

**Intergovernmental Oceanographic Commission**  
Reports of Governing and Major Subsidiary Bodies

**IOC Committee on International  
Oceanographic Data  
and Information Exchange**

Fourteenth Session  
Paris, 1 - 9 December 1992

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## 1. ORGANIZATION OF THE SESSION

1 The Chairman of the IOC Committee on International Oceanographic Data and Information Exchange (IODE), Dr. N.C. Flemming, opened the Session at 10.00 on 1 December 1992 at the UNESCO Headquarters, Paris.

2 The Chairman welcomed the participants to the Fourteenth Session of the Committee and presented the broad objectives of the Session:

- (i) To respond to the requirements for merged global datasets as envisaged by the Second World Climate Conference, the Intergovernmental Panel for Climate Change, and especially by the UN Conference on the Environment and Development;
- (ii) To support the procedures and systems which will enable the development of accessible global merged datasets;
- (iii) To ensure that IODE and the Integrated Global Ocean Services System (IGOSS) play a key role in the development of the Global Ocean Observing System and Global Climate Observing System;
- (iv) To improve the use of new technology, including work stations, CD-ROMs, and high speed networks;
- (v) To collaborate with the ICSU Panel on World Data Centres to provide guidance and assistance in development of the WDCs for Oceanography and of the WDCs for Marine Geology and Geophysics;
- (vi) To promote the establishment of NODCs and data and information management facilities in developing countries;
- (vii) To better integrate marine information management aspects into IOC programmes;
- (viii) To seek new sources of financial support for IODE.

3 Dr. Flemming invited the Deputy-Secretary IOC, Dr. K. Voigt, to address the Session.

4 On behalf of the Secretary IOC, Dr. Voigt welcomed the participants to the Session, to the IOC Secretariat and to Paris. In doing so, he emphasized the importance IOC has always laid on the activities of the IOC Committee on IODE. Being one of the first IOC Committees established about 30 years ago, it has always given the IOC Member States the opportunity to exchange views and find ways for further development of the oceanographic data and information exchange system. It has been the constant concern of the IOC and of its Secretary throughout the development of the system to encourage and strengthen the most fruitful bonds of co-operation, not only with the Member States of IOC, organizations of the United Nations System, the international governmental and non-governmental organizations, but also with the world scientific community as a whole. He emphasized that the findings of UNCED give a new dimension to the exploitation and research of the oceans and have opened new horizons for the IODE system.

5 Dr. Voigt invited the Committee to propose mechanisms and procedures for making the IODE system more effective and able to cope with the increasing demands for oceanographic data and information. They should include the ability to handle the immense volume of data, the capability of rapidly disseminating the data and information, a wide geographical coverage, the ability to produce useful products for different user groups.

6 In closing, he stressed that the decisions of the Session will provide a basis for evolving a sound and workable strategy, both to guide the IOC's own direct activities in the marine data and information management and to enable IOC to fulfill its role in GOOS, GCOS and as a joint specialized mechanism for co-ordinating marine research and ocean activities within the United Nations System. Dr. Voigt wished the Committee every success and a good stay in Paris.

7 The Chairman thanked Dr. Voigt for his kind words of welcome and expressed gratitude to the Secretary IOC for the continuous support provided to the IODE activities and for hosting the Session. He expressed a strong belief that the record number of participants of IODE-XIV (33 Member States and 15 International Bodies) shows an increased interest in the oceanographic data and information exchange between the IOC Member States. He noted the welcome attendance of many new IOC Member States who do not yet have NODCs, and hoped that the meeting would encourage them to form national ocean data and information management infrastructure in the near future.

8 A List of Participants at the Session is given in Annex III. **The Committee adopted** the Agenda for the Session as presented in Annex I. **The Committee decided** to establish an *Ad hoc* Resolution Committee and **invited** Dr. R. Wilson from Canada to be its Chairman. It was also agreed that an *Ad hoc* Funding Committee with the objectives: to formulate actions needed to be taken in order to have additional funding; to identify priorities; and to make estimates of funds needed to implement activities planned for the coming intersessional period, be established under the Chairmanship of Prof. F. Webster.

9 **The Committee designated** Mr. B. Searle from Australia to be the Rapporteur for the Session.

10 Dr. I. Oliounine introduced the provisional time schedule and documentation for the Session. The List of Working Documents is given in Annex IV.

## 2. STATUS OF THE GLOBAL DATA EXCHANGE

11 The Chairman summarized the major policy issues confronting IODE, and referred to his Report on the intersessional period (Document IOC/IODE-XIV/6) and to the report of the Seventh IODE Officers' Consultative Meeting, Tianjin, China, 7-8 February 1991 (Document IOC/IODE-Cons-VII/3).

12 The List of Actions required during the intersessional period (Document IOC/IODE-Cons-VII/3, Annex III) was reviewed by the Officers prior to IODE-XIV. They noted that almost all the actions had been completed, or were in hand. The Chairman thanked the numerous individuals in the data centres and members of the IODE subsidiary bodies who had contributed to the successful work achieved.

13 The intersessional period had been very busy, with major international conferences on the environment and climate, culminating in the UN Conference on Environment and Development in Rio, in June 1992. The United Nations Framework Convention on Climate Change, and the Convention on Biological Diversity contain references to the importance of open access to data and the need for data management. The importance of the ocean is recognized in Agenda 21 of the Rio Conference, *inter alia*, through references to IOC and to the Global Ocean Observing System (GOOS).

