) on behalf of UNEP (United Nations Environment Programme).

As an initial co-ordinating step to bring together all organizations and representative bodies with an interest in GCOS/GOOS, the Bureau of Meteorology, on behalf of the co-sponsors, hosted a planning and co-ordination workshop on 17 December 1992. The objectives of the workshop were to:

(i) draw together, for initial briefing, all those Australian individuals, groups and co-ordinating bodies they may wish to play a role in GCOS and GOOS planning and implementation;

(ii) survey the scope of present Australian programmes and activities which relate to GCOS and GOOS; and

(iii) discuss, and hopefully agree on, the most appropriate mechanism(s) for ensuring co-ordinated Australian input to the various international bodies dealing with GCOS and GOOS including, in particular, the Intergovernmental Meeting on the World Climate Programme in Geneva in April 1993.

The workshop was chaired by Dr. D.J. Gauntlett, Deputy Director (Research and Systems) of the Bureau of Meteorology, with Dr. A.D. McEwan, Chief of the CSIRO Division of Oceanography as Deputy Chairman and a total of 44 participants attended, representative of the majority of Australian organizations and co-ordinating bodies, including universities, with an interest in climate, marine science and/or oceanography. Many that were unable to attend the workshop expressed interest in participation in GCOS and GOOS and have been added to a distribution list for notice of further activities and co-ordination measures.

In a GOOS context, issues receiving particular emphasis at the meeting concerned the translation of key research networks, such as those associated with TOGA (Tropical Ocean Global Atmosphere), and relevant support facilities, into routine ongoing monitoring systems, and the extent to which oceans around Australia are poorly characterized. The opportunity and the obligation to use our unique Southern Hemisphere location and expertise as a focus for Australia's participation in the global effort was widely acknowledged.

Participants at the workshop agreed to the establishment of an appropriate overall co-ordination and communication mechanism focussed around an Australian GCOS/GOOS Joint Working Group (JWG) which would report to the Steering Committee. The membership of the JWG was chosen to provide a workable balance across the relevant disciplines and key organizations at an appropriate level and degree of expertise. The first tasks of the JWG are to prepare input for national reports to relevant international meetings, including the IOC Assembly in February-March 1993 and the Intergovernmental Meeting on the World Climate Programme in April 1993, and to determine and establish an appropriate sub-working group structure to respond to the scientific and management aspects of GCOS/GOOS at a national level. The Steering Committee has taken steps to formally establish the JWG which will have its inaugural meeting in mid to late February, 1993.

Australian GOOS activities will be based on and around existing systems, with enhancements and additions as justified. Assessing priorities within an Australian context for the GOOS modules and for various measurements and observing systems will be an early task of a scientific working group.

BRAZIL

Brazilian efforts for the implementation of GOOS
(submitted by Cmdr Paulo Cesar Dias de Lima, DHN, Niteroi - RJ)

Brazil recognizes the necessity of an appropriate management of the various marine ecosystems (estuaries, coastal lagoons, mangrove forests, open shelf and oceanic areas, etc.) along the ca 8.500 km of the Brazilian coastline.

For this reason, the goals of GOOS are considered important by the Brazilian Government. Its national co-ordinating agency (the national focus for GOOS) will be the Directorate of Hydrography and Navigation (DHN) of the Brazilian Navy, which will be permanently advised by the Ministry of Science and Technology (MCT), the Ministry of Foreign Affairs and other governmental organisms related to marine programmes.

The requirements for GOOS development at the national level are being implemented.

However, the following already ongoing activities may be considered as initial steps for the implementation of GOOS in Brazil:

1. **IODE**

Brazil has a National Database (BNDO/DHN) integrated with the IODE, that validates and has access to physical oceanographic, geological and meteorological data obtained in Brazilian waters.

A database for the input of biological parameters associated with GOOS will have to be developed.

IODE/Brazil is now publishing an information bulletin and is attempting to acquire modern computer equipment.

2. **IGOSS**

In addition to the data actually obtained and transmitted to IGOSS, Brazil is co-ordinating efforts for the implementation of a data collection by XBT in ships-of-opportunity, using the INMARSAT communication system.

3. **GLOSS**

Brazil has been performing systematic observations of sea level, contributing with 8 permanent tidal measuring stations, to the development of GLOSS. These permanent tidal measuring stations include the oceanic station of the island of Trindade.

In addition, the Brazilian Space Programme, conducted by INPE - Institute for Space Research, launched a satellite recently, with the purpose of collecting oceanographic data to be used to feed predictive models and with a view to other applications.

Moreover, improvement of personnel capacity was possible by means of a training course on observation and analysis of sea level for GLOSS, carried out at the Oceanographic Institute of the University of Sao Paulo, sponsored by IOC. The course was addressed by countries which use the Spanish and Portuguese languages, including Sao Tomé e Principe and Mozambique.

Brazil is very pleased to contribute to the development of GOOS in this way.

CANADA

GOOS National Report
(submitted by the Delegation of Canada)

Canada has not yet taken any national action to co-ordinate GOOS activities, however, the national representative to GOOS comes from the same office as that supplying the national IOC contact and co-ordinating existing IOC

programmes. Canada supports strongly the existing programmes dealing with data collection, communications and management. A limited number of initiatives to prepare oceanographic products are underway, and, in this regard, there is an increased interest in interannual and interdecadal variations in the ocean environment because of the failure of the fisheries, especially in the Atlantic.

As in other countries, increasing attention is being paid to marine pollution. An interdepartmental committee has been formed to deal with Marine Environmental Quality, including the necessary monitoring activities. Internationally, Canada is an active member in the AMAP with the other Arctic countries studying the contaminant problems in the Arctic polar region. For the North Pacific, the newly-formed North Pacific Science Organization (PICES) will provide a forum for developing a regional ocean monitoring programme.

Canada provides the world ocean data centre for drifting buoys at its Marine Environmental Data Service and regularly publishes buoy track data on a global scale. Canada has many monitoring programmes in place using data from sea-level gauges, buoys, research vessels, ships of opportunity, aircraft and satellites. These will be brought into the GOOS as it becomes appropriate.

CHILE

GOOS-Related Activities in Chile
(submitted by the Delegation of Chile)

Since we are an active member of IOC, Chile, once more, considers with interest the positive evolution of the new orientation that IOC activities have been following for the last years, which for sure means a better future.

During the present sessions, we have received updates which indicate success regarding the excellent level of IOC active programmes which constitute the for the development of the new objective defined by GOOS.

We feel and we hope that we are not wrong in thinking that this effort to develop GOOS does not only represent a futuristic vision of the scientific community, but is simply a priority for the whole world population. This is why we will strongly support the GOOS development as far as it is possible for us to do it.

In this connection, our first action has been to appoint a permanent NATIONAL CONTACT POINT for GOOS, acting directly through the representative of Chile for IOC.

Furthermore, within the National Oceanographic Committee (its president is also the Representative of Chile for IOC), a working group has been defined to co-ordinate national activities for GOOS and in principle may better serve this programme.

In regard of this action, I would like to point out that in Chile, the National Oceanographic Committee co-ordinates and implements all oceanographic activities through Working Groups, formed by experts from the 23 member entities of the Committee, including public and private programmes which will be co-ordinated nationally through a body that respond directly to the National IOC Representative. Thus, the national and international co-ordination for GOOS exists according to IOC established regulations.

About the GOOS Developing Plan Project, the Delegation of Chile considers that priority should be given to modules with regards to the resources and the importance of the programmes, whatever the deadline of the implementation. Thus, every country performs each module according to defined priorities and available resources.

Elsewhere, Chile is implementing ocean observing activities for TOGA-WOCE-GLOSS-IGOSS-IODE-JGOFS programmes, which will be kept after the experiments as permanent observing system activities in the future, according GOOS needs.

Finally, we are glad to inform you that since January 1993, our fleet has a new oceanographic research vessel AGOR "VIDAL GORMAZ" (ex US "THOMAS WASHINGTON") which will allow us to better support IOC programmes, mainly those of GOOS.

ACTUAL ACTIVITIES RELATED TO IOC PROGRAMMES

1. **WOCE CRUISES**

a) Cruise PR-14: starting in 1993, this cruise will be organized twice a year (June and October). Up to now, two cruises (organized in 1991 and 1992) collected bathymetric, salinity and dissolved oxygen data to a depth of 1200 metres using XBTs, Nansen bottles and CTD. Cruises planned for 1993, 1994 and 1995 will use XBTs and a roseta type sampling system composed of Niskin bottles and CTD.

b) Cruise SR-1: will take place once a year between Cape Horn and the Antarctic peninsula. The first one is planned for the month of November 1993. This cruise will be carried out four times; three times in summer and once in winter (according to the seasons of the Southern Hemisphere).

2. **SEA LEVEL (COASTAL/TIDAL STATIONS)**

a) Oceanographic stations with satellite communication (joint programme with NOAA):

Station	Latitude (South) (g.m.s.)	Longitude (West) (g.m.s.)	Sensors *	Gauge Type
Arica	18 28 30	70 20 09	1,2,3	HANDAR
I. San Felix	26 16 50	80 07 46	1,2,3	HANDAR
Caldera	27 03 46	70 50 06	1,2,3	HANDAR
I. Pascua	27 09 00	109 27 00	1,2,3,4,5	NGWLMS
I. Pascua	27 09 00	109 27 00	3	HANDAR
Valparaiso	33 01 32	71 38 01	1,2,3	HANDAR
Valparaiso	33 01 32	71 38 01	1,2,3,4,5	NGWLMS
I. R. Crusoe	33 37 02	78 49 47	3	HANDAR
I. D. Ramirez	56 31 00	68 43 00	1,3,4,5	NGWLMS

* 1 = air temperature
2 = sea temperature
3 = sea level
4 = wind speed and direction
5 = atmospheric pressure

b) Sea-level stations with bubbler system

Station	Latitude (South) (g.m.s.)	Longitude (West) (g.m.s.)	Sensors *	Gauge Type
Arica	18 28 30	70 20 09	2,3	Bubbler
Iquique	20 13 00	70 10 00	2,3	Bubbler
Antofagasta	23 39 00	70 25 00	2,3	Bubbler
I. San Felix	26 15 50	80 07 46	2,3	Bubbler
Caldera	27 03 46	70 50 06	2,3	Bubbler
I. Pascua	27 09 00	109 27 00	2,3	Bubbler
Coquimbo	29 56 00	71 21 00	2,3	Bubbler

Station	Latitude (South) (g.m.s.)	Longitude (West) (g.m.s.)	Sensors *	Gauge Type
Valparaiso	33 01 32	71 38 01	2,3	Bubbler
San Antonio	33 35 00	71 38 00	2,3	Bubbler
I. R. Crusoe	33 37 02	78 49 47	2,3	Bubbler
Talcahuano	36 41 00	73 06 00	2,3	Bubbler
Corral	39 52 00	73 26 00	2,3	Bubbler
P. Montt	41 29 00	72 58 00	2,3	Bubbler
P. Arenas	53 10 00	70 54 00	2,3	Bubbler
P. Williams	54 56 00	67 37 00	2,3	Bubbler
I. D. Ramirez	56 31 00	68 43 00	2,3	Bubbler
P. Soberania	62 29 00	59 38 00	2,3	Bubbler

* 2 = sea temperature
3 = sea level

3. **OCEANOGRAPHIC BUOYS (TRANSMISSION VIA SATELLITE)**

a) TOGA buoy project: set up at 18°00'00" South and 085°00'00" West, will record wave height and period, sea temperature, air temperature, wind speed and direction, and atmospheric pressure.

b) Drifting buoys: joint project with Scripps Institute of Oceanography drifting buoys launched from ships-of-opportunity operating between South America, New Zealand and Japan.

4. **SHIPS-OF-OPPORTUNITY**

At present, the Hydrographic and Oceanographic Service of the Armada of Chile is operating, jointly with NOAA-AOML-Miami, five merchant ships which run between the South-American continent and Japan, Tahiti and New Zealand. These ships are equipped with XBT (SEAS) which will transmit the data via satellite. Furthermore, during the coming two months XBT high-density equipment (project with Scripps Institute of Oceanography) will be set up on the line Valparaiso-Tahiti.

CHINA

GOOS National Report
(submitted by the Delegation of China)

Regarding the draft development plan for GOOS, we endorse the strategy put forward in the draft. In view of GOOS being mainly divided into two parts, coastal and open ocean, and of the close relationship between the coastal areas and socio-economic development, we think it would be appropriate for the Committee to concentrate efforts on the pilot project on coastal zone development for demonstration during the early stage of the development of GOOS so as to attract more countries, especially the developing countries, to participate in GOOS. Hence it will facilitate the further development of the GOOS system.

We are of the opinion that, in view of the changes of global environment and climate, the increased pollution of coastal waters, the scarcity of various resources, the proper management and rational utilization of the marine resources are the common issues facing all of us. The proposed GOOS will, in the long run, provide the basis for the solutions to many of the above issue. Therefore, we support the establishment of GOOS and we set up a national committee for GOOS and will actively participate in its activities and together with other member states, make our contribution to it.

China already has a national marine environment observing network. The development of the network started in the 1950s. The marine hydrological and meteorological observing stations located along the coast and islands were gradually set up from 1956. The sectional survey covering the whole China Sea area were conducted from 1960. The marine environmental forecasting started from 1967. In the early 1980s, the first buoy was deployed in the offshore area of the Chinese coast. The establishment of the data buoy network occurred in 1986. The marine pollution monitoring has been conducted since 1972. The monitoring and assessment of water quality of marine environment for the whole offshore area has been carried out since the 1980s.

