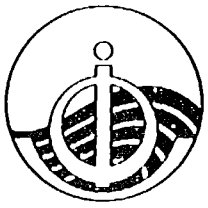
Intergovernmental Oceanographic Commission
Reports of Governing and Major Subsidiary Bodies



First Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS)

Melbourne, Australia, 18-21 April 1994

UNESCO

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

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1. OPENING

1 The Chairman, Prof. Michel Glass, opened the First Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS) at 9h00 on 18 April 1994.

2 Dr. Roy M. Green, Chairman of the Australian Committee of Heads of Marine Agencies (HOMA), welcomed the participants on behalf of the Australian Government and HOMA which provides the national representation to the IOC. He noted the importance of GOOS to Australia and the partnerships among national agencies that have been formed to foster GOOS and GCOS. Dr. John Zillman, Director of the Australian Bureau of Meteorology speaking on behalf of Mr. Stuart Hamilton, Secretary of the Federal Environment Department, reinforced Dr. Green's welcome on behalf of the Australian representative to WMO and UNEP. He briefly summarized the interests of Australia in each module and the national commitments to GOOS.

3 Sponsoring agency representatives each briefly addressed the participants. Dr. Wolfgang Scherer, Director, GOOS Support Office, on behalf of the Secretary IOC, expressed his sincere appreciation to the Government of Australia for hosting the meeting and for the excellent arrangements. He indicated the importance of holding such events in member countries, the southern hemisphere being an exemplary initial location.

4 Dr. Peter Dexter, on behalf of the Secretary-General of WMO, thanked the Government of Australia, and noted that WMO is now a full co-sponsor of GOOS. He took the opportunity to briefly present the perspective of the WMO toward GOOS. He pointed out that GOOS is ambitious, indeed enormous, in both concept and scope, requiring a clear focus and definition. Specific user requirements must be clearly identified, then the observing system must be defined, integrating existing components and establishing mechanisms to expand as needed. Subsequently, data management mechanisms must be developed, and lastly monitoring and review procedures must be established. He indicated that the I-GOOS Committee needs to facilitate the input of governments into the specification of GOOS requirements, to translate requirements and scientific design to an implementation design, to co-ordinate implementation of both the observing and data management systems, to identify and generate resources for implementation, and to eventually develop mechanisms for monitoring and review. He emphasized the urgency of making decisions and recommendations to advance the implementation of GOOS. He also emphasized the importance of continuing the excellent cooperation among the partner organizations.

5 Dr. Ian Dight, on behalf of UNEP, indicated that GOOS, GCOS and GTOS are viewed as the three major international efforts to systematically observe the global environment. The scope of GOOS is compatible with UNEP's co-ordination, assessment and reporting functions associated with EARTHWATCH and the Oceans and Coastal Areas Programme. He stressed the importance of relating activities to sustainable development and preparing the information and assessments needed by decision-makers.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

6 The Agenda of the Session as adopted by the Planning Session is given in Annex I.

2.2 DESIGNATION OF A RAPPORTEUR

7 The Planning Session designated Dr. Douglas Gauntlett (Australia) as Rapporteur for the Session.

2.3 CONDUCT OF THE SESSION

8 The Chairman introduced the Provisional Timetable which would be adjusted as appropriate.

9 The List of Participants is given in Annex VI.

3. REPORT BY I-GOOS CHAIRMAN AND DIRECTOR OF GOOS SUPPORT OFFICE ON INTERSESSIONAL ACTIVITIES

10 The Chairman referred to Document IOC-WMO-UNEP/I-GOOS-PS-I/6, Report of GOOS Intersessional Activities. He and the Director GOOS Support Office, highlighted ongoing activities and specific events during the past year including an expert meeting sponsored by the Organization for Economic Co-operation and Development (OECD) on Oceanography in Tokyo (September 1993). This meeting focused on GOOS and identified it as meeting the criteria as a multi-national OECD "megascience" effort.

11 The intersessional I-GOOS report was presented by the Director of the GOOS Support Office giving the highlights from document IOC-WMO-UNEP/I-GOOS-PS-I/6. These included a GOOS Symposium held in Tokyo, Japan, March 1993. This symposium provided a forum for presenting the strategic plan "The Approach to GOOS" (Document IOC-XVII/8 Annex 2 rev.) for GOOS and its modules, descriptions of the modules and for being informed about the Japanese plans for GOOS.

12 A second major event was the opportunity provided by an OECD megascience forum on Oceanography which featured GOOS. The purpose of this forum was to promote international co-operation in the field of oceanography, *viz.* the balance of research, technology development and operations. IOC and GOOS were represented by Dr. M. Glass, the Chairman of I-GOOS and Dr. W. Scherer, the Director of the GOOS Support Office. Most of the discussion revolved around GOOS and the forum decided that GOOS meets the megascience criteria on the grounds of its overall cost and scale, the need for global co-ordination and planning. OECD agreed to assist in performing socio-economic benefit studies on GOOS related activities.

13 At its meeting of the Joint Scientific and Technical Committee (JSTC) for GCOS at the beginning of October 1993 it was recommended that I-GOOS should have primary responsibility for the implementation of the common module between GOOS and GCOS. The JSTC also recommended that a follow-on panel to the OOSDP be established to be jointly sponsored by GCOS and GOOS.

14 GOOS was featured at Oceanology International '94 held at Brighton, UK, 8-11 March 1994, in three sessions devoted to Monitoring the Global Ocean. GOOS also participated in an exhibit with the support of Seawatch Europe. A questionnaire on interest in GOOS was developed with the help of Dr. N. Flemming, UK, and circulated at this meeting.

15 The first issue of GOOS NEWS is now available providing an informal forum for exchange of GOOS related information. Present plans call for GOOS NEWS to be published three times a year.

4. STATUS OF PLANNING AND IMPLEMENTATION OF THE GLOBAL OCEAN OBSERVING SYSTEM

4.1 JOINT IOC-WMO-ICSU TECHNICAL AND SCIENTIFIC COMMITTEE FOR GOOS (J-GOOS)

16 The present status of the formation of a Joint IOC-WMO-ICSU Technical and Scientific Committee for GOOS (J-GOOS) was given by Dr. Scherer. He reported that a Memorandum of Understanding (MOU) was signed by the three co-sponsor IOC, WMO and ICSU in September of 1993

establishing J-GOOS and giving its terms of reference. The committee will consist of 12 ordinary members having a wide cross-section of expertise and 7 representative members, two each from the co-sponsors and one from GCOS. The officers are one chair- and one vice-chair person. The MOU calls for support of J-GOOS and its supporting bodies by the GOOS Support Office having a J-GOOS staff director.

17 To date 10 of the 12 regular members have been identified and all of the representative members have been assigned. The first meeting of the panel is scheduled to take place in Nantes, France sponsored by IFREMER. The sponsor representatives will need prior to the meeting on the 25th of May. The entire panel will hold its meeting on 26-27 May 1994.

4 2 REPORTS ON EXISTING PROGRAMMES RELATED TO GOOS

18 **The Planning Session noted** with interest and appreciation the GOOS Status Report for 1993 (Doc. IOC/INF-958). It considered this is a very valuable document which should continue to be updated in the future. It also **considered** that its value would be further increased if the status report could include information on regional developments relevant to GOOS, such as the Euromar/Seawatch project, as well as reports on national ocean monitoring activities which contribute to GOOS. It therefore **requested** the GOOS Support Office to endeavour to include as much as possible of this type of information in future status reports.

19 **The Planning Session further noted** with interest a summary report on existing operational systems (Document IOC-WMO-UNEP/I-GOOS-PS-I/10), programmes and activities of IOC and WMO which contribute to GOOS, prepared on the basis of responses to a letter sent by the Chairman of I-GOOS to the Chairmen of the relevant IOC and WMO subsidiary bodies, including IGOSS, IODE, GLOSS, DBCP, and CMM. **The Planning Session re-emphasized** the importance of these activities and bodies to the implementation of GOOS, both now and in the future, since they already provide a significant basis for GOOS and must be further enhanced in the future to meet GOOS requirements. Close liaison and co-ordination is therefore vital between GOOS and the relevant existing bodies of IOC, WMO and UNEP.

20 Mr. B. Searle provided a report on recent activities of IODE relevant to GOOS. IODE recognizes its important role within the development of GOOS and looks forward to the considerable challenges that will be faced to support GOOS. IODE has established four primary goals as objectives in response to GOOS requirements which address the exchange of data, data management, the provision of products and data quality issues. TEMA activities form a component of each of these objectives. Some of the specific activities within IODE that will assist in creating a foundation for GOOS data management and exchange include the:

(i) Global Ocean Data Archaeology and Rescue (GODAR)
(ii) Global Temperature and Salinity Pilot Project (GTSPP)
(iii) Investigations into Distributed Data Management Capabilities
(iv) New data management technology including the Continuously Managed Database (CMO)
(v) Ocean-PC as a technology transfer mechanism
(vi) Improved data monitoring
(vii) Standardization of formats.

21 IODE has two additional strengths that ensures its ability to meet the demanding needs of GOOS. The first is the existence of a number of Groups of Experts and Technical Groups which are extremely active in progressing all areas of data management capabilities. The second area is the considerable and increasing participation of the international scientific community in data management particularly in the area of data quality control. These initiatives and the many more within IODE will assist considerably in the evolution of this programme to support GOOS.

22 The Chairman of the IOC-WMO Working Committee for the Integrated Global Ocean Services System (IGOSS), Mr. Dieter Kohnke, reported on the activities of his Committee which are relevant to GOOS. IGOSS has achieved great progress in the collection of oceanographic sub-surface

data, in quality control procedures as well as in the operational exchange and processing of data. However, the geographical and timely coverage of data is still far from being ideal. IGOSS has undertaken great efforts to improve this situation. IGOSS considers itself as an operational body which is capable of supporting of implementation of GOOS/GCOS requirements. The IGOSS structure may support any observing and services system that might expect some kind of timely data collection and exchange as well as associated data quality control.

23 The IGOSS Chairman pointed out that the IGOSS Committee has established close working contacts with WMO's Commission for Marine Meteorology (Joint *ad hoc* Group on Ocean Satellites and Remote Sensing) and with IOC subsidiary bodies, such as IODE (joining the Global Temperature/Salinity Pilot Project - GTSPP). For the time being the IGOSS Committee will keep contact with GOOS and GCOS through its Chairman.

24 The WMO Secretariat reported on recent activities and developments of the Commission for Marine Meteorology, the Commission for Basic Systems and the DBCP of relevance to GOOS. These included:

(i) initiation by the DBCP and GCOS, of an International South Atlantic Buoy Programme (both drifting and moored buoys), to support the WWW and GCOS;
(ii) convening, by WMO and IOC, of a Technical Conference on Space-Based Ocean Observation (Bergen, September 1993) and other work of the CMM/IGOSS/IODE Sub-group on ocean satellites and remote sensing;
(iii) data management developments initiated by CBS, including the new Distributed Data Base structure and expansion of the BUFR code to cover all GF3 parameters;
(iv) the new WMO Marine Pollution Emergency Response Support System;
(v) the Joint WMO/IOC project to develop marine observing systems and services in the ASEAN region.

25 Dr. J.H. Stel reported on the Seawatch-Europe activities. He pointed out that the Seawatch system was running well and that some 40% of the cost was covered by the sale of products to a growing user community. A Seawatch programme is also operated in Thailand. Plans for implementing the system in other regional sea areas are under consideration.

26 **The Planning Session noted** all these activities of GLOSS, IGOSS, IODE, DBCP, CMM and CBS with interest and appreciation, and re-emphasized their relevance and importance to GOOS. It **recognized** that, as existing operational activities supported by governments, they must be considered as the primary initial mechanisms for supporting the implementation of GOOS requirements.

27 It therefore **urged** the different bodies to continue their efforts to enhance ocean observing systems, and **requested** them to continue to report to future I-GOOS sessions and to be prepared to assist in implementing emerging GOOS requirements.

4.3 FORMULATION OF GOOS MODULES: REPORTS OF PANELS

28 A number of module panels of GOOS were established prior to the first meeting of J-GOOS under which the module design panels should reside. In particular the panel on the climate module originated from the World Climate Research Programme, i.e. OOSDP. The other two existing panels were established on an *ad hoc* basis to address the Health of the Ocean Module and the Living Marine Resources Module. These two *ad hoc* panels will be reviewed by J-GOOS and modified if and as necessary. The Marine Services Module is perceived as a service module and therefore is proposed to become established under I-GOOS. Due to the complexity and interdisciplinary the Coastal Zone Module will be established subsequent to the first J-GOOS meeting.

4.3.1 Ocean Observing System Development Panel (OOSDP)

29 Progress of the OOSDP was reported by its Chairman, Dr W. Nowlin. The Panel (which includes representation from TOGA, WOCE, GEWEX, and JGOFS) is nearing completion of its task to

prepare a scientific design for the climate module of GOOS/the ocean component of GCOS. It will complete its task by the end of the year and have a final report ready for consideration by the second meeting of J-GOOS in February 1995.

30 OOSDP developed an interim report in February 1993 that served as the basis for the ocean part of the GCOS Draft Plan issued in April 1993. A first draft of the final report has already received some preliminary review and comments have been integrated in a draft currently being prepared for another review that will give related program offices and others an opportunity to comment before the final draft is printed. Three background reports that examine design issues related to the role of models, CO_2, and air-sea fluxes have already been published. Four more are in various stages of preparation; they will cover climate aspects of sea ice, the hydrologic cycle, a review of enabling technologies, and unique aspects of the Indian Ocean that must be considered in GOOS design.

31 It is generally agreed that the ocean climate observing system measurements be long term, systematic, relevant for initializing models and/or documenting the role of the ocean in climate, subject to continuing examination, cost effective and routine. These conditions have already received a wide degree of acceptance in national GOOS efforts.

32 Dr. Nowlin discussed several key features of the report. He used examples from the subgoals identified by OOSDP to illustrate how the report approached the question of assigning priorities of elements recommended in support of each subgoal. Elements (i.e., winds, SST, sea level, etc.) were plotted on a graph whose axes roughly represent degree of impact of a particular observation on achieving the subgoal vs feasibility of making the measurement routinely with existing technologies on a global basis. High feasibility-high impact are one estimate of high priority.

33 Dr. Nowlin wrapped up his presentation by proposing a candidate GOOS organizational structure for consideration by I-GOOS. He also recommended that the new panel planned as a follow-on of the OOSDP should be jointly sponsored by J-GOOS and GCOS/JSTC and that co-sponsorship by the JSC be considered as well.

4.3.2 *Ad hoc* Health of the Ocean Panel (HOOP)

34 This topic was introduced by Dr. Scherer based on Document IOC-WMO-UNEP/I-GOOS-PS-I/8. He reported that HOOP held its Second Session in Paris, France, 10-15 February 1994. It defined its initial emphasis to be (i) the development of a set of reliable biological distress indices of the health of the marine environmental, (ii) monitoring concentrations and trends of contaminant loading in the coastal zones in relation to community responses, (iii) development of methodologies for the evaluation of assimilative capacities of the coastal zones for contaminants, and (iv) reclamation of information on contaminant levels at regional and national levels as baseline information. The panel identified major commitment needs by member states and provided a list of recommendations. These recommendations will be referred to the Technical Implementation Panel after its formation.

4.3.3 *Ad hoc* Living Marine Resources (LMR) Panel

35 A summary report was provided by Dr. Scherer based on Document IOC-WMO-UNEP/I-GOOS-PS-I/9. To date this *ad hoc* panel has had one meeting at San Jose, Costa Rica, 7-10 December 1993. The group, in the process of defining the scope of this module, included criteria on global and broad-scale monitoring, climate change concerns as well as biodiversity. The monitoring of species abundance and trends in the context of regime shifts, ecosystem changes and resource sustainability will also be part of the module's scope. Fisheries considerations include monitoring and assessments on regional and global scales, critical habitats and assisting developing countries. Some critical ecosystems such as coral reefs, mangroves and seagrass beds were identified for their importance and the long-term monitoring of coral reefs was given as a priority of the LMR Module of GOOS. Major applications for plankton monitoring information within GOOS are in resource and climate evaluations with the overall goal of characterizing broad scale states and trends in zooplankton species composition and biomass. A second meeting was felt necessary to complete a first draft of the LMR Module.

5. REPORTS ON GOOS NATIONAL ACTIVITIES AND RELATED REGIONAL PERSPECTIVES

36 Representatives of seventeen Member States furnished written reports summarizing their activities concerning GOOS planning and implementation: Australia, Brazil, Canada, Chile, China, France, Germany, India, Italy, Japan, Malaysia, Mauritius, Netherlands, Poland, Russian Federation, United Kingdom, and United States of America (see Annex V). Thirteen representatives gave oral reports: Australia, Brazil, Canada, China, France, Germany, India, Japan, Netherlands, Norway, Russian Federation, United Kingdom, and United States of America. Reports were very positive, reflecting extensive national planning activities underway. A number of Member States have established or plan to establish soon formal structures such as national committees to coordinate national contributions to GOOS among the relevant agencies and institutions. The Chairman noted the importance of articulating the socio-economic benefits of GOOS, to justify the additional resources required.

37 Brief presentations on plans for the implementation of GOOS on a regional basis were made by representatives of Japan and the USA (for the North Pacific) and the UK (for Europe - EUROGOOS). **The Planning Session noted** these developments with interest. It **agreed** that such co-ordinated regional efforts are a very effective way of proceeding with GOOS implementation, and **emphasized** that such implementation should be concerned, at least initially, with filling data gaps for identified priority data and applications, rather than simply enhancing observing system components in areas with already good coverage.

38 Finally on this item, **the Planning Session noted** the brief reports presented on the activities of the IOC regional bodies, and recalled that WMO and UNEP also have regional bodies which are relevant to the future implementation of GOOS. It **considered** that it was premature at this stage of GOOS development to formulate specific recommendations relating to regional implementation by these various bodies. However, it **agreed** that existing regional bodies would eventually have an important role to play in assisting in and contributing to GOOS implementation in their respective areas of interest. It therefore **requested** the proposed Strategy Sub-committee, and the GOOS Support Office, to consider the development of a strategy for the involvement of the regional bodies of IOC, WMO and UNEP in GOOS implementation, for the consideration of a future session of I-GOOS (see agenda item 7 Internal Structure of GOOS).

6. GOOS INTERACTION WITH OTHER RELEVANT ACTIVITIES OF IOC,WMO, UNEP AND ICSU

6.1 INTERACTION OF GOOS WITH GCOS AND GTOS

39 Dr. Thomas Spence, Director GCOS Planning Office, expressed his satisfaction with the consistent references to the importance of GCOS (i.e., the climate module of GOOS). He referred to Document JSTC-GCOS-III, Extract of the Report of the Third Session of the Joint Scientific Committee for the Global Climate Observing System (JSTC-GCOS-III) and to a newsletter recently prepared and disseminated on the progress of GCOS. The Joint Scientific Committee has prepared a draft plan which has been distributed for comment. He noted the significant accomplishments of the OOSDP and the importance of further work on that topic, following completion of their final report in December 1994.

40 That Committee has also established working groups on data management, space-based measurements, and socio-economic benefits. Dr. Melbourne G. Briscoe, chairman of the last group, presented a brief report summarizing the tasks to be accomplished. This group includes eight members who will survey the existing work and recommend additional analyses to be done. A report will be given at the next meeting of the Joint Scientific Committee and at the WMO Conference on the Economic Benefits of Hydrological and Meteorological Services, both to be held in September 1994.

41 Dr. Scherer briefly described the interactions with GTOS as still preliminary since it was felt that GTOS is still in its infancy. He stressed, however, the future need to co-ordinate with GTOS especially the GOOS Coastal Zone Module where close collaboration is desirable. He also stressed the

overall importance of the need to co-ordinate and harmonize all the global systems GOOS, GCOS and GTOS.

6.2 INTERACTION OF GOOS WITH WWW, WCRP AND IGBP

6.2.1 World Climate Research Programme

42 **The Planning Session noted** that there has been a long strong and steady relationship of the IOC with the WCRP on matters directly related to the development of an ocean observing system that precedes GOOS. The WCRP's initial joint planning structure had the IOC-SCOR CCCO assuming dominant responsibility for the ocean aspects of climate research and the WMO-ICSU JSC overseeing the atmospheric aspects. The CCCO spawned TOGA and WOCE under this arrangement. In addition the CCCO recognized early on that an ocean climate observing system would be essential to make progress in climate prediction, and, in the mid 1980's, established an ocean observing system development program group.

43 As experience with TOGA and WOCE accumulated, the scope and urgency for an observing system began to clarify, and the CCCO decided to build on the earlier work of the Ocean Observing System Development Programme Working Group and, with the co-operation of the JSC, to form the Ocean Observing System Development Panel with appropriate terms of reference and a membership that included representation from the precursor group and from the WCRP programs of TOGA, WOCE and GEWEX, as well as from JGOFS of the IGBP. Shortly thereafter, the IOC, ICSU and WMO reached agreement to streamline the growing WCRP oversight structure. The IOC became a cosponsor of the WCRP, and a restructuring and expansion of the JSC was agreed with a phasing out of the CCCO.

44 One result of this restructuring was that the OOSDP reports to the JSC. Stewardship of the Panel has continued to rest with the IOC in the GOOS support Office until it finishes its task. The OOSDP has continued to provide a strong, close and vital linkage between the WCRP and GOOS both through organizational lines as well as continuity of personnel. This same sort of strong linkage and continuity will extend to CLIVAR as it evolves and will be built-in to the follow-on Panel to the OOSDP that focuses on implementation.

6.2.2 World Weather Watch (WWW)

45 The WMO Secretariat gave a brief overview on the status of implementation of the WWW, emphasizing those elements of relevance to GOOS. This overview covered (see also agenda item 4.2):

(i) the global observing system, including VOS, drifting buoys and satellites; and

(ii) data management, including codes development, the DDB structure, the GTS development and the new Global Digital Sea-Ice Data Bank of CMM.

46 Dr. D. Gauntlett, President of the WMO Commission for Atmospheric Science, further reported on relevant aspects of the Global Atmosphere Watch and GESAMP.