14 Three major successes during the last 3 years have been the rapid development of the Global Temperature Salinity Pilot Project (GTSP), jointly with IGOSS; the Ocean Climate Data Workshop, sponsored by a number of international organizations: CEC, WMO, ICES, ICSU with IOC as a lead agency, and hosted by the USA; and the successful start of the project on OCEAN-PC with the publication of the OCEAN-PC Inventory and the development of a pilot software package. The Chairman expressed his thanks to Dr. J. Churgin for his work in organizing the workshop and editing the proceedings, and to Dr. R. Wilson and Dr. D. McLain for the time and energy they devoted to GTSP and OCEAN-PC.

15 IODE has continued to support training in the IOC regions and the Chairman expressed his gratitude to those Member States who have hosted meetings and workshops.

16 At IODE-XIII there was an agreement between IODE and the ICSU Panel on WDCs to enter into a joint publication of the Manual on International Oceanographic Data Exchange (IOC Manual and Guides No. 9, 1991, UNESCO) and this was carried out.

17 In Europe there has been a fruitful collaboration between IODE and the Marine Science and Technology Programme (MAST) of the Directorate-General XII of the Commission of the European Communities (CEC). One result of this collaboration was the publication of a joint IOC/CEC Manual of Quality Control Procedures for Validation of Oceanographic Data, which was available at the Session as a working document (Document IOC/IODE-XIV/25).

18 The three Groups of Experts of IODE all held meetings during the intersessional period, and their reports were presented to the Session.

19 New concerns which have emerged include the need for action on the exchange and archiving of chemical, CO<sub>2</sub>, and biological data, new initiatives jointly with IGOSS on remotely-sensed marine data management and the urgency of data rescue and data archaeology activities.

20 The activities mentioned by the Chairman were considered in detail under subsequent items on the Agenda.

21 The Chairman concluded by stressing that data management was central to all the political endeavors at present being launched in regard to improving the global environment, enhancing development of the developing countries and monitoring changes in climate.

22 **The Committee expressed thanks** to its Chairman and the IOC Secretariat for their contribution to the successful implementation of tasks specified at the Thirteenth Session of the Committee in 1990.

## 2.1 MANAGING GLOBAL OCEAN DATA FLOW

23 The Committee considered Documents IOC/IODE-XIV/7 "*Monitoring of IGOSS-IODE Data Flow, Status and Recommendations for Improvement*", IOC/IODE-XIV/21 "*IOC Country Codes Review*", and IOC/IODE-XIV/22 "*IGOSS-IODE Data Flow Diagram (rev.)*", which suggested means by which improved data exchange may be achieved.

24 Dr. R. Wilson summarized the key points of Document IOC/IODE-XIV/7. **The Committee agreed**, in principle, that within the IODE and IGOSS systems there are tools and mechanisms in place such as NOPs and ROSCOPs for data flow monitoring, but the system lacks synthesis and analysis.

25 Dr. Wilson made the point that a general monitoring scheme was unlikely to work well for the complex data flows that are being developed within the global programmes, such as WOCE and TOGA. Each data flow monitoring plan must take into account the specific characteristics of the data flow. He also noted that the basis of any data flow monitoring scheme was knowledge of what data had been collected. Thus, the work of the Drifting Buoy Technical Co-ordinator, in compiling information on data collected by drifting buoys, the work of the WOCE IPO in compiling statistics on XBT data collection, and the work of NODCs in completing and submitting Cruise Summary Reports (ROSCOP) is fundamental to successfully monitoring these data flows.

26 Since each data type has different special characteristics, **the Committee proposed** that two experimental procedures should be instituted: one for temperature salinity data, and one for drifting buoy data. In the first case, GTSP would collaborate with the International Project Office (IPO) of the World Ocean Circulation Experiment (WOCE) and in the second, the RNODC for Drifting Buoys Data, the WOCE SVP, and the Drifting Buoy Technical Co-ordinator would work jointly. The detailed specifications of these projects are presented in Annex V to the Summary Report.

27 **The Committee adopted** Document IOC/IODE-XIV/7 and **requested** the IOC/WMO Steering Committee on GTSP and the RNODC for Drifting Buoys Data to proceed with the development of monitoring systems for temperature, salinity and drifting buoys data.

28 **The Committee noted** that some other international organizations such as UNEP use their own procedures for ocean data management and monitoring. Often ocean data management systems established by these organizations duplicate the IODE system of data centres and do not interact with the system at all. **The Committee recommended** improved co-operation, consultation and collaboration between IODE and other data management structures to ensure consistent data for management procedures, and **requested** the National Representatives on IODE in the IOC Member States to perform a more active stimulating role on the wide use of the IODE principles.

29 **The Committee appreciated the efforts** of the IOC Member States and the IOC Secretariat in the increase of submission and dissemination of National Oceanographic Programmes. If in 1989 only 8 NOPs had been received by the Secretariat, in 1992 there were 21 Member States which participated in this important exercise - Argentina, Australia, Brazil, Canada, China, Colombia, Ecuador, Finland, France, Germany, Indonesia, Japan, Republic of Korea, the Netherlands, Peru, Portugal, Sweden, Thailand, Turkey, United Kingdom, USA. **The Committee expressed thanks** to Japan for assisting IOC in the distribution of their NOPs and urged Member States to follow this example. **The Committee welcomed** the close collaboration of IOC with the Delaware University (USA) in circulation of OCEANIC information on planned and past oceanographic cruises and **requested** the IOC Secretariat to continue and widen this joint activity.

30 **The Committee called** on other Member States to increase their participation in the NOPs submission.

31 **The Committee discussed** the possibility of linking NOPs and Cruise Summary Reports (ROSCOP) electronically, so that data tracking could be more efficient. It was recognized that even with the simplified form which is used now, many cruises still did not get reported properly. The Delegate of France described an on-board system for preparing summaries of cruise results electronically, but this system was more complex than ROSCOP, and was part of a specialized suite of software.