Up to now, there are more than 100 marine stations, 20 profiles and 200 sampling points along the Chinese coast. At the above-mentioned stations and sampling points, the measurements of chemical parameters, especially nutrients, are carried out apart from the measurement of the routine hydrological and meteorological parameters. The national network of marine environment monitoring was set up in 1984 with participation of about 100 institutions from different departments. More than 400 regular points for sampling sea water, sediments, and marine living organisms have been put up along estuaries, harbors, bays and the outlets as well as the offshore area. At present, there are 3 marine data buoys in year-round operation in the offshore areas. Now we have already passed the technical capability for producing comparatively advanced data buoys. Airborne and satellite remote sensing techniques have been applied to marine environmental observation. In addition there is also a mobile observing/delivering system composed of 236 merchant ships sailing in the open oceans and 80 of them have transmitted data through GTS. Marine environment forecasting (of which some oceanographic parameters are being forecasted) has been established. The framework consists of one national forecasting centre (Beijing), three local forecasting centres (Qingdao, Shanghai and Guangzhou), one provincial forecasting station (Hainan) and seven sub-regional central ocean observing stations (Dalian, Qinhuangdao, Yantai, Xiamen, Shanwei and so on).

Apart from the above, China has also actively participated in the International Oceanographic Research Programmes like TOGA and WOCE. At present there are still three Chinese Research Vessels conducting observations in the equatorial Pacific for participation in the TOGA-COARE programme.

Above all, after many years of efforts, our national ocean observing network has appeared with a certain scale. But there is still a lot to be done. In the future, on the basis of constant improvement of the existing system, new monitoring parameters will be added. More efforts will be made for monitoring marine living organism and sediment in addition to the original monitoring of sea water. Efforts will be made to set up provincial forecasting stations according to the three levels of national, provincial and local forecasting facilities. Meanwhile efforts will be made for the development of trend prediction of red tide, oil spill and marine pollution. More work will be done to further the development of the buoy system. In addition to the above, we will actively participate in international co-operation and seek assistance from foreign countries so as to increase the level of the ocean observing technology of China. And in the meantime, to contribute to the development of GOOS.

FRANCE

The French National Contribution to GOOS
(submitted by Mr. M. Glass, IFREMER, Paris)

Many French institutions are already involved in operations which are at present scientific, but which could have an operational character.

Seven institutions are involved in these operations:

(i) CNRS (Centre National de la Recherche Scientifique) and the Universities are performing experiments connected to TOGA, WOCE and JGOFS and are building ocean models.

(ii) ORSTOM (Institut Français de Recherche pour la Recherche Scientifique en Coopération pour le Développement) is devoted to overseas research, particularly along the tropical belt, with centres in Nouméa, Dakar and Cayenne.

(iii) IFREMER (Institut Français de Recherche pour l'Exploitation de la Mer) is in charge of the French oceanographic fleet. It has a scientific and operational character (coastal environment monitoring, statistics of fisheries).

(iv) CNES (Centre National d'Etudes Spatiales) is in charge of the French space programme and of the relations with the other space agencies.

(v) IFRTP (Institut Français de Recherches et Technologies Polaires) operates regular cruises to the French subantarctic islands and Adélie Land.

(vi) Météo France has an important research capability, including air-sea interactions.

All these institutions are already co-ordinating their efforts to perform TOGA, WOCE and JGOFS-connected experiments.

Together with SHOM (Service Hydrographique et Océanographique de la Marine) which performs hydrographic sections for the needs of the French Navy, they have decided to give IFREMER the task of proposing and co-ordinating a possible scenario for the French contribution to GOOS.

A task force has been set up, the work of which is:

(i) to propose a scenario sufficiently attractive to be funded by other ministries than the Ministry responsible for Science. In that respect, the connection between the future products available from GOOS and the needs of the users will have to be stressed;

(ii) to co-ordinate this proposal with the efforts and needs of the other countries;

(iii) to be the contact point with the GOOS and GCOS offices.

Up to now, the task force has listed the scientific activities which could be included in GOOS as regular operations. Among them, we can mention:

(i) in connection with the ENSO phenomenon, the efforts in the West tropical Pacific Ocean connected with the TOA moorings, regular hydrographic sections, launch of drifting buoys, and XBT launching from Voluntary Observing ships;

(ii) regular hydrographic sections and XBT activities in the tropical Atlantic Ocean with the idea of possibly forecasting droughts in the Sahelian countries;

(iii) sea level monitoring through the exploitation of tide-gauge data;

(iv) CO_2 fluxes by using satellite wind observations;

(v) long duration times series provided by the French coastal observatories, to try and differentiate the local and climatic effects.

One should add to this list other activities which are already operational, even though they are presently funded by the Ministry for Science:

(i) ground segment of satellites (TOPEX/POSEIDON and the French Processing and Archiving Facility of ERS1), to be continued and expanded.

(ii) a WOCE/TOGA subsurface database.

(iii) the RAVEL (Réseau Automatique de Veille sur l'Environnement Littoral) project.

(iv) and SST maps.

A special effort on instrumentation at sea is also considered.

A first scenario is requested before the end of 1993, for a possible funding beginning during the fiscal year 1995. The scenario will be progressive and will rest on scientifically founded operations, proven during the execution of WCRP or IGBP programmes.

GERMANY

GOOS National Report
(submitted by Prof. Dieter Kohnke, BSH, Hamburg)

Germany attributes high priority to the development of a global ocean observing system. It supports strongly that GOOS must be scientifically - based and built on existing operational programmes, such as IGOSS, IODE, GLOSS and others.

At present, we are in the process of identifying the capacities which can contribute to GOOS. Germany is actively participating in the World Ocean Circulation Experiment (WOCE) through a repeated hydrographic section between Greenland and Ireland, through ship-of-opportunity lines in the North and South Atlantic Ocean, through drifting buoys and RAFOS. Research cruises take place in the North Atlantic Ocean as part of the Joint Global Ocean Flux Study (JGOFS). The International JGOFS Office is located in Kiel. It is heavily involved in the Integrated Global Ocean Services System (IGOSS) and the International Oceanographic Data and Information Exchange (IODE).

Large capacities have been built up for participation in monitoring the North Sea and Baltic Sea as a contribution to the regional conventions on preventing marine pollution (Paris-, Oslo- and Helsinki Conventions).

A network of automatic recording stations is maintained on the continental shelf to measure temperature, salinity, oxygen, currents, radiological and meteorological variables. This network will be extended by four additional stations in the Baltic Sea and up-graded with new technology, as it becomes available. The Bundesamt für Seeschiffahrt und Hydrographie (BSH - Federal Maritime and Hydrographic Agency) in Hamburg receives, processes and archives NOAA satellite images from the Northeast Atlantic Ocean and adjacent seas. The NOAA data contributes to the preparation of the weekly chart of sea-surface temperature in the North Sea and of sea-ice charts in the Baltic Sea. The evaluation of micro-wave data for operational purposes has started in the BSH after the launch of the ERS-1 satellite.

All ocean modelling work is presently provided at research institutes. Links between research and agency groups are being enhanced.

With its present capacities Germany is in a position to contribute very soon to the GOOS modules (i) for monitoring, assessment and prediction of climate; (ii) for monitoring of the coastal zone environment; (iii) for assessment and prediction of the health of the oceans; and (iv) for marine meteorological and oceanographic services.

A national *ad hoc* Group for GOOS was formed in 1992 to develop a plan for Germany's participation. Presently, a Memorandum is being prepared by the *ad hoc* Group to define and justify a long-term participation in GOOS, to identify the institutions which may have to play a role in GOOS, to assess the magnitude of costs involved, and to work-out organizational structures for an efficient contribution, if necessary.

In 1992 the Bundesamt für Seeschiffahrt und Hydrographie (BSH) was designated as the governmental agency to act as the national GOOS Office which co-ordinates the German activities within GOOS and liaises with relevant international organizations and programmes.

INDIA

National Planning Activities in India Related to Global Ocean Observing System
(submitted by Mr. B.N. Krishnamurthy, Director, Dept. of Development, New Delhi)

1. INTRODUCTION

Observations of ocean surface physical parameters have been conducted by scientists and oceanographers in India for a long time. The system for measurements of tides along the coast line of India is more than 100 years old and equally old is the depth sounding of the sea for navigation. The surface physical

parameters in the past have been measured by ships. The data obtained through ship observations has been utilized for development of marine infrastructure like ports, sea walls, etc.

During the last two decades India has given emphasis to ocean science and research and established national laboratories and organizations for promoting the conduct of marine scientific research. Observations are now made for all the parameters, *viz.* physical, chemical, biological, environmental, etc. In order to give a concerted thrust to research and development, the Government of India has established a fullfledged Department of Ocean Development in 1981 with well defined responsibilities and an established policy for promoting, organizing, co-ordinating fundamental and applied research in ocean sciences. In the past 10 years, the Department has initiated specific programmes covering the activities in the coastal zone and islands. The programmes like Marine Satellite Information Service (MARSIS), Sea Level Monitoring and Modelling (SELMAM), Coastal Ocean Monitoring and Predictive System (COMAPS), Drifting Buoys, etc., fall within the planned component of GLOBAL COASTAL AND NEAR-SHORE MONITORING SYSTEMS of the GOOS. Research programmes under TOGA and JGOFS programmes are also being undertaken in India. Thus there exists a wide infrastructure in India which relates to the IOC programme of GOOS.

A brief description of various national activities is given in the following paragraphs:

2. MARINE SATELLITE INFORMATION SERVICE (MARSIS)

2.1 The knowledge of ocean with its major impact on weather and climate and with practically boundless reservoirs of marine life, minerals, hydro-carbons, etc., is essential for preservation, conservation and development of resources for the benefit of coastal community and the population in general. The first step in the study of ocean is to acquire data on major ocean parameters and disseminate to the users as a data or a higher data product. The vastness of the sea to be covered and the nature of data required make it necessary to adopt newly emerging techniques of satellite remote sensing. The Department of Ocean Development, has established MARINE SATELLITE INFORMATION SERVICE (MARSIS) under which data derived from satellite is used for disseminating information of value to end users. This service is operated through space and space related agencies in India. The data products developed/proposed to be developed for dissemination are as follows:

(i) sea surface temperature (SST);

(ii) application of SST for depicting potential fishing zones and dissemination of such maps to fishermen in the coastal areas;

(iii) oceanic eddies;

(iv) ocean surface wind, waves, development of a forecasting model for near real-time forecasting of ocean waves in the Indian Ocean region;

(v) preparation of coastal maps showing wetlands, erosion, accretion;

(vi) preparation of coral reef maps;

(vii) ocean modelling studies;

(viii) development of coastal zone information system.

2.2 MARSIS centres have been established along the Indian coast with specific responsibility of development and dissemination of data products to the users under the jurisdiction of each centre.

3. SEA LEVEL MONITORING AND MODELLING (SELMAM)

3.1 The variation in the Mean Sea Level (MSL) due to global climatic changes and its consequent effects on the land bordering the sea is engaging the attention of scientists, planners and administrators. In order to prepare for meeting any eventuality arising out of variation in MSL, the Department of Ocean Development has taken up a programme on SEA LEVEL MONITORING AND MODELLING (SELMAM), which has three sub-components:

(i) Establishment of accurately measuring modern tide gauge for assessment of MSL at 14 sites in phase 1.

(ii) Preparation of micro level coastal area maps.

(iii) Development of predictive models for the assessment of variation in MSL and its effect on the coastal areas.

3.2 In the first phase of the programme, 14 modern tide gauge stations would become operational. Operational initiation of the predictive model is expected before 1997.

4. COASTAL OCEAN MONITORING AND PREDICTIVE SYSTEMS (COMAPS)

4.1 The wastes discharged from land-based domestic and industrial sources cause major pollution in the coastal marine environment. Pollution problems occurring in the coastal areas may have an impact on the levels of pollutants beyond territorial waters. A monitoring system to assess the health of Indian seas has been in operation since 1986-87.

4.2 The major objectives of this programme are:

(i) To establish a knowledge base in the field of biogeochemical parameters in estuaries and in the coastal waters and open seas.

(ii) To operate an appropriately structured information system for ready dissemination of various data sets to users in Government, industry, research and social institutions.

(iii) To implement R&D programmes that will continually update the knowledge and information bases.

(iv) To provide advisory and technical services to Government, industry and public institutions aimed at evolving pollution containment measures.

(v) To detect radical changes in the biogeochemical regimes of the marine system and to alert Government, public and social institutions of their implications.

(vi) To set standards for the measurement of various pollution parameters and to ensure compatibility between the data acquired and processed by various monitoring agencies through definition of equipment specifications, periodic intercalibration exercise, planned cross-checks and training programmes.

The COMAPS programmes is being implemented through a network of 10 institutions; each responsible for specified sampling locations and for collection of data on 25 parameters.

The coastal waters up to a distance of about 25 km from the shoreline along predetermined transects are being monitored. These transects are selected on the basis of (i) ecological sensitivity; (ii) location of industries; and (iii) location of urban establishments. The following parameters are selected for monitoring:

(a) Water quality

Temperature, salinity, dissolved oxygen, pH suspended solids, BOD, inorganic phosphate, nitrate, nitrite, ammonia, total phosphorous, total nitrogen, total organic carbon, petroleum hydrocarbons, pathogenic Vibro, pathogenic *Enterobacteriaceae (E.Coli, Salmonella, Shigella)*.

(b) Sediment quality

Texture, organic carbon, phosphorous, cadmium, lead and mercury and pesticide residues (DDT, BHC and Endosulfan). Radioactivity levels, Pathogenic Vibros, pathogenic *Enterobacteriaceae (E. Coli, Salmonella, Shigella)*.

(c) Biological characteristics

Primary productivity, chlorophyll a, phaeophytin, phytoplankton cell count, total and major species of phytoplankton. Zooplankton biomass, population, total groups and major groups.

Experimental trawling for catch, total species and major species of fishes. Selected organisms are proposed for analysis of cadmium, lead and mercury and for pesticide residues (DDT, BHC, Endosulfan).