47 **The Planning Session noted** that the marine component of the Global Observing System of the WWW was implemented overall to perhaps 60% of requirements, but that significant gaps existed in certain ocean areas. Efforts were being made to fill these gaps, by both CMM and the DBCP, but the support and assistance of GOOS would be required to more nearly satisfy all the WWW requirements for marine data. **The Planning Session further noted** certain aspects of the development of the WWW Data Management structure to satisfy GCOS and GOOS requirements. It **agreed** on the need for a co-ordinated approach to data management by GOOS and GCOS, which should also be closely linked to the data management developments within the WWW.

48 **The Planning Session agreed** that interaction and co-ordination between GOOS, the WWW and GAW should and must occur in particular with regard to certain marine observing systems,

environmental data management, environmental satellites and regional implementation projects. It **noted** the existing WMO subsidiary bodies dealing with these matters, and **agreed** that subsidiary bodies established under its new internal structure (agenda item 7) must, as a priority, develop liaison mechanisms with these existing WMO bodies.

49 **The Planning Session noted** that there were two types of external bodies with which GOOS should interact: those such as IGOSS/IODE which were already committed to GOOS, and those such as CBS and CEOS which needed to be sensitized to GOOS requirements. **The Planning Session agreed** on the value of having a tabulated summary of existing activities and groups of WMO and IOC of relevance to GOOS, which would greatly facilitate the development of interaction mechanisms. It therefore **accepted** the offer of several Member States to assist the GOOS Support Office to prepare this summary, for consideration by the I-GOOS Strategy Sub-Committee.

6.2.3 International Geosphere Biosphere Programme (IGBP)

50 In introducing the International Geosphere Biosphere Programme: A Study of Global Change (IGBP) Dr. Pernetta stressed that this was a research and not an operational programme consisting of six core projects covering research on global change and atmospheric chemistry (IGAC); the hydrological cycle (BAHC); terrestrial ecosystems (GCTE), past climate changes (PAGES); ocean fluxes (JGOFS); and, land-ocean interactions in the coastal zone (LOICZ). In addition there are three framework activities covering data and information (IGBP-DIS), global analysis and modelling (GAIM) and networking and strengthening global change science (START).

51 Dr. Pernetta outlined the structure of LOICZ and its stage of development, which he noted was the newest of the Core Projects. The Science Plan, published in 1993 is presently being translated into an Operational Plan which will be published by the end of 1994. He suggested that I-GOOS might wish to consider the possible interactions between the Coastal Module of GOOS and LOICZ, the Science Plan of which provides an opportunity of accelerating development of the GOOS Coastal Module.

6.3 INTERACTION OF GOOS WITH OTHER ACTIVITIES

52 No additional activities on bodies relevant to GOOS were noted at the session.

7. INTERNAL STRUCTURE OF GOOS

53 This topic was introduced by Dr. M. Glass, the Chairman of I-GOOS, as described in document IOC-WMO-UNEP/I-GOOS-PS-I/12. After some extensive discussions in plenary this topic was referred to a sessional working group which developed the structure given in Figure 1 which was adopted by I-GOOS. This conceptual structure delineates the interactions between I-GOOS and J-GOOS giving J-GOOS scientific design responsibility while I-GOOS is responsible for implementation. A high level Strategy sub-committee was identified which will advise I-GOOS on requirements, policy, marketing and resources related issues. The terms of reference are provided in Annex IIB. Three I-GOOS panels to address Technical Implementation, Capacity Building, and Products and Distribution will report to I-GOOS. Their terms of reference are given in Annex IIB. Support for these panels and the Sub-committee needs to be provided by the GOOS Support Office. Close user interactions were envisioned for the Products and Distribution Panel. Regional issues were deemed important for all Panels.

54 Within the adopted overall structure of I-GOOS, as given in Figure 1, **the Planning Session agreed** that the higher priority must be given to the establishment of the proposed I-GOOS Strategy Sub-committee. This sub-committee is a high level advisory body for I-GOOS, charged with the responsibility to advise I-GOOS on strategic issues of planning, policy and implementation of GOOS. As such, **the Planning Session considered** is essential that the sub-committee begin its work at the earliest possible opportunity, to address immediate or imminent implementation issues such as the post-TOGA observing system and the recommendations in the OOSDP report, as well as to prepare a first draft GOOS strategic plan for consideration by I-GOOS-II. **The Planning Session therefore adopted** Recommendation I-GOOS-PS-I.1 on the establishment of an I-GOOS Strategy Sub-Committee, and

requested the governing bodies of IOC, WMO and UNEP, as well as Member States to provide the necessary resources to enable this sub-committee to begin its work. Also within the overall structure adopted for GOOS, **the Planning Session further agreed** on the need to immediately establish the Technical Implementation Panel and the Products and Distribution Panel. Therefore it **adopted** Recommendations I-GOOS-PS-I.2 and I-GOOS-PS-I.3.

55 **The Planning Session noted** that at an appropriate time in the future the structure of GOOS will need to be reviewed for further reinforcement or refinement.

8. IMPLEMENTATION ISSUES

56 Implementation issues were addressed within the framework of the adopted internal structure for GOOS. The implementation of the Strategy Sub-committee and the Technical Implementation Panel were deemed of high priority and so acted upon. The basis was laid for the implementation of the Capacity Building and the Products and Distribution Panels at the next I-GOOS meeting. Specific implementation items related to coastal zone issues were addressed to an *Ad hoc* Coastal Zone Group as described in Recommendation I-GOOS-PS-I-4. Within the purview of the Technical Implementation Panel, the urgent need to continue the TOGA observing system beyond the end of 1994 were recognized by the establishment of a Task Team as described in Recommendation I-GOOS-PS-I.2. The implementation of the common module of GCOS and GOOS which was requested by the JSTC of GCOS to be implemented by GOOS was also referred to the Strategy Sub-committee for implementation with high priority as described and adopted in Resolution I-GOOS-PS-I-1 (Annex IIA).

57 The issue of the need and urgency to develop and adopt a data management policy for GOOS was raised by the US. The definition of a data management policy for GOOS was referred to the newly established Strategy Sub-committee for appropriate action. A working document for discussion by the intersessional subgroup is given in the Annex IV as a Proposal for Data Management Policy Guiding Principles for GOOS. There was general but not complete agreement on many of the principles in the proposal, specifically the principle of timely, full and open exchange was agreed upon. The issue was referred to an intersessional working group consisting of N. Flemming (Chair) (UK), M. Briscoe (USA), V. Jivago (Russia), F. Gerard (France), K. Hirose (Japan), D. Kohnke (Germany), B. Searle (IODE/IGOSS), L. Guo (China), and G. Needler (Canada). This intersessional working group should report to the Strategy Sub-Committee.

9. CAPACITY BUILDING

58 **The Planning Session recognized** very clearly that GOOS can only be successfully implemented through the combined efforts of all Member States of IOC, WMO and UNEP. At the same time, many Member States, in particular developing countries but also in some developed countries, lack sufficient trained manpower as well as observing systems, communications and data management technology to enable them to participate fully in the GOOS implementation. Such capacity building will also enable countries to share the products and other benefits which will accrue from GOOS.

59 **The Planning Session therefore recommended** that an I-GOOS Panel on Capacity Building should be established, to assist in the global implementation of GOOS through enhancement of the capacities of Member States in trained manpower, ocean observing systems and related infrastructure, and data and information management systems, required specifically for the successful operation of GOOS. To this end, the Planning Session prepared a draft recommendation, to be considered by Member States during the intersessional period and presented for adoption at the next session of I-GOOS. This draft recommendation is given in Annex III to this report. In preparation for the adoption of this draft recommendation, the **Planning Session requested** the Chairman of I-GOOS and the Secretariat to:

(i) canvass Member States concerning a suitable person to be nominated as chairman of the Panel,

(ii) investigate and if possible identify sufficient funding to support the work of the Panel,

(iii) investigate, through discussions with Member States or otherwise, the possible appointment of a full time secretary to serve the Panel,

(iv) bring the requirements for this panel, and its importance, to the attention of the governing bodies of IOC, WMO and UNEP.

10. COASTAL ZONE ISSUES

60 The Planning Session discussed the definition of the Coastal Module of GOOS and its relationship with other GOOS modules. Attention was drawn to the LOICZ Science Plan presented by Dr. J. Pernetta earlier.

61 Discussion focused on the need to identify more precisely the GOOS objectives in relation to the potential role of GOOS in providing data and services in support of planning the sustainable management of coastal areas by member states, and the possible nature of coastal zone activities in GOOS.

62 It was agreed that there was an initial need to assess the nature of coastal ocean products required by Governments and user community groups. Reference, in this connection, was made to the survey of user interests in UK. The Planning Session also agreed that a regional approach will be needed in the development of the Coastal Module. The Planning Session noted that many countries have already established operational coastal zone activities and services.

63 The attention of the Planning Session was drawn to the definitions and recommendations made by the UNEP-IOC-WMO Group of Experts in 1990 on the development of a Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change. The proposed global system would contribute to: (i) the global, regional and national efforts to assess climate change and the environmental and socio-economic impacts of this change and (ii) the development and implementation of policies and measures designed to mitigate the undesirable effects of such changes. Potential changes in the coastal zone and near-shore areas are to be described and modelled. The system is intended to provide a global framework for measuring physical, chemical, geological and biological parameters, based on present and planned data collection and exchange activities rather than duplicating other efforts.

64 **The Planning Session reviewed** the status of the on-going and planned coastal pilot monitoring activities recognized by the I-GOOS-I (Rec. GOOS-I.4) as a possible contribution to the GOOS Coastal Module (Doc. IOC-WMO-UNEP/I-GOOS-PS-I/14 and 14 Add.1).

65 **The Planning Session proposed** to set up an intersessional *ad hoc* group for the next single intersessional period in order to revise and define more precisely the contents of the Coastal Module of GOOS, assess on-going and planned multinational and regional coastal monitoring and observation systems and to prepare an outline strategic plan for the Second Session of I-GOOS, including *inter alia*: potential benefits to participating governments; criteria for inclusion of activities in the coastal module; priorities for action; measures needed to implement the module; work plan and timetable; and the potential contribution of relevant ongoing activities.

66 In preparing the Strategic Plan the *ad hoc* group should take into consideration the existing pilot coastal monitoring activities; the framework for coastal monitoring prepared by the 1990 meeting of an *ad hoc* group of experts; the LOICZ Science Plan; the work of J-GOOS Panels, in particular the LMR and HOOP; and the newly established IOC *ad hoc* group of experts on coastal zones.

67 **The Planning Session invited** the J-GOOS at its first meeting to consider the scientific aspects of the coastal module and to review the framework for coastal monitoring formulated by the 1990 meeting of an *ad hoc* group of experts.

68 **The Planning Session requested** the Secretary IOC, in consultation with the Chairman

and co-sponsoring agencies of I-GOOS, to consider the possibility of holding the meeting of the *ad hoc* Group on GOOS Coastal Module in conjunction with Coastal Zone'94, being co-sponsored by IOC, to be held in Halifax, Nova Scotia, Canada, September 1994.

69 **The Planning Session invited** the Secretariat to collate existing information concerning the needs of member states for coastal data and services based on the reports and reviews contained in IOC expert meeting reports, reports of IOC regional bodies and reports of the UNEP Regional Seas Programme, and to make this information available for the deliberations of the *ad hoc* Panel on the Coastal Zone Module of GOOS.

10.1 COASTAL PILOT MONITORING ACTIVITY

70 **The Planning Session reviewed** the status report on the development of GOOS Coastal Pilot Monitoring activities undertaken within the framework of the UNEP-IOC-WMO Long-Term Global Monitoring Systems of Coastal and Near-Shore Phenomena Related Climate Change, presented by the IOC Secretariat in document IOC-WMO-UNEP/I-GOOS-PS-I/14, "GOOS Pilot Monitoring Activities", and documents: 14 Add.1 on "The Role of the Continuous Plankton Recorder Survey in the Global Ocean Observing System" submitted by Dr. John C. Gamble and 14 Add.2 on "UNEP-IOC-WMO-IUCN Pilot Monitoring Activity on Coral Reef Ecosystems" submitted by Dr. C. Wilkinson.

71 **The Planning Session noted** the development of some of the pilot activities and the interest expressed by many Member States in their participation in view of their important practical value for the rational use of marine resources and coastal zone management.

72 **The Planning Session recalled** that the I-GOOS-I in its recommendation GOOS-I.4 recognized these pilot activities as an important contribution to the GOOS Coastal Zone Module and noted that they may have potential value for other GOOS Modules, in particular the high priority to coral reefs assigned by the Living Resources *ad hoc* Panel. It also **recalled** that the I-GOOS-I requested the J-GOOS to review the pilot activities and provide advice on their implementation in the context of the overall strategy of GOOS. The delay in the establishment of the J-GOOS has not allowed this to take place.

73 **The Planning Session** therefore **requested** the J-GOOS at its First Session (May 1994) to review and assess the potential contribution of the coastal pilot monitoring activities to the various GOOS modules and to provide advice to I-GOOS, on their findings.

74 **The Planning Session adopted** Recommendation I-GOOS-PS-I.4 to establish an I-GOOS Intersessional *Ad hoc* Group on the GOOS Coastal Zone Module.

75 **The Planning Session also requested** the I-GOOS Intersessional *Ad hoc* Group on the Coastal Zone Module to identify the potential contributions of existing and planned multi-national coastal zone monitoring and observational systems, to the coastal zone module of GOOS, including the pilot monitoring activities which have already been developed and are ready for implementation.

76 **The Planning Session wished to encourage** the sponsoring agencies IOC, WMO, UNEP as well as other collaborating organizations, LOICZ, IUCN, ASPEI, UNESCO to support the prompt implementation of the coastal pilot monitoring activities, in particular the Coral Reef Monitoring.

77 **The Planning Session also invited** Member States to consider their possible support and contribution to the implementation of pilot coastal monitoring activities, particularly pilot activities on coral reefs, mangroves, sea-level and plankton, by establishing global and regional data assembly and analysis centres with the responsibility to organize training activities.

11. ESTABLISHMENT OF POSSIBLE SESSIONAL WORKING GROUPS ON ITEMS 8, 9 AND 10

78 Sessional working groups was set up for the development of an internal GOOS structure, on the Strategic sub-committee, the three panels and an *ad hoc* committee to address coastal zone issues.

12. CONSIDERATION OF REPORTS FROM WORKING GROUPS

79 The reports from the sessional working groups are reflected in the Recommendations and Resolutions provided including their terms of reference as appropriate.

13. REVISIONS OF "THE APPROACH TO GOOS" AND STRATEGIC PLANNING FOR THE YEAR 2000

80 **The Planning Session**, noting after the establishment of the Strategy Sub-committee, **considered** that such revisions need to be based on a careful integration of requirements, policy, resources and marketing plans and that the progress made on the planning and implementation of GOOS need to be reflected in its Strategic planning document "The Approach to GOOS". It **decided** to request the Strategy Sub-committee to review and update "The Approach to GOOS" to reflect its mid-range planning considerations and in particular that it revise initial emphasis of each of the five modules of GOOS and identify initial products to be produced.

81 To assist the Sub-committee in its work, **the Planning Session requested** Member States to submit comments and revisions to "The Approach to GOOS", as well as proposals concerning the strategy plan in writing to the GOOS Support Office, preferably prior to August 1994, so that they may be consolidated for the consideration of the first session of the sub-committee.

82 **The Planning Session further agreed** on the need to provide additional input and support for the Sub-Committee relating to the preparation of the strategic plan, in view of the importance and urgency of this task. It therefore **decided** to establish a small, *ad hoc* task team, to work only by correspondence, to prepare some outline concepts and compile background information relevant to the strategic plan. It **accepted** with appreciation the offer of M. Briscoe (USA) to chair this task team, as well as the offer of A. McEwan (Australia), N. Flemming (UK), V. Ryabinin (Russia), F. Gerard (France), K. Hirose (Japan), G. Needler (Canada), Y. Xu (China), D. Kohnke (Germany), J. Stel (Netherlands), and K. Tuen (Malaysia) to contribute to its work.

14. PLAN OF ACTION FOR 1994-1995

83 **The Planning Session reviewed** the Document IOC-WMO-UNEP/I-GOOS-PS-I/11 "Programme and Budget, 1994-1995" and bearing in mind the proposed new GOOS structure and limited staff and financial resources available at present for GOOS, and **adopted** Recommendation I-GOOS-PS-I.5 on Priorities and financial requirements to be addressed to the governing bodies of IOC, WMO and UNEP and their Member States.

84 **The Planning Session also prepared and adopted** Resolution I-GOOS-PS-I-2 on "the GOOS Priority Actions for 1994-1995".

85 The U.S. expressed the fundamental importance of investing in the development of the international GOOS coordination through both seconded staff and financial contributions to the GOOS Trust Fund. Because of increasing budgetary constraints, the Member State face increasing difficulties in maintaining the current level of support to this effort and strongly encouraged Member States to identify resources to contribute in order to maintain the continuity of activities now being undertaken by the GOOS Support Office. **The Planning Session requested** the sponsoring agencies to clarify their

position regarding budgetary and staff support for GOOS. A report was requested for I-GOOS-II in 1995. The concern was also expressed that the IOC Secretariat present its financial situation in a manner that clearly indicates the limited resources actually assigned presently to GOOS development efforts and to separate these resources from other bodies such as IGOSS etc.

15. NEXT SESSIONS OF THE I-GOOS

86 In view of the custom to hold I-GOOS meetings preceding the biennial IOC Assemblies, the Session decided to hold the next I-GOOS meeting 6-9 June 1995, the IOC Assembly being scheduled for 13-27 June 1995 in Paris.

87 The Session agreed to continue biennial planning sessions, to be held in alternate years, and hosted by a Member State. It was further agreed that the planning session should be held in different continents each time. Member States were, therefore, invited to consider hosting the next I-GOOS session in 1996.

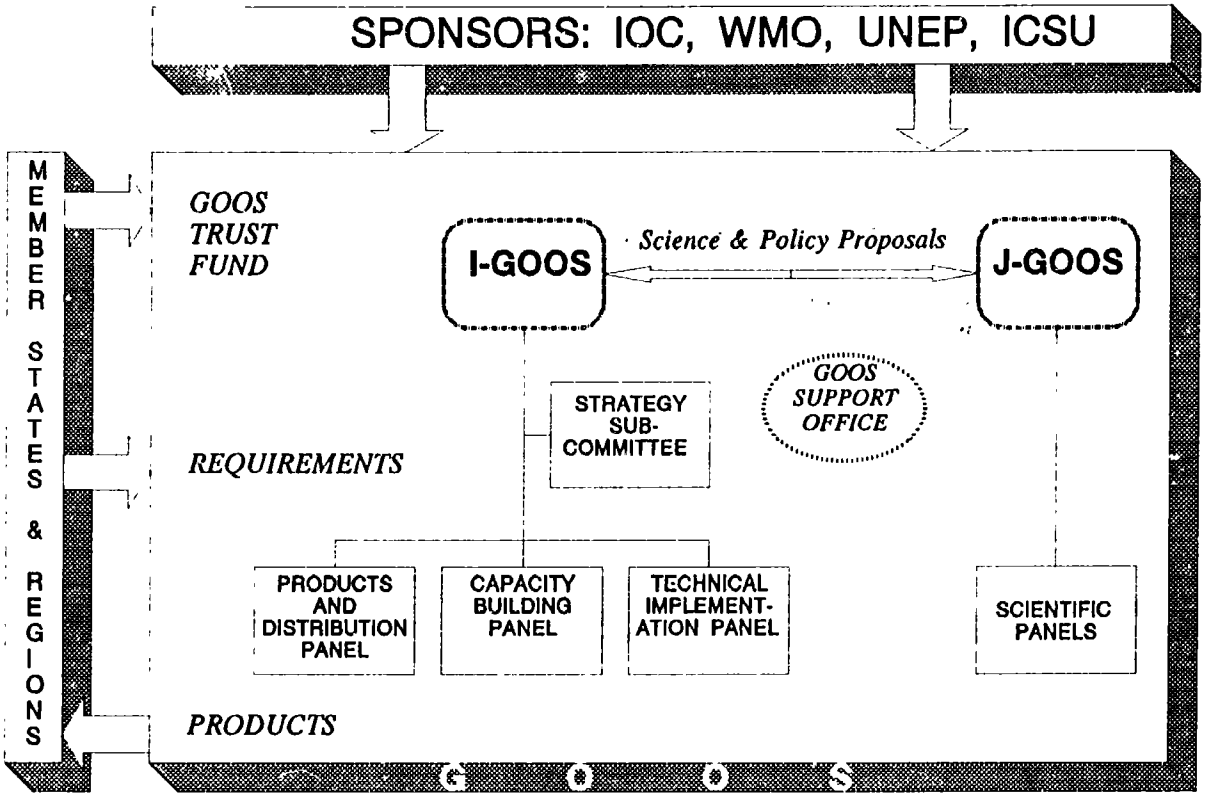
16. ADOPTION OF THE REPORT

88 **The Planning Session reviewed** and **adopted** the Summary Report and its Recommendations and Resolutions.