32 The Chairman of the Joint IOC-WMO Committee for IGOSS, Prof. D. Kohnke, introduced a revised version of the diagram which was prepared to illustrate and update the flow of data through the IGOSS and IODE systems. This diagram includes links with the data centres of GTSP and with the special data analysis centres of the global science programmes. After comments and additional revision, **it was recommended** to include this diagram in a new issue of the Guide to IGOSS Data Archives and Exchange. It is also presented in Annex VI to the Summary Report.

33 The Oceanographic Secretary of the International Council for the Exploration of the Sea (ICES), Dr. H. Dooley, presented his proposal for the revision of a list of country codes. The problems caused by changing ship codes and country codes were discussed and the difficulty of ensuring correct transition from the codes used in one organization to codes used by another was stressed. **It was agreed** that the list contained in Document IOC/IODE-XIV/21 should be recognized as the official IOC Country Code List for the time being (see Annex VII). Some delegates noted that there is also a problem with the assignment of ship identifiers.

34 **The Committee accepted** the fact that the concern expressed by the Representative of ICES reflects the present situation and stated the requirement that such lists must be kept under continuous review. It noted that the revised Terms of Reference of the IODE Group of Experts on TADE recognized this as a need as well. **The Committee therefore agreed** to pass the responsibility to the GE-TADE to maintain these international code tables in co-operation with WDCs (Oceanography), the Committee for IGOSS and RNOCD-Formats and to make proposals to the Member States on any modifications which will be required. The GE-TADE was also requested to compile tables showing the various country code and ship code lists used by different organizations.

## 2.2 ACTIVITIES OF WDCs

35 The Directors of WDCs, Oceanography A, B and D as well as the Directors of WDCs A and B for Marine Geology and Geophysics reported on the activities of their centres during the period 1990-1992 (Document IOC/IODE-XIV/8).

36 **The Committee welcomed** the progress made by WDCs and noted that the international marine database of the WDCs, Oceanography, contains data for almost 3 million observations, including data for more than one million oceanographic stations; 569,000 bathy-thermographs; 207,000 biological observations, and 670,000 current measurements. All data held in WDCs are identified and described in the catalogues of data holdings. WDC-A, Oceanography, has used its catalogue of data to assist the co-located US NODC in compiling 3 digital files of oceanographic station data and CTD/STD data from ocean measurement programmes that have repetitive sampling at the same location for long time periods. The files include data from 27 North Pacific sections, 56 North Atlantic Sections and 29 sections for the remainder of the World Ocean. Improvements have been made to the PC-based Catalogue database; diskettes are now exchanged on a yearly basis between WDC B and D. The inter-comparison of WDC-A and WDC-B Catalogues had been performed and an effort was made to obtain the identity and completeness of WDCs archives. WDC-B created an automated catalogue based on a IBM PC/AT compatible system, the content of which is available to other WDCs in printed form, on a diskette, or via electronic communication. WDC-D, Oceanography has compiled and published 2 volumes of data collected by China.

- 37 **The Committee expressed concern** that due to the current economic and political situation in the former Soviet Union, data collections not only in different research institutions, but even in WDC-B, may be irretrievably lost and data exchange may be jeopardized. **The Committee called** on its Member States, the Secretary IOC and other international organizations, such as ICSU, CEC, WMO, UNEP, to make every effort in order to save the unique data collections. **The Committee expressed thanks** to IOC and ICSU for sending a mission to the Russian Federation in August 1992 with the objective to investigate ways to secure the safety and future availability of oceanographic datasets held in various institutes and organizations of the former Soviet Union. This mission formulated recommendations which could be used for data rescue and preservation efforts. Some concrete steps of assistance to WDC-B have been proposed, discussed and agreed upon under Agenda Item 6.4.
- 38 The Directors of the WDCs A and B for Marine Geology and Geophysics reported on the work of their Centres. There has been close collaboration between the centres, and large quantities of data were made available on CD-ROM.
- 39 There was a 40% increase in marine geology data holdings and a 30% increase in marine geophysics at WDC-A, MGG. Data from several thousand additional climatically significant cores from the Southern Oceans are in preparation. Underway geophysics digital holdings at the Center are now 35.2 million MGD77 records covering 11.9 million nautical miles of ship tracks for 3,290 cruises. There are 6.7 million track miles of analog data including 5.3 million track miles of analog seismic reflection data. The WDC-A, MGG is now actively seeking to create a multibeam database. The WDC-B created the databases "Sediments, rock and mineral resources" on the basis of the materials of 990 cruises from 32 countries for 94,300 geological stations; "Results of geophysical work" on the basis of the materials from 1,890 cruises of 18 countries and "Results of drilling", based on the materials of "Glomar Challenger".
- 40 The Director WDC-A, Marine Geology & Geophysics (MGG) noted the production of 2 new CD-ROMs containing marine geophysical and marine minerals data, copies of which he presented to the Director of WDC-B, MGG.
- 41 The Chairman congratulated the Directors of WDCs-MGG for their achievements and assistance provided by them to numerous user groups.
- 42 The Chairman of the Committee, Dr. N. Flemming, in his capacity as Vice-Chairman of the ICSU Panel on WDC's, presented the report of the Chairman of the Panel, Dr. S. Ruttenberg (Document IOC/IODE-XIV/24). He said that, from the point of view of ICSU, the organized system of national data centres with international exchange responsibilities, transferring data to WDCs, was an ideal model for other scientific disciplines.
- 43 The Chairman stressed that the ICSU guidelines for data exchange were essential to protect the integrity of free exchange of oceanographic and other kinds of environmental data. These, combined with the WWW principles for management of operational data, should be protected in order to ensure the success of GOOS and GCOS.
- 44 The WDC System had originally been established by ICSU to manage data submitted to them in archival mode. The terms on which host countries establish and manage WDCs at their own expense did not include pro-active responsibilities. The WDCs were not expected to search for data, to conduct data analysis, or prepare specialized datasets. They were definitely not expected to prepare or deliver data in operational mode. If activities of this kind are required from the WDCs for Oceanography, then these activities have to be treated as special projects which are supported with new funds.
- 45 The ICSU Panel on WDCs is strongly aware of the expectations for global environmental data management following the UNCED Conference in Rio, and the Framework Convention on Climate Change.
- 46 **The Committee agreed** that it is important that new procedures are developed to enable the WDCs, Oceanography to exploit new technologies, transfer data electronically, assemble global merged datasets, and provide a service to the global research programmes.
- 47 **The Committee requested** that SCOR and IOC support the early discussions between WDCs,