5. JOINT GLOBAL OCEAN FLUX STUDY (JGOFS)

5.1 The programme of research under this project aims to obtain a better understanding of the time-varying fluxes of carbon and associated biogenic elements in the Arabian Sea by addressing to the following questions:

(i) Role of the Arabian Sea, a biologically productive region of the ocean, in the CO_2 air-sea exchange balance. Magnitudes and direction of the CO_2 air-sea exchange flux during different seasons. Influence of productivity in controlling this flux.

(ii) Primary and new production rates and their spatial and temporal variability. Export fluxes of carbon and biogenic elements from the euphotic zone and their relation to primary productivity. Productivity in the various regions of the Arabian Sea influence the maintenance of the denitrification layer in the eastern basin. Role of the denitrification layer in the carbon, nitrogen cycling.

(iii) Burial rates of carbon and other biogenic elements in the margins and deeper regions of the Arabian Sea and their relation to water column processes. Temporal and spatial variations paleo-fluxes of biogenic elements. Relation of fluxes to monsoon variability.

(iv) Role of the continental margin in the removal/supply of materials to the deep Arabian Sea and any significant control on the formation and maintenance of the denitrification layer at mid depths.

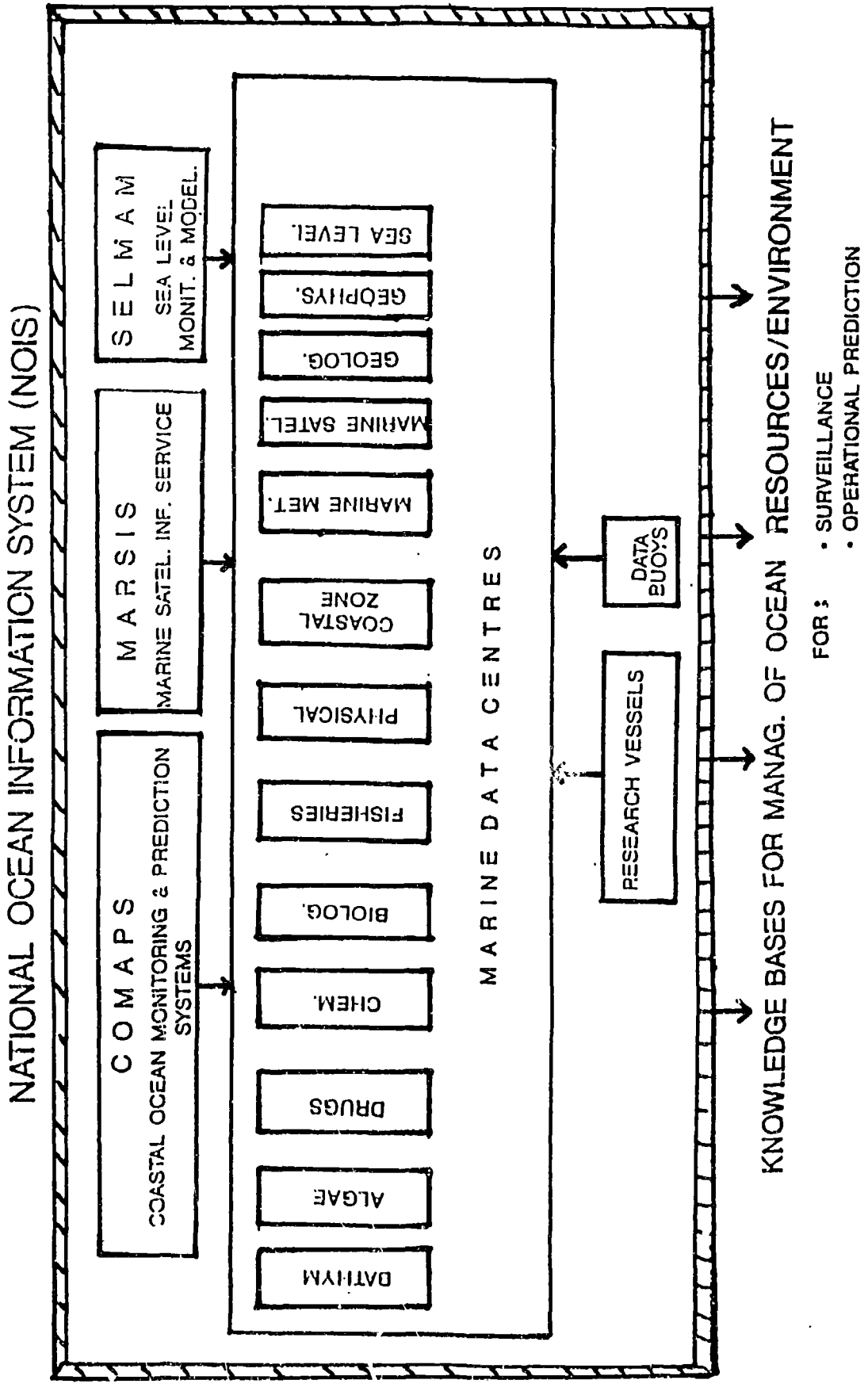
Such a study requires a multidisciplinary approach, collection of several types of samples and their analysis for selected chemical, biological, radioactive and isotopic tracers.

6. NATIONAL OCEAN INFORMATION SYSTEM (NOIS)

A number of universities, research and other institutions and oil exploration agencies in India deal with ocean related subjects such as geology, geophysics, physics, chemistry, biology and oil exploration agencies etc. These institutions generate enormous amount of field data which needs to be centralized for archiving and for dissemination. The Department of Ocean Development has formed a NATIONAL OCEAN INFORMATION SYSTEM (NOIS), with 13 Marine Data Centres (MDC) at as many institutions.

Each Data Centre acts as the principal repository of a specific set(s) of data and would be responsible for designing modern Data base Structures and establishing appropriate systems for archiving them for ready retrieval. The operation of the NOIS is schematically represented in the appendix.

APPENDIX


NATIONAL OCEAN INFORMATION SYSTEM (NOIS)
COMAPS
COASTAL OCEAN MONITORING & PREDICTION SYSTEMS
MARSIS
MARINE SATEL. INF. SERVICE
SELMAM
SEA LEVEL MONIT. & MODEL.
MARINE DATA CENTRES
BATHYM.
ALGAE
DRUGS
CHEM.
BIOLOG.
FISHERIES
PHYSICAL
COASTAL ZONE
MARINE MET.
MARINE SATEL.
GEOLOG.
GEOPHYS.
SEA LEVEL
DATA BUOYS
RESEARCH VESSELS
KNOWLEDGE BASES FOR MANAG. OF OCEAN RESOURCES/ENVIRONMENT
FOR: • SURVEILLANCE
• OPERATIONAL PREDICTION

JAPAN

Japanese Activities Related to GOOS Planning and Development
(submitted by the Delegation of Japan)

1. INTRODUCTION

The development of a global ocean observing system is urgently necessary for better understanding and better prediction of natural and/or possible anthropogenic climate variabilities.

Japan has established the pioneering hydrographic repeated sections in the western North Pacific Ocean since the 1960s and will utilize the recent world impetus to maintain and enhance the existing ocean monitoring system. Japan also recognizes the importance of establishing an interactive scheme among basic research programmes, technology development and operational observation programmes.

The Ministry of Education, Science and Culture (Monbusho) and the Science and Technology Agency (STA) have decided to support basic studies and technology development towards the establishment of GOOS, respectively. Both of the projects supported by the Monbusho and the STA will start in 1993 fiscal year and continue for five years during the period of the first phase of the GOOS international Programme. At the same time, various operational activities have been carried out by the Japan Meteorological Agency (JMA), the Hydrographic Department of the Japan Maritime Safety Agency (JMSA) and the Japan Fisheries Agency (JFA) and others.

Besides, Japan is concerned about training, education and mutual assistance efforts (TEMA) and technology transfer in marine sciences and services to enable all countries to participate in GOOS.

This report is to provide the current status of establishing national mechanisms of Japan for GOOS and the outline of activities related to GOOS planning and development of the concerned organizations which is tentatively summarized based on the currently available information.

2. CURRENT STATUS OF ESTABLISHING NATIONAL MECHANISMS FOR GOOS

(i) It is the current legal procedure in Japan that the National Committee for IOC of the Japanese National Commission for UNESCO has become the focal point of the IOC activities as a whole for national and international co-ordination. In this mechanism, the National Committee for IOC has so far played the role to co-ordinate and promote the IOC activities in co-operation with the concerned Ministries and Government Agencies, universities and research institutes.

(ii) As regards to GOOS also, the National Committee for IOC has provided a place for the consideration of the national plan relating to GOOS. In addition, the official correspondence and international co-ordination with the IOC Secretariat regarding GOOS has been done under the responsibility of the National Committee for IOC.

(iii) The GOOS, however, needs bilateral and multilateral co-operations in the broader fields than ever for its successful implementation, and the substantial elements of GOOS could be operational activities rather than those of research, requesting the periodical monitoring on the continuous basis. Thus, the concerned Ministries and Government Agencies needs to be accumulated in the broader scope. In this context, the Council for Ocean Development which is one of the advisory committees to the Prime Minister will make recommendations on the long-term plan of ocean development and its related researches including the GOOS. The above-mentioned situation shows the difficulty for the National Committee for IOC to co-ordinate the national plan relating to GOOS independently.

(iv) Under the circumstances, the efforts are being made to set up the inter-Ministry's forum to study the national plan relating to GOOS, especially in response to the administrative and management aspects.

(v) It is envisaged that the double-focal-point system will be introduced as the key factor of the national mechanisms for GOOS. One will be the

National Committee for IOC and the other will be the inter-Ministry's forum.

3. PARTICIPATION OF THE CONCERNED GOVERNMENT ORGANIZATIONS IN GOOS PLANNING AND DEVELOPMENT

3.1 MINISTRY OF EDUCATION, SCIENCE AND CULTURE (MONBUSHO)

Monbusho which supports research activities by university scientists has promoted many research programmes such as WCRP and IGBP. Now, it was decided that basic studies towards establishment of GOOS will start in 1993 fiscal year and continue for five years. And Monbusho will keep supporting researches which lead to development of GOOS.

3.2 SCIENCE AND TECHNOLOGY AGENCY (STA)

The STA has participated in the existing international ocean research programmes, e.g. TOGA and WOCE and plans to promote oceanic researches including these programmes and development of new observation technologies in co-operation with other organizations, especially considering international concord and co-operation, in order to develop Comprehensive Ocean Observation System centering around the Pacific (the details are shown in Appendix 2 "The Pacific Ocean Observation and Research Initiative (Draft)) in line with GOOS.

3.3 JAPAN METEOROLOGICAL AGENCY (JMA)

The JMA, one of national organizations responsible for oceanographic services and oceanic research as well as the authorized national meteorological service, has been actively contributing to the four fields - observing system, data management system, product and research - of the individual modules of the GOOS, in particular, of the climate module and the ocean service module, and will further improve the existing activities (the details are shown in Appendix 3 "Future Plans of Further Contribution of JMA to GOOS").

3.4 JAPAN MARITIME SAFETY AGENCY (JMSA)

The Hydrographic Department of JMSA is a representative authority in Japan for marine surveys and observations, and is also functioning as Japan Oceanographic Data Centre (JODC) both nationally and internationally. Thus, the Department has been engaged in carrying out various types of surveys and observations in and around Japanese waters, and collecting, managing and supplying marine data and information. The Department has also been participating actively in various international co-operative projects, surveys, and research programmes, covering some operational aspects of the GOOS in particular.

As future activities, the Department will positively contribute to the development and implementation of the GOOS, based upon its extensive experiences and contributions of operational ocean monitoring around Japan.

3.5 JAPAN FISHERIES AGENCY (JFA)

Fisheries Agency is the authority responsible for living resources and related environmental issues of marine and freshwater realm.

National Fisheries Research Institutes are engaged in the researches of physical and chemical oceanography and its relation to primary and secondary biological productivity as well as of various aspects of fishery resources participating in the international research activities. Monitorings of the change in biological activity of aquatic creature and their environment are also made in relation to the global environment change.

4. ACTIVITIES RELATED TO GOOS TO BE SUPPORTED OR IMPLEMENTED BY THE CONCERNED GOVERNMENT ORGANIZATIONS

4.1 MINISTRY OF EDUCATION, SCIENCE AND CULTURE (MONBUSHO)

The following research projects will be carried out by university scientists.

4.1.1 Basic Studies towards Establishment of GOOS (1993-1997)

(1) Evaluation of oceanic transports of heat and water mass in the North Pacific Ocean

Heat and volume transports of the ocean circulations are observed with use of moored of current meters and inverted-echo-sounders, CTD casts, acoustic drop-sondes, and altimeters on board satellites along two sections across the Kuroshio, off Shikoku and on the Izu Ridge, and along one section across the subarctic gyre around the date line. Turbulent processes which affect the ocean current and the heat transport are studies.

(2) Evaluation of fundamental elements of the oceanic processes

Fluxes of sensible and latent heat and momentum across the ocean surface are estimated by the satellite data, and they are validated with use of the data from ships and buoys. A surface buoy mooring in rough seas is developed and operated to monitor the surface fluxes. The surface fluxes are determined eventually in a coupled ocean-atmosphere system.

(3) Design of ocean observing system aided by high-resolution models of the ocean circulations

Numerical models of the global and regional circulations are developed to identify the key elements and locations for monitoring them. The models are indispensable to interpolations of the data without uniform spatial and temporal distributions, as well as to forecasting.

(4) Monitoring techniques for ensuring time series data of the ocean environment

An efficient and reliable technique to analyze dissolved gases and radio active nuclei is developed to monitor budget of greenhouse gases and their circulations. Field observations are made at selected stations with a time interval sufficient to monitor changes in the ocean environment.