17. CLOSURE OF THE SESSION

89 The Session was closed at 18h05 hours on 21 April 1994.

Figure 1 - CONCEPTUAL GOOS INTERNAL STRUCTURE



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. **REPORT BY I-GOOS CHAIRMAN AND DIRECTOR OF GOOS SUPPORT OFFICE ON INTERSESSIONAL ACTIVITIES**

4. **STATUS OF PLANNING AND IMPLEMENTATION OF THE GLOBAL OCEAN OBSERVING SYSTEM**

4.1 JOINT IOC-WMO-ICSU TECHNICAL AND SCIENTIFIC COMMITTEE FOR GOOS (J-GOOS)

4.2 REPORTS ON EXISTING OPERATIONAL ELEMENTS OF GOOS (IGOSS, GLOSS, DBCP, IODE, MARPOLMON, MUSSEL WATCH, HAB AND WWW) AND RELATED ACTIVITIES (CEOS, CMM)

4.3 FORMULATION OF GOOS MODULES: REPORTS OF PANELS

5. **REPORTS ON GOOS NATIONAL ACTIVITIES AND RELATED REGIONAL PERSPECTIVES**

6. **GOOS INTERACTION WITH OTHER RELEVANT ACTIVITIES OF IOC,WMO, UNEP AND ICSU**

6.1 INTERACTION OF GOOS WITH GCOS AND GTOS

6.2 INTERACTION OF GOOS WITH WWW, WCRP AND IGBP

6.3 INTERACTION OF GOOS WITH OTHER ACTIVITIES

7. **INTERNAL STRUCTURE OF GOOS**

8. **IMPLEMENTATION ISSUES**

9. **CAPACITY BUILDING**

10. **COASTAL ZONE ISSUES**

11. **ESTABLISHMENT OF POSSIBLE SESSIONAL WORKING GROUPS ON ITEMS 8, 9 AND 10**

12. **CONSIDERATION OF REPORTS FROM WORKING GROUPS**

13. **REVISIONS OF "THE APPROACH TO GOOS" AND STRATEGIC PLANNING FOR THE YEAR 2000**

14. **PLAN OF ACTION FOR 1994-1995**

15. NEXT SESSIONS OF THE I-GOOS

16. ADOPTION OF THE REPORT

17. CLOSURE OF THE SESSION

ANNEX II

A - RESOLUTIONS

Resolution I-GOOS-I-PS-I-1

IMPLEMENTATION RESPONSIBILITY OF THE COMMON GCOS/GOOS MODULE

The Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS),

Noting

(i) the report of the Third Session of the Joint Scientific Committee for the Global Climate Observing System (JSTC-GCOS),

(ii) IOC Resolution EC-XXV.3 on the commonality of the Ocean Module of GCOS and the Climate Module of GOOS,

Considering

(i) that the common GOOS/GCOS module can only be successfully implemented through the combined efforts of all Member States of IOC, WMO and UNEP,

(ii) that operational design priorities and implementation strategy needs to consider the implementation requirements of all GOOS modules in order to achieve effectiveness and operational efficiency,

(iii) that I-GOOS at its First Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS) has recommended the establishment of the I-GOOS Technical Implementation Panel,

Decides

(i) to refer the implementation of this common GCOS/GOOS module to the I-GOOS Technical Implementation Panel for appropriate action;

(ii) that it urges the Technical Implementation Panel to give high priority to this implementation issue and that it communicate its considerations and recommendations to I-GOOS, J-GOOS and the JSTC for GCOS immediately subsequent to its first meeting.

Resolution I-GOOS-I-PS-I-2

GOOS PRIORITY ACTIONS FOR 1994-1995

The Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS),

Proposed to the sponsoring agencies the following actions for implementation in 1994-95, in priority order:

(i) Formulation of the GOOS Strategy:

- Activities of the I-GOOS Sub-committee on Strategy,
- *Ad hoc* group on Strategy, and
- Data Policy Group;

(ii) Development of GOOS Coastal Zone Strategy

- Meeting of the I-GOOS Intersessional *Ad hoc* Group on GOOS Coastal Zone Module;

(iii) Scientific Design of GOOS and its Modules

- Activities of J-GOOS and its Panels;

(iv) Support of the Development of the operational implementation of the post-TOGA Observing System;

(v) Support of GOOS related aspects of existing operational ocean observing and data management systems;

(vi) Establishment of the other I-GOOS Panels as proposed at I-GOOS-PS-I session.

B - RECOMMENDATIONS

Recommendation I-GOOS-PS-I.1

I-GOOS STRATEGY SUB-COMMITTEE

The Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS),

Noting

(i) IOC Resolution XVII-5 - Global Ocean Observing System (GOOS),
(ii) "The Approach to GOOS", Doc. IOC-XVII/8 Annex 2 rev.,

Considering the urgent need to

(i) develop, refine and continually update a strategic plan for GOOS,
(ii) develop basic policies regarding interaction and co-ordination, both internal and external to GOOS,
(iii) develop advice on the identification and prioritization of resources for GOOS development,

Recommends

(i) the establishment of an I-GOOS Strategy Sub-committee, with terms of reference given in the Appendix to this recommendation;
(ii) that the sub-committee be comprised of the Chairman of I-GOOS, the Chairman of J-GOOS and no more than eight other members selected by the Chairman of I-GOOS in consultation with the secretariats of IOC, WMO and UNEP, to provide both broad, high level representation of marine scientific, industrial and environmental expertise, and also wide regional distribution;
(iii) that the sub-committe be chaired by the Chairman of I-GOOS;
(iv) that membership will normally be for three years and shall be rotated to reflect the projected needs for specialist expertise as they arise;
(v) that the Director of the GOOS Support Office and representatives of the GOOS subsidiary panels or bodies may participate as non-voting members;
(vi) that the sub-committee should meet at least once, and preferably twice prior to I-GOOS-II.

Appendix

I-GOOS Strategy Sub-Committee
Terms of Reference

1. To oversee the development, refinement and periodic updating of a strategic plan for GOOS, which will define:

   - objectives, products and outcomes of the GOOS modules;
   - a broad plan of implementation, including stages, milestones and relevant structural issues; and
   - process of priority setting and review.

2. To develop and recommend basic policies for:

   - coordination and cooperative interaction with other external programs such as GCOS, WCRP,

and IGBP (and others) and implementational bodies and activities such as IGOSS, GLOSS, IODE, WWW and others;

- "crosscutting" issues including:
  - data management
  - regional development; and
- coordination and balance between internal GOOS activities.

3. To advise on the prioritization, distribution and synthesis of resources to ensure the best parallel development of the GOOS modules in pursuit of the defined objectives.

4. To report to, and advise, the Chairman, I-GOOS, and undertake other tasks defined by the Chairman.

Recommendation I-GOOS-PS-I.2

ESTABLISHMENT OF I-GOOS PANEL ON TECHNICAL IMPLEMENTATION

The Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS),

Noting

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

(ii) the formal request from JSTC/GCOS that GOOS should implement the ocean component of the climate observing system,

(iii) the formal request from Intergovernmental TOGA Board that GOOS should take responsibility for the continued operational implementation of the post-TOGA observing system and tropical Pacific monitoring system after the end of 1994,

Emphasizing

(iv) that GOOS is an operational system designed to provide standard and consistent global oceanographic data, including biological and biogeochemical data, for the benefit of Member States,

(v) that Member States, international organizations and bodies, existing operational progammes already have considerable experience and capabilities which can be of great assistance in achieving the aims of GOOS,

(vi) that the scientific specifications developed by J-GOOS and the practical applications of the GOOS Modules can be met by a carefully implemented global system of long term observations and models,

Recommends

(i) to establish an I-GOOS Panel on Technical Implementation with Terms of Reference as given in Appendix to this Recommendation;

(ii) to invite the Chairman of I-GOOS and the Secretary IOC in consultation with WMO and UNEP to take actions to establish the Panel in 1994 and appoint its Chairman until the next meeting of I-GOOS on an interim basis;

(iii) that the Chairman and Members of the Panel be appointed by I-GOOS for a minimum of 2 years and a maximum of 8 years;

(iv) that the Panel should consist of no more than 10 members in addition to the Chairman and should meet in plenary session at least once per year;

(v) that the Panel should report to each session of I-GOOS and support the Strategy Sub-Committee with technical information and reports when required;

(vi) that the Panel Task Team be set up for co-ordinating the implementation of an operational system for the continuation of the Post TOGA Observing System to be in place before the end of 1994.

Appendix

I-GOOS Panel on Technical Implementation
Terms of Reference

1. Provide oversight for the implementation of an integrated ocean observation network capable of meeting the GOOS scientific and operational requirements in accordance with the GOOS strategy.

2. Identify the most appropriate means for implementing the elements of GOOS. In the first instance the capabilities and particularly existing systems should be considered. Where requirements cannot be satisfied through existing systems the Panel should seek agents and mechanisms to provide the necessary elements.

3. Oversee the implementation and maintenance of an appropriate information and data management system, including standards and protocols for GOOS.

4. Review and assess the practical implications of new technological systems which may be of help in achieving the objectives of GOOS, or which will improve the effectiveness and efficiency of the various observing systems, subject to the advice of J-GOOS.

5. Establish, as necessary, Implementation Task Groups to address and carry out the specific technical tasks identified by the Panel.

6. Maintain regular working contact with J-GOOS, and its subsidiary bodies, and with other panels of I-GOOS through regular reporting on the progress of implementation of GOOS.

Recommendation I-GOOS-PS-1.3

ESTABLISHMENT OF I-GOOS PANEL ON PRODUCTS AND DISTRIBUTION

The Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS),

Noting that GOOS is an operational system intended to fulfil Member States' needs for ocean products,

Recognizing that the success of GOOS will depend on its ability to identify, anticipate and satisfy the needs of users,

Recognizing further that monitoring of the GOOS system will be necessary to maintain and improve its performance,

Recommends:

(i) to establish an I-GOOS Panel on Products and Data Distribution with the Terms of reference given in the Appendix to this recommendation;
(ii) that membership should consist of a chairman and five members appointed by the Chairman of I-GOOS in consultation with the Secretariats of IOC, WMO and UNEP with due consideration being given to the need for adequate geographical and disciplinary representation and of the

desirability of user representation;
(iii) that a sixth member shall be nominated by the Chairman of J-GOOS;
(iv) that the panel will report to each session of I-GOOS;
(v) that the Chairman and members will serve for a minimum of two years and a maximum of four years;

Recommends that the panel should be served by a full time support officer;

Requests the sponsoring organisations and Member States to investigate possibilities for establishing this support post.

Appendix

I-GOOS Panel on Products and Distribution
Terms of Reference

(i) To seek and evaluate user needs from Member States and regional groups and interpret them in terms of products;

(ii) To identify the needs for changes in the GOOS system as required by new products;

(iii) To report on the accuracy and quality of the delivered products and data of the GOOS system with respect to the user requirement;

(iv) To consider and oversee the mechanisms for the generation of products and for the distribution to users of products and data;

(v) To maintain and make available a catalogue of GOOS data, products and services;

(vi) To co-ordinate the socio-economic assessment of GOOS.

Recommendation I-GOOS-PS-I.4

ESTABLISHMENT OF I-GOOS INTERSESSIONAL *AD HOC* GROUP ON THE GOOS COASTAL ZONE MODULE

The Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS),

Having reviewed the progress of ongoing IOC-WMO-UNEP Coastal pilot monitoring activities, and the framework for coastal monitoring detailed in the meeting report of the *ad hoc* group of experts held in Paris 1990 (UNEP-IOC-WMO/GCNSMS-I/3),

Having also considered the definition of the coastal zone module as given in 'The Approach to GOOS' (IOC-XVII/8 Annex 2 rev.) and the science plan of Land-Ocean Interaction in the Coastal Zone (LOICZ) Core Project of the International Geopshere Biosphere Programme (IGBP),

Recognizing the social and economic importance of coastal zones to Member States and the potential role of GOOS in providing data and services for the sustainable management of coastal areas by member states,

Recognizing further that there is already an extensive but imperfect scientific basis for the implementation of a GOOS Coastal Zone Module,

Recommends that:

(i) an I-GOOS intersessional *ad hoc* Group on the GOOS Coastal Zone Module be established and work until the Second I-GOOS meeting with the terms of reference given in Appendix to this Recommendation;

(ii) experts from the following regions or countries be invited to serve in the *Ad hoc* Group: Africa/Indian Ocean; Europe; South America; Southeast Asia; Australia; China; U.S.A.

Appendix

***Ad hoc* Group on the GOOS Coastal Zone Module**
Terms of Reference

(i) Identify the benefits derived from the Coastal Module of GOOS for participating Governments

(ii) Identify which coastal zone resources are of greatest interest to user governments, establish the priorities for information required by those users and determine the users' timeframe for that information and GOOS products;

(iii) Following identification of priorities, detail what measures are required to provide that information for user governments;

(iv) Identify the potential contributions of existing and planned multi-national coastal zone monitoring and observational systems, to the coastal module of GOOS;

(v) Prepare an outline strategic plan for the coastal module to be submitted to the next I-GOOS meeting.

Recommendation I-GOOS-PS-I.5

GOOS PROGRAMME AND BUDGET FOR 1994-1995

The Planning Session of the IOC-WMO-UNEP Committe for the Global Ocean Observing System (I-GOOS),

Having reviewed the programme and budget of IOC for GOOS for 1994-1995,

Recognizing that the international co-ordination of GOOS design, planning and development requires substantial financial and staff support,

Recalling its Rec. GOOS-I.2, adopted by the Seventeenth Session of the IOC Assembly, on the establishment of an **earmarked part of the IOC Trust Fund** to support the costs of the planning and development phase of GOOS and the establishment of an earmarked GOOS/TEMA part of the IOC Trust Fund to support the TEMA-related activities within GOOS,

Noting with satisfaction also that **WMO and UNEP have decided to co-sponsor** the I-GOOS,

Noting with concern possible decreases in the contributions of Member States to GOOS, International related activities,

Endorses the attached Calendar of GOOS events for 1994-95 as attached;

Expresses its concern that the available GOOS staff and budget are not sufficient to implement the planned GOOS activities in 1994-95;

Urges Member States to contribute to an earmarked GOOS part of the IOC Trust Fund to support GOOS activities;

Urges also Member States to second specialists to the GOOS Support Office to support the activities of J-GOOS and its Panels, I-GOOS and its sub-committees and other subsidiary bodies;

Invites the co-sponsoring agencies of I-GOOS - IOC, WMO and UNEP, and of J-GOOS - IOC, WMO and ICSU to consider urgently the ways and means to increase financial support to GOOS;

Requests the Secretary IOC to report to I-GOOS-II on the staff and budget allocations for GOOS activities (distinct from related activities such as IGOSS, GLOSS, DBCP, etc.).

ANNEX III

DRAFT RECOMMENDATION TO BE TRANSMITTED FOR APPROVAL BY I-GOOS-II

I-GOOS PANEL ON CAPACITY BUILDING

The IOC-WMO-UNEP Committee for the Global Ocean Observing System (I-GOOS),

Noting

(i) Recommendation I-GOOS-I.6 - TEMA in relation to GOOS,

(ii) IOC Resolution XVII-5 - Global Ocean Observing System (GOOS)

Noting further existing training, education and related capacity building activities and programmes of IOC, WMO and UNEP,

Considering

(i) that GOOS can only be successfully implemented through the combined efforts of all Member States of IOC, WMO and UNEP,

(ii) that many Member States, in particular developing countries, presently lack sufficient trained manpower, observing systems, communications and data management technology to enable them to participate in GOOS implementation and also share fully in the products and other benefits which will accrue from GOOS,

(iii) that there is also a requirement to prepare and distribute material that will contribute to the education of both decision makers and users on the benefits to accrue from GOOS.

Decides

(i) to establish an I-GOOS Panel on Capacity Building, with the terms of reference given in the Appendix to this draft recommendation;

(ii) to elect a Chairman of the panel;

(iii) that, in addition to the chairman, the Panel will comprise no more than nine expert members to be selected by the Chairman of the Panel, in consultation with the Chairman of I-GOOS and the Secretariats of IOC, WMO and UNEP, with due consideration being given to the need for adequate geographical and disciplinary representation;

(iv) that the panel will report to each session of I-GOOS;

(v) that the Chairman and members will serve for a minimum of two years and a maximum of four years;

Recommends that the panel should be served by a full-time secretary;

Requests the sponsoring organizations and Member States to investigate possibilities for establishing this secretary position.

Appendix

TERMS OF REFERENCE OF I-GOOS PANEL ON CAPACITY BUILDING

(i) Identify and keep up to date the requirements of Member States for capacity building in the implementation of their contributions to each component of GOOS, viz observing system; communications; data management; product preparation and handling; information dissemination etc.;

(ii) As necessary recommend and extend assistance to developing countries in assessing their requirements for capacity building in support of GOOS;

(iii) Recommend cost-effective means for undertaking capacity building for GOOS e.g. through the provision of training and education fellowships, voluntary co-operation programmes, regionally co-ordinated development projects etc.;

(iv) Assist in the identification of sources of funding for GOOS-related capacity building, e.g. GEF, national aid agencies, regional and bi-lateral aid programmes, GOOS Trust Fund and regular budgets of IOC, WMO and UNEP, VCP, etc.;

(v) Recommend on the implementation of existing facilities, such as OCEAN-PC, where appropriate in support of GOOS, in co-ordination with the Technical Implementation Panel;

(vi) Encourage developed countries and international organizations to establish pilot projects in developing countries, and facilitate, where possible, the participation of developing country scientists in the pilot projects as well as in regional implementation programmes for GOOS;

(vii) Support the I-GOOS Products Panel in the preparation of material suitable for raising the awareness of both decision-makers and potential users and distribution to the benefits of GOOS;

(viii) Maintain liaison and co-ordination with relevant subsidiary bodies and activities of IOC, WMO and UNEP concerned with capacity building, and make use of these activities to implement GOOS capacity building as much as possible.

ANNEX IV

WORKING DOCUMENT ON

PROPOSED DATA MANAGEMENT POLICY REQUIREMENTS: GUIDING PRINCIPLES FOR THE GLOBAL OCEAN OBSERVING SYSTEM (GOOS)

"The overall purpose of this policy is to facilitate timely, full and open access to quality ocean data for the Global Ocean Observing System (GOOS). GOOS requires an early and continuing commitment to the establishment, maintenance, validation, description, accessibility and distribution of high-quality, operational, and long-term data sets. GOOS must transmit, exchange, and process its operational data flow within time limits appropriate to the generation of products and the requirements of predictive models.

(i) Timely, full and open sharing of a wide spectrum of global international data sets for all ocean programmes is a fundamental objective.

(ii) GOOS data generated in real-time or in near real-time needed for the assimilation by analytic and predictive models and other projected applications must be available in the public domain in order to promote safety at sea, assist in the avoidance or prediction of storms and coastal flooding, and to promote the safety and efficiency of all maritime activities.

(iii) Data submitted for international exchange will be provided at the lowest possible cost to GOOS participants in the interest of full and open access to data. This cost should, as a first principle, be no more than the marginal cost of processing, copying and shipping to fill a specific user request.

(iv) With regard to data archiving, all data will be made available in the public domain of IODE data centres within one year collection (chemical, biological and geological data may require longer intervals). For those scientific research programmes contributing GOOS data in which selected principal investigators have initial periods of exclusive data use, data will be made available as soon as they become widely useful or at the maximum two years after data collection.

(v) Preservation of data needed for long-term global ocean programmes is required. For each and every global ocean data parameter, there will be at least one explicitly designated archive.

(vi) International data archives must include easily accessible information about the data holdings, including quality assessments, supporting ancillary information, and guidance and aids for locating and obtaining the data.

(vii) National and international standards should be used to the greatest extent possible for media and for processing and communication of global oceanographic data sets".

ANNEX V

GOOS NATIONAL PLANNING ACTIVITIES

AUSTRALIA

Australia recognizes the task of planning and co-ordinating a full spectrum of marine observations over its vast coastline and exclusive economic zone. Although these observations are necessarily directed mainly to national objectives, GOOS provides a framework for the definition and design of appropriate systems, for co-ordination and, in the context of UNCED, an additional impetus for national sponsorship.

1. NATIONAL GOOS ORGANIZATION

Australian GOOS is planned through the Australian GCOS/GOOS Working Group, which reports to a Steering Committee comprising senior representatives of the main organizational pathways to the corresponding international and intergovernmental bodies, as shown in Table 1.

Representative	National Organization	Corresponding International Organization
Dr. Roy M. Green	Chairman, Head of Marine Agencies (HOMA) Group	Intergovernmental Oceanographic Commission (IOC)
Dr. John Zillman	Director, Commonwealth Bureau of Meteorology (BoM)	World Meteorological Organization (WMO)
Prof. Garth W. Paltridge	Australian Academy of Science	International Council of Scientific Unions (ICSU)
Mr. David Buckingham	Commonwealth Department of Environment (DEST)	United Nations Environment Programme (UNEP)

Table 1: Composition of Australian GCOS/GOOS Steering Committee

The Working Group membership is selected from representatives of the main national agencies concerned with atmospheric, marine and terrestrial data. Its current composition is given in Table 2.

Chair:	
D.J. Gauntlett	*Bureau of Meteorology*
Deputy Chair:	
A.D. McEwan	*CSIRO Division of Oceanography*
Members:	
R.R. Brook	*Bureau of Meteorology (Observations and Engineering Branch)*
W.F. Budd	*Antarctic Co-operative Research Centre*
B. Embleton	*CSIRO Office of Space Science and Applications*
A. Henderson-Sellers	*National Committee for Climate and Atmospheric Sciences*
I.S.F. Jones	*National Committee for Oceanic Sciences/Australian Meteorological and Oceanographic Society*
G.I. Pearman	*CSIRO Division of Atmospheric Research*
W.L. Steffen	*CSIRO Division of Wildlife and Ecology/International Geosphere Biosphere Programme*
B.J. Stewart	*Bureau of Meteorology, Hydrology Branch*
P. Moran	*Australian Institute of Marine Science*
N. Lawson	*Institution of Engineers Australia*

Table 2: Australian GCOS/GOOS Working Group (JWG)

Through this structure it is intended that national GCOS, GOOS and (in due course) GTOS activities are developed under a single organization thereby facilitating co-ordinated proposals to government and inter-agency communication, avoiding undesirable duplication of effort and competition for resources.

The development of detailed national plans and proposals is undertaken by expert subgroups, reporting to the GCOS/GOOS Working Group.

The Australian GOOS Expert Sub-Group (ESG) is chaired by Dr. N. Smith of the Bureau of Meteorology Research Centre. Its members are: Richard Coleman (University of Tasmania), Ron Cox (Water Research Laboratory, University of New South Wales), Ian Jones (University of Sydney), Gary Meyers (CSIRO Division of Oceanography), Peter Moran (Australian Institute of Marine Science), Ben Searle (Australian Oceanographic Data Centre), Matt Tomczak (Flinders Institute of Atmospheric and Marine Sciences) and Trevor Ward (CSIRO Division of Fisheries).