Oceanography and MGG and international scientific managers so that scientific demands and expectations on WDCs can be understood and dealt with at an early stage of the scientific programme. **The Committee recommended** the following actions which should be carried out:

- (i) WDCs, Oceanography should continue a project to harmonize data holdings. The WDCs were requested to quickly publish annual catalogues as well as semi-annual updates of holdings. Electronic bulletin boards should be widely used for their distribution;
- (ii) IODE Officers, in consultation with the Bureau of the Joint IOC-WMO Committee for IGOSS, would decide on the projects and actions required to assemble for and manage appropriate oceanographic datasets arising from satellite remote sensing, including the procedures for archiving and supporting these data in the WDCs, Oceanography (see Agenda Item 6.1);
- (iii) IODE will seek to identify projects arising from particular data types which require the assembly of global datasets (e.g., chlorophyll, CO<sub>2</sub>, sediment cores, etc.), and seek to promote additional sources of funding which will enable NODCs and WDCs to engage in these projects.

## 2.3 NATIONAL AND REGIONAL DATA AND INFORMATION MANAGEMENT ACTIVITIES

48 The Committee considered reports on national data management activities submitted by National Coordinators for IODE (Document IOC/IODE-XIV/8). The Delegates were invited to briefly provide additional information on their intersessional activities and focus attention on the recommendations requiring approval of IODE-XIV.

49 **The Committee noted with satisfaction** a large number of national reports available at the Session and taking into account the value of information contained in these reports for the IOC Governing Bodies and other international fora, recommended to submit them as an information document for the Seventeenth Session of the IOC Assembly (February - March 1993, Paris).

50 **The Committee welcomed** an increased support from national funding agencies to the activities of NODCs and recommended NODCs to participate actively in meeting the users' requirements and needs, and to provide assistance to national decision-makers in the formulation of economic plans and in policy making.

51 A case study of the strategy for the establishment of an NODC presented by the Delegate from Ireland was received by the Committee with great interest, as there were many delegations from developing countries which are considering creating ocean data management infrastructures in their own countries.

52 **The Committee appreciated the interest** of the Russian Federation to perform IODE functions on the territory of the former Soviet Union and welcomed the readiness of Russia to provide support and assistance to newly established states. **The Committee recommended** that Russia should consult with the Member States concerned on the most appropriate ways of co-operation and called on the former Republics of the Soviet Union to follow the IODE procedures and to join the IODE system.

53 **The Committee expressed its gratitude** to BODC of UK for the recent release of a CD-ROM package containing more than 95% of the data collected during 38 cruises of the NERC North Sea Community Research Project in the Southern North Sea in 1988-1991. The dataset covered a wide diversity of data types including 70,000 nautical miles of underway thermo-salinograph, fluorimeter and transmissometer data, well over 3000 CTD casts, data from 300 moored instrument deployments, 20 cruises of underway ADCP data, and a wide variety of measurements on some 10,000 water samples including nutrients, suspended matter, trace metals, chlorophyll, sulphur compounds, halocarbons and plankton species. Other data included atmospheric chemistry data and data from productivity experiments, sediment cores and AVHRR images. The Delegate from UK was pleased to present a copy of the CD-ROM to the Directors of WDCs, Oceanography, inviting them to incorporate the data into their archives and to provide feedback on their experiences in handling this new form of data delivery for a diverse range of data.

54 The Committee received with satisfaction, statements of the Delegates of Gambia, Jordan and Kuwait, who informed the Session on the progress made by these Member States in the establishment of national oceanographic data and information collection and management systems, and of their interest to become active participants of IODE. **The Committee decided** to revise the IOC Manuals and Guides No. 5 for Establishing a National Oceanographic Data Centre which was published in 1975, and **invited** the IOC Secretary to make necessary arrangements.

55 **The Committee noted** that the last intersessional period marked a positive change in attitude of military and fishery data holders in several countries towards international data exchange. The agreement of JODC with national fishery agencies to make their data available internationally, and that of the data centres of the Navy in USA and Russia to declassify some of their oceanographic data was given as an example. **The Committee welcomed** this development and **called** on Member States to support this initiative.

56 The IOC Secretariat Members and the IOC Consultant referred the Committee to the activities in some geographical regions (IOCINCWIO, IOCARIBE, the ROPME area, Black Sea) targeted to the establishment of regional oceanographic data centres. **The Committee recognized the need** for such centres and **requested** its Chairman, the Chairman of the Group of Experts on RNODCs and Climate Data Services, and the IOC Secretariat, to follow closely the developments and establish close co-operation with these regions in order to introduce and familiarize them with the IODE experience, procedures and guidelines. This may help to achieve compatibility of new centres if they are established outside the IODE system, with the global IODE network.