(5) Monitoring of ocean currents and biomass abundance by new techniques

Biological activities and their environments are essential to understand the material cycles in the ocean. An acoustic technique and an algorithm for the satellites data processing are developed to evaluate plankton density and biological environments. Current fields are monitored by the acoustic Doppler current profiler (ADCP) by measuring inducted voltage of a submarine cable across a strait.

4.1.2 Regional Co-operative Researches

(1) Ocean dynamics and climate in the western Pacific

Ocean variation in the western Pacific Ocean at low-latitudes has severe influence on the global climate changes such as the El Nino-Southern Oscillation and the decadal variations. The project is to stimulate researches on the ocean dynamics and climate in the area by means of observation planning, ocean data exchange and ocean modelling. The project is one of the cores of the "Ocean Dynamics and Climate" Programmes of the IOC/WESTPAC and it also aims to develop GOOS in the western Pacific.

(2) Ocean circulation research in the east Asian marginal seas (CREAMS)

Development of an ocean-atmosphere coupled model is most urgent to predict the global environmental change on the firm scientific basis. The current ocean modelling is largely behind the atmospheric model because of a lack of understanding of basic oceanic processes. The project aims to improve a numerical model for the East Asian Marginal Seas (the Sea of Japan, the East China Sea and the Yellow Sea) through validation by the observation data. Numerical forecasting of the sea conditions will be tried. The project aims to develop GOOS for the Asian Marginal Sea as well as to be involved in the IOC/WESTPAC Programmes.

(3) A field study on the tides and currents in Malaysian Seas

Human activities are so high in the Malaysian Seas that continuous monitoring of oceanic environments is important. The project aims to carry out current measurement in the sea and to develop forecasting scheme of tidal currents

for the estimation of water exchange in the coastal water. The project contributes to the GOOS coastal module.

4.2 SCIENCE AND TECHNOLOGY AGENCY (STA)

The following projects have been and will be carried out by the Japan Marine Science Technology Centre (JAMSTEC) and the operational agencies such as JMA, JMSA and JFA.

4.2.1 Ongoing Projects - Observational Studies

(1) North Pacific and Arctic Studies

To study transports of heat and materials in the ocean at the higher latitudes with research vessels, buoys, satellites, etc.

(2) Tropical Pacific Studies

To study a role of the tropical ocean in climate change (TOGA related study).

(3) Deep sea ocean flux study

To study ocean flux and its distribution in the deep sea.

(4) Kuroshio Research

To study mechanism of Kuroshio meander and air-sea interaction in the Kuroshio area.

(5) International research programme for world ocean circulation and its observation system

International co-operative observational study to build a world ocean circulation model (WOCE related study).

(6) International co-operative research on ocean flux in the marginal seas

To study mechanism of ocean flux such as carbon and nitrogen in the marginal seas (JGOFS and LOICZ related study).

(7) International co-operative research on ocean flux and energy at ridges (feasibility study)

To study mechanism of ocean flux and energy at ridges (Inter-Ridge related study).

(8) Asian monsoon study

To study mechanism of Asian monsoon through meteorological and oceanographic observations and numerical modelling (TOGA related study).

(9) Operations of research vessels

To operate research vessels and submersibles to study related topics.

- Research and Development of Observation Technology

(1) Research and development on the fundamental technology of an innovative buoy system to contribute to GOOS (feasibility study)

To research and develop buoy systems for global observations: drifting buoy, moored buoy, sensors installed in buoy, data transfer and service system.

(2) Research and development of ocean acoustic tomography

To research and develop ocean acoustic tomography for observing distribution of sea water temperature, current speed in real time and in three dimension within a square of 1,000 km length.

(3) Research and development of 10,000 m depth unmanned submersible

To research and develop an unmanned submersible for the research of

deep seas.

(4) Research and development of deep sea drilling vessel and system

To research and develop a deep sea drilling vessel and system with the riser pipe applicable for drilling of almost all parts of ocean, to study plates tectonics, plate dynamics, and change of ocean environment.

(5) Research and development of observation technology for global ocean

To research and develop observation technology with airborne and satellite-borne sensors.

4.2.2 Research and Development on the Fundamental Technology of an Innovative Buoy System to Contribute to GOOS (1993-1997)

(1) Research and development of multi-purpose and automated buoy

To research and develop multi-purpose and automated buoys which are able to be easily deployed as moored system or drifters and which can realize multi-parametric observations, including development of automated and energy saving systems.

A. Development of Buoy
(a) Drifting Buoy
  a. Multi-purpose drifting buoy (with various sensors)
  b. Self position controlled buoy
(b) Self drifting buoy (which controls its drifting direction with a surface wind)
(c) Self positioning buoy (which controls its position with GPS and solar battery)
(d) Moored Buoy
  a. Higher latitude buoy (modified version of ATLAS buoy applied to higher latitudes)
  b. Long lives buoy (surface platform with a long lived electric source)

B. Development of Sensors
(a) Surface meteorological sensors (to observe surface wind, etc.)
(b) Ocean physical sensors (to observe flux of CO_2, and etc.)
(c) Chemical and biological sensors (to observe planktons, nutrients, and etc.)

(2) Research and development of transfer technology of observation data

To research and develop technology for transferring large amounts of observation data applicable to satellite communication and of periodical real time data to apply to weather forecast.

(3) Research and development of data management and service system

To develop data transfer and service system with a user friendly data source.

4.3 JAPAN METEOROLOGICAL AGENCY (JMA)

4.3.1 Ocean observing system

(1) Oceanographic survey on board the marine meteorological observation vessels

The JMA operationally dispatches six meteorological observation vessels in the seas adjacent to Japan and the western Pacific Ocean for oceanographic surveys. Those surveys have provided us with long period time-series oceanographic data sets which are indispensable for monitoring and research of ocean.

Thus, the JMA has accumulated oceanographic data obtained along fixed lines in the waters around Japan every season for more than 50 years and semi-annual data sets for over 25 years from Japan to the equator in the western North Pacific. Recently, their regular oceanographic survey in the western North Pacific has been intensified on a semi-annual basis to three or four times per year.

The observations on board the vessels cover the following fields:

(i) Physical, chemical and biological oceanography,
(ii) Marine pollution monitoring,
(iii) Atmospheric components measurements (carbon dioxide, methane and CFCs in atmosphere and ocean), and
(iv) Marine meteorology including sea surface, upper-air and weather radar observations.

Among them, the marine pollution monitoring of contamination of sea water with heavy metals (Hg/Cd) and petroleum is carried out in the framework of UNESCO/IOC MARPOLMON and the greenhouse gases observation is implemented for the Global Atmospheric Watch (GAW) of the World Meteorological Organization (WMO).

(2) Sea level monitoring

The JMA operates 66 tidal stations along the coast of the Japanese archipelago and remote islands for the monitoring of tsunami and storm surge as well as long-term variations of sea level. Said facilities have been providing the IOC GLOSS and the IGOSS Sea Level Monitoring Project with monthly-mean sea level data.

(3) Voluntary observing ships

The JMA is recruiting merchant vessels equipped with XBT observation facilities in the Pacific Ocean and the Indian Ocean to collect subsurface temperature data on a real time basis. Furthermore, marine meteorological data, sea surface temperature data and ocean surface current data are operationally collected from the merchant vessels and fishing boats.

(4) Ocean data buoy system

Four moored-type ocean data buoys are being operated by the JMA to obtain three-hourly meteorological data including ocean waves and solar radiation. The observed data are transmitted to the JMA via the Geostationary Meteorological Satellite on a real time basis.

In the framework of the IOC-WMO Drifting Buoy Co-operation Panel, the JMA is implementing operational quality control of drifting buoy data which are exchanged via the Global Telecommunication Systems (GTS) of the World Weather Watch (WWW) programme of the WMO.

(5) Observations of sea water temperature, ocean waves and fog at coastal stations

The JMA is operationally maintaining observations for those parameters at coastal stations on the Japanese archipelago.

(6) Ocean observations from space

The JMA is operating the Geostationary Meteorological Satellite as part of the WWW programme of the WMO. Cloud distribution, cloud amount, upper-air wind and sea surface temperature are derived from the satellite observational data and disseminated to all over the world.

4.3.2 Data System

(1) Ocean data/information services

(a) The JMA established the El Nino Monitoring Centre in April 1992. The centre monthly issues "El Nino Monitoring Prompt Report" (in Japanese) and "Monthly Ocean Report" regarding El Nino and its associated meteorological/oceanographic conditions.

(b) The IGOSS SOC (Specialized Oceanographic Centre) for the North Pacific Ocean co-located in the El Nino Monitoring Centre in the JMA disseminates wide-ranged operational oceanographic information and products in a printed media and by meteorological radio facsimile.

(2) Climatic data/information services

The JMA is operating the Japan Climatic Data Centre (JCDC) and the WMO

World Data Centre for Greenhouses Gases. These centres are collecting, analyzing and distributing climate-related meteorological/environmental data including greenhouse gases.

(3) Data communication system

For the collection and dissemination of the meteorological and oceanographic data/information mentioned above, the JMA is operating the following telecommunication systems.

The Global Telecommunication System (GTS) of the WMO WWW programme is serving for the international exchanges of meteorological and oceanographic data on a real time basis.

The Geostationary Meteorological Satellite stationed at 140.E above the equator is serving to collect meteorological/oceanographic data from DCPs (Data Collection Platforms) installed on islands, ocean data buoys and vessels.

The Meteorological Radio Facsimile Broadcasting of the JMA on high frequency bands are playing a vital role in dissemination of oceanographic and meteorological products to user communities including mariners.

4.3.3 Products

The following is the list of oceanographic products issued by the JMA:

(i) El Nino Monitoring Prompt Record (once a month);
(ii) Monthly Ocean Report (once a month);
(iii) Analysis and prognosis of sea surface temperature and sea surface current in the western North Pacific (every ten-day);
(iv) Report of observation for monitoring background marine pollution (once a year);
(v) WMO World Data Centre for Greenhouse Gases Data Report (twice a year);
(vi) Sea ice information and forecast (twice a week);
(vii) Wave analysis and forecast charts for the western North Pacific and for the coastal waters of Japan (once a day);
(viii) Marine climatological summary (once a year).

4.3.4 Research

The Meteorological Research Institute of the JMA is making intensive study on global changes of ocean and atmosphere and is developing procedure and techniques for observation, data collection, analysis and preparation of products.

(1) Physical and chemical oceanography

Development of current observation, chemical analysis procedure and ocean circulation modelling for study of oceanographic variations. Analyses of oceanographic data including satellite data are implemented for better understanding and predicting of climate change.

(2) Climatic research

Coupled atmosphere-ocean models are now being developed for the operational prediction of El Nino events and climate change. Relevant scientists of the JMA have contributed to drafting the IPCC reports.

(3) The JMA is intensively contributing to international oceanographic/climatic programmes such as WOCE and TOGA in the WCRP including repeat observations along the fixed lines and one-time shot observations.

4.3.5 Technical Supports for Developing Countries

The JMA is accepting several trainees to learn oceanographic survey mainly from Asian countries ir participating in the WESTPAC oceanographic cruises each year.

4.4 JAPAN MARITIME SAFETY AGENCY (JMSA)

4.4.1 Ocean Survey

The Hydrographic Department, JMSA, is regularly conducting oceanographic observation of ocean current, water temperature, salinity, etc., in

and around Japanese waters.

As a part of the implementation of WESTPAC Programmes, WOCE, Japan Antarctic Research Expedition (JARE), etc., the Department is also carrying out observation of ocean current, water temperature, etc. and such precise observation of deep sea current by using an oceanographic mooring system and drifting buoys in the North Pacific Ocean and the Southern Ocean.

4.4.2 Marine Pollution Survey and Monitoring

In and around Japanese waters, major bays and harbors, as well as in the western Pacific area, mid-latitude areas in the North Pacific Ocean, and the Southern Ocean, the Hydrographic Department, JMSA, is carrying out marine pollution survey and monitoring of sea water, bottom sediments, oil, PCB, heavy metals and radioactive materials for their concentrations and interannual changes. In order to find diffusing conditions of pollutants, observation of deep sea current is also being conducted.

4.4.3 Tidal Observation

In order to monitor the rise and fall of the sea surface, the Hydrographic Department, JMSA, has been carrying out tidal observation at 27 tide stations located widely in Japan and the station at the Showa Base in the Antarctica, which contributes to GLOSS and also WOCE.

4.4.4 Oceanographic Data and Information Services

The Japan Oceanographic Data Centre (JODC) has been serving as the only comprehensive oceanographic data bank in Japan, collecting, processing, managing and supplying various marine data and information. The JODC also acts internationally as an organization representing Japan in the International Oceanographic Data and Information Exchange (IODE) system and as the Responsible National Oceanographic Data Centre (RNODC) for IOC/WESTPAC programme and IGOSS. In recent years, JODC has been contributing to international exchange of marine data and information to cope with global environmental problems.

4.5 JAPAN FISHERIES AGENCY (JFA)

4.5.1 Oceanic Research

(1) Annual variation of sea-surface temperature in the tropical seas (1987-1993)

The DBT, XBT and CTD casts have been made by the fisheries experiment and the fisheries tracing vessels of the local governments in the tropical area of the Pacific and Indian Ocean. These were conducted to examine the possibility for the establishment of the temperature observation network by means of fishing boats being in operation in these areas. This programme was undertaken partly in co-operation with TOGA.

(2) Oceanographic construction and biological productivity in the Subarctic and Kuroshio/Oyashio areas (1991-1993)

Physical, chemical and biological observations were made under the WOCE programme to elucidate the relationship between ocean and the lower trophic levels biological productivity in Kuroshio/Oyashio areas (WOCE related study).

(3) Circulation of the terrestrial- and the ocean- origin materials in the marginal seas (1992-1994)

Amounts of the production, consumption and spatial transportation of the materials are evaluated in the marginal seas and adjacent areas (JGOFS).