Its Terms of Reference are (in brief):

(i) To provide the JWG with scientific advice on GOOS planning and implementation in Australia.
(ii) To formulate the design and specification of Australian GOOS.
(iii) To compile and assess relevant Australian activities, identify 'deliverables' and areas where new or additional work is needed.
(iv) To advise JWG on priorities and schedules.
(v) To liaise with GCOS and GTOS ESG's.
(vi) To report to the JWG.

2. NATIONAL MARINE DATA MANAGEMENT

The rapidly developing demand for spatial data and the need to implement processes for the quality control archiving and access of marine data in general have prompted the proposed creation of a national Marine Data Group (MDG) under the joint sponsorship of the Heads of Marine Agencies (HOMA) Group and the Commonwealth Spatial Data Committee. This group, to be Chaired by Dr. A. McEwan will be assisted by Technical Advisory Groups as required on specific subject areas including Oceanographic Data, Standards, Fisheries/Biology, Geology, Human Use and others. The MDG would interact closely with the Australian GCOS/GOOS Working Group in item 1. above.

3. STATUS OF AUSTRALIAN GOOS PLANNING

The GOOS ESG (see item 1. above) met for the first time on 16-17 August 1993 at the Australian Oceanographic Data Centre, Sydney. The Report of the First Meeting of the Australian GOOS Expert Sub-Group provides an account of that meeting, the main outcomes of which are summarized as follows:

(i) Specific goals for A-GOOS would not fall conveniently into the GOOS module structure, and a separate (non comprehensive) list of 27 goal titles was defined and members were assigned to the development of detailed goal statements and the observational 'elements' of which they are composed.

(ii) Discussion of methods of classification of the 'elements' led to experiments in the use of matrix presentation in terms of Difficulty versus Impact. An example is shown in Figure 1.

(iii) The task of assessing current activity was addressed, with the intention of preparing a comprehensive summary report.

(iv) The 'elements' would be classified according to the 'categories' of observation (i.e. currently operational; capable of being made operational; and experimental), but no priority would be placed upon them, pending better analysis and specification of detail.

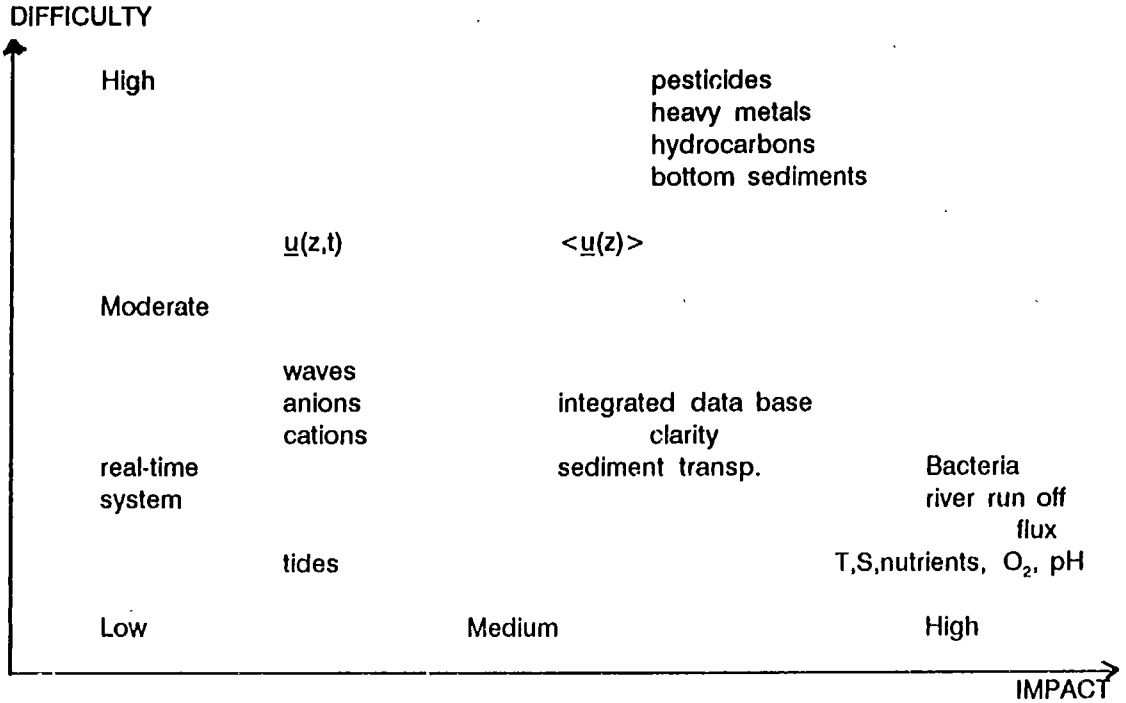
From the above it was agreed that the main task of the ESG was to draft a report detailing existing systems within Australia which could fairly be termed operational, existing research and developed systems which would provide significant benefits if implemented operationally, and finally developing systems which offer the potential of significant contributions. The Australian plan will encompass all modules of the internationally defined GOOS.

The ESG strategy has been to first define a set of goals which the Australian contribution could reasonably be expected to meet. This work has substantially been completed in the months since the meeting but, as yet, no substantive steps have been taken to form an integrated plan. Attempts have been to classify identified elements according to the ease with which the observations might be taken and the potential benefit to be gained; an attempt has also been made to categorize the elements as existing, developed or developing. At the next meeting of the ESG, by which time a first outline of the background and strategy for each of the goals should have been completed, a more thorough examination of the goals and their potential impact (benefit) will be undertaken and the first steps will be taken toward prioritizing the various recommendations. A more complete draft based on these discussions will be completed in the second half of 1994.

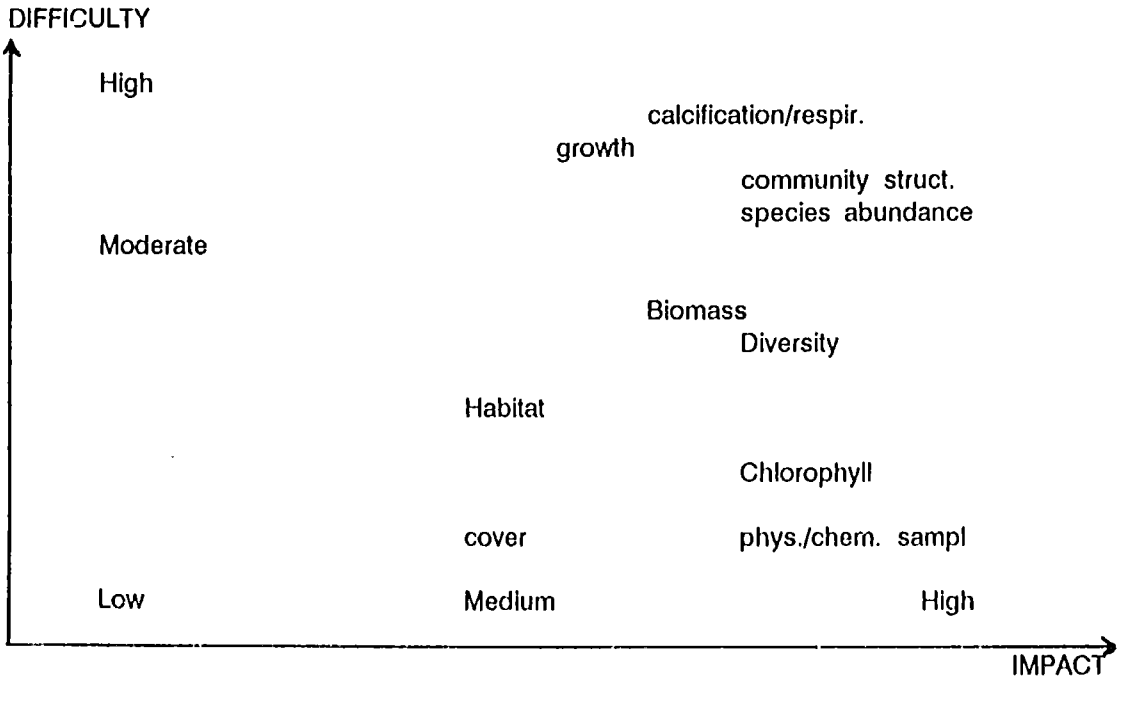
The first meeting also endorsed the idea of undertaking a survey of the Australian oceanographic and marine community to establish the status of existing systems. With support from the Bureau of Meteorology a short survey questionnaire was drafted and circulated amongst all oceanographers and marine scientists who were believed to be involved with, or interested in, routine 'operational' observation and monitoring of the oceans in the vicinity of Australia. This survey was circulated in late 1993. To date there have been of the order of 24 replies detailing a range of activities. A thorough analysis, perhaps with follow-up correspondence, is being considered.

At some time in the future, perhaps toward the end of 1994, it is hoped that a first draft of the ESG Report with recommendations will be completed and this will be circulated amongst the Australian oceanographic community. The first Report should be available around the beginning of 1995.

Figure 1: Difficulty versus Impact Matrix



Coastal Monitoring Sites



Coral Reef Monitoring

BRAZIL

1. **GOOS:** The I-GOOS activities have been developed according to a previously established routine with the transmission of messages obtained by Brazilian Research Ships.

2. **GLOSS:** In addition to the existing stations there is a project to install two stations in islands of Brazilian coast, with real time data transmission by ARGOS system. In the future, these stations will be integrated to the Brazilian GLOSS net.

3. **DBCP:** Brazil takes part in the Drift Buoys Co-operation Programme for the South Atlantic together with Argentina, South Africa, United States and England.

4. **IODE:** It has been put into operation a new computer system linked to the VAX environment, series 6000. It will allow the development of a relational data bank to the management, storage and recovery of 3 million oceanographic and meteorological data from the National Oceanographic Data Bank, for GOOS needs in Brazil.

5. **MUSSEL WATCH:** In March 1993, at the Oceanographic Institute of Sao Paulo University, there was a meeting to review and discuss the results of the initial phase of implementation programme.

6. **HAB:** Brazil took part in the Second Session of the Intergovernmental Panel about Harmful Algal Blooms. It was discussed the interaction between HAB, subprogramme of "Ocean Science in Relation to Living Resources - OSLR" programme, and GOOS programme. Although Brazil has no serious and constant problems related to HAB there is the potential danger localized mainly at the south region of the country which was considered an area of risk. Along the coast local phenomena have occurred so that all the activities being developed worldwide about this subject should be considered.

7. **WWW:** Brazil has given its contribution to WWW, as responsible for marine meteorology in maritime areas of South Atlantic (METAREA V). The operation of a meteorological data treatment system from GTS integrated spacial platforms is predicted. This system will make possible the development of numerical prediction models in regional scale.

8. **TEMA:** In 1994, Brazil should begin the search for existing facilities and needs of human resources for GOOS, in accord to the XVI-5 of the IOC Meeting.

9. **REGIONAL CO-OPERATION:** There has ben a meeting in Brazil to settle the regional co-operation with Argentina and Uruguay. The OSNLR, OSLR, GIPME, WOCE and TEMA programmes have been chosen for this co-operation.

10. **NATIONAL CO-ORDINATION:** The national co-ordination of GOOS programme has begun in Brazil with a meeting about Coral Reefs, in which, DHN-Navigation Hydrographic Directory (as the co-ordination member of GOOS in Brazil), the Ministry of Science and Technology and Scientists took part.

11. **MARINE LIVING RESOURCES:** The Brazilian participation with subprogrammes HAB, SARP and EDLR of the Ocean Science in Relation to Living Resources (OSLR) programme, as well as the development of researches related to this subject, have contributed to this part of GOOS.

12. **COASTAL ZONE:** Brazil has an active participation in the subprogramme COMEMIR, and CZAR of the OSNLR programme with the development of researches in this field in Brazilian Universities. It is associated with other related programmes, such as LOICZ and it has expressed the intention to take part in the coral reef monitoring activity.

13. **HEALTH OF THE OCEANS:** The Brazilian participation in the programme GIPME is still beginning in what concerns the intercalibration of nutrients and salinity, hydrocarbons, pesticides and heavy metals. In 1992 it was performed the first series of data collection in the Brazilian coast, related to the

programme Mussel Watch, with the contribution of Brazilian laboratories in data analysis.

CANADA

Although GOOS has been widely endorsed by UN agencies, ICSU and various international and intergovernmental forums, it will only be implemented with the strong support from nations acting together in an internationally agreed framework. Canadian participation to date has focused on international planning for GOOS, both from the scientific perspective and from policy/management considerations, and with the integration of existing monitoring programmes into the broader system.

The research which forms the foundation for the design of GOOS lies in the results of international experiments which are underway (TOGA, WOCE, JGOFS, GEWEX, GLOBEC, OLEIC) or planned (GOEZS, CLIVAR). Canadian scientists have played a leading role in the planning, design and implementation of many of these experiments. They also participate in the Ocean Observing System Development Panel (OOSDP), which will report by the end of 1994 on the design of the ocean observing system for the climate module of GOOS, and in the Health of the Ocean Panel for the design of that module. Support of the design of observing systems for the other GOOS modules on the coastal zone, services and living resources will be provided as seems appropriate.

Planning for GOOS has advanced on a number of international fronts, and Canada has participated in most. For instance, Canadians have been active in IOC Assembly meetings garnering support from other nations for the GOOS concept, developing the IOC report on "The Case for GOOS", the OECD Megascience Forum on Operational Oceanography and GOOS, the First Session of I-GOOS and, of course, this first planning session of I-GOOS.

The implementation of GOOS will, to the extent possible, be carried out using existing operational bodies such as IGOSS and GLOSS, and use IODE for the international exchange and archiving of ocean data. Canada has been concerned with making these bodies more effective and in particular has been active in the Global Temperature-Salinity Pilot Project (GTSPP) aimed at improving the timeliness, quality and amount of ocean data available to national and global operational and research programmes. This project can be a model for future ocean observing systems.

Within Canada there is a number of specific initiatives that will guide Canadian participation in GOOS. Two that will help situate GOOS within the context of GCOS are: (1) a Workshop on Canadian Climate System Data to be held at Quebec City, May 16-18, 1994, and (2) the formation of a national task group for GCOS. This task group, which is chaired by Mr. G. Holland, is currently preparing a report that would set the scene for Canadian involvement in GCOS by identifying practical initiatives that Canadians can take in support of GCOS by indicating the benefits of GCOS to both the providers and users of its products. Consideration of the possible formation of a Canadian panel for GOOS awaits the results of these initiatives.

Given the status of planning for GOOS internationally and nationally, it is somewhat premature for Canada to plan a contribution to GOOS beyond that presently being made to existing ocean observing systems both as part of research programmes and in support of international mechanisms for the collection, dissemination and storing of ocean data. For the time being effort is being devoted to completing the international experiments such as WOCE and JGOFS, which will help define the space-time sampling required of systematic ocean observations. Once preliminary network designs have been recommended for the modules of GOOS by bodies such as the OOSDP, Canada will be in a better position to plan to implement a portion of GOOS to the extent feasible given existing or enhanced resources.

CHILE

1. WOCE Cruise

1.1. PR-14 CRUISE

During October 1993, the PR-14 Cruise was carried out on-board the AGOR investigation platform "Vidal Gormaz".

This cruise has been carried out in three sections, following a rectangle formed by 38°S and 38°S parallels, and 82°15'W meridians, with as an average, a distance of 30 nautical miles between each point (Fig. 1).

Sea-water samples were taken to determine the dissolved oxygen, salinity and temperature, and register the oceanographic variables, with CTD (SBE-19) until 1,500 m deep.

Meteorological observations were carried out every 6 hours during the whole cruise, data on wind direction and magnitude, different categories and quantity of clouds, barometric pressure, air and sea-water temperature, relative humidity rate, visibility, magnitude and direction of waves. All these data have been sent by remote-sensing to NOAA using SEAS equipment.

During the navigation track between oceanographic stations considered, XBTs have been launched 2 nautical miles before reaching each station. In total, 25 XBT T-5 and 3 T-7 have been dispatched.

1.2 SR-1 CRUISE

During November 1993, SR-1 Cruise was carried out on-board the AGOR research vessel "Vidal Gormaz".

This cruise covered an extension located between 55°S and 65°S and between Diego Ramirez Island and the Bransfield Straight. 17 oceanographic stations were covered (Fig. 2).

Superficial sea-water samples dissolved, salinity and temperature, and register oceanographic with CTD (SBE-19) until variables until 2,000 m deep.

Meteorological observations were realized using the same method as for PR-14 cruise.

XBT were launched between the oceanographic stations, 2 nautical miles before reaching each station. In total, 17 XBTs were dropped.

2. GLOSS

During 1993 the following coastal flux stations have been operational:

2.1 OCEANOGRAPHIC STATIONS WITH SATELLITE COMMUNICATIONS (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

2.2 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 Félix	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
Valparaiso	33 01 32	71 38 01	2,3	Bubbler
San Antonio	33 35 00	71 49 47	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

Station	Latitude (South) (g.m.s.)	Longitude (West) (g.m s.)	Sensors *	Gauge Type
Corral	39 52 00	73 06 00	2,3	Bubbler
P. Montt	41 29 00	72 58 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. TOGA

3.1 TOGA BUOY EXCHANGE CRUISE

In March 1993 took place the exchange of the TOGA buoy using the AGOR "Vidal Gormaz". This buoy is located in 17°58.7'S and 85°7.12'W; it registered the wave height and period; air and sea-temperature; wind direction and magnitude; and atmospheric pressure.

Sea beam data were obtained from Iquique transect to the buoy and vice-versa.

30 XBT were launched from the Iquique transect to the buoy.

3.2 DRIFTING BUOYS

During 1993, the "Drifting Buoys" Project used some of the trade vessels of the "Ships-of-Opportunity" programme and others considered of interest on account of their route, to launch buoys in the South Pacific. These buoys were provided by the Scripps Institute of Oceanography.

Among the vessels who carried out these launchings: M/N "Andino" with two launchings in her route to Japan (March & April 1993); M/V "Joana Bonita", who launched 5 buoys on her way to New Zealand (February 1993); M/V "Longavi", who launched a buoy on her route from Papeete to Callao (December 1993).

3.3 SHIPS-OF-OPPORTUNITY

The "Ships-of-Opportunity" Programme is a joint project with NOAA and the Scripps Institute of Oceanography.

During 1993, five trade vessels participated in the programme. They carried out XBT observations, through SEAS and AXL (Kluge Automatic XBT Launcher) equipments, in several transects of the World Ocean (Fig. 3). These vessels are the following:

- O/O "VIÑA DEL MAR". 331 XBT (SEAS) observations along the South America to Europe route.
- M/N "ANDINO". Carried out 89 XBT (SEAS) observations along the route Chile to Japan.

- M/V "KARINA BONITA". Carried out 270 XBT observations (SEAS) along the routes Chile - New Zealand; New Zealand - Australia; Brazil - South Africa.

- M/V "JOANA BONITA". Carried out 300 XBT observations (AXL) along the Chile -New Zealand route.

- M/V "LONGAVI". Carried out 69 XBT observations (SEAS) along the Chile - USA route.