## 2.4 LINKS BETWEEN IODE AND IGOSS

57 The Chairman of the Joint IOC-WMO Committee for IGOSS, Prof. D. Kohnke informed the Committee about the IGOSS Programme and its main components, the IGOSS Observing System (IOS), the IGOSS Data Processing and Services System (IDPSS), and the IGOSS Telecommunication Arrangements (ITA). He then reported on the findings of the Sixth Session of the Joint Committee (IGOSS-VI) which was held from 18-27 November 1991 in Geneva.

58 IGOSS-VI stressed the necessity for strengthening its co-operation with the IODE Committee. However, it re-stated that there is no need for merging the 2 Committees. As a consequence, IGOSS proposed the establishment of a Joint IGOSS-IODE Task Team on Data Services (Resolution 2, JC-IGOSS-VI). He informed the Committee that a Joint IGOSS-IODE Bureau Meeting took place on 30 November 1992, in Paris. The Meeting supported the rationale of Resolution 2, however, it felt that the tasks to be allocated to the proposed Joint Task Team may be carried out more effectively by the Joint Bureau meetings and by meetings of other Joint IGOSS-IODE groups. The Committee was also informed that IGOSS-VI decided not to continue with appointing a Rapporteur for IODE-related matters.

59 The IGOSS Chairman suggested that the work of the IGOSS Group of Experts on Operations and Technical Applications (GE/OTA) and of the IODE Group of Experts on Technical Aspects of Data Exchange (GE-TADE) be more effectively co-ordinated, and recommended that:

- (i) sessions of the GE/OTA and GE-TADE be convened at the same venue so that a one- or two-day joint meeting could be held;
- (ii) changes of terms of reference of one group should be done *vis-à-vis* the terms of reference of the other GE.

60 The IGOSS Chairman informed the Committee that the CMM-IGOSS *ad hoc* group on ocean satellites and remote sensing has been established by IGOSS, jointly with the WMO Commission for Marine Meteorology (CMM). Taking into account the development of global observing programmes, such as GCOS and GOOS, he expressed the opinion that it might be desirable for IODE to join the *ad hoc* group.

61 **The Committee welcomed** the spirit and the objectives of Resolution 2 (JC-IGOSS-VI), and taking into account the conclusions of the Joint IGOSS-IODE Bureau Meeting, **expressed agreement** that those objectives would no doubt be better met through the Joint IGOSS-IODE Bureau and other subsidiary groups' meetings. **It therefore recommended** that such meetings be held when necessary. **The Committee agreed** that the GE/OTA and GE-TADE activities should be complementary: the GE-TADE would be in charge of data management *sensu stricto* and delayed mode aspects of data exchange, whereas the GE/OTA should concentrate on data gathering and telecommunications, as well as on real- and near-real time aspects.

62 **The Committee supported** the idea to hold sessions of the 2 groups at the same venue and period of time, in order to allow for a one- or 2-day joint meeting, and **recommended** to discuss the revision of the Terms of Reference of the GE-TADE under Agenda Item 7.1.

63 **The Committee expressed agreement** with the view of the IGOSS-IODE Bureau on the need to have a Joint CMM/IGOSS/IODE *ad hoc* group on ocean satellites and remote sensing, **and decided** to discuss it in detail under Agenda Item 6.1. **The Committee agreed** not to have a Rapporteur for IGOSS-related matters.

64 The Committee was informed on the activities of the IGOSS Task Team on Quality Control for Automated Systems (TT/QCAS) and the status of the actions recommended by IGOSS-VI relevant to these activities were reviewed. These recommendations concerned the revision of the fall rate equation for XBTs. **The Committee welcomed** the progress in the preparation of the scientific paper which is expected to be ready for publication in mid-January. The publisher will be asked to designate the paper as a "rapid response" paper because of the timeliness of the information contained therein. **The Committee noted** the decision of the Task Team to continue the utilization of the old equation until proper action can be taken by the appropriate international bodies to implement the new equation. The Task Team proposed the following recommendations regarding the implementation of the new equation:

- (i) **Real-Time Data:** The fall rate equation should not be changed until a new JJXX code is available. As soon as the new code is available, then the process of transition should proceed as quickly as possible. The new code should permit the encoding of the following information: manufacturer, probe type, equation used, deck unit used.
- (ii) **Delayed Mode Data:** The fall rate equation should be changed at an agreed future time to permit documentation of the change. Datasets should include, as a minimum, the following meta-data: the manufacturer, probe type, equation used and deck unit used. In the meantime, the data centres must request, from the data provider, the depth equation used in the data submission, and this information must be recorded for implementation when appropriate new code formats are available.

65 **The Committee supported** the recommendation of the TOGA-WOCE XBT-XCTD Planning Committee (October 1992, Geneva) that the target date for full implementation of the revised equation should be 1 January 1995, i.e., immediately following the TOGA 10-year observing period. The IGOSS Operations Co-ordinator with assistance from the TT/QCAS will co-ordinate and track the progress of the technical implementation with the appropriate bodies. The fall rate equation currently in use should be maintained in all data exchanges until 1 January 1995, at which time it is expected that all the appropriate procedures will be in place.