(4) Exploration of Kuroshio and adjacent areas (19986-1996)

The co-operative study with China has been made since 1986. Relationship between the plankton production and spatial accumulation of pelagic fish eggs and larvae and the physical construction of ocean is studied.

(5) Small scale structure of the ocean (1988-1996)

Satellite observation with visible and infra-red sensors has been conducted to trace the process from birth to death of the small scale watermass.

This contributes to evaluate the influence of environmental changes on watermass movement.

(6) Primary production monitoring system (1990-1992)

Wide area mapping of the amount of plant pigments obtained from the satellite information enables to estimate the primary production of the ocean in comparison with the sea truth data.

4.5.2 Research on Environmental Issues

(1) Environmental monitoring with fishing boat (1993-1997)

This project is to monitor the various elements of atmosphere, seawater, marine animals and floating particle on board the operating fishing boats in the tropical, temperate and subarctic areas of the Pacific, Atlantic and Indian Oceans.

(2) Ecological control of harmful red tide algae blooming (1989-1993)

The succession mechanism of diatoms and harmful dinoflagellates has been studied to explore the technology for the pretension of harmful algae blooming.

(3) Evaluation of pollutant influencing on the neuritic creatures (1992-1996)

This project intends to explore the rapid detecting method for the chronic toxicity due to the harmful pollutants in marine fishes.

(4) Biological monitoring of marine environment (1990-1992)

The accumulation of pollutants is traced in marine mammals, sea birds and squid.

(5) Ultraviolet effect on phytoplankton growth (1990-1992)

The influence of the increase of the ultraviolet ray on the marine phytoplankton is evaluated.

(6) Acid rain effect on the inland water animals (1990-1992)

4.5.3 Living Resources Research

Numerous research projects on marine and fresh water living resources have been operated under the direction of Fisheries Agency.

Representative ones are as follows:

(1) Fish resources investigations in the northern North Pacific (partly 1955-)

Ecological and biological investigations for salmonids, Alaskan pollack, squids, etc. are carried out in the northern North Pacific.

(2) Fish resources investigation in the far seas (partly 1953-)

Ecological and biological investigations for the resources of demersal and pelagic fishes are made in the North Atlantic, tropical Pacific.

APPENDIX 1

COMMENTS OF JAPAN ON THE GOOS DRAFT DEVELOPMENT PLAN

I. Definitions - Objectives, Scope and Basic Concepts

In principle, the definition of GOOS - its objectives, scope and basic concepts as shown in the draft development plan is seconded.

In order to lay the sound foundation of GOOS operations, researches activities in terms of both basic and technology development should be emphasized.

II. GOOS Modules

Special attention should be paid to the establishment of satellite-using communication system in order to realize real time processing of oceanographic data at global level. In addition, many scientists and researchers in Japan have stressed the need to develop the data communication network through satellites in order to promote the efficient collection of oceanographic data.

III. Priorities

Giving priority to the common modules to GOOS and GCOS, that is, the climate one is understandable and seconded. The other modules, however, are also stressed and the clarification on the targets of each module to be achieved should be in mind before their implementation. Especially, as regards the modules in which biological and chemical elements have importance relatively, those are, the marine living resources and coastal zone modules, scientific findings applicable to the methodologies of GOOS operations have not been accumulated adequately in case of the accuracy of monitoring etc. Therefore, in order to attain a systematic stock of scientific findings for GOOS operations, research activities for this purpose should be given priority.

IV. Financing and Cost Evaluation

It would be mentioned that in Japan, the most expensive costs in ocean research and monitoring, that is, the running costs of a research vessel have been paid and sustained by a research institute, which enables us to conduct periodical monitoring on the continuous basis.

V. GOOS Major Elements

The establishment of an international global ocean analysis and prediction centre could be done only after finalizing careful consideration in terms of the co-ordination with the existing similar institutes at international or regional levels, the availability of national institutions and the applicability of the outputs of the existing ocean observing and data management programmes such as IGOSS etc.

The establishment of national and regional operation oceanographic centres in the developing Member States should be done on the basis of strengthening their capacities to be made through the interactions between their own efforts and technical assistance from the developed Member States. Since 1981, Japan has contributed to WESTPAC/TEMA activities funded by its Fund-in-Trust, receiving trainees from the region in the shipboard research and the short-term training on oceanographic data management. It is important to put these kinds of training activities into continuous basis in order to enhance total capacities of Member States as a whole.

VI. Relationship between GOOS and International Research and Operational Programmes and Systems

GOOS should be set up on the basis of strengthening the existing international operational systems such as IGOSS, WWW and IODE etc. Therefore, consideration and analysis should be given to how the existing systems could be co-ordinated and collaborated with GOOS. As regards international research programmes such as TOGA and WOCE of WCRP, GLOBEC, GIPME etc., the relationship with GOOS should also be clarified more definitely. And also, the missing components of GOOS should be identified in order to launch pilots research projects on the new technology development etc. to complete its programmes and components.

GOOS should be set up in close consultation with the GCOS-concerned organizations in order to ensure the optimum effects of interactions between two systems.

VII. GOOS Management and Co-ordination

TSAC (J-GOOS) would have difficulty to deal with all modules of GOOS, if the committee was comprised of the limited twelve members.

In order to promote the efficient implementation of GOOS, the roles and responsibilities of each G7 country should be clarified in terms of the target area for research and monitoring, the technology development such as satellite remote sensing and the field of basic research.

VII. Implementation Programme

It should be stressed repeatedly that the successful result of GOOS depends upon the strengthening of basic researches and the technology development for ocean monitoring.

The existing network of survey vessels for periodical or long-term monitoring should be strengthened. The establishment of long-term monitoring network using general vessels should be placed clearly in the implementation programme.

APPENDIX 2

THE PACIFIC OCEAN OBSERVATION AND RESEARCH INITIATIVE
(Draft)

Science and Technology Agency (STA
Japanese Government
February 1993

The whole plan of Japanese Government for GOOS is currently under study including deliberations yet to be had by the Council for Ocean Development, an advisory body to the Prime Minister. This draft initiative has been prepared by STA based on hearing obtained from experts in interested Ministries, scholars and men of experience in Japan.

1. BACKGROUND

The GOOS (Global Ocean Observing System) that has been promoted by the IOC in co-operation with the WMO, etc. is becoming a major theme of global ocean observation and research in the 1990s. In the Agenda 21 of the UNCED (United Nations Conference on Environment and Development) that was held in June last year, measures toward the GOOS of each country were incorporated. In January this year at the Japan-United States Summit Meeting, it was agreed and included in the action plan that Japan and the United States would make joint efforts in ocean research in the Pacific.

To deal with global environmental issues in recent years, and for the eternal prosperity of human beings, it is essential to clarify various phenomena of the earth, and especially of the ocean. Ocean observation and research on global scale that couldn't be conducted in the past has become necessary.

The ocean observation and research in Japan up until today has mainly focussed on routine observation and research for administrative purposes, such as meteorological observation and hydrographic survey around Japan and in the sea area of the Northwestern Pacific. Japan can boast to the world of its observation network. However, from the viewpoint of ocean observation and research on global scale, Japan is behind Europe and the U.S. Moreover, the operational system concerning climate monitoring, assessment and prediction aimed at by the GOOS, coastal zone management and development, monitoring and assessment of marine living resources, assessment and prediction of the health of the ocean, marine

meteorological and oceanographic operational services has not been sufficiently established.

Japan, therefore, will propose, based on its international status, the "Pacific Ocean Observation and Research Initiative" to contribute to the GOOS. The initiative will deal with global environmental problems, development of marine living resources, utilization of ocean energy and space, conservation of national territory, maintenance of maritime safety, preservation of ocean environment, etc.

2. BASIC CONCEPT

Traditionally Japan has been dealing mostly with its surroundings and the Northwestern Pacific. As a step to go beyond this situation, Japan will make efforts to deal on global scale with the Pacific, an ocean closely related to Japan that comprises about 50% of the world's seas (about one third of the global surface), including its adjacent oceans and both polar regions, on the base of co-operation with the U.S.

Japan will, in co-operation with other Pacific rim nations, take an international initiative to promote this plan, as well as contribute internationally.

3. OBJECTIVES

Our final objective (in about 30 years) is to construct a "Comprehensive Observation System" that will benefit climate monitoring, assessment and prediction aimed at by the GOOS, coastal zone management and development, monitoring and assessment of marine living resources, assessment and prediction of the health of the ocean, marine meteorological and oceanographic operational services. This system consists of a comprehensive and continuing ocean observation system utilizing various leading-edge observational means related to from-sea floor-to-universe technology, and data-integrated and international analysis/management and distribution systems. In 20 years or so, Japan aims at realizing construction of a "climate monitoring, assessment and prediction observation system" that is a base of other systems.

4. PROCEDURE

4.1 PRIORITY AREA

Among the observation systems, construction of the "climate monitoring, assessment and prediction observation system" will have priority over others, and such observation systems as "coastal zone management and development", "monitoring and assessment of marine living resources", "assessment and prediction of the health of the oceans", and "marine meteorological and oceanographic operational services" will be launched concurrently. They will be supported by research to solve ocean phenomena on global scale, research necessary to establish the data analysis management and distribution system, system design and development of new observation technology.

4.2 PHASES

Japan will incorporate results obtained from process-oriented research and development of new observation technology into the observation research system based on the existing intensive observation operations, the Kuroshio research around Japan and existing observation and data management programme such as IGOSS and GLOSS. At the same time, the observation system will be established phase by phase in four phases. Phase I will deal with the surrounding sea areas of Japan, Phase II with a specified area of the Equatorial Tropical Western Pacific and the Northern Pacific and both polar regions, Phase III with an enlarged area of the entire Pacific, and Phase IV with the entire Pacific that is the area for verification.

4.3 PILOT PROJECT

Meanwhile, in about 10 years, Japan will plan and implement the following two pilot projects, in the specific sea area. One of the projects is the "Western Pacific Comprehensive Ocean Observation and Research that conducts observation and research with objectives to clarify the following, including the International Research Programme TOGA (post TOGA), WOCE, JGOFS, GLOBEC: (i) interaction of ocean and atmosphere, (ii) world ocean circulation from surface to middle-depth layers, (iii) the mechanism of carbon cycle related to greenhouse, (iv) dynamics of ecological system, (v) equatorial circulation and subtropical

circulation, and (vi) Indonesian through flow in the Equatorial Tropical Western Pacific. The other pilot project is the "Northern Pacific and Polar regions Comprehensive Ocean Observation and Research" whose objective is to clarify the following in the Northern Pacific (Bering Sea) and polar regions where effects for global environment are seldom assessed, including the WOCE, JGOFS and GLOBEC: (i) interaction of ocean and atmosphere, (ii) world ocean circulation, (iii) material circulation and, (iv) dynamics of ecological system.

Also Japan will promote InterRIDGE, LOICZ, the Kuroshio research, etc. as other studies.

4.4 TECHNOLOGY DEVELOPMENT

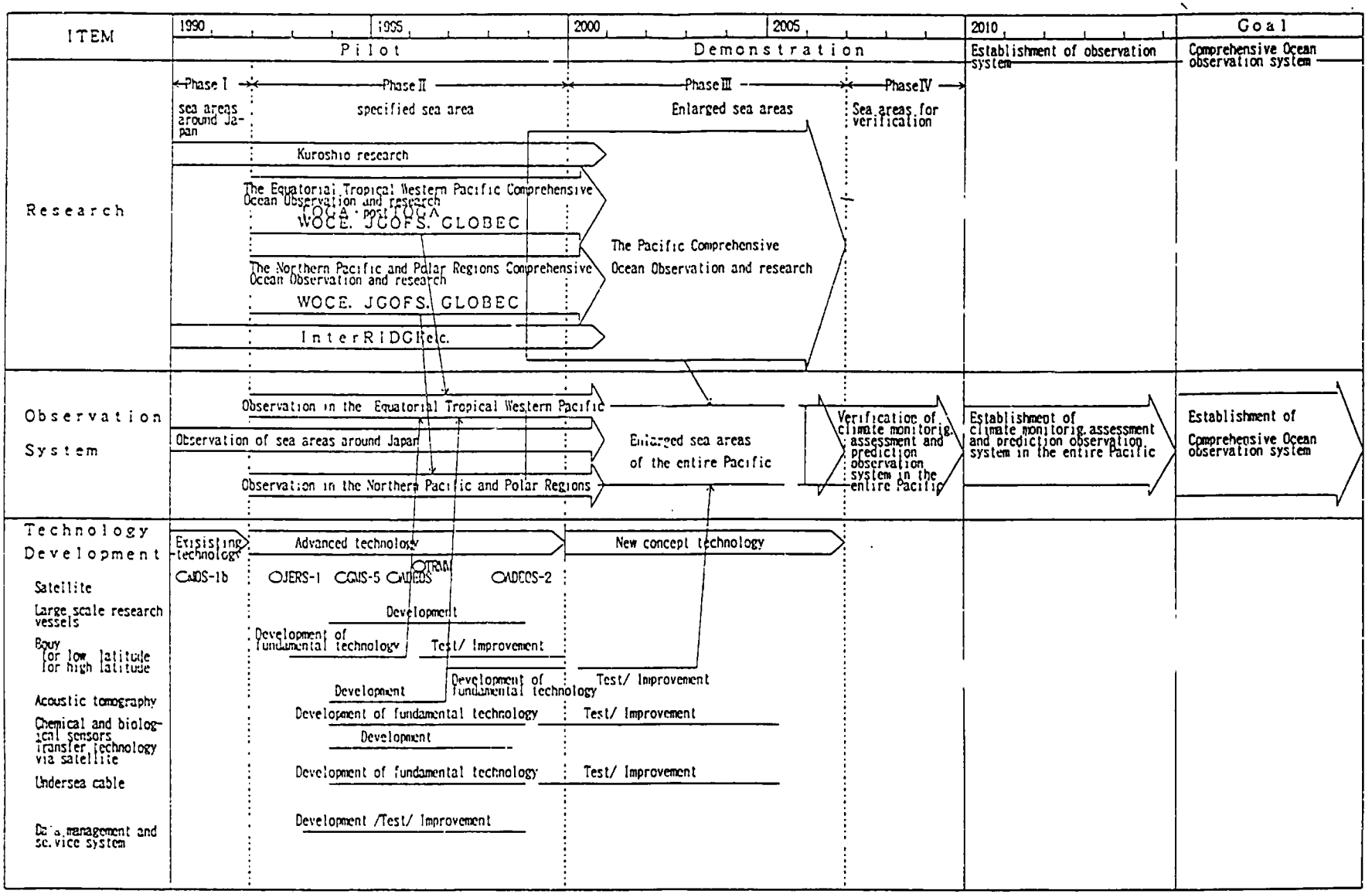
During the present 10 years (Phase II), satellites remote sensing such as meteorological satellites, MOS-1, JERS-1 will be utilized aggressively to conduct technology development necessary for the phase III "Observation System of the Pacific Comprehensive Ocean Observation and Research". Also, a studying of new ocean observing satellite will be promoted. In addition to buoys deployed in the entire area of the Pacific, acoustic tomography technology deployed in important sea areas and development of chemical sensors, other automatic observation technology (robots, long-term observation station) will be developed. Development of new data transmission system utilizing satellites and of basic technology of data transmission system via sea floor cables will be handled. The data transmission system via sea floor cables will be tested and improved in Phase III, and will be aimed at practical use in Phase IV. To develop the ocean research and study at a high level, a fleet of ocean observation ships with advanced observation capability equipped with special observation instruments will be expanded. At the same time, large-scale ocean research ships, etc. that can deliver massive materials and equipment and enables research and study in remote places, stormy weathers, a frozen sea, etc. will be expanded.