Figure 1 Area covered by the Cruise PR-14 and oceanographic stations

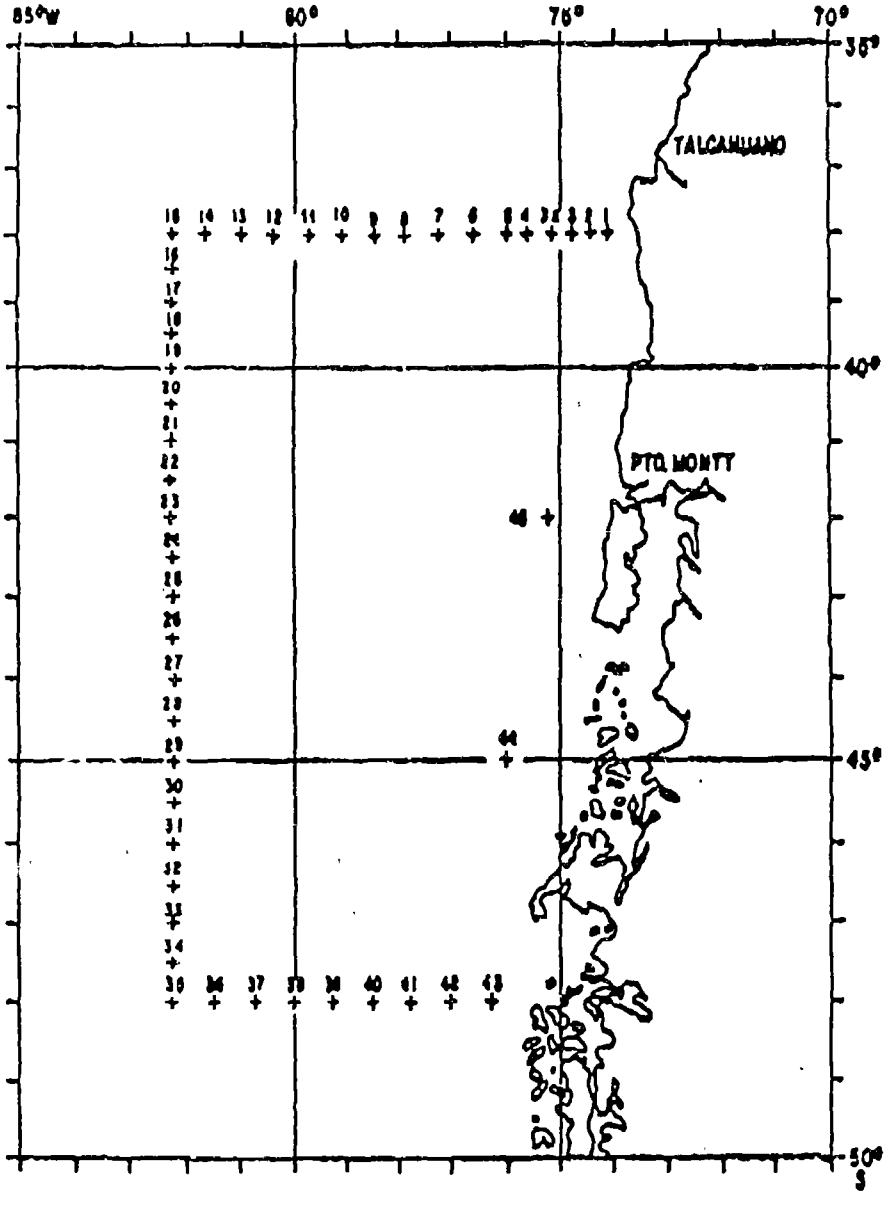


Figure 2 Area covered by the Cruise SR-1 and oceanographic stations

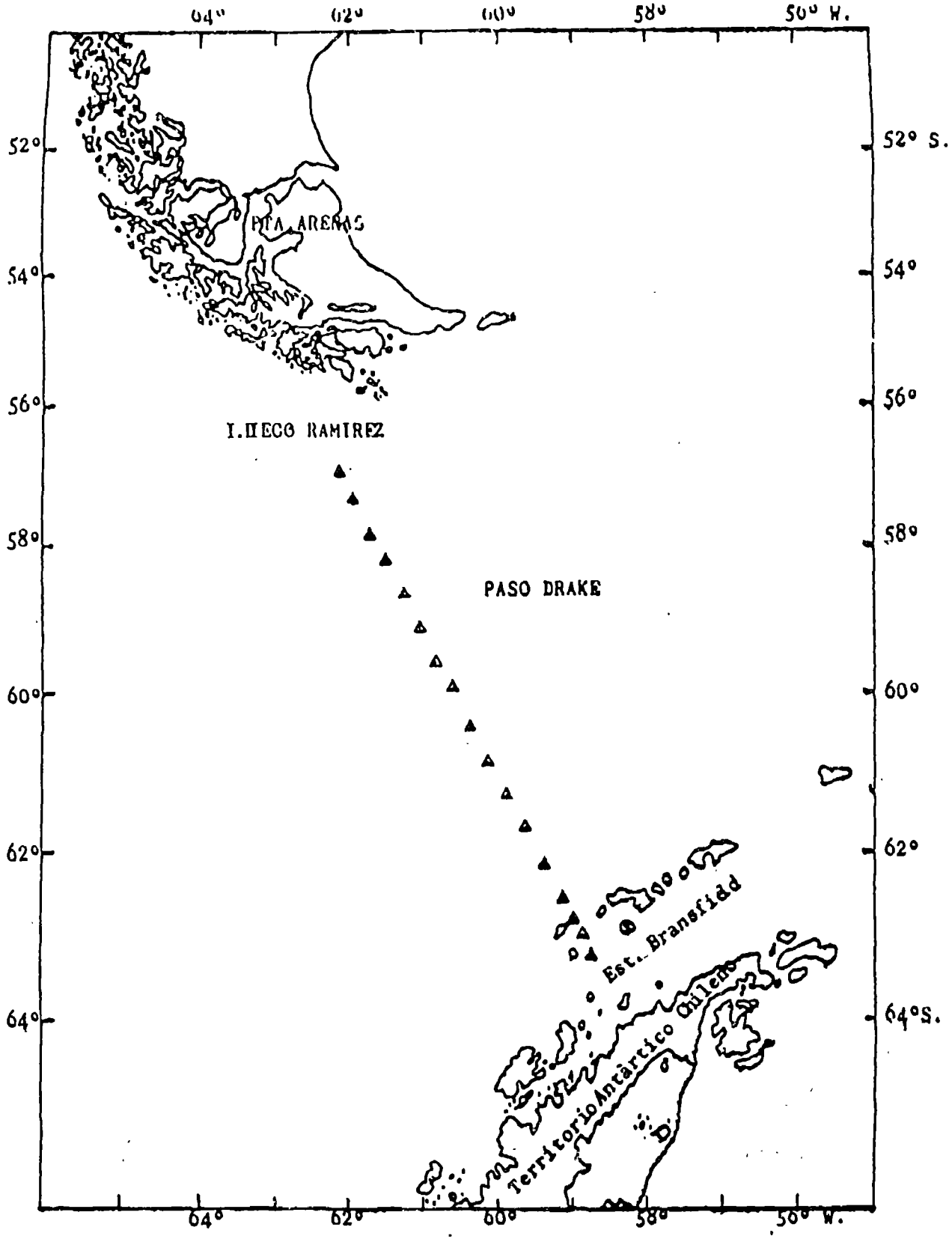
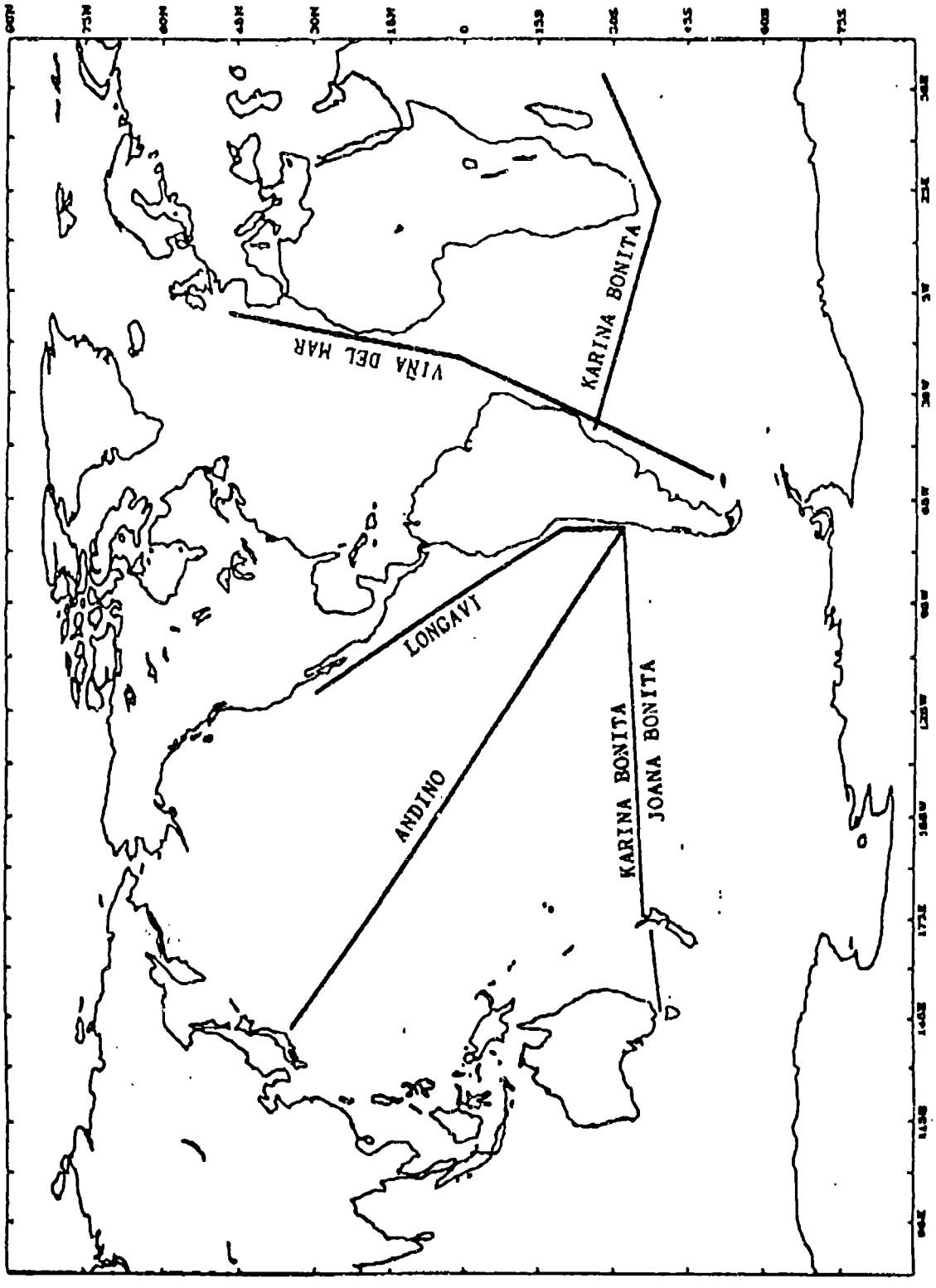


Figure 3 Cruise tracks of the Ships-of-Opportunity



CHINA

1. BACKGROUND

The Ocean Observing System in China has been established since 1950's. Up to now, there are more than 100 marine hydrological and meteorological observing stations (MHMOS) located along the Chinese coast line and the islands from the Yalujiang estuary in the north to the Nasha archipelago in the south, and the major elements to be measured are tide, wave, water temperature, salinity, wind, air-pressure, and humidity, three(3) of the stations carry out their observations by the automatic measuring and data delivering system, and approximately 9,000,000 observing data can be obtained annually. Nearly 200 sampling points which located on 20 sectional lines have been set for the purpose of measuring water current, wave, water temperature, water depth, salinity, dissolved oxygen, pH, nutrients, transparency, visibility, cloud, wind, air-pressure, humidity, etc. by the Oceanographical Sectional Monitoring, and the monitoring cruises are carried out in February, May, August and November (i.e. the demonstrative month of the 4 seasons) each year, and the annual data obtained is 70,000. The marine monitoring for environmental quality is conducted in near shore, major estuaries, harbor area, bays and the adjacent area of land based pollutant outlets directly towards the sea, and some 400 points are set for taking sea-water, sediment and living organisms samples, and the elements to be measured are more than 30 including heavy metal, organic compounds (oil and pesticide), nutrients, etc., 55,000 monitoring data can be obtained annually. There are three(3) data buoys which conduct year-round measurement of water temperature, wave, surface current, air-pressure, air-temperature, wind direction and speed in the near shore of China Sea, and the annual obtained data is up to 60,000. The quantity of deferent type of data buoy is 16 set, and the data obtained has been entering the practical uses stage. In addition, there is a voluntary hydrological and meteorological observation system being composed of 236 commercial vessels, and the vessels sail on the major oceans of the world, and 48 of them have been listed in the Global Telecommunications System.

2. MHMOS DEVELOPMENT PLANNING

From 1994 to 1997, the major planning objectives are: to accomplish automatic observation for major elements instead of man-made observation in part of MHMOS; to set up new automatic observing stations, automatic tidal observatories and sea-ice radar observing station; to renew or equip micro-computers so as to perfect the data processing system and achieve the data delivery of disks; and to further perfect the communication network of MHMOS.

On the capacity building of equipments, digital float tidal meter, air-acoustic tidal meter and pressure tidal meter could be selected for the renew of old tidal meters being used in 44 tidal observatories. Acoustic wave meters and gravity remote measuring wave meters will be selected and set up in 12 stations for observing wave automatically, and wave direction observing buoys to be applicable in the stations will be developed. In order to meet the WHO requirement, the existing EL wind direction/speed meters will be substituted by automatic wind meters gradually. A coast based sea-ice radar observing station will be established at west coast of Liaodong Bay, Bohai Sea. Eight(8) stations will be equipped with automatic meteorological observing system for measuring wind, air-temperature, humidity, air-pressure and rain. Small sized water temperature/salinity observing buoys will be developed and equipped at 30 stations. Satellite communication will be tried out in five(5) stations located at outlying area or islands, one(1) satellite ground station will be set up, and 40 stations will utilize large power radio station for digital communication. Three(3) island based automatic observing stations will be set up in order to increase the quantity of automatic stations up to 6. Along the east and south coast, 10 new tidal observing stations will be established, and all of them will operate their observation automatically. The capability of data collecting and processing system should be advanced, the effort will be focused on increase the intelligence of sensors so that they can continual operate observation and store data, and deliver the data by VHF, on the other hand, multi-elements data automatic collector will be equipped in part of the stations in order that they can receive and pre-treat the data from deferent sensors, and then deliver the data to data processing centre in real-time or fixed time. Normally, the data processing system in MHMOS is 386 micro-computer.

3. THE KEY POINTS OF DEVELOPMENT PLANNING OF THE MARINE ENVIRONMENTAL QUALITY MONITORING SYSTEM

The marine environmental quality monitoring system of China is composed of vertical and horizontal sub-systems. The former is the SOA system which has the National Marine Environmental Monitoring Centre (the 1st class) located at Dalian, Bohai and Yellow Sea, East Sea, and South Sea Marine Environmental Monitoring Centres (the 2nd class) located at Qingdao, Shanghai and Guangzhou, as well as 11 local Marine Environmental Monitoring Stations (the 3rd class) located at Qinhuangdao and Yantai, etc. The later is the joint established the National Marine Environmental Monitoring Network which is composed of 100 environmental monitoring stations belong to SOA, NEPA, Ministry of Communication, Ministry of Water Resources, Ministry of Agriculture and Navy respectively.

The planning of the system construction will be focused on the capacity increasing of the 3rd class stations. As for the arrangement of monitoring area, the focus will be put in the "hot point", specially the major estuaries and bays, the area with frequent rad tide appeared, fishing grounds, ocean dumping sites, oil development area, nuclei power station adjacent area, marine natural reserves, and important land based pollutant sources adjacent area. On the base of taking water quality monitoring as the host presently, the techniques for sediment and living organisms monitoring will be advanced towards the goal of taking the living organisms monitoring as the host gradually. In addition, great attention will be paid on the monitoring of virus contamination of marine economical shellfish. Since the routine monitoring activities with fixed sampling points, time period and measuring elements can only indicate normal status of the area to be monitored, the compliance and tracing monitoring capability should be developed for the system in order to meet the requirement of solving the problem of heavy marine pollution accidents and pollution introduced regional environment problem. In coming years, the second near shore base line survey for marine environmental pollution will be carried out for the purpose of understanding the variation of pollutant base line, as well as the effects of pollution on the fisheries and human health after the first base line survey conducted in 1970's. In view of the marine environmental quality monitoring is the basis of marine environment management, and effects of the monitoring giving service to the management depend on the monitoring system can produce quick and useful products or not, the China Sea Marine Environmental Information System, therefore, should be established on the basis of present data base of marine environmental quality monitoring, and in the meantime, great effort should be made on developing service products of the monitoring data.

4. THE PLANNING OF MARINE DATA BUOY DEVELOPMENT

At present, the operation of the data buoy is divided into two types, i.e. long term observation in fixed points and short term observation in selected points. In the central part of the Yellow Sea and East China Sea, and the north part of South China Sea, there is a fixed point respectively for long term observation. The short term observation points are selected in accordance with requirement of special missions of oceanographical investigation or oceanic constructional projects mainly. The real-time observing data have been playing an active role in marine environmental forecasting.

From now to 2000, in order to enhancing the application of data buoy techniques, the following efforts will be made to:

(i) advance the capability of existing buoy operational vessels, and add buoy operational equipment on new built R/V vessels;
(ii) increase quantity of alternate buoys, i.e. to build two(2) large shallow water operation buoys and two(2) small buoys;
(iii) perfect the communicating system of real-time transmission of the buoys, on this aspect, it is considered to apply geostationary satellite communicating techniques, in the meantime, the data receive rate of short wave transmission and capacity of LUT receiver will be advanced, and the international co-operation on ARGOS system will also be continue conducted;
(iv) develop pollution observing buoy, drifting buoy and submooring data buoy system, as well as carry out intercalibration, standardization research and optimization design of the buoy;
(v) conduct methodology research and application of buoy's data 4-dimensional assimilation;
(vi) develop the profiling techniques for observing the important oceanographical elements gradually

in order to form the capability of long term comprehensive observation.

5. THE DEVELOPMENT PLANNING OF OCEANOGRAPHICAL SECTIONAL MONITORING AND VOLUNTARY HYDROLOGICAL AND METEOROLOGICAL OBSERVATION SYSTEM

The Oceanographical Sectional Monitoring will maintain the existing scale basically, in the meantime, the design and testing of sea-water dynamic models will be initiated from part to part in China Sea by means of using historical monitoring data, and China Sea investigation for the source and sinks of green-house gases will be carried out. On the basis of stabilizing the quantity of observation vessels, the voluntary hydrological and meteorological observation system will seek for enhancing efficiency of its operation.

6. THE NATIONAL MECHANISMS OF NATIONAL AND INTERNATIONAL CO-OPERATION RELATED TO GOOS

The State Oceanic Administration (SOA) is the governmental agency implementing ocean comprehensive management, and it plays an important role in the national and international co-operation related to GOOS. On the national level, the National Marine Environmental Monitoring Network, which is organized by SOA, has been operated for 10 years, the relevant environmental monitoring stations belong to NEPA, Ministry of Communication, Ministry of Water Resource, Ministry of Agriculture and Navy participate in the monitoring activities of the network. The Co-operation Network of Tidal Observing stations, which was set up by SOA in the north, east and south sea area respectively, has also been operated for many years, the stations participating in the network belong to SOA, Ministry of Water Resource, Ministry of Communication and Navy. On the international level, SOA is the responsible agency in organizing and co-ordinating relevant projects, for instance, the west Asia data buoy network to be established by Working Group on Marine Environment and Marine Scientific Research, Economic and Social Commission for Asia and the Pacific (ESCAP); GEF project-- Monitoring and Protection of the Yellow Sea Large Marine Ecosystem; and Regional Programme for the Prevention and Management of Marine Pollution in East Asia Seas that is assisted by UNDP

FRANCE

1. PURPOSE OF THE DOCUMENT

The present paper reports on the French activities related to GOOS matters. The first part gives a general overview of French activities related to ocean observation. The second part describes more specifically actions taken for GOOS and related activities. It is concluded by some prospects for the next intersessional period.

2. FRENCH CONTRIBUTION TO OCEAN OBSERVATION

During the last decade, France has been deeply involved in ocean sciences. The national effort addressed primarily oceanic research through a contribution to the international projects developed under WCRP[1] and IGBP, using space-based observing systems, research vessels and submarines. But an important effort has also been initiated to support operational observing developed by WMO and IOC. The main French agencies involved in Ocean Observation are: CNES, IFREMER, INSU, Météo-France, ORSTOM and SHOM.

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[1] For the acronyms description, refer to the Appendix.

a) TOPEX-POSEIDON

France contributes for 50% to the **TOPEX-POSEIDON** programme, developed as a joint venture between CNES and NASA, as a major support to the WOCE programme. This satellite gives the best altimetric data available for monitoring ocean topography.

b) ERS-1/2

Contributing at the level of 22% to the ESA programme, France is now making extensive use of the operational data produced by the system, in support of marine weather services and oceanic research. The national involvement in the data archive network is also important, through the Processing and Archiving Facility (CERSAT) dedicated to scatterometer, altimeter and SAR wave mode data.

c) ARGOS

The operations and commercialization of the **ARGOS** data collection system, based on the US meteorological satellites of the TIROS series has appeared as a major infrastructure for ocean observing programme.

d) Oceanographic Fleet

France provides to the national and international scientific community the support of ten research vessels and two research submarines managed by IFREMER. This fleet is extensively used in support to TOGA, WOCE and JGOFS.

e) International programmes under WCRP

The national participation to TOGA and WOCE, is co-ordinated under the general framework of a national programme for Climate Dynamic Studies (PNEDC). It includes the deployment of drifters and buoys, the equipment of ships of opportunity, the participation to special research campaigns such as TOGA-COARE, participation in programme data archive and developments in ocean modelling.

f) IGOSS, GLOSS, IODE and DBCP

The French agencies contribute to the operational collection, archiving and distribution of oceanic data co-ordinated by international bodies like IGOSS, GLOSS, IODE and DBCP. Short reports on these points are given in the next section.

The national effort in support to ocean observation can be estimated to nearly 1 GFF (167 M$ in 1992). On the average, 50% of this amount is dedicated to the oceanic satellites programmes, 25% is used for supporting the oceanographic fleet, 10% to support the programmes under WCRP and IGBP. The remainder can be assigned to already operational activities, mainly under the responsibility of meteorologists and hydrographers.

3. TECHNOLOGY IN SUPPORT TO OCEAN OBSERVATION

a) Systems for coastal zone monitoring

The most important endeavors is the MAREL network, under development by IFREMER with industrial partners. It relies on autonomous systems (moored buoys) for collecting physical and chemical parameters in coastal waters and transmitting the data through satellites. New sensors are also being studied, with special emphasis to their behavior in the drastic sea water conditions (pressure, corrosion, fouling, ...).

Remote sensing is actively used for coastal environment management. Various centres in France and the overseas territories make active use of high resolution SPOT images for pollution monitoring and mapping of island environment. The use of ERS-1 SAR images appears as promising for operational

monitoring of coastal waters.

b) Open Ocean monitoring

Drifting buoys (MARISONDE) are operationally deployed by Météo-France. IFREMER has developed special drifters to trace surface currents (TOGA buoy) or deep sea currents (MARVOR float). This last one is followed acoustically and capable of surfacing periodically to transmit its data by the ARGOS system which will allow for the reconstitution of the trajectories.

The field of AUV (Autonomous Unmanned Vehicle) offers a challenge and opportunity for automatic data collection under the sea surface. Part of the NERC's AUTOSUB project is now approved as an European MAST II project under the title of "advanced Systems Research for Unmanned Autonomous Underwater Vehicles", with a main financial support of France, UK, together with Greece and Portugal.

c) Sea floor technology

Sea floor laboratories are under development, for collecting information on the deep sea. Transmission from the bottom to the sea surface is a difficult challenge. IFREMER has designed TIVA which can transmit data or pictures through the vertical acoustic channel. TIVA is able to transmit 6 colour pictures per minute, with a definition of 480 x 240 pixels. Such laboratories could be supported by ROVs (remotely operated vehicles).

4. OCEAN OBSERVATION PROGRAMMES RELEVANT TO GOOS

4.1 DBCP

The Data Buoy Co-operation Panel is an action group of WMO and IOC aimed at co-ordinating the efforts of countries operating buoys. The contribution of French agencies in 1993 has covered two types of activities: operations and research.

Météo-France has continued to maintain an operational data buoy network for acquisition of surface and subsurface data within the bay of Biscay, in support to weather forecast and to technology development.