66 The Representative of WMO informed the Committee of some of the results of the Tenth Session of the WMO Commission for Basic Systems (Geneva, November 1993) of relevance to both IGOSS and IODE. CBS is the WMO constituent body with overall responsibility for the operation of the WWW which includes, *inter alia*, the responsibility for the development and maintenance of codes and data representation formats for the international operational exchange of all forms of geophysical data on the GTS. In response to specific requirements expressed by IGOSS and other bodies for the exchange on the GTS of sea-level data, CBS-X had approved a new SEALEV code for experimental use on the GTS as from 1 December 1992. SEALEV is a character code which is a specific application of a new universal flexible character code (FLEX), and is based on the relevant GF-3 tables. CBS also agreed that further development work should take place on FLEX, designed to allow for the transmission on those parts of the GTS not yet capable of carrying the binary format, BUFR of new types of meteorological and oceanographic data, e.g., in support of GOOS and GCOS.

67 In taking these decisions, CBS clearly recognized the need for closer collaboration with the oceanographic community in the development and maintenance of codes and formats for oceanographic data exchange and archival, as well as on questions of geophysical data management generally. It therefore specifically invited IOC, through both IGOSS and IODE, to participate in the work of the CBS Working Group on Data Management, including its sub-group on Data Representation and Codes, and requested it be invited to participate on equivalent work related to GF3 tables undertaken within the IODE framework.

68 The Committee was informed that CBS had also approved certain modifications to the DRIFTER code, for the GTS exchange of ocean-buoy data. These modifications included the introduction of the IGOSS quality control flags, as well as measures to safeguard the confidentiality of certain oceanographic aspects of buoy data.

69 **The Committee expressed its appreciation** to CBS for those actions, and particularly **welcomed** the offer to participate in the work of the CBS Working Group on Data Management. **It requested** its Chairman, in consultation with the IGOSS Chairman, to arrange for representation on this Working Group as appropriate to the issues to be addressed. **The Committee further invited** representation from the Working Group to participate in the GE-TADE discussions of relevance to CBS.

70 Finally, under this Agenda Item **the Committee considered** the draft of the revised version of the Guide to IGOSS Data Archives and Exchange (IOC Manuals and Guides No.1, 1985, UNESCO). Taking into account that the IGOSS-IODE Data Flow Diagram has been revised to better reflect new developments having occurred during the last few years, such as the GTSPP (see Agenda Item 2.1), and that this revision had implications upon chapters 2.4, 2.5 and 2.6 of the draft Guide, **the Committee requested** to amend these chapters accordingly, and **entrusted** the Secretariat to implement it in collaboration with the IGOSS and IODE Chairmen.

### 3. PARTICIPATION IN GLOBAL OCEAN CLIMATE PROJECTS

#### 3.1 ACTIVITIES OF THE GROUP OF EXPERTS ON RNODCs AND CLIMATE DATA SERVICES

71 The Committee was presented with the findings of the Second Session of the Group of Experts on RNODCs and Climate Data Services (Document IOC/IODE-CDS-II/3) and with the report of the Chairman of the Group on intersessional activities (Document IOC/IODE-XIV/10).

72 The major topics addressed by the Group at its Session included: evaluation of the Ocean Climate Data Workshop recommendations, participation of the IODE centres in support of global scientific programmes, overview of climate research and other global scientific programmes with an accent on ocean data management aspects.

73 **The Committee appreciated** the initiative and efforts made by the Chairman of the Group in the organization of the IOC-CEC-ICES-WMO-ICSU Ocean Climate Data Workshop (18-21 February 1992), Greenbelt, Maryland, USA, and extended its thanks to NOAA and international organizations for hosting the Workshop and providing financial support. The Chairman of the Committee noted that the Workshop Report had been provided to the participants at the last Session of the IOC Executive Council (March, 1992, Paris) and was received most favorably. The Proceedings of the Workshop had also been published and were available at this Session.

74 **The Committee recognized** that the Workshop was an important landmark in establishing a dialogue between data managers and scientists and gave a wonderful opportunity to identify ways for improving data management in support of ocean climate research and to provide guidelines for improved data services.

75 **The Committee adopted** the Recommendations of the Workshop and **requested** its Chairman and Vice-Chairman, as well as the Chairmen of its subsidiary bodies to follow closely the implementation of these Recommendations. **It was recommended** that the IODE Officers will review the status of their implementation at the regular meetings.

76 **The Committee noted the importance** of having similar workshops in the regions which would bring together scientists and data managers and would help to improve access to marine data. In this regard, the Committee was pleased with the results of the International Workshop on Oceanographic Data Management for the countries of WESTPAC and the Indian Ocean (Tokyo, 10-13 November 1992). Thirty scientists and data managers from the region took part in this event. **The Committee called** on its Member States to follow this initiative in their regions. **The Committee requested** the Delegate of Japan and the IOC Secretariat to facilitate the publication of this Workshop Report.

77 **The Committee noted with satisfaction** the activities of the Group, **adopted** Recommendations of the Second Session and, recognizing the need for IODE to respond to the data requirements of global ocean research and monitoring programmes, **recommended** to modify the title of the Group of Experts and to have new Terms of Reference as they are presented in Recommendation IODE-XIV.1 and in the Annex to the recommendation.

78 Under this Agenda Item, the Committee considered the reports submitted by the Directors of RNODCs (Document IOC/IODE-XIV/8) and **re-emphasized** the view that the network of RNODCs is a very important mechanism to assist both NODCs and WDCs in meeting users' needs. **The Committee expressed concern** that the data flow to RNODCs is still very weak and slow. **The Committee stressed again** the need to provide RNODCs regularly with marine data and expressed a hope that after high level quality control and acquisition improved datasets will be available to regional and international communities.