4.5 TECHNOLOGY ASSISTANCE, EDUCATION TRAINING

Through joint research concerning the GOOS with each country, Japan will promote information exchanges with our research, technology and observation as well as human exchanges.

(This draft was prepared by the Science and Technology Agency with opinions from professionals in related ministries and agencies as well as from men of learning and experience and is under review at present.)

The Pacific Ocean Observation and Research Initiative (draft)



APPENDIX 3

FUTURE PLANS OF FURTHER CONTRIBUTION OF JMA TO GOOS

The JMA as one of national organizations to operationally observe, monitor and forecast changes of oceanographic conditions as well as those of atmosphere will further improve the existing activities on WWW, GAW, IGOSS, GLOSS and WCP, which are important basis of the GOOS. Particularly, their efforts are expected to be focussed to introduce more sophisticated systems in the climate module and the ocean service module of the GOOS. The following are typical items to be strengthened in this regard.

1. Observations on board the JMA's vessels

Further intensification of ocean observations in both of time and space in the western North Pacific will be duly considered.

2. Observations of trace and greenhouse gases in the western North Pacific

The observations will be further extended in the western North Pacific in conjunction with the observations on board the JMA's vessels mentioned above.

3. Deployment of drifting buoys

The JMA will initiate regular deployment of drifting buoys in the western North Pacific to establish operational network to monitor sea surface/sub-surface temperatures, ocean current and marine meteorological data.

4. Recruitment of merchant vessels for deployment of XBT will be further expanded to establish operational sub-surface temperature observations.

5. The collection of sea level data in the western Pacific as well as in Japan will be intensified for effective and reliable monitoring of changes of sea level associated with the El Nino and the global warming.

6. Further utilization of satellite observing facilities for strengthening telecommunication and observation of ocean environments from space will be fully considered.

7. Analysis and forecasting services of ocean conditions will be improved in introducing ocean data assimilation techniques which accommodate various observational data obtained in the framework of GOOS. Intensive efforts will be put on development of dynamical modelling of oceans for operational forecasting of El Nino. Furthermore, numerical coupled atmosphere-ocean models to reveal general ocean circulation will be continuously developed.

Toward Further Development of the GOOS

The GOOS, in particular its Climate Module, can be regarded as an oceanographic portion of the GCOS (Global Climate Observing System) which is now being developed jointly by IOC/UNESCO, UNEP, ICSU, and WMO.

In this connection, the JMA is making full endorsement of the objectives and purposes of the GOOS given in "GOOS Draft Plan" in putting stress on development of the climate module which is common to part of the GOOS (Climate Module).

In establishment of GOOS, comprehensive co-ordinations with GCOS and other existing system are essentially required.

Oceanographic observations using observation vessels are to be regarded as one of the most indispensable tools for the long-term and reliable monitoring.

In establishment of global/regional product centres as well as modelling centres, full co-ordination and utilization of existing facilities such as IGOSS SOC will be taken into consideration.

The NETHERLANDS

GOOS related activities in the Netherlands in 1992
(submitted by the Delegation of the Netherlands)

GOOS related activities in the Netherlands are both of a purely scientific nature and linked to an innovative regional monitoring system being the Seawatch-the Netherlands pilot project.

1. SCIENTIFIC ACTIVITIES

The GOOS related scientific activities in the Netherlands concern the participation in international research programmes such as WOCE and JGOFS and the execution of basic and applied research in the Dutch coastal zone as well as monitoring activities.

In 1992 the Netherlands participated substantially in the JGOFS Southern Ocean Cruise on board the German research vessel Polarstern. These research activities were part of the Dutch Antarctic research programme. The activities were funded by the Netherlands Marine Research Foundation (SOZ) and executed by scientists of the Netherlands Institute for Sea Research (NIOZ). SOZ also carried out JGOFS related research during its Indian Ocean Expedition which takes place from May 1992 to April 1993. About twelve weeks of research are dedicated to JGOFS-activities in 1992 and 1993. Non Dutch participants come from among others Belgium, Germany, India, Kenya, Malaysia, UK and USA.

WOCE activities were organized during research cruises of the new Dutch research vessel Pelagia near Greenland.

2. SEAWATCH-THE NETHERLANDS

In the middle of the eighties the EUREKA/EUROMAR project was established for developing new technologies and techniques for exploring and monitoring the marine environment. At present EUROMAR involves thirteen countries. More than a hundred companies and sixty research institutes are now participating in more than twenty projects. The Netherlands chaired EUROMAR in its first years and organized the first EUROMAR Technology Market. The latter is a new mechanism for bringing together marine scientists, marine managers, companies and developers for making plans for new approaches and technologies. The results of EUROMAR are presently being integrated in the EUROMAR Seawatch programme. So far, France, Germany, the Netherlands, Norway, Sweden and the United Kingdom are participating in Seawatch. At present an experimental Seawatch system is operating among others at the North Sea and in the Gulf of Thailand. Plans are in preparation for the Bering Sea, the Black Sea and the Thyrrenean Sea.

The Seawatch-Europe project is implementing the best available technology. By this Seawatch develops an innovative operational marine environmental network. Major technical issues for the Seawatch system are: network structure, standardization, innovative sensor technology, data transmission, data processing facilities and storage, integrated use of monitoring technology and operational modelling technology and comprehensive user facilities.

A number of aspects are covered to some extent by ongoing EUROMAR projects such as FIESTA for standardization, OPMOD for modelling and MERMAID for a measuring buoy system. Other aspects are dealt with by the Seawatch partners.

The Seawatch-Europe project aims at covering areas subjected to transboundary pollution transport. The project comprises an international system of automatic oceanographic stations with real time data transmission to shore based receiving stations, data handling and analysis systems for information synthesis and a user friendly information system for presenting the environmental data to various users nationally and internationally. Each participant in Seawatch is provided with environmental data from other participating countries on an operational basis.

For industrial partners in Seawatch-Europe in particular and in EUROMAR in general, the Seawatch project serves as a pilot project for innovative technologies. The project also serves as a 'marketing tool' for extensive data sets from the marine environment. Data and information collected is offered to European environmental agencies, research institutes and private industries. By this it is strengthening the growing demand of a quality oriented market.

Besides data acquisition and dissemination on an international scale, Seawatch technology and data can be applied on a regional, national and local level. This kind of derived application is a major aspect of the EUROMAR-Seawatch initiative.

The ultimate objective of Seawatch-the Netherlands is to establish and operate the Dutch Seawatch stations as part of the Seawatch system and to offer the Seawatch information and technology in the Netherlands to industrial, governmental and scientific users on a local, national and European scale. The Seawatch-the Netherlands stations are self supporting units linked to the Seawatch-Europe network.

The first phase of the Seawatch-the Netherlands project has covered the technical and commercial feasibility of the European Seawatch system for the Dutch situation and its regional and local implications. At present the results of the experiment are assessed by the Dutch Seawatch partners.

NORWAY

Possible National Input to GOOS
(submitted by the Delegation of Norway)

The main area of interest is the North-east Atlantic with the North Sea, the Norwegian Sea and the Barents Sea. Norway strongly support the planning phase of GOOS. The following elements may be part of the Norwegian input to GOOS:

1. OCEAN MONITORING AND FORECASTING SERVICE (HOV)

HOV could be regarded as a national equivalent to GOOS. It is a three-year development project which presently is under evaluation. Hopefully, it will enter into a permanent phase from 1994. HOV has developed largely as an operational service covering a wide range of oceanographic products; waves, surges, arctic sea ice, transport of nutrients, pollution and algae. End users are found both within the industry and different governmental bodies.

HOV may be seen as a pilot example of GOOS module 5 "Operational services". We, therefore, suggest that HOV serve as a demonstration example within the GOOS phase 2 "Operational demonstrations". Further, it will be considered, at the national level, to shape HOV in the future, in such a way that it serves as a GOOS instrument, indicating then a closer and more interactive relation to IOC activities.

2. NATIONAL MARINE ENVIRONMENTAL MONITORING SYSTEM

The national monitoring system consists of the following three components:

(i) **Coastal monitoring**
A system of fixed coastal stations for monitoring ocean climate, eutrophication and algal blooms. Time series exist back to the mid-30's.

(ii) **Pollution monitoring**
Carried out at regular interval in fjords, coastal areas and oceanic areas (North Sea and the Barents Sea). The main emphasis is put on organic contaminants, trace metals and radioactivity.

(iii) **Ocean climate and production monitoring**
System of fixed oceanographic sections repeated at regular intervals combined with less frequent regional coverage for monitoring and assessing.

- Ocean climate
- Primary and secondary production
- Fish stocks

3. ONGOING AND PLANNED RELEVANT ACTIVITIES

The following research projects and activities are believed to be relevant to GOOS:

(i) CAR-DEEP
National programme on physical and chemical processes and fluxes in the Norwegian Sea. It has relations to JGOFS.

(ii) MARE COGNITUM
National programme in the Norwegian Sea with the main emphasis on biological variability and its causes. It has relations to GLOBEC.

(iii) NORDIC-WOCE
Nordic programme to support WOCE along the Scotland - Greenland Ridge. There are still some problems with the funding of this project.

(iv) ARCTIC MONITORING AND ASSESSMENT PROGRAMME (AMAP)
This is an international programme for the marine, the atmospheric and the terrestrial environment of the Arctic. The objective during its first phase is to produce an Environmental Quality Status Report for the Arctic in 1996. This report will be the basis for further monitoring work. All the 8 states bordering the Arctic are participating in the work and with Japan, UK, Germany and the Netherlands as observers. Norway is lead country for the marine environment during the planning and implementation phase.

4. DR. FRIDTJOF NANSEN PROJECT

As part of the Norwegian aid, the research vessel "Dr. Fridtjof Nansen" has performed studies on fishery resources in several developing countries since 1975. The work has been performed in the Indian Ocean, off the western African coast and in Latin-American waters. Training of personnel and institutional building have also been a part of this project. A new R/V "Dr. Fridtjof Nansen" will be operational in the beginning of 1994. In the new project environmental studies and capacity building have gained much more significance than in the previous project. During the period 1994-1996 the main working area for "Dr. Fridtjof Nansen" will be the Benguela current upwelling system.

POLAND

Current programme and plans of activities related to GOOS
(submitted by the Delegation of Poland)

Poland expresses great interest to participate in the development and implementation of a Global Ocean Observing System (GOOS). Possibilities and proposals of research institutions and agencies for potential participation are presently under consideration. Also establishment of an agency to act as the national GOOS office is being discussed. A final decision, I am afraid, will not be reached before the end of this year.

Nevertheless governmental and academic institutions are carrying out research within the following programmes:

(i) Greenland Sea Project: repeated hydrographic sections in Norwegian-Barents Sea Confluence Zone, in Greenland and Norwegian Seas with the special attention to the Polar Front.

(ii) Monitoring of the Baltic Sea as contribution to the Helsinki Convention.

(iii) Joint Global Ocean Flux Study (JGOFS): research on energy and matter fluxes between atmosphere and the ocean, aerosols generation and intensity in particular. They maintain in the polish waters:

(a) Seasonal cruises recording physical, chemical and biological parameters for long-term monitoring of changes;
(b) Sea-level observations at polish coast;
(c) Meteorological observations along the coast and at the sea;
(d) Modelling: models of water circulation of the Baltic Sea and other regions are being worked out.

Research on: climate and its long-term changes, climate prediction, protection of polish-shoreline, impact of global climate changes on regional and coastal ecosystems is carried out or planned.

PORTUGAL

GOOS National Planning Activities
(submitted by Prof. A.F.G. Fiuza, Grupo de Oceanografia,
Departamento de Fisica, Universidade de Lisboa)

As a nation of seafarers with continuing interest in the use of the ocean and in its protection, Portugal strongly supports the GOOS initiative.