The most important effort has been done during intense observation campaigns part of international (TOGA-COARE) and national (SEMAPHORE) experiments. Special attention shall be given to the last experiment, dedicated to the study of mesoscale circulation and air sea interaction, during which more than 100 floats of different types have been deployed simultaneously. It has allowed to learn about the operational potential of these *in situ* measurement devices.

4.2 GLOSS

At the beginning of 1994 France gives a significant contribution to GLOSS by operating twelve sea-level stations along the national coast and in remote areas of the territories in the Pacific, Indian and Antarctic Oceans. Three more are planned.

This effort covers the installation, operation, maintenance and scientific exploitation of sea-level stations located in especially rough areas. It is conceived as a contribution to programmes like WOCE, in complement of satellite altimetric missions.

4.3 IGOSS

The French meteorological centre in Toulouse is active in both IGOSS data processing system and IGOSS specialized oceanic data centres. Data quality control is applied to Bathy-Tesac observations entered into the GTS in Toulouse. It covers the conformity of reports to the FM-Bathy/Tesac format (inclusion of a report identifier, groups of five numerals), the series of groups and consistency of component

parameters (date, position series of depths, temperature peaks and salinity, etc.). The products issued are described in the information bulletin on IGOSS.

This activity is associated with the specialized data centre for drifting buoys, archiving the DRIBU data circulating on the GTS. Regular information is provided to national IGOSS representatives, and IGOSS officials. More than 850,000 drifter messages have been archived in 1993. Most of the reports come from the ARGOS processing centre in Toulouse, and some come from the Radio telecommunication centres

4.4 TOGA

Since 1985, ORSTOM and IFREMER are managing the subsurface data centre. At the present time, more than 240,000 temperature and salinity profiles collected between 30°N and 30°S are archived. Most of these profiles are acquired by voluntary observing ships. The data base merges real time information coming through the GTS with the data transmitted in delayed mode. It is planned to extend the system to the world ocean, in support to WOCE.

Consistently, ORSTOM is managing about 21 voluntary observing ships operating XBT systems with transmission via satellite. These ships are operated along identified shipping lines, four in the Atlantic, three in the Indian and three in the Pacific.

The transfer of these actions to an operational programme within the framework of GOOS is now to be studied.

5. GOOS IN FRANCE

5.1 EVENTS OCCURRED SINCE THE FIRST MEETING OF I-GOOS

Following the recommendations of the first I-GOOS meeting, France has initiated the definition of its contribution to the system. The work has started with the agreement of the major institutions involved in oceanic science and oceanic services (CNES, CNRS, IFREMER, IFRTP, Météo-France, ORSTOM, SHOM). The major events from February 1993 read as follows:

a) A programmatic document on a National Programme for GOOS (GOOS/France) has been drafted. Its major objectives have been endorsed by the interested Agencies. It is now being submitted to government authorities.

b) A National Office for the GOOS[2] has been established. It is supported by Météo-France and IFREMER. Its main task is to co-ordinate the definition and the implementation of the French Contribution for GOOS.

c) A Scientific Workshop on GOOS-France is organized in May 1994, to help defining the key projects to be inserted within the French programme for GOOS.

5.2 FUTURE PLANS

The first actions within the national contribution to GOOS are expected to start in 1995. Relying on the experience described in sections 2 and 3, the French efforts for GOOS are proposed to be focused around the development of observing systems of three identified oceanic areas:

(i) the inter-tropical oceans,
(ii) the Atlantic ocean and its adjacent seas,
(iii) the national and overseas territories exclusive economic zones.

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[2]/ GOOS-France - 155 rue Jean-Jacques Rousseau - F-92138 ISSY LES MOULINEAUX CEDEX - Tel: (33 1) 46 48 22 11 - Fax: (33 1) 46 48 22 24

Specific projects within these oceanic areas will primarily address the following themes:

(i) contribution to the definition and development of the space segment for GOOS,
(ii) implementation of centres for data processing and archiving in view of the production of oceanic services,
(iii) implementation and long-term operation of *in situ* data acquisition networks relying on cost-effective instruments,
(iv) development of an European contribution to GOOS,
(v) support to sustainable development.

The above list is not exhaustive. It only summarizes the national priorities towards the development of operational oceanography.

6. CONCLUSION

The development of GOOS is identified in France as one of the important endeavors for oceanography within the next decade. The national partners have initiated the first steps towards the definition of a comprehensive contribution to the system. It is hoped that the planning meeting in Melbourne will allow to define the international structure enabling to build-up an efficient synergy between Member countries potential.

APPENDIX

LIST OF ACRONYMS

CNES	Centre National d'Etudes Spatiales
DBCP	Data Buoy Co-operation Panel
ESA	European Space Agency
GLOSS	Global Sea Level Observing System
GOOS	Global Ocean Observing System
IFREMER	Institut Français de Recherches pour l'Exploitation de la Mer
IFRTP	Institut Français de Recherche et Technologie Polaires
IGBP	International Geosphere Biosphere Programme
IGOSS	Integrated Global Ocean Services System
INSU	Institut National des Sciences de l'Univers
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanic Data Exchange
NASA	National Aeronautic and Space Administration
ORSTOM	Institut Français de Recherche Scientifique pour le Développement en Coopération

SAR	Synthetic Aperture Radar
SHOM	Service Hydrographique et Océanographique de la Marine
TOGA	Tropical Ocean and Global Atmosphere
WCRP	World Climate Research Programme
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment

GERMANY

The German Federal Government's medium-term plan for marine research and technology expresses the interest of Germany to participate in the Global Ocean Observing System (GOOS). Germany is in the process of building up national organizational structures for planning and implementing its contribution to GOOS.

The Bundesamt für Seeschiffahrt und Hydrography (BSH - Federal Maritime and Hydrographic Agency) in Hamburg has been designated to act as the national GOOS Secretariat. It will co-ordinate the German activities within GOOS and liaise with relevant international organizations and programmes. The establishment of a German GOOS Committee and a scientific advisory body is under consideration.

The main area of interest for German governmental institutions is the North Atlantic Ocean and adjacent seas. Research institutes however operate in the entire Atlantic Ocean, Indian Ocean, and in the two polar regions. Therefore, German priorities in GOOS relate to (i) rising sea-level, (ii) wave conditions, (iii) ship routing, (iv) water quality conditions in the North and Baltic Sea, and (v) climate changes in Europe.

Germany is in a good position to participate in GOOS from the beginning, because of its activities in running scientific and operational programmes. Germany participates in monitoring programmes of regional conventions for protecting the sea (Oslo-, Paris-, and Helsinki Convention).

(i) **Current German participation in international programmes Germany participate actively in the following research programmes:**

- World Ocean Circulation Experiment (WOCE);
  (repeated hydrographic section between Greenland and Ireland, ships-of-opportunity in North and South Atlantic Ocean, drifting buoys, RAFOS, Pegasus)

- Joint Global Ocean Flux Study (JGOFS);
  (research cruises in the North Atlantic Ocean, International JGOFS Office)

Germany is actively supporting the following services programmes:

- Monitoring of the oceans as contribution to the regional conventions on preventing marine pollution (Paris-, Oslo- and Helsinki Convention)

- Integrated Global Ocean Services System (IGOSS);
  (Ship-of-opportunity Programme with XBT, XCTD and SST measurements, IGOSS National Oceanographic Centre)

- International Oceanographic Data and Information Exchange (IODE);
  (German Oceanographic Data Centre, Specialized Analysis Centre for the WOCE-WHP)

It maintains in its waters:

- a network of automatic recording stations on the German continental shelf (see figure); (temperature, salinity, oxygen, currents, waves, radiology; some records extend back to the 1920s)

- Sea-level observations at the German coasts;
  (tide gauge "Cuxhaven" is part of GLOSS, its records extend back some 140 years)

(ii) A review of future application relevant to GOOS is underway for

- Satellites;
  Receipt, processing and archival of NOAA satellite images from the Northeast Atlantic Ocean and adjacent seas (preparation of SST and sea-ice charts). The evaluation of microwave data for operational purposes has started.

- Modelling;
  At present all ocean modelling work is provided at research institutions: coupled ocean/atmosphere models, wave forecast modelling, eddy-resolving North Atlantic models and global ocean circulation models. Links between research and agency groups are being enhanced.

(iii) Plans for the Future

A German participation in GOOS will have to meet the needs for

- climate research
- long-term monitoring of climate changes
- climate prediction
- protection of Germany's shoreline
- identification and monitoring of the impact of global climate changes on regional and coastal ecosystems
- health of the ocean

Therefore, it is planned to participate in programmes

- to monitor the upper ocean to estimate the spatial distribution and temporal variability of heat, freshwater, salinity, CO_2, Plankton, sea-level as well as the transport of energy and substance through the ocean/atmosphere interface;

- to measure systematically, in suitable space and time intervals, the ocean circulation, the variability of important physical and chemical parameters, and the transport of CO_2 and particulate matters in the deep ocean.

INDIA

1. INTRODUCTION

1.1 A Report on the activities in India related to GOOS was presented, by Mr. B.N. Krishnamurthy, Director, Department of Ocean Development, Govt. of India, New Delhi, at the meeting of the IOC Committee for GOOS which met in Paris, 16-19 February 1993. Some programmes are continuing and some new have been taken up during the preceding year. It was mentioned in that Report that India is implementing the following programmes which are related to GOOS:

(1) Marine Satellite Information Service - MARSIS
(2) Sea Level Monitoring & Modelling - SELMAM
(3) Coastal Ocean Monitoring & Predicting System - COMAPS
(4) Joint Global Ocean Flux Study - JGOFS
(5) National Ocean Information System - NOIS

1.2 Under the MARSIS programme remotely sensed data from satellites is utilized to develop products like sea surface temperature, potential fishing zone maps (based on sea surface temperature), ocean eddies, coral reef and coastal maps etc. to disseminate to the end users. Under the SELMAN programme, it is proposed to establish 13 state of the art tide gauges for measuring tides for assessment of the mean sea level and its variations. It is also proposed to prepare detailed coastal maps which will be helpful in assessment of the damages, more realistically, due to storm surges or expected sea level variations in the long range. Two tide gauge stations were set in the preceding year. Under the COMAPS programme a watch is kept on the health of the water by taking samples regularly and analyzing them for possible pollutants, including heavy metals.

Based on the experience of routine monitoring, some locations potential to become hot spots, have been identified for close monitoring. Wherever the levels of pollution are found to be crossing the threshold limit, the concerned authorities have been alerted to take remedial action. Under JGOFS programme one cruise has been completed for about 10 days in Arabian Sea and another cruise for two weeks is planned in April 1994. The objective of the programme is to obtain a better understanding of the time varying flux of carbon and associated biogenic elements in the Arabian Sea. Under NOIS, 13 marine data centres have been established for storing specific ocean parameter in each of them. These centres are being interconnected by establishment of micro earth stations at each of them. The system would facilitate the national laboratories and other scientific community to access ocean data.

1.3 A National Committee on GOOS has been duly constituted. The Committee is headed by the Secretary of the Department of Ocean Development and consists of members representing important institutes in India carrying out work on ocean science and services. Some of such institutes are, National Institute of Oceanography, Naval Physical & Oceanographic Laboratory, Survey of India, Physical Research Laboratory, etc.

2. SOURCES OF DATA GENERATION IN INDIA

Data on physical, chemical, biological and other ocean parameters is being generated in India by the following:

(i) Research vessels belonging to the Government of India research organizations.
(ii) Data collected by research institutes for a specific developmental projects like ports, offshore stations, etc.
(iii) Programmes of the Department of Ocean Development *viz.* MARSIS, SELMAM, etc.
(iv) Programme of the India Meteorological Department.
(v) Programmes of Indian Council of Agricultural Research relating living resources.
(vi) Geological Survey of India.
(vii) Moored and drifting buoy programme.

National effort is on to systematize the collection of data and store specific parameters in specialized marine data centres under the National Ocean Information System mentioned at para 1.2.

3. NEW PROGRAMMES

3.1 NATIONAL INSTITUTES OF OCEAN TECHNOLOGY (NIOT)

A National Institute of Ocean Technology has been established in India in the premises of Indian Institute of Technology, Madras in November 1993. NIOT will concentrate on development of technologies for exploitation of marine resources where as the already existing National Institute of Oceanography (NIO) will continue to do research and develop technology for surveys of ocean resources. The NIOT has been

given specific missions to begin with, as follows:

(i) Wave Energy
(ii) Sea Bed Mining
(iii) Coastal Zone
(iv) Marine Instruments

3.2 NATIONAL DATA BUOY PROGRAMME

The information on parameters like waves, winds, etc. is being collected in India on a site specific basis for a developmental projects so far. Spatial data covering the Arabian Sea and Bay of Bengal is not available though some of it exists in the form of ships' observations. Hence India is proposing to have a programme of establishing met-ocean data buoys covering the Arabian Sea and the Bay of Bengal. A National Committee has been constituted by the Department of Ocean Development to advise on the number, type of buoys, operation, management and maintenance.

3.3 IOC-UNEP-WMO PILOT ACTIVITY ON SEA LEVEL VARIABILITY IN THE COASTAL REGION OF INDIA

The Department of Ocean Development have approved a project proposal by Dr. S. Shetye, Scientist, NIO, GOA with the following major objectives:

(a) to study evolution of storm-surges in the Bay of Bengal;
(b) to study the sea level variability in the coral islands of Lakshadweep archipelago, and
(c) to develop a numerical model capable realistic simulation of tidal circulation on the shelf along the east and west coast of India.

The research project is expected to produce first order estimates of tidal currents needed for offshore and maritime activities useful in marine pollution dispersal, design of offshore structures, prediction of storm surges, monitoring coastal currents and their fluctuations, etc.

The estimated cost of the project is Rs. 4.00 million and the duration 4 years.

3.4 TRAINING EDUCATION AND MUTUAL ASSISTANCE

The Department of Ocean Development is getting a report prepared on the facilities for training available in India at different Institutes and the training facilities required by the Indian scientists abroad, in ocean science and service sectors. The report is under finalization and will be sent to IOC for further action in due course.

ITALY

ENEA is interested in participating in the Global Ocean Observing System (GOOS), within the framework of a wider italian participation which is in the process of being defined among several research and industrial institutions to be presented to the appropriate government decision makers.

In order to include a Mediterranean perspective within GOOS, a Permanent Committee of Mediterranean Marine Research Institutions (MEDMARIS) has been established with French, Spanish and Greek participation. ENEA CNR (the Italian National Research Council) and ICRAM (Italian Institute for Marine Applied Research) are full members of this Permanent Committee.

At his last meeting, the above committee has decided, among others, to organize a working group on a possible MEDGOOS with the following main tasks.

1. Define regional priorities within GOOS;

2. Establish a network of GOOS focal points, one member organization for some or all of the five GOOS modules;

   This network should promote the development of GOOS components that would meet specific Mediterranean interests and stimulate, through workshops or fora, the involvement of leading Mediterranean industries in space, sensors, modelling and communications;

3. Identify and estimate the amount of regional resources to adequately participate in the various phases of GOOS (1990-2000, 2000-2007 and from 2007 onwards);

4. Prepare a regional proposal to participate in GOOS activities to be presented to national governments in a concerted manner to allow them to coordinate their decisions in comparison with the program at the Mediterranean level.

The four mentioned Countries should hold their first meeting after the Melbourne I-GOOS Meeting and define their schedules and operational modes in order to present the first report to the Mediterranean Conference to be held in Venice on the 10-11 November 1994.

In the meantime, ENEA has approved on the 22nd December 1993 the "Mediterranean Basin Project", a multiannual programme for a global ecological model, connected with environment and development, involving scientific, technological and socio-economic aspects of the Mediterranean area.

The project had the support of the Italian Parliament Committee for Technological Innovation to stimulate legislative and financial instruments.

The project aims chiefly at planning, carrying out, managing and maintaining an overall system of analysis, research and operations in the Mediterranean area, consisting of:

a) oceanographic and atmospheric models;
b) an integrated system (hardware, software, procedures, services) centered on massive parallel computers designed and built in Italy;
c) an information system and data bank;
d) a real time monitoring system;
e) a telematic network to gather and publish the information gained.

Alenia Spazio, a leading company in space technologies teletracking and parallel supercomputing is the reference as to the aspects concerning H.P. computing and related technologies, synthetic aperture radars, prime contracting of all industrial activities.

In practice, the Mediterranean Basin Project is becoming an important Italian contribution to international environmental programmes in the region related to areas such as global and climate change (IGBP, GOOS), coastal management and natural hazard prevention and protection. In fact the Project is intended to become not only a major national initiative for developing and applying highly innovative technologies for the monitoring, protection and management of the Mediterranean Basin, seen as an element unifying the terrestrial, atmospheric and marine environment but also a national frame of reference for international action in the region.

Within this project, ENEA is setting up a "Study of the Relation between Surface and Signature and Three Dimensional Dynamic Structures in the Mediterranean Sea". The aim of the study is to use altimeter and *In situ* data to examine the relationship between the surface signature of the Mediterranean circulation in the dynamic of its interior.

The intention is to combine altimeter, scatterometer and in situ data to improve the present understanding of the general circulation of the Mediterranean sea at different time and space scale (from

the meso-scale to basic scale).

Satellite and *in situ* data will be either assimilated or simply used as forcing into numerical models.

Simultaneous observations of volume anomaly (from *in situ* temperature and salinity measurements) sea level gauges and altimetry will allow the partition into barotropic and baroclinic signal of the altimeter. Once the means of performing this partition will be achieved, the separated components will be practically applied to dynamic modelling.

The objectives of the investigation are the following:

a) Study seasonal and infra-annual variability of the general circulation of the Mediterranean Sea using altimeter and *in situ* data;
b) Relate subsurface structures to altimeter estimate of the sea level variability under different forcing;
c) Use altimeter and *in situ* data for the partition between the barotropic and baroclinic contribution of the altimeter signals;
d) Provide a long term calibration of the satellites ERS-1/2 altimeter measurement over a selected site;
e) Use scatterometer data to force numerical circulation models;
f) Assimilate altimeter and in situ data into numerical circulation models.

The Experimental plan and data requirement are concerned with the following issues:

1) Geographical areas of *in situ* measurements will be the Sicily and the Sardinia channels and the Ligurian Sea, where ENEA have set up an observatory nearby the Research Centre of St. Teresa, in La Spezia.
2) Current meter chain will be moored at some cross-over points for a period time of about one year;
3) A current meter chains in the Corsica Channel will be maintained for the entire life period of the ERS-2 as well as a sea level gauge in the Caprate Island.
4) GPS campaigns will be occasionally conducted by the French groups (F. Barlier) in the framework of ENEA/OCA-CNES collaboration;
5) Meteorological data coming from the Ligurian Sea surrounding stations will be collected and analyzed for the period of ERS-2 life.

JAPAN

1. INTRODUCTION

Japan has established the pioneering hydrographic repeated sections in the western North Pacific Ocean since 1960's and will utilize the recent world impetus to maintain and enhance the existing ocean observation system. Japan, having insight into the initiatives of the existing operational observation programmes to be taken in GOOS activities, also recognizes the importance of establishing an interactive scheme among basic researches, technology development and the operational programmes.

Japan holds the various Ministries and Government agencies in taking part in GOOS and conducting the related activities. The Ministry of Education, Science and Culture (Monbusho) and the Science and Technology Agency (STA) have been supporting basic studies and technology development towards the establishment of GOOS, while conducting the researches in relation to WOCE, TOGA, etc. Various operational activities have been carried out by other governmental organizations. The Japan Meteorological Agency (JMA) has been taking the initiatives in I-GOOS and GLOSS, and recently established its El Nino monitoring Centre. The Hydrological Department of the Japan Maritime Safety Agency (JHD) has been working as the Japan Oceanographic Data Centre of IODE and conducting oceanographic observations and marine pollution monitoring in the Western Pacific Ocean. The Japan Fisheries Agency (JFA) is the authority responsible for living resources and the related environmental issues of marine and freshwater

realm, while making remarkable contributions to coastal zone monitoring. The Environmental Agency (EA) has been carrying on marine pollution survey in the coastal zone of Japan. The Ministry of Post and Telecommunications (MOPT) has been operating tropical rainfall measuring in the scope of atmosphere-ocean coupled interaction and oil pollution surveillance through its satellite and airborne radar. The Ministry of Construction (MOC) has been conducting various researches on sea level rise and its socio-economic impact from the view point of coastal zone conservation. Module-wise summaries of their activities are available in item 3. of the report, detailed descriptions in item 4. Future scope is accessible in item 5.

It should be stressed that Japan has been actively participating in TEMA and technology transfer activities within the frameworks of IOC/WESTPAC and bilateral co-operation programmes, providing opportunities to participate in data process and management seminar and on-board training, etc.

2. PRESENT STATUS OF GOOS DEVELOPMENT AND IMPLEMENTATION

2.1 CLIMATE MODULE

One of the most important targets of the Climate Module of the GOOS is understanding of climate change including El Nino in the tropical Pacific and global warming. For this purpose, long-term and comprehensive oceanographic data are indispensable. Furthermore, reliable prediction of climate change requires sophisticated numerical models. Taking into account the crucial role of atmosphere and ocean coupled system in climate change, the Climate Module of the GOOS should be forwarded in co-operation with the GCOS.

In Japan, the Japan Meteorological Agency (JMA), the Japan Hydrographic Department, Maritime Safety Agency (JHD), and the Fisheries Agency (JFA) have been making oceanographic observations on board research vessels in the seas adjacent to Japan and the western North Pacific on an operational basis. The observation networks maintained by the said Agencies have provided us with comprehensive long-term data sets and they are expected to enable us to reveal characteristics of the variations of the ocean. To enhance the monitoring activities related to the global warming issue, the observation of greenhouse gases such as carbon dioxide and methane both in the atmosphere over the ocean and in the ocean from surface water to deep ocean was initiated in 1989.

The Science and Technology Agency (STA) also has been conducting observation and research programmes through its executive bodies, the Japan Marine Science and Technology Centre (JAMSTEC) and the National Space Development Agency of Japan (NASDA). JAMSTEC has been carrying out Equatorial Pacific Ocean Research, Arctic Ocean Research, etc. NASDA has been carrying out satellite observation of the Earth.