79 Considering that the BIOMASS Programme is now completed and dissolved and that ROSCOP forms had never been received by RNODC-SOC, **the Committee decided** to define the Terms of Reference of RNODC-SOC as they are presented in Annex VIII to the Summary Report and **requested** the Secretary IOC to notify IODE National Co-ordinators and IOC Member States on agreed upon changes.

80 **The Committee requested** its Chairman and the Director of RNODC-SOC to take all necessary actions in order to increase the data flow to RNODC-SOC from the research institutes which have in their possession, physical and chemical data from the area of the Southern Oceans. **The Committee urged** the Secretary IOC to bring this matter to the attention of the Scientific Committee on Antarctic Research.

81 **The Committee strongly recommended** that, whenever historical or modern data are being passed to RNODCs or WDCs, they should contain meta data on the state of instrument calibration, on the conditions under which the data were collected, and on the equations and procedures used for converting the data into digital form.

82 Noting the need of scientific programmes for the management of large datasets of new types of data, such as biological, chlorophyll, chemical and CO<sub>2</sub> and pollution data, **the Committee decided** that some NODCs should consider providing RNODC facilities for agreed parameters and **agreed** to discuss this issue in detail under Agenda Item 6.2.

### 3.2 CO-OPERATION WITH OCEAN CLIMATE EXPERIMENTS' DATA GROUPS

83 The Chairman reminded the delegates that IODE appointed contact persons for various ocean climate experiments: TOGA, WOCE, JGOFS, IGBP. The contact persons were invited to summarize information on the activities of these experiments relevant to IODE.

84 The Director of BODC, Dr. M. Jones, who was representing JGOFS emphasized the importance that JGOFS places on the proper management of its data and on the need to compile high quality datasets on bio-geochemical fluxes and concentrations within the World Ocean and its interfaces to atmosphere, sea floor and continental boundaries. He stressed that any assistance that IODE could provide in the assemblage of such datasets would be much appreciated. Dr. Jones then drew attention to the recent publication of the JGOFS Implementation Plan jointly published by IGBP and SCOR in IGBP Report No. 23. The field work for JGOFS began in 1989 and will continue until about 1997 with a peak in 1994-1995 as a result of the next generation of satellite ocean colour sensors becoming available.

85 From a data management point of view, one of the key features of the JGOFS Project is the diversity of new types of measurements being undertaken, particularly in the fields of biology and chemistry. In order to provide a solid foundation against which to develop its high quality dataset, JGOFS is actively involved in specifying measurement protocols and in providing training in their use, in collaboration with IOC. A number of these protocols are published in JGOFS Report No. 6, while others are being developed.

86 The JGOFS data management system aims to provide all interested scientists with complete and convenient access to the international JGOFS dataset. The leading role in this system is taken by small topical data centres, each responsible for assembling an "on-line" database for a clearly defined subset of data. Often, but not inevitably, the subset will consist of the data collected by investigators from a single country. A Data Management Group will work throughout the life of JGOFS to co-ordinate the activities of the data centres, monitor compliance with data management requirements and periodically reassess the needs and performance of the system. Each national JGOFS programme will either establish one or more topical data centres in their country, or arrange for an existing centre, possibly in another country, to be responsible for managing their data. In either case, the national programme will inform individual investigators of their obligations to submit data to an appropriate topical centre and to satisfy the centre's requirements for quality control and documentation. In addition to assembling data for their own area of responsibility, each topical centre will arrange exchange with other centres so that the complete JGOFS dataset is available from each centre, accessible according to that centre's procedures.

- 87 The JGOFS scientific community has recognized that professional data managers are needed to overcome the problems of assembling, quality controlling, documenting and ensuring the permanent availability of data. In this respect it was reassuring to note the extent to which national JGOFS programmes are turning to their NODCs for data management support and the positive symbiosis that is developing between NODCs and their national JGOFS communities. The US NODC and the BODC are working examples of this new relationship and both have been very active in handling data from the North Atlantic Bloom Experiment. Thus a comprehensive set of the UK JGOFS data in the North Atlantic is accessible on-line at BODC and a CD-ROM of these data is planned for release in late 1993. Similarly the JGOFS communities in Germany, Japan and France are turning to their NODCs to fulfill their obligations in completing their national JGOFS datasets.
- 88 The Representative of JGOFS concluded his remarks by expressing his enthusiasm for the way in which the relationship between JGOFS and the IODE network of NODCs was developing and by encouraging NODCs to interact with their national JGOFS communities with a view to providing professional data management support.
- 89 **The Committee recognized the importance** of the activities carried out under the JGOFS Programme in developing data management systems for new standard types of data, and **requested** its Chairman to invite the Chairman of the JGOFS Data Management Group, Dr. R. Lowry, to become the IODE contact person for JGOFS.
- 90 Prof. S.I. Rasool, the Director of the IGBP Data and Information System, gave a short presentation on the activities and plans for the data and information system of IGBP. He pointed out that the acquisition, processing and manipulation of global-scale environmental datasets are all of fundamental importance to IGBP. The rationale for IGBP-DIS stems from a number of generic issues of data acquisition and management which cut across the activities of the IGBP Core Projects and relate to their integration. Among the most important of these issues are: requirements for new global sets and for existing global datasets in new forms, with emphasis on spatially-referenced information at fine resolution; the need to ensure the provision of long-term datasets; close co-operation and greater exchange of data from diverse sources. The aim of IGBP-DIS is to improve the supply and management of data and information in order to facilitate the attainment of the IGBP's scientific goals through dataset development, data dissemination and data co-ordination in an international context.
- 91 Noting that the general aim and the main foci of IGBP-DIS are similar to those of the IODE, **the Committee recognized** that it would be a duplication of effort, for IGBP-DIS to establish data centres for archiving and supply of the full range of marine datasets relevant to IGBP interests without taking into account the IODE experience in ocean data management. **The Committee requested** its Chairman to strengthen links with IGBP-DIS in order to co-ordinate activities and closely monitor the development of IGBP-DIS projects with a view to collaboration. The Delegate of USA agreed to nominate a person for IGBP-DIS.
- 92 Dr. Wilson, the IODE contact with the WOCE Programme reported on intersessional activities. These activities included participation in two WOCE DMC meetings in Brest, France and Tokyo, Japan in 1990 and 1991. The meetings discussed the development of the WOCE Data Analyses Centres (DAC) system, satellite data acquisition, interactions with the WOCE data, and the Services Argos processing chain for drifting buoy data. Two WOCE Upper Ocean Thermal (UOT) DAC meetings were held in Tallahassee and Washington to develop WOCE UOT DAC which includes GTSP, the WOCE UOT Scientific Centres in AOML, Miami, Scripps Institution of Oceanography, and CSIRO, Australia. An *ad hoc* meeting was also held in AOML in 1992 followed immediately by the Surface Velocity Programme (SVP) Fifth meeting in Bermuda to solve some of the last few problems in the SVP/RNODC Drifting Buoy Data Flow.
- 93 IODE data centres participate formally in the WOCE DACs for UOT and SVP programmes. BODC operates the WOCE DAC for sea level (comprehensive dataset). DOD is part of the SAC for the WHP. In the intersessional period GTSP and WOCE have established the data flow for the real-time data to the WOCE Scientific QC Centres. The necessary monitoring of the real-time data flow has been implemented to ensure that the routing failures that might occur on the GTS are identified and fixed at an early date.