Ongoing activities in Portugal of relevance to the development of GOOS are:

(i) Systematic measurement of sea level along the coast of Continental Portugal and in the Azores and Madeira (part of GLOSS, run basically by the Navy's Instituto Hidrografico and also by the Instituto Geografico e Cadastral).

(ii) Measurement of wind waves with buoys (Instituto Hidrografico).

(iii) Operational forecasting of wind waves (Instituto Nacional de Meteorologia e Geofisica).

(iv) Research cruises (hydrology - Grupo de Oceanografia da Universidade de Lisboa and Instituto Hidrografico; biology - Instituto Nacional de Investigaçao das Pescas; sediments - Serviços Geologicos de Portugal and Instituto Hidrografico).

(v) Measurement of shelf and slope circulation with moored current meters (Grupo de Oceanografia da Universidade de Lisboa and Instituto Hidrografico).

(vi) Systematic measurements of surface layer currents and temperatures in the eastern North Atlantic with satellite-telemetering drifters (a contribution to the WOCE Surface Velocity Programme, Grupo de Oceanografia da Universidade de Lisboa).

(vii) Systematic measurements of surface layer salinities and vertical temperature profiles with XBTs using Portuguese merchant ships and fishing vessels (Grupo de Oceanografia da Universidade de Lisboa).

(viii) Development of satellite oceanography methods and applications (Grupo de Oceanografia da Universidade de Lisboa):

(a) NOAA/HRPT and METEOSAT data reception, processing and archiving;
(b) preparation and distribution of satellite-derived products: sea surface temperature charts, distribution of fronts, near-real time operational support to fisheries;
(c) investigation of the space-time structure of phytopigments in the eastern North Atlantic using Coastal Zone Color Scanner data (in the frame of the ESA/JRC OCEAN project) as a preparatory step to the use of the SeaWIFS.

In the frame of the EC MAST-II sponsored MORENA project ("Multidisciplinary Oceanographic Research in the Eastern Boundary of the North Atlantic"), which is co-ordinated by the University of Lisbon (Grupo de Oceanografia) and aims at the understanding, quantification and modelling of shelf-ocean exchange of energy, mass and momentum, in 1993 Portugal and Spain will conduct the WOCE Core 3 eastern boundary experiment (WOCE-AR16 study area) off western Iberia and will deploy current meter mooring lines WOCE-ACM27 and ACM28 there for one year.

Another initiative of considerable potential in the context of GOOS is FOROCEAN ("Forecasting the Ocean"), which is a project that has been recently submitted to the NATO Science for Stability Programme by the University of Lisbon, in co-operation with Portuguese fishing co-operatives and shipping companies. FOROCEAN aims at contributing to the development of a marine analysis/forecasting capability (sea temperatures, surface waves, fronts, currents, mixed layer depths) based on satellite data (NOAA-N, METEOSAT, ERS-1 & 2, TOPEX-Poseidon, DSMP), on information from buoys and ships-of-opportunity, and on analyses from the ECMWF.

With respect to training and education activities with relevance for GOOS, there are training courses for marine technicians at the Instituto Hidrografico and at the Instituto Nacional de Investigaçao das Pescas, and there are formal undergraduate and postgraduate (M. Sc. and Ph. D.) programmes in Oceanography at the University of Lisbon.

RUSSIAN FEDERATION

GOOS related activities in the Russian Federation
(submitted by Prof. S. Lappo, Director of the
State Oceanographic Institute, Roshydromet, Moscow)

The Russian Federation fully supports the development of Global Ocean Observing System. We feel that one of the most efficient and practical ways in creating the Global Ocean Observing System (GOOS) is to increase support for already existing international observing systems, such as IGOSS and GIOSS, and to integrate existing and/or planned national ocean observing systems.

National marine observing systems have been created in order to solve national economic problems and/or as the reaction to adverse effect caused by natural changes and human activities in the World ocean (see Appendix).

In the former Soviet Union an example of such a network is the system of "Secular" (Long-term observational series) sections established in various seas surrounding the country with the objective to provide detailed description of hydrological and hydrochemical regime of the marine areas.

Overgrowing use of pesticides in agriculture and growing discharge of industrial wastes put forward the task of monitoring and control of such an input and dissemination of the contaminants in marine environment, that affect the biological resources of the sea as well as coastal zone management and development.

For this reason the Federal System of the marine pollution monitoring and control has been created.

Another example of a system for timely warning of marine natural disasters is the National Tsunami Warning System in the Pacific co-ordinated with other countries of the Pacific region.

The above-mentioned marine monitoring systems are based on the application of national methodology and technology.

In creating international global observing system it is necessary to agree on the list of parameters to be observed, locations of sites and key areas for observations, requirements to accuracy of observations, data formats and procedures, etc.

Each country develops the optimal observation network and therefore it is important to initiate the design of optimal international network for global system and specific oceanic regions so that available limited resources be used in a most efficient way. As an example of such approach is the concept of energetically active zones used by Russian scientists in monitoring and assessing the role of the ocean in climate change and variability.

Satellite observing systems will provide tremendous volume of information from the World Ocean. Optimal selection of information required for operational analysis and forecasts is needed.

The international system should be built on the principle that each participant of the system will benefit most from such a co-operation.

The Russian delegation would like to point out that the establishment of GOOS will be of great importance for solving global problems related to the ocean and climate. The organizations and scientists of the Russian Federation would be willing to participate in its design, planning and development, providing contribution to GOOS through existing national ocean observing systems.

APPENDIX

PROGRAMMES OF RECEIVING OF THE OCEANOGRAPHIC INFORMATION FROM THE SEAS OF RUSSIA

1. Permanent acting systems

- Marine coastal observation network (Fixed network of 287 stations and posts)
- System of ice stations
- Ship secular sections (44) on the seas of Russia
- System of seasonal ship observations of Russian seas pollution (574 stations)
- System of ship of opportunity observations
- System of tsunami warning and forecasting (21 stations)
- System "Tides"
- System of monitoring the zones of buried chemically active staffes in the seas "Dumping"

2. Systems of identification of the emergency situations (systems of special input)

- System "Spreads" (System of identification of the oil spots)
- System of identifying and forecasting of wave surge (for example, for oil platforms)

3. Research and technical programmes:

- Programme "DIGMA"
- Programme "Fronts"
- Programme WOCE
- Programme "Sections"
- Programme "Climate"
- Programme "MONOC/ECOMONOC"

SPAIN

Spanish National Activities Related to GOOS
(submitted by the Delegation of Spain)

Spain supports the idea of a GLOBAL OCEAN OBSERVING SYSTEM and the need for its implementation is recognized. In this context, research and monitoring activities will be promoted accordingly.

In Spain the activities for understanding climate processes and monitoring climate variations or change are co-ordinated by the National Commission for the Climate. So, GOOS activities also will be a component of that commission.

With respect to ongoing national activities related to GOOS, Spain has a network of 12 permanent sea-level stations, and systematic observations are carried out in a few transects on the Atlantic and Mediterranean shelves. In the near future a time series station in the oceanic waters of the Canary Islands will be started, with the aim of determining long-term changes of water mass properties, fluxes of dissolved and particulate matter, and currents in the deep ocean.

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

GOOS National Planning Activities
(submitted by Dr. N.C. Flemming, NERC,
Institute of Oceanographic Sciences, Deacon Laboratory, Wormley)

For more than ten years UK has been participating in major international marine science research programmes which are consistent with laying the foundations for a Global Ocean Observing System. UK was an active participant at the Second World Climate Conference in 1990, and supported the development and implementation of GOOS. The UK Statement to the 1992 Session of the IOC Co-OPC stressed the UK commitment to the various international agreements on climate and climate research. UK supported the UN Framework Convention on Climate Change and the UN Convention on Biodiversity. The need for a Global Ocean Observing System is stated in the UNCED conference document Agenda 21. UK hosted the meeting of the Committee for Earth Observing Satellites (CEOS) which prepared the catalogue of satellite requirements UNCED, and this is very clear on the role of GOOS.

British scientists have been active in IOC programmes contributing to the development of GOOS, particularly GLOSS and IODE, and have supported TEMA courses in these activities. British scientists have been very active in developing global marine science experiments such as WOCE, JGOFS, LOICZ, and GLOBEC. UK was pleased to host an informal expert consultation meeting on GOOS in London in May 1992. UK contributed secretariat support in preparing the IOC Panel Report "The Case for GOOS".

A key step in establishing a successful Global Ocean Observing System is the co-ordination of policy between the beneficiaries and participating agencies of GOOS at the national level. This will help each Member State to identify the benefits which it could obtain from GOOS, usually involving many Government Departments. GOOS will produce in the international public domain data products which are useful in fisheries management, coastal flood prevention, weather and climate prediction, coastal management, management of contaminants and pollutants, safety at sea, ship-routing, exploitation of marine resources, and many other applications. Member States wishing to be active in GOOS, both as contributors to the observing system, and beneficiaries from the data distribution, will find it advantageous to co-ordinate the interests and policies of their agencies at the national level which are concerned with marine affairs and research.

To achieve this objective in its own case, UK Government has, as an interim measure, designated the International Affairs Sub-Committee of the Inter Agency Committee on Marine Science and Technology (IACMST) as the national focus for GOOS. This group provides the opportunity for discussion on the design of GOOS, and national contributions to GOOS, to involve the following agencies: Fisheries (2 agencies); Transport; Environment; Trade and industry; Natural Environment Research; Science and Engineering Research; Naval Oceanography and Naval Research; Meteorological Office; and the Overseas Development Agency to

assist with TEMA matters. The IACMST has close links to other agencies such as the National Rivers Authority (NRA) and the various Conservation agencies. NRA has expressed strong support for GOOS, because of the potential for improved management of estuarine and coastal flooding.

British Departments and agencies have examined in detail the implications of managing climate research and climate impact on timescales of the order of 15 years, and attempted to predict costs. These studies have been co-ordinated by the Department of Environment, and involve the British National Space Centre (BNSC), and the Research Councils and the Universities. GOOS emerges as a major component of the overall projected activity.

During 1992 IACMST sponsored with the British National Space Centre a conference on the satellite observing systems required for oceanographic research and operations, in which the needs of GOOS were analyzed and given strong support.

From the point of view of domestic UK national agencies, the benefits of GOOS will develop most rapidly if the UK national input is based on skills and experience available from all the marine research and operational agencies in the UK, and if the products required by UK are specified by a wide range of UK users. UK envisages benefits at three spatial scales: (i) Global, where global data sets are gathered by fully international co-operation, in a way which no single country or group of countries could undertake, and products distributed which are of benefit to all states; (ii) Regional, where those countries bordering the north and north-east Atlantic collaborate to add higher resolution data, and generate higher resolution products of value to the region; and (iii) Local, where the products of (i) and (ii) are used as input, boundary conditions, and long-term forcing functions for models, predictions, and management information in UK coastal waters and adjacent seas. European collaboration is important at all scales. British oceanographers and data managers have worked closely with their European colleagues and the EC DGXII in the development of ocean data management systems which will help to unify European data sets.

During the last 5 years UK has established the Hadley Centre for Climate Research and Prediction, operated by the Meteorological Office and financed jointly by the Department of Environment, and the James Rennell Centre for Ocean Circulation supported by the Natural Environment Research Council (NERC). These Centres will be active participants in programmes of global ocean data gathering, and the design and operation of ocean models, and coupled ocean-atmosphere models, during the development of GOOS. UK (NERC) has published the Fine Resolution Antarctic Model (FRAM) Atlas illustrating the use of eddy-resolving models in description of the ocean. An eddy-resolving isopycnic model is currently being integrated at the Rennell Centre.

Technology development is a critical component of GOOS, and UK research institutions and commercial companies are active in developing instruments both for remote sensing, and for *in situ* measurements. Research is being dedicated to various buoy systems, chemical sensors, and automatic untethered vehicles (AUVs). The principle AUV, "Autosub" is at the stage of trials for a demonstration test vehicle (DTV) 3/4 final scale.

UK supports the steps being taken by IOC to establish a secure basis for the development and implementation of GOOS. We recommend in particular the establishment of a strong independent Joint Scientific and Technical Committee, supported by IOC and other agencies, and including ICSU.

UNITED STATES OF AMERICA

GOOS National Report
(submitted by the Delegation of the United States of America)

1. BACKGROUND

International agreements aimed at significantly improving our capabilities for describing and predicting environmental change have set in motion international planning for a Global Ocean Observing System (GOOS). The United States has taken an active role in international planning for a Global Ocean Observing System, not only because of our expertise and longstanding interest in marine affairs, but because of the economic benefits foreseen of a Global Ocean Observing System. GOOS, which is essentially the consequence of decades of quality

research, is where the payoff finally takes place for all the investments that have been made.

2. U.S. GOOS GOALS

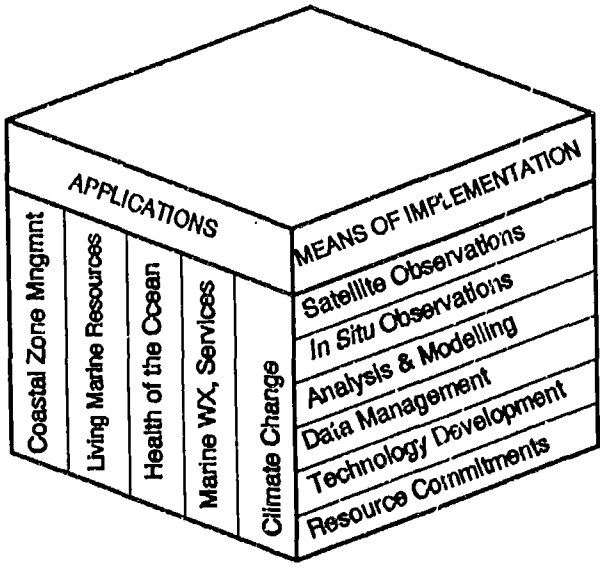
2.1 To provide or to assist in providing those long-term ocean observations and predictions needed for societally-beneficial monitoring and forecasting of conditions and change in the climate system and in the coastal zone environment, including marine ecosystems, environment quality, and marine weather and services; and

2.2 To assist in providing those long-term global ocean observations needed for research activities concerned with understanding of the topics above.