In addition to the operational observations using observation vessels, various facilities including moored/drifting buoys, tidal stations, satellites and voluntary observing ships are employed in an integrated manner for monitoring and researches of the ocean. Moreover, governmental research institutes and universities are making efforts to develop oceanographic observation techniques and to implement research-oriented ocean surveys related to climate change.

Oceanographic data are exchanged nationally and internationally with a view to preparing oceanographic products disseminated not only locally but also globally. These data are also widely used in the studies on oceanic conditions. For the monitoring and prediction of the oceanographic phenomena such as El Nino, and for timely dissemination of the oceanographic information, oceanographic data are collected on a real-time basis within the frameworks of World Weather Watch (WWW) Programme and IGOSS. Furthering of the activities related to GOOS cannot be achieved without the free and unrestricted international exchange of oceanographic data.

The above data are archived in various data centres within the frameworks of the IODE, Global Atmosphere Watch (GAW), etc. and are utilized for researches. Data distribution systems are required to be enhanced to provide researchers with long-term global and comprehensive data sets for understanding the oceanographic processes in the climate system.

2.2 LIVING MARINE RESOURCES MODULE

Studies on the ecology of marine living resources has been carrying out extensively by related various research institutes and universities. Japan catches several million tons of fish within its 200 miles zone every year. The status of those living resources are monitored in terms of species and stocks based on commercial fisheries and research vessels of National Fisheries Research Institutes (NFRI) and prefectural fisheries experimental stations. The main monitoring items are the geographical distribution of stocks, fishing efforts and catches by age. Based on these data, stock size by age and allowable biological catches are estimated. The data obtained are managed by the six regional fisheries research institutes and a summary report is published by the Fisheries Agency every year.

Regarding the main fishery resources distributed around Japan, expectable fishing grounds and catches of the next fishing season are for casted by identifying sea condition and distribution, migration and abundance of pre-recruit stock. Observation and forecasting have been made by NFRI and prefectural fisheries experimental stations since 1935 onward to attain more efficient fishing industry.

Japan has extensive high sea fisheries. The National Research Institute of Far Seas Fisheries (NRIFSF) has been conducting the observation on the status and, management of high sea fishery stocks.

The Japan Marine Fishery Resource Research Centre (JAMARC) has been searching undeveloped fishery resources in highseas and in the 200 mile zone of the foreign countries. Many undeveloped fishery resources were found by the research vessels operated by JAMARC, and many of them became utilizable on the commercial basis. The data obtained are managed by JAMARC and Japan Fisheries Agency.

The observations of plankton and environmental parameters which are very important to elucidate mechanism of fluctuation of marine living resources has been made by the Environmental Agency, the Meteorological Agency and local governments. The Japan Oceanographic Data Centre (JODC) has managed those data in digital form.

The development of new techniques to monitor the plankton biomass abundance has been tried by using an acoustic technique and the satellites data, and zooplankton counter by the Ocean Research Institute, the University of Tokyo and the Japan Marine Science and Technology Centre (JAMSTEC), respectively.

2.3 COASTAL ZONE MODULE

Monitoring and assessment of changes in coastal zone and near-shore areas are particularly important because of its direct effects to human habitation. In return, those areas are quite easy to be influenced by human activities. In some cases, the influence would be too harmful and unable to be recovered. Therefore, the continuous and insensitive efforts of observing coastal zone are indispensable to conserve those sensitive ecosystems, and also interdisciplinary approach that integrates physical, chemical, biological and geological observations are required.

From this point of view, the Japanese Governmental Organizations have conducted several observing activities of different forms. The Japan Marine Science and Technology Centre (JAMSTEC) has participated in Marginal Sea Flux Experiment in the West Pacific to understand the transports and transformations of carbon, nitrogen, which are biologically important on the continental margin around Japan. The Port and Harbor Research Institute (PHRI) of the Ministry of Transport (MOT) observes and analyses coastal waves at 42 NOWPHAS (Nationwide Ocean Wave information network for Ports and Harbors) offshore stations since 1970. The Japan Hydrographic Department, the Maritime Safety Agency (JHD) is conducting the survey in the coastal area and publishing the Basic Map of Coastal Seas to provide the detailed coastal information, and also conducting observation of coastal currents, coastal pollution included of water and sediments. The Japan Meteorological Agency (JMA) is conducting the observations of sea water temperature at coastal stations and al nine tidal stations on tsunami and storm and providing sea level data to IGOSS Sea Level Programme, associated with global warming. The Ministry of Construction (MOC) has conducted various researches through the Geographical Survey Institute, to assess

the effects of rapid sea level rise (SLR) and collect basic information of the coastal sea area.

2.4 HEALTH OF THE OCEAN MODULE

In Japan, the water quality monitoring in public water is conducted regularly under the Water Pollution Control Law (WPCL). In fiscal 1990, 186,567 samples were collected at 5,458 monitoring stations (river station: 3,869, lake station: 276, marine station: 1,313) and they were analyzed for harmful substances such as cadmium, cyanide, etc. Furthermore, 409,734 samples collected at 6,764 monitoring stations (river station: 4,213, lake station: 416, marine station: 2,135) were analyzed for items regarding the conservation of the living environment in items of BOD, COD, DO, pH, etc. The ratio of samples exceeding Environmental Quality Standards (EQS) regarding health items has reduced remarkably since 1971. However, in Tokyo Bay, Ise Bay and Seta Inland Sea, which are enclosed sea areas, achievement of EQS remained in the same level as recently.

An annual marine pollution survey in adjacent seas of Japan has been conducted since 1975 by the Environment Agency (EA). In the survey, total 42 sampling points were set on the observation lines that extended from the Japanese coast. The survey investigates concentration of harmful substances (Cd, Pb, As, Hg, PCBs, etc.), as well as oceanographic data (temperature, pH, salinity, etc.) of sea water and sediments at the sampling points. The 1990 survey revealed no particular worsening of pollution level.

The National Institute for Environmental Studies, EA developed a ferry mounted monitoring system. This system deployed to investigate the temporal and spatial variation of biogeochemical parameters (dissolved nutrients, phytoplankton biomass, temperature, salinity and pH) along the ship's regular route between Pusan, Korea and Kobe, Japan. Since the start of monitoring (June 1991), the data have revealed the contrast between the Seto Inland Sea and the outer continental shelf are and the spatial heterogeneities over smaller scales.

Another survey has been conducted by the Japan Hydrographic Department, the Maritime Safety Agency (JHD) to collect basic data for marine environment conservation. In this survey, concentration of oil, PCBs and toxic heavy metals in sea waters and sediments at sampling points in adjacent seas and major bays of Japan are measured. The result also shows no degradation of marine environment by these pollutants. Tar balls drifting or cast ashore are also surveyed regularly by JHD. The 1990 survey reveals that drifting tar balls increased in the area of Japan sea and those cast ashore decreased in the southern part of Honshu, the largest island of Japan, when comparing with previous year survey.

The Japan Meteorological Agency (JMA) organize a survey to obtain background data of pollutants in adjacent seas of Japan and Western Pacific Ocean. According to the 1990 survey, the concentration of Hg and Cd remains at the same level of the previous year and the number of drifting tar balls were low since 1982.

The Japan Fisheries Agency (JFA) has started a survey which aims to reveal distribution of drifting materials in the North Pacific Ocean since 1986. The 1989 survey shows 60% of discovered drifting materials consisted of plastics and their density is high in the mid part of North Pacific Ocean and adjacent seas of Japan.

2.5 OCEAN SERVICES MODULE

As for the national operational oceanography, Japan may be counted as one of the world leading countries. There are three operational organizations who are producing oceanographic products at regular basis. The purpose for each organization is different; for example, the Japan Meteorological Agency (JMA)'s interest is focused on weather and climate forecast and monitoring, the Japan Fisheries Agency (JFA)'s on fishery, the Hydrographic Department of Japan, the Maritime Safety Agency (JHD)'s for the economy and safety of navigation, etc. Their data are, in spite of the different purposes at different organizations, exchanged in real-time basis, which may be called, in other words, purposefully independent, yet effectively co-operated hydrography for the Japanese ocean observing system.

For timely and effective services, it is necessary to establish an on-line data and information network

system, which helps to produce timely products, with helps of an efficient observation system and of data assimilation for analysis and forecasting. Especially, it is necessary to establish and maintain a full and open data sharing policy and freely and openly accessible data base, and to distribute products that satisfy the demands of users. It cannot be too much emphasized in the GOOS? in which multi-national institutions will be involved, national data hubs are indispensable.

As for data management, the Japan Oceanographic Data Centre (JODC) has been acting as the sole national oceanographic data centre and takes the responsibility of international data exchange as the focal point for the International Oceanographic Data and Information Exchange (IODE) of IOC. Also, the IGOSS Specialized Oceanographic Centre (SOC) for the Pacific Ocean collocated in the El Nino Monitoring Centre of the JMA disseminates wide-ranged operational oceanographic information and products in a printed media and by meteorological radio facsimile.

For the approach to the global environmental, oceanographic and meteorological issues on the GOOS, it is indispensable that the data, which are obtained from various types of platforms in the world, should be streamed promptly and smoothly. Based on those data, operational oceanographic products including analyses and forecasts are intensively prepared and widely disseminated to users' community. In this point of view, on-line database availability and on-line network system should be urgently established. In addition, implementation issues such as data sharing policy, data processing and data telecommunication, etc., should be co-ordinated in the GOOS project, in order to realize the on-line data management and disseminating system for the goal of GOOS.

MALAYSIA

1. INTRODUCTION

Malaysia is a maritime country bestowed with rich marine resources. The Malaysian territorial waters and Economic Exclusive Zone are supporting a large fishery industry while deep sea fishing industry is actively encouraged by the Malaysian Government. The 1993 crude oil reserve stands at 14.3 billion stb while the gas reserve stands at 76.7 trillion scf. Exploration and exploitation of these resources have contributed to the growth of the country's economy.

These activities require the construction of supporting facilities in the open waters as well as the coastal areas. In order to ensure the safety of property and life at sea while these economic activities are being carried out, and the protection of the supporting infrastructure in the coastal areas against sea level rise due to climate change and coastal erosion, there must be continuing monitoring of the marine environmental conditions. The data obtained from such monitoring would not only be beneficial towards the operational aspects, but they can also contribute towards the understanding of the variability of local marine meteorological conditions. Such understanding will lead to improved safety of the design of these structures and enhances the overall operating efficiency of these activities.

At present, there are several agencies which installed observing systems to monitor marine meteorological and physical oceanographic parameters. These parameters are the meteorological parameters such as wind and temperatures, and the physical oceanographic parameters such as waves, swells, sea levels and currents. Although these observations are made for operational purposes and engineering studies, they can also be utilized for climate variability studies if the data have been collected over a sufficiently long period.

2. NATIONAL OCEAN OBSERVING SYSTEMS

2.1 MALAYSIAN METEOROLOGICAL SERVICE (MMS)

MMS archives marine meteorological parameters such as wind, temperature, waves and swell in the

South China Sea, Straits of Malacca and other oceans of the world. These data are obtained from the Voluntary Observing Ships' (VOS) Programme. The division in MMS which manages this programme is the Division of Marine Meteorology and Oceanography (DMMO). At present, a total of 132 vessels participate in the programme.

DMMO also secures the co-operation of various oil companies to provide meteorological observations over the South China Sea. Observers at some platforms are routinely sending their real-time observations to DMMO. Of these companies, only Sarawak Shell Berhad (SSB) installed various recording instruments such as tide gauges, current meters and laser sensors for wave heights at their platforms along the coastal waters of Sarawak and Sabah. SSB has also set up a number of meteorological stations along the coast to support their operations. Their observations are transmitted on real-time mode to DMMO daily. These SSB data constitute an important component of the marine meteorological data base currently maintained at DMMO.

MMS maintains a meteorological station on an atoll (Terembu Layang-Layang) in the Spratly Islands. However, the harsh marine environment disrupts the recording of meteorological parameters. There have been many down-times and efforts are being made to improve the operating efficiency of these instruments.

MMS recently took over the collection and management of wave data measured by a wave rider buoy installed in 15-meter water depth off the east coast of Peninsular Malaysia. This wave rider was installed by the Department of Drainage and Irrigation of Malaysia (DID) in its efforts to record wave data for their coastal erosion studies in the east coast. The wave data is available to DDMO in real-time mode while DID is only interested in the processed data for its engineering study. DID will be installing a directional wave spectrum recorder soon and MMS will work closely with DID in the management of data.

2.2 DEPARTMENT OF SURVEY AND MAPPING, MALAYSIA (DSM)

There are a total of 12 tide gauge stations installed by DSM in Peninsular Malaysia and one each in Sarawak and Sabah. This network of tide gauges is aimed towards the establishment of a National Geodetic Datum for the country. DSM contributes some of its tidal data to the IGOSS Sea Level Pilot Project (ISLPP) Centre at Hawaii.

2.3 HYDROGRAPHIC DEPARTMENT, TLDM

The Hydrographic Department, as representative of Malaysia in the ASEAN-Australian Tide and Tidal Phenomenal Project (later renamed Regional Ocean Dynamics, ROD), has been working closely with Flinders University of Australia in the installation of tide gauges and collection of tidal data in the Malaysian waters. There have been technical problems to record uninterrupted data due to the harsh marine environment in which the instruments are installed.

In late 1993, the Hydrographic Department installed an Acoustic Doppler Current Profiler at Lumut in the Straits of Malacca to determine the volume of water flowing through the straits. This project is conducted under the ASEAN ROD. The processing of the data is presently done by the Australians.

3. SUMMARY

The benefits of having an ocean observing system has been constantly brought to the attention of agencies which carry out the various marine economic activities. Unfortunately, even for mariners who have vast experience sailing the world oceans and who now manage many of these economic activities, the influence of marine environmental conditions in the Malaysian waters on their operations is taken lightly. MMS found such a lack of interest a stumbling block in its efforts to seek co-operation to improve the quality of observed surface marine meteorological data as well as to expand the existing observing network.

Nevertheless, through the national IGOSS Committee and various committees on marine sciences, MMS seeks to acquire marine meteorological data from other local sources and at the same time offers its assistance and co-operation to prevent duplication in the collection of these data. The present observing systems in MMS as well as in the other agencies will continue to support the goals of IGOSS which can

contribute towards the implementation of GOOS.

MAURITIUS

Mauritius is participating actively in all the five components of GOOS.

(i) Climate Monitoring, Assessment and Prediction

Mauritius is a member of the Intergovernmental TOGA board and has participated in most of its activities and in various TOGA programmes.

(a) Sea-level programme

Mauritius has established two sea-level stations at Mauritius and Rodrigues within the framework of the TOGA Programme in 1986. Both stations are now upgraded for automatic data transmission via Satellite to the University of Hawaii. Hourly and monthly mean data forwarded regularly to the University of Hawaii and the Permanent Service for Mean Sea Level.

(b) Expendable Bathy thermograph programme (XBT)

The XBT programme on the M.V "Mauritius Pride" on the route Mauritius - Rodrigues is continuing and data is being transmitted via Argos to Brest. However no feed back has been received so far.

(c) Drifting Buoy

It is recalled that Mauritius made a nominal contribution in cash to the Drifting Buoy Co-ordination Panel (DBCP) and informed the Committee of the proposed programme within the framework of the South West Indian Ocean (SWIO) Tropical Cyclone project to procure and deploy 12 drifting buoys in a phasewise manner in the cyclone belt of SWIO to be funded partially by the European Development Fund (EDF).

However, this project has been updated and on the basis of budgetary constraints and priorities, the Drifting buoy component of the project is not being considered for implementation at this stage.

(d) Climate study and sea-level rise

Following a statement of Intent and a proposal for a country study on Climate Change, the U.S. country studies Management Team is planning to send a small team to assist Mauritius in developing a financially practical Technical proposal. The two main areas identified for study are climate scenarios and sea-level rise.

(e) Wave programme

A project to measure waves off the Southern coast of Mauritius using a wave rider buoy has been submitted to the World Bank for funding. The response has so far been encouraging and it is expected that approval will soon be forthcoming.

(ii) Monitoring and Assessment of Marine Living Resources

The Third Session of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean (Mauritius, December 1992) has recommended the establishment of a group of Experts on Ocean Service for Living Resources. A meeting of the Group is being planned in the region and Mauritius is envisaging to take an active part in this group.

(iii) Monitoring of the Coastal Zone Environment and its Changes

(a) Baseline data

Baseline data on currents, sea temperature (surface and sub-surface) is being collected in the coastal zone around Mauritius within the Oceanographic Data collection component of an Environmental Programme for Mauritius.

(b) Coastal Erosion and Coastal Management programmes

Coastal erosion is an acute problem in Mauritius. Participation in various regional programmes such as the IOC-WMO-UNEP short term pilot project vulnerability assessment in relation to sea-level rise funded by UNEP- and UNEP-IOC-WMO Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change has been initiated.

An IOC consultant recently visited Mauritius to review and provide some guidelines on the implementation of the UNEP EAF/5 Integrated Coastal Zone Management within the framework of the East Africa Regional Seas programme. A committee comprising members of different institutions/Organization have been set up to prepare a Pilot project proposal for the implementation of EAF/5 at a site in the west of Mauritius. Valuable baseline data in different fields of oceanography in the coastal zone will be collected during the implementation of this pilot project.

(iv) Assessment and Prediction of the Health of the Ocean

It is recalled that the Third Session of the IOC Regional Committee for the Co-operative Investigation for the North and Central Western Indian Ocean (Mauritius, December 1992) recommended that a workshop on Marine Water Quality be organized in the region.

Mauritius has already informed IOC of its interest to host this workshop.

An Oil contingency Plan has been prepared and is being finalized.

(v) Marine Meteorological and Oceanographic Operational Services

Mauritius is responsible, under the WMO Marine Meteorological programme for providing weather and sea forecast for International Shipping on a daily basis for the area bounded by latitude Eq-30°S, longitude 50°E - 90°E.

Under the GMDSS scheme, Mauritius has assumed responsibility for providing on a routine basis twice daily weather and sea forecast and warning for shipping within the area bounded by latitude Eq-30°S and longitude 55°E.

Special arrangements have also been made to provide such services to the national fishing fleet.

Tidal predictions are provided on a routine basis to the general public through the mass media and to other economic sectors on request.

THE NETHERLANDS

The Dutch agency responsible for co-ordinating policy on GOOS is, on an interim basis, the Netherlands Geosciences Foundation (GOA), as the successor of the Netherlands Marine Research Foundation (SOZ). Discussions on the establishment of a national GOOS committee are underway. It is expected that such a committee will be established soon under the aegis of the national committee for the

Global Climate Observing System (GCOS). The Dutch committee on GOOS will be an interagency committee.

The Netherlands is actively involved in the possible development of EURO-GOOS as well as the SEAWATCH EUROPE system. A Dutch delegate participated in the OECD Megascience Forum Experts Meeting in Tokyo in September 1993 to discuss future developments in marine sciences. The Dutch Government is well aware of the GOOS initiative as the OECD Megascience Fora are chaired by a Dutch high level policy maker.

Since some decades several monitoring networks are maintained by the Dutch authorities. These networks are operated by local authorities as well as the Ministry of Transport and Public Works. The Netherlands participates in monitoring programmes of regional conventions for the protection of the sea such as the Oslo-, Paris-, and Helsinki Convention.

The Netherlands just completed a one year's research programme in the northern part of the Indian Ocean. Research concerned the variation of the monsoon in space and time and its effect on the climate and the marine ecosystem. A large part of the research programme was devoted to JGOFS related studies. A special programme was devoted with Kenya on land - ocean interactions. Within the context of the Indian Ocean Programme (1990-1994) Partnerships in Marine Science were established with Kenya, Pakistan and the Seychelles. The aim of such a partnership is the transfer of know-how and technology (capacity building) by the execution of a joint research programme.

The Netherlands made a contribution to the IOC Trust Fund for the WESTPAC meeting in November 1994 in order to encourage the participation of scientists from the region.

POLAND

Polish governmental and academic institutions carry out research within the following international projects:

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

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

(iii) BALTEX, which is the part of Joint Global Ocean Flux Study (JGOFS): research on energy and matter fluxes between atmosphere and the ocean, aerosols generation and intensity in particular.

Besides the following research are maintained in the Baltic Sea:

(a) Regular 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.

Lots of attention is paid to modelling: models 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.

The organizational problems are not solved yet. We are still in the process of identification of capacities which can contribute to GOOS and possible sources of financial support. The organizational structures are discussed as well.

RUSSIAN FEDERATION

The Russian Federation will participate in the implementation of the basic modules of GOOS. Development of modern means of oceanographic observations, data collection and processing, and improvements in the quality of oceanographic products as well as the development of new types of products will be given the highest priority.

The Russian Federation will continue the development of the following observing systems:

(i) space born system;
(ii) network of coastal marine stations;
(iii) ship stations;
(iv) tsunami warning station network.

At present there has been experience in use of the following satellite observing systems:

(i) meteorological system Meteor-3;
(ii) earth resource system Resource-O1;
(iii) oceanographic system Ocean-O1.

Currently the time of exploitation of several satellites expired, so launch of new satellites is underway.

New and improved sateilite observation systems are at present being developed for implementation. They are:

(i) hydrometeorological system based on a geostationary satellite,
(ii) modified meteorological system Meteor-3M,
(iii) enhanced earth resource system Resource-O2,
(iv) second generation oceanographic system Ocean-O2.

Activity is underway in the country to maintain the marine observing systems in order to provide marine meteorological services with observational data and to fulfil international responsibility of the country.

The Roshydromet (Federal Service for Hydrometeorology and Environmental Monitoring) research fleet consists of 26 ships of unlimited area of operation and 17 ships for operation on marginal seas. The Russian Academy of Sciences has similar capabilities. The Roshydromet fleet is used for oceanographic and ecological expeditions, in support of activity of satellite observing stations and of the Russian Antarctic Expedition. Participation of both fleets in expeditions and observation programmes in the interests of GOOS will be encouraged.