3. THE U.S. APPROACH

A central focus of U.S. GOOS is the suite of operational measurements that will allow societally useful improved marine weather and services, monitoring and prediction of interannual climate variability, of the changes in the health of the ocean and living marine ecosystems, and of those coastal and near-shore environmental conditions needed by coastal managers (see Figure 1). We presently have some of the needed capability for modelling, prediction, and detection of change and could generate some of the required products; however, in general we do not have the data needed to force and validate the models and predictions. The operation measurement data - the central core of U.S. GOOS - must be supported by directed research and technology development into improved and cost-effective measuring techniques and instrumentation. Basic research leading to a better understanding of the processes in the global and coastal ocean will ultimately improve the operational measurements, but is not a central focus of U.S. GOOS. The U.S. will include the acquisition of data in its contribution to GOOS while recognizing the importance as well of co-ordinated management of data and data products.

Figure 1



Initial activities are categorized as follows:

Blue-Water Cluster: Climate and Weather	Green-Water Cluster: Coastal
• Climate Change	• Info for Coastal Zone Management
• Marine Weather & Services	• Health of the Ocean
	• Living Marine Resources

The Climate and Weather cluster includes predominantly physical parameters and emphasizes "blue" (or deep) water; the Coastal cluster emphasizes non-physical measurements and has strong "green" (and "brown") water components; however, all are related. The synergism among the modules prompt us to initiate them simultaneously rather than sequentially.

It is proposed that operational measurements and data management address three high priority objectives:

(i) El Nino Predictions;

(ii) Detection of long-term changes, including those in the coastal zone;

(iii) Improved marine weather and services.

4. **RESPONSIBILITIES**

In the U.S., NOAA is providing the leadership for the set of U.S. GOOS activities. A U.S. planning meeting (WHOI, October 1992) recommended that U.S. GOOS should include multi-agency research programmes as well as operational ocean monitoring activities. A strong partnership with the academic community was deemed to be essential. NOAA, which has the operational mission in the U.S. to describe and predict changes in the oceanic and atmospheric environment, is providing the leadership for the set of activities that are the co-ordinated contribution to the international effort. The Office of the Oceanographer of the U.S. Navy is co-operating in the operational measurements. The U.S. research activities will be focussed through the National Science Foundation, with NOAA research being a contribution activity. NOAA's portion of U.S. GOOS will include: NOAA operational observations, analyses and predictions; funding civilian operation measurements, including management of the associated data and products; and being a partner in the multi-agency research and technology development efforts that are directly addressing GOOS issues. Initially the U.S plans to focus on the following specific efforts; note that observations made primarily for coastal applications, if continued indefinitely, become valuable for climate change-related purposes as well.

Technical Activity	Application Module Mainly Affected
• TOGA Observing System	• Blue Cluster
• Upper ocean temperature	• Blue Cluster, Coastal Zone
• Moored buoy sensors	• Coastal Zone, Marine WX/Services
• Satellite/*in situ*	
sea level	• Climate, Coastal Zone
ocean color	• Green Cluster
winds	• Blue Cluster, Coastal Zone
• Continue existing time series	• All Modules
• Technology Development	• All Modules

It should be noted that funding for these efforts is not certain. In summary, the U.S. is now operating portions of a GOOS with plans for additional efforts, but long-term resource commitments have not been made.

VENEZUELA

GOOS National Report
(submitted by the Delegation of Venezuela)

GOOS-related activities are co-ordinated by the Comision Nacional de Oceanologia (CNO) (National Commission for Oceanology), a multidisciplinary and interinstitutional high-level body, which co-operates closely with the National Commission for Hydrology and Meteorology (CNHM). Both commissions share the same Technical Secretariat: the Consejo Nacional de Investigaciones Cientificas y Tecnologicas (CONICIT) (the National Council for Scientific and Technological

Research).

The major ongoing research and/or services programmes in Venezuela which are direly related to GOOS are:

1. Institutional programmes (carried out by single oceanographic organizations).

2. Interinstitutional programmes (national and international):

2.1 **National maregraphic network:** this is under the authority of the Servicio Autonomo de Geografia y Cartografia (SAGECAN) (National Autonomous Service for Geography and Cartography) of the Ministerio del Ambiente y de los Recursos Naturales Renovables (MARNR) (Ministry for the Environment and Natural Renewable Resources) in co-operation with the Direccion de Hidrografia y Navegacion de la Armada (Directorate for Hydrography and Navigation of the Navy). Also related to GLOSS.

2.2 **Study of the variation in sea-level temperature in Venezuelan coastal areas and its effect on climatology, fisheries and ecology:** funding will be equivalent to US$200,000 over three years. Under the co-ordination of the Instituto Oceanografico de Venezuela (IOV) (the Oceanographic Institute of Venezuela) of the University of Oriente (UDO).

2.3 **Integrated study of the lagoon system of Tacarigua-Unare-Piritu:** co-ordinated by IOV-UDO and the Instituto de Zoologia Tropical (IZT) (Institute of Tropical Zoology) of the Universidad Central de Venezuela (Central University of Venezuela). Also related to GLOSS.

2.4 **"CARIACO" Project:** a co-operative oceanographic research project between IOV-UDO and the Fundacion La Salle de Ciencias Naturales (the La Salle Foundation for Natural Sciences), on the Venezuelan side, and the University of South Florida and the National Science Foundation (NSF) on the American side. Also related to JGOFS.

2.5 **Project on tracking antennae for oceanographic satellites:** co-operative projects between the Instituto de Tecnologia y Ciencias Marinas (INTECMAR) (Institute for Technology and Marine Sciences) of the Universidad Simon Bolivar (USB) (Simon Bolivar University), the Centro de Procesamiento Digital de Imagines (CPDI) (Centre for Digital Image-Processing) and SAGECAN-MARNR.

2.6 **National network for rapid alert on large-scale marine algae blooms**, in particular with regard to toxic red tides and "Ciguatera".

2.7 **Project on the "Centro Regional de Tecnologias Marinas del Caribe" (Regional Centre of Marine Technologies of the Caribbean):** at an advanced stage of programming, in relation with the "Bolivar Programme.

2.8 Project on **"Integrated Management and Sustainable Development of Marine and Coastal Areas":** co-ordinated by the Direccion de Ordenacion del Territoria (DOT) (Directorate of Territorial Development) of the MARNR. Also related to GLOSS.

3. **SUPPORT ACTIVITIES**

3.1 Programme on Human-resources: educational and training at Graduate, Master's, Doctorate levels as well as at the level of baccalaureate and high-level technicians.

3.2 Network on oceanographic information.

3.3 Non oceanographic ship "Punta Brava".

4. **CONCLUSION**

Venezuela supports GOOS not only from the scientific/technical viewpoint but also from that of human-resource training to support and reinforce the physical infrastructure of research and development.

MAURITIUS

National Planning Activities for GOOS
(submitted by Mr. Y. Valadon, Director,
Meteorological Services, Mauritius)

The Mauritius Meteorological Service is planning to participate actively within its capabilities in the development of GOOS. Some activities which are relevant to this programme have already been initiated.

1. SEA-LEVEL STATION

Two sea-level stations have been established in Mauritius and Rodrigues since 1986 within the framework of the TOGA programme. The Mauritius stations was upgraded in February 1992 and is transmitted data at 15 mn interval via satellite to the University of Hawaii. The Rodrigues station will also be upgraded in January 1993.

Mauritius is planning to continue to monitor sea-level within the GLOSS programme after TOGA in 1995. However, funds would have to be sought for maintenance purposes. IOCINCWIO-III has given this activity a high priority and is proposing US$10,000.

As regards the action plan on the IOC-UNEP-WMO Pilot Activity on Sea-Level Changes and Associated Coastal Impacts which will be discussed at the Seventeenth Session of the IOC Assembly, Mauritius is prepared to provide the facilities for the establishment of a station within this pilot project. It is noted that IOCINCWIO-III (Mauritius, 15-18 December 1992) proposed that an island site be included in the action plan in addition to the three stations recommended for the pilot activity.

2. XBT PROGRAMME

This programme which started in 1988 on the Mauritian ship "M.V. Mauritius Pride" on the route Mauritius-Rodrigues-Mauritius was discontinued temporarily due to problem in connection with the launcher. A new launcher has been received from IFREMER, Brest and the programme is being resumed.

Mauritius will be prepared to co-operate with India which is implementing the XBT line India-Mauritius-India and with other countries in the implementation of the lines Mauritius-Singapore-Mauritius-Australia which are being planned within the framework of WOCE.

3. ASAP

Action has been initiated to establish an ASAP programme on the "M.V. Mauritius Pride". LT Alan Hilton of NOAA and Dr. Giraytys of WMO came recently to Mauritius to discuss this programme.

4. INDIA-MAURITIUS OCEANOGRAPHIC PROGRAMME PROTOCOL

This protocol has been endorsed by India and Mauritius. A proposal is being submitted by Mauritius to India to obtain the service of a consultant to prepare a detailed work programme to conduct oceanographic studies on board the Indian research ship "Sagar Kanya" in the Mauritius EEZ. A long-term plan to obtain baseline data in all the fields of oceanography is being envisaged.

This programme of co-operation, will contribute much to GOOS in the South Indian Ocean.

ANNEX VI

LIST OF DOCUMENTS[1]

WORKING DOCUMENTS

IOC/GOOS-I/1	Agenda
/1 Add.	Timetable
/2	Annotated Provisional Agenda
/3	Summary Report of the Session
/4	List of Documents
/5	List of Participants
/6	Progress Report of the Ocean Observing System Development Panel (OOSDP)
/7	UNEP-IOC-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change. Progress report
/8	Reports on national GOOS planning and identification of national resources for GOOS
/9	Progress report on IOC participation in the CEOS
/10	TEMA in Relation to GOOS
/11	Reports of IOC Subsidiary bodies on GOOS
/12	Development of the GOOS Module on the Assessment and Prediction of the Health of the Ocean
IOC-XVII/8 Annex 2	Toward a Global Ocean Observing System: "The Approach to GOOS"
IOC-XVII/8 Annex 1	Draft Action Plan for IOC Follow-up to UNCED and Implementation of Agenda 21

INFORMATION/REFERENCE DOCUMENTS

IOC/INF-915	Report of the IOC Blue Ribbon Panel for GOOS - The Case for GOOS
IOC/GE-GLOSS-III/3	Summary report of the Third Session of the IOC Group of Experts on GLOSS
IOC/IODE-XIV/3	Summary report of the Fourteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange
UNEP-IOC-ASPEI/GTTCR-I/3	Report of the UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs

[1] **This list is for reference only. No stocks of these documents are maintained, except for the Summary Report.**

IOC/INF-902	Global Ocean Observing System - Status Report on Existing Ocean Elements and Related Systems, 1992
DBCP-VIII/3	Report of the Eighth Session of the Drifting Buoy Co-operation Panel
IOC-WMO/IGOSS-VI/3	Report of the Sixth Session of the Joint IOC-WMO Committee on IGOSS
IOC/EC-XXV/3 (Extracts)	Extracts of the Report of the Twenty-fifth Session of the IOC Executive Council (Resolution EC-XXV.3 "International Mechanisms for GOOS Development")
SC/MD/97 (Extracts)	Extracts of the Report of the Sixteenth Session of the Assembly (Resolution XVI-8 "IOC GOOS Support Office")
IOC/STECCO/3	Report of the International Meeting of Scientific and Technical Experts on Climate Change and Oceans (Malta, 19-21 July 1991)
IOC/INF-908	IOC-UNEP-WMO Pilot Activity on Sea-Level Changes and Associated Coastal Impacts - Draft Action Plan for Implementation in the Indian Ocean
IOC/GOOS-I/Inf.1	Report of the First Meeting of the UNEP-UNESCO Task Team on the Impact of Expected Climatic Change on Mangroves (Rio de Janeiro, 1-3 June 1992)
IOC/GOOS-I/Inf.2	Pilot Phase of the COOS Monitoring Scheme for Plankton Community Structure
IOC/GOOS-I/Inf.3	Proposed Pilot Programme for a Coastal Circulation Component of the Global Ocean Observing System

ANNEX VII

LIST OF ACRONYMS

CEOS	Committee on Earth Observation Satellites
CPR	Continuous Plankton Recorder
DBCP	Drifting Buoy Co-operation Panel
GCOS	Global Climate Observing System
GEF	Global Environment Facility
GIPME	Global Investigation of Pollution in the Marine Environment (IOC)
GLOSS	Global Sea-Level Observing System (IOC)
GOOS	Global Ocean Observing System
ICSU	International Council of Scientific Unions
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IODE	International Oceanographic Data and Information Exchange (IOC)
IUCN	World Conservation Union
JGOFS	Joint Global Ocean Flux Study (SCOR-IOC)
JSC	Joint Scientific Committee (ICSU-WMO)
JSTC	Joint Scientific and Technical Committee
MARPOLMON	Marine Pollution Monitoring System (IOC)
OOSDP	Ocean Observing System Development Panel
OSLR	Ocean Science in Relation to Living Resources (IOC-FAO)
OSNLR	Ocean Science in Relation to Non-Living Resources (IOC-UN(OALOS))
SCOR	Scientific Committee on Oceanic Research (ICSU)
STECCO	Scientific and Technical Experts on Climate Change and Oceans
TEMA	Training, Education and Mutual Assistance in Marine Sciences (IOC)
TOGA	Tropical Oceans and Global Atmosphere (WCRP)
UNCED	1992 United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WESTPAC	IOC Sub-Commission for the Western Pacific
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WWW	World Weather Watch