The National Tsunami warning station network consists of seismic and hydrophysical subsystems. It is a part of the International Tsunami Warning System in the Pacific. The national system issued timely warning with respect of significant tsunami case on July 12, 1994.

Russia is planning its more active participation in several GOOS related international operational programmes such as IGOSS, IODE, GLOSS, as well as in the Voluntary Observing Ship Scheme of the WMO, which are of great importance for GOOS.

To support Ships of Opportunity Programme of the IOC and WMO the Russian Federation suggests that Russian ships be used as platforms for deploying buoys and performing oceanographic observations with the use of XBTs.

Some efforts have been undertaken to increase the volume of observations taken by Russian observing ships, particularly SHIP reports. The basic reason for the decrease of the number observations is that ships has to pay for the transmission of the reports. At present a Memorandum of Understanding

has been signed with the Department for Marine Transportation of the Russian Federation, in which there is a statement that ship reports represent the necessary basis for marine meteorological services. The requirement for the ship to be equipped with meteorological instruments is at present one of the requirements of national Maritime Register. Some arrangements are being prepared by the Roshydromet to initiate reimbursement of the weather report transmission cost to Russian ships.

The Guide to the IODE Data Quality Control has been prepared at the National Oceanographic Data Centre. The centre took active part in the development of data quality control method for the GTSPP project. The computerized method has been developed and applied for the data quality control. Currently the centre develops methods for the hydrochemical data and current measurements quality control.

Russia continues to support the activity of the WDC-B1 and monitoring data delivery to the World Data Centres. The Responsible National Oceanography Data Centre for IGOSS also performs monitoring of the IGOSS data delivery.

Oceanographic data archaeology project has started in the country. A catalogue of ship ocean expeditions has been prepared. It has been implemented in the form of specialized data base, which contains data on more than 7000 cruises on high seas. Approximately 1000 of cruises have been identified, which made observations not recorded on magnetic media.

The RNODC of the Russian Federation for IGOSS started preparation and dissemination of the following data products: high quality observational data of temperature, salinity and hydrochemical parameters; climatology of major oceanographic parameters (mean values, root mean square deviations, some additional characteristics) with 1 x 1 degree resolution, monthly and seasonal analyses of temperature and salinity for the 500 m upper layer of North Atlantic and North Pacific based on the IGOSS data.

The Russian Federation extends its GLOSS sea level observing network from which data are submitted to the Permanent Service for Mean Sea Level. The country has agreed to include several Antarctic stations in this network. Unfortunately, due to current financial difficulties continuation of the sea level observations at remote Antarctic locations and installation of new tide gauges cannot be done without international support. Russia would be also interested in international activities aimed at a connexion of national system to the International Global Geodetic Reference System.

Oceanographic studies in support of climate research will concentrate more on polar regions filling the evident gap of the current international activities. The programme "Arctic Climate System Study" of WCRP will be given high priority. Major part of the project is basically oceanographic. The following themes of research are considered: water masses structure and Arctic ocean circulation, sea ice, interactions in the system "atmosphere - ice".

Russia is starting the production of Arctic buoys. Basic components of the satellite based buoy data collection system are being elaborated. They can be used not only in polar regions. The Central Design Bureau for Hydrometeorological Instruments of the Roshydromet elaborates new version of a cost-effective drifting buoy.

A new pilot approach is being developed in Russia of making standard oceanographic observations from an helicopter, which enables to shorten the time of the survey thus leading to cost-effectiveness and better synchronization of the data.

There are some perspective designs of compact, cheap, expendable and ecologically neutral instruments for measurements of sea water temperature and conductivity, and of sea level fluctuations. All they have long time of autonomous service and are capable to transmit recorded data via acoustic channel in response to polling from a ship.

Comprehensive multi-scale oceanographic data assimilation system is being developed in the country to serve various customers in real-time mode. It will provide data for climate research and regional ocean climate studies.

To co-ordinate the activities related to GOOS the National GOOS Committee will be established within the Roshydromet. It will interact with various user community groups and agencies. It is quite probable that some specialized subdivisions aimed at major GOOS objectives will be established in Russian oceanographic institutes.

The following national agencies will take part in GOOS:

(i) Roshydromet (Federal Service for Hydrometeorology and Environmental Monitoring);
(ii) Russian Academy of Sciences.

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

In the report of the UK to the first meeting of IOC Committee for GOOS (Feb 1993) we listed the pre-existing programmes of global marine science (WOCE, JGOFS, LOICZ) and IOC programmes and committees (GLOSS, DBCP, IGOSS, IODE, TEMA) which have been continuously supported by UK. This support continues. UK presented a strong endorsement of the concept of GOOS , and urged the formation of a Joint Scientific and Technical Committee with the participation of ICSU. We are therefore pleased to note the signing of the MoU in September 1993 which creates a joint sponsorship of GOOS involving the participation of WMO, UNEP, and ICSU with IOC. UK hosted a meeting of the IAPSO Commission on Sea Level and Tide Gauge Benchmarks at Wormley in December 1993, as part of the scientific advice to GLOSS.

The UK agency responsible for co-ordinating policy on GOOS is, on an interim basis, the International Sub Committee of the Inter-Agency Committee on Marine Science and Technology (IACMST). It involves the following national agencies: Fisheries (2 agencies), Transport, Environment, Trade and Industry, Natural Environment Research, Science and Engineering Research, Naval Oceanographic Research, Meteorological Office, and the Overseas Development Agency. The IACMST has close links to other agencies such as the Office for Science and Technology, British National Space Centre, National Rivers Authority and the nature conservation agencies.

Through IACMST, UK is working to establish the priorities of operational data types, observations, and marine information services required by UK commercial companies, research organizations, and government agencies. In order to justify the case for economic investment by UK in GOOS it is necessary to identify the social and economic benefits which would accrue worldwide, at the European regional scale, and directly in the UK itself. This includes the global benefits created by the UK contribution to TEMA in GOOS. During summer 1993 a survey was conducted of British commercial and research organizations which might use operational oceanographic data during the next decade. The results of this survey provide a good guide as to the parameters which would be of greatest benefit from an operational system. UK marine operational data users expressed equal interest in estuarine, coastal shelf seas, and global data sets. They also graded and prioritized the data parameters needed in each environment, the acceptable latency of delivery, and the media and transmission methods preferred for each data type.

The 1993 survey illustrates the general scale of demand for GOOS data in the UK, and confirms the validity of the concept, as seen by UK national data users. However, it does not quantify the economic value of the data, either as a marketable product, or as a public good. Further studies and workshops are being conducted to establish potential values and costs at this level of detail. If reasonably confident estimates of linkages can be established for a few widely differing data types and applications, then the general case for investing in GOOS will be strengthened from the UK point of view.

UK delegates participated in the GOOS Workshop hosted by the Japanese Government in Tokyo in March 1993, in the OECD Megascience Forum Experts Meeting in Tokyo in September 1993 to discuss GOOS, and in the Meeting of the Panel for Living Marine Resources held in Costa Rica. UK also participates in the Ocean Observing System Development Panel (OOSDP) which is preparing the scientific assessment of the Climate Module for GOOS.

UK scientific developments related to GOOS include advances in ocean modelling, satellite data interpretation, data banking, and technology required for GOOS. The UK programme to develop oceanic range autonomous underwater vehicles (AUVs) has reached the stage of production of technology demonstrators in key areas, including the propulsion system. The outline design is complete, and the full hydrodynamic coefficients have been obtained. UK has been an active participant in the discussion to develop a European regional component of GOOS, know as EuroGOOS, and hosted a discussion workshop on this subject in London in October 1993.

In March 1994 the international conference and exhibition Oceanology International 94 held in UK was used to promote both the science and technology of GOOS. Three half day sessions of the conference programme were devoted to ocean and shelf seas monitoring. A survey was conducted of the 500 companies exhibiting equipment, and 163 expressed an interest in being involved in the development of GOOS. The addresses have been provided to the IOC GOOS Support Office.

UK supports the efforts to identify the economic and social arguments for investment in GOOS, and welcomes the creation of J-GOOS, which will ensure a sound scientific design for GOOS. The gradual development and implementation of GOOS should be based on the maximum use where possible of existing systems, combined with an efficient identification of missing elements or gaps in geographical coverage, and development of new technology to improve data rates, data quality, and speed of data transmission.

UNITED STATES OF AMERICA

The following report gives the table of contents and a summary of the complete 34-page national report prepared for the I-GOOS meeting. Copies of the complete report are available from:

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E. Environmental Protection Agency
F. Department of Energy
G. Department of State

II. U.S. Government Agencies Contributing to GOOS and Points of Contact
III. Acronym Listing

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This report documents the status of U.S. GOOS: activities which support the intergovernmental Global Ocean Observing System. U.S. GOOS is composed of the suite of scientifically-based operational measurements that will provide societally useful data and data products. It is the national contribution to the intergovernmental effort. Portions are in place, other portions are now being undertaken in a research mode and need to be converted to long-term operational efforts, and still other portions are not yet funded. The climate module of GOOS is the ocean component of the Global Climate Observing System (GCOS). Observations for societal benefit are primary, for research are secondary, but both are part of U.S. GOOS. We do not wish to draw a boundary between research and operations, but rather to work with the problems and opportunities of considerable overlap.

This current report is informal--- to other U.S. agencies and to our international partners, as well as to I-GOOS. We expect that our future reports will be to a new U.S. governmental structure for Science and Technology, the National Science and Technology Council, which is chaired by President Clinton. One of the subcommittees of the NSTC is the Committee on Environment and Natural Resources. U.S. GOOS should report to the Executive Committee of the CENR. The high level of this reporting helps validate the importance of GOOS to the U.S.

U.S. GOOS includes observations now taken from moored and drifting buoys, volunteer observing ships, research vessels, fishing vessels, tide gauges, aircraft, and satellites. Enhancements are envisioned to expand these networks, develop more advanced technology such as better buoy sensors, secure satellite ocean color and wind data, and perhaps most importantly, to make the transition from limited-term research funding to long-term operational funding for this work. Measurements will first address three high priority objectives:

- El Niño Predictions
- Detection of short-term and long-term changes, including marine ecosystems and the coastal zone
- Improved marine services

U.S. GOOS goals are:

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; marine ecosystems; the coastal zone environment; environmental quality, and marine weather and oceanographic services; and

2. To assist in research activities concerned with understanding of the topics above.

U.S. GOOS includes a strong partnership with the academic community. In addition to NOAA,

the U.S. Navy is cooperating in the operational measurements and technology and product development to support GOOS. The U.S. research activities will be focused through the National Science Foundation (NSF). The National Aeronautics and Space Administration (NASA) is contributing the suite of sensors and ground data systems that provide global views from space. An interagency working group has been set up, chaired by NOAA, which includes representatives of the Navy, NSF, NASA, NOAA, Department of Energy, Environmental Protection Agency, and State Department. Contact information for the agency representatives is given below. The Department of State chairs an interagency committee, the Panel on International Programs and Interagency Cooperation in Ocean Affairs (PIPICO), which coordinates all matters pertaining to UNESCO's Intergovernmental Oceanographic Commission (IOC) including its GOOS initiative.

Our interagency work for the next year has three primary elements:

- Develop a strategic plan for the U.S. contribution to GOOS
- Refine our relationship to GCOS in the U.S.; Mr. Robert Winokur of NOAA has been designated as the NOAA lead for GCOS, but there is not yet any U.S GCOS committee. It may be advantageous to combine the GOOS and GCOS committees.
- Seek governmental support for GOOS

We have been working closely with Japan in the development of joint activities in the North Pacific, in addition to the current high level of international activities in the equatorial Pacific in support of ENSO forecasts. We propose, with Japan, that GOOS should focus on the North Pacific Ocean as a regional GOOS activity, in cooperation with PICES for the science base.

The U.S. is now operating portions of a GOOS with plans for additions to it, but long-term resource commitments have not been made. Educational efforts need to be made to convince the public that investing in a GOOS yields a worthwhile return in social and economic benefits. When this case is made, we will begin to see more complete implementation of a comprehensive GOOS and the research needed to support it.

ELEMENTS OF THE U.S. GOOS STRATEGY

1. Articulate to the U.S. public that ocean observations return significant economic and social benefits. Applied oceanography makes use of prior investments in research: we have an excellent research enterprise; we now need to reap the benefits.

2. Cultivate academic-federal-private partnerships so as to make the best use of national expertise in oceanography and in the transition of research to application.

3. Promote directed research and technology development to insure a continued sound scientific basis for GOOS and to provide long-term observations needed for ocean research and application.

4. Foster a national infrastructure for planning, technology development, coordination, and oversight in support of the U.S. contribution to GOOS and contribute to the international efforts necessary to a) coordinate GOOS on a multi-national level and b) ensure successful participation of developing countries.

5. Place primary initial emphasis on ocean observations and data systems required for ENSO prediction, so as to gain early successes and demonstrate societal benefits in the climate module.

6. Continue and improve existing time series of ocean observations (living marine resource and plankton surveys, contaminant monitoring, oceanographic monitoring) that conform with the international strategy for GOOS.

7. Cluster U.S. coastal data requirements into a "Coastal GOOS" that merges other GOOS modules with U.S. management, assessment, and other application needs.

8. Structure a data management policy that makes utmost use of existing mechanisms, provides for synthesis of disparate data sets to satisfy users needs, and operates with an objective of unrestricted and immediate distribution of all U.S. GOOS data.

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WMO-IOC-UNEP-ICSU Global Climate Observing System (GCOS)

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ANNEX VII

LIST OF DOCUMENTS[1]

Document Code		Title
WORKING DOCUMENTS		
IOC-WMO-UNEP/I-GOOS-PS-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	Report of GOOS Intersessional Activities
	/7	Terms of Reference and Composition of J-GOOS (Memorandum of Understanding J-GOOS)
	/8	Executive Summary of the *Ad hoc* HOOP Panel
	/9	Executive Summary of the *Ad hoc* Panel on Living Marine Resources
	/10	Report on GOOS Interaction with other Operational and Research Activities
	/11	Draft GOOS Programme and Budget 1994-1995
	/12	Proposal on the Establishment of I-GOOS Implementation Panels and Sub-Committees
	/13	National GOOS Reports
	/14	Development of IOC-UNEP-WMO Coastal Pilot Monitoring Activities and Their Interaction with I-GOOS
	/15	Analaysis of Regional Perspectives
JSC-GCOS-III		Report of JSTC-GCOS-III
IOC/INF-958		GOOS Status Report - 1993 (Report of the GOOS Support Office)

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

Document Code	Title
IOC-XVII/8 Annex 2 rev.	Global Ocean Observing System (GOOS) "The Approach to GOOS
JSC-OOSDP-IX	Executive Summary of OOSDP-IX

ANNEX VIII

LIST OF ACRONYMS

ACCLAIM	Antarctic Circumpolar Currents Levels by Altimetry and Island Measurement
ARGOS	Automatic Remote Geomagnetic Observatory System
ASEAN	Association of South-East Asian Nations
ASPEI	Association of South-Pacific Environmental Institutions
ASOEM	Asian Senior Environment Officers Meeting
ATCM	Antarctic Treaty Consultative Meeting
BAC	Climate Alert Bulletin
BATHY	Bathythermograph Report
BERPAC	Bering Sea-Pacific Project
BODC	British Oceanographic Data Centre
CCAMLR	Commission for the Conservation of Antartic Marine Living Resources
CCCO	Joint SCOR-IOC Committee on Climatic Changes and the Ocean
CCOP	Committee for the Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas
CEP POL	Marine Pollution Assessment and Control Programme for the Wider Caribbean (IOC-UNEP)
CLS	Collecte Localisation Satellites
CMSPBS	Co-operative Marine Science Programme for the Black Sea
CNES	Centre National d'Etudes Spatiales
COASTS	Programme on Coastal Ocean Advanced Science and Technology Study
COMAR	Major UNESCO Interregional Project on Research and Training Leading to the Integrated Management and Coastal Systems
COSALC	Regional Project on Research and Training on Coastal Systems in Latin America and the Caribbean and their Relation with the Continental Shelf

COST	Committee on Science and Technology (ASEAN)
CPPS	Permanent Commission for the South Pacific
CPR	Continuous Plankton Recorder
CRP	Consolidated Rehabilitation Programme
DATARING	Data Acquisition for Tidal Applications for the Remote Interrogation of Network Gauges
DBCP	Drifting Buoy Co-operation Panel
DCP	Data Collection Platform
DOS	Disk Operating System
DOSS	*Ad hoc* Study Group on IOC Development, Operations, Structure and Statutes
ECOR	Engineering Committee on Oceanic Resources
ENSO	El Niño and the Southern Oscillation (USA)
ERFEN	Estudio Regional del Fenómeno 'El Niño'
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FAGS	Federation of Astronomical and Geophysical Services
FAO	Food and Agriculture Organization of the United Nations
FCCC	Framework Convention on Climate Change
FIAMS	Flinders Institute for Atmospheric and Marine Sciences
GCNS	Global Coastal and Nearshore Monitoring System
GCOS	Global Climate Observing System
GEEP	Group of Experts on Effects of Pollutants (IOC-IMO-UNEP)
GEF	Global Environment Facility
GEMS	Global Environment Monitoring System (UNEP)
GEMSI	Group of Experts on Methods, Standards and Intercalibration (IOC-UNEP)
GESREM	Group of Experts on Standards and References Material (IOC-IAEA-UNEP)
GF3	General Format 3
GIPME	Global Investigation of Pollution in the Marine Environment (IOC)

GLOBEC	Global Ocean Ecosystem Dynamics
GLOSS	Global Sea Level Observing System (IOC)
GMS	Geostationary Meteorology Satellite
GOES	Geostationary Operational Environmental Satellite System
GOOS	Global Ocean Observing System (IOC)
GPS	Global Postioning System
GTS	Global Telecommunications System
IAEA	International Atomic Energy Agency
IAPSO	International Association for the Physical Sciences of the Ocean
ICES	International Council for the Exploration of the Sea
ICG	International Co-ordination Group
ICSPRO	Inter-secretariat Committee on Scientific Programmes Relating to Oceanography
ICSU	International Council of Scientific Unions
IERS	International Earth Rotation Service
IDNDR	International Decade for Natural Disaster Reduction
IGBP	International Geosphere-Biosphere Programme (ICSU)
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
IHO	International Hydrographic Organization
IMO	International Maritime Organization
INC	Intergovernmental Negotiation Committee for a Framework Convention on Climate Change
INMARSAT	International Maritime Satellite Organization
INPE	Instituto Nacional de Pesqueras Especias
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCARIBE	IOC Sub-Commission for the Caribbean and Adjacent Regions
IOCINCWIO	IOC Regional Committee for the Co-operative Investigations in the North and Central Western Indian Ocean
IODE	International Oceanographic Data and Information Exchange (IOC)

IPCC	Intergovernmental Panel on Climate Change (UNEP-WMO)
IPP	Integrated Project Plan
IREP	Integrated Recruitment Programme
ISLP-Pac	IGOSS Sea Level Programme in the Pacific
ITIC	International Tsunami Information Centre
ITSU	International Tsunami Warning System in the Pacific
IUCN	The World Conservation Union
JASL	Joint Archive for Sea Level
JGOFS	Joint Global Ocean Flux Study (SCOR-IOC)
JSC	Joint Scientific Committee (ICSU-WMO)
LAT	Lowest Astronomical Tide
LME	Large Marine Ecosystems
LOICZ	Land-Ocean Interaction in the Coastal Zone
MARPOLMON	Marine Pollution Monitoring System (IOC)
METEOSAT	Geostationary Meteorological Satellite
NERC	Natural Environment Research Council
NESDIS	National Environmental Satellite and Data Information Service
NGWLMS	Next Generation Water Level Measurement System
NOAA	National Oceanic and Atmospheric Administration (USA)
NOS	National Ocean Service
OAU	Organization of African Unity
ODAS	Ocean Data Acquisition Systems, Aids and Devices
ODP	Ocean Drilling Programme
OOSDP	JSC-CCCO Ocean Observing System Development Panel
OPC	Ocean Processes and Climate (IOC)
OSLR	Ocean Science in Relation to Living Resources (IOC-FAO)
OSNLR	Ocean Science in Relation to Non-Living Resources (IOC-UN(OALOS))

PICES	North Pacific Marine Science Organization
POL	Proudman Oceanographic Laboratory
PSMSL	Permanent Service for Mean Sea Level
PSTN	Public Switched Telephone Network
PTT	Platform Transmitter Terminal
PTWC	Pacific Tsunami Warning Centre
RLR	Revised Local Reference
RNODC	Responsible National Oceanographic Data Centre (IODE)
ROPME	Regional Organization for the Preservation of the Marine Environment
RV	Research Vessel
SAREC	Swedish Agency for Research Co-operation with Developing Countries
SARP	Sardine-Anchovy Recruitment Project (IREP)
SCOR	Scientific Committee on Oceanic Research (ICSU)
SLC	Sea Level Centre
SLR	Satellite Laser Ranging
SOA	State Oceanic Administration (China)
SOC	Specialized Oceanographic Centre
SSG	Scientific Steering Group
STWS	Storm Tide Warning Service
TEMA	Training, Education and Mutual Assistance in Marine Sciences (IOC)
TESAC	Code for reporting an observation of temperature, salinity and currents from a sea station
TGBM	Tide Gauge Bench Mark
TGI	Tide Gauge Inspectorate
TIME	Tsunami Inundation Modelling Exchange Project
TOGA	Tropical Oceans and Global Atmosphere (WCRP)
TREDMAR	Training & Education in Marine Sciences (UNESCO)

UH	University of Hawaii
UN	United Nations
UNCED	1992 United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
VCP	Voluntary Co-operation Programme
VLBI	Very Long Baseline Interferometry
VNIRO	Russian Institute on Sea Fishery & Oceanography (Russian Fed.)
WCP	World Climate Programme
WCRP	World Climate Research Programme
WDC	World Data Centre
WESTPAC	IOC Sub-Commission for the Western Pacific
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WWW	World Weather Watch
XBT	Expendable Bathythermograph