- 94 For UOT, discussions are now under way on completing the delayed mode data flow. WOCE has assumed that delayed mode XBT data would be submitted according to the principles of Manuals and Guides No. 9 while the WOCE PIs assumed that the data confidentiality rules for WOCE applied. A compromise is being sought to try to obtain the data for use by the WOCE community more quickly.
- 95 For the SVP programme, most of the data flow has been established and is working. The RNODC for Drifting Buoy Data in MEDS receives data via the GTS and prepares and distributes monthly maps as agreed. The first shipment of delayed mode data covering the period July -December 1991 has also been received. MEDS is now processing the delayed mode data to augment or replace the real-time data as appropriate. With the help of Mr. E. Charpentier, the Technical Co-ordinator for the Drifting Buoy Co-operation Panel, a database containing meta data on the buoys and sensors has been established. This database will be augmented with other information from PIs as appropriate to fully describe the collection of the data.
- 96 Both the SVP and UOT programmes delivered data to the WDCs on a regular basis.
- 97 WOCE has raised the issue of preparation of a complete project dataset at the end of the experiment. **The Committee requested** the Chairman of IODE to contact WOCE and to begin discussions as to how IODE could assist in this endeavor. **The Committee also noted** that there was some concern that existing formats for submission of data to WDCs do not accommodate all of the WOCE meta data. **It was decided** that by the end of WOCE enough progress would have been made on the matter of meta data on CD-ROMs and that this would not be a problem.
- 98 The Committee was also informed of a visit by Dr. J. Crease, acting as a WOCE Data Quality Expert, to MEDS to use the GTSPQ QC software for part of the quality control he was carrying out on some WHP data. As a result of his visit, improvements have been made to that software to the benefit of GTSPQ.
- 99 The Representative of WOCE-IPO expressed her satisfaction with the co-operation between IODE and WOCE and noted that WOCE relies upon the IODE system.
- 100 The Committee named Mr. S. Tani to serve as an IODE contact person with the WOCE Programme.
- 101 Dr. J.P. Rebert reported on the TOGA centres' activities during the intersessional period, relevant to IODE. The centres satisfactorily met the programme needs. Thanks to the support of NASA, Dr. Rebert put the collection of the datasets collected in 1985 and 1986 on a CD-ROM, that was distributed in 1990. An updated CD-ROM containing the 1985-1990 period will be distributed in 1993. The collection of the sub-surface data includes now about 200,000 temperature profiles which is of a great interest to scientific and modelling communities. Data transmission to the WDCs, Oceanography, was carried out periodically on a half-yearly basis.
- 102 It was noted however, that the delayed mode data flow was slow for data collected within research programmes, compared to that of the data collected by the ships-of-opportunity network implemented for TOGA and WOCE. This stresses the importance of maintaining the TOGA center activity after the end of the official TOGA programme, to ensure the completeness of the collection.
- 103 The TOGA sub-surface data center is in the process of implementing a new data management system, to extend its responsibilities to the WOCE programme data. This system was designed to meet the WOCE requirements, to be fully compatible with the GTSPQ, and to take into account the necessity of including a big volume of meta-data related to XBT observations. The efforts undertaken in the framework of the data archeology and rescue project are of special importance for TOGA.
- 104 Discussions are underway at the national level concerning the possible role of the TOGA sub-surface data centre in support of the future global programmes like GOOS and CLIVAR.
- 105 **The Committee supported** the view that the TOGA sub-surface data center should maintain its activity after TOGA terminates, in close collaboration with GTSPQ, and **invited** Dr. Rebert to continue to serve as an IODE contact point in the TOGA Data Management Working Group.

- 106 **The Committee expressed its appreciation** to all the experts who ensured a continuous liaison and close co-operation with the scientific programmes. **The Committee requested** new contact persons to continue these activities, and report regularly to the IODE Officers on the progress in data management activities of JGOFS, TOGA, WOCE and IGBP in order to be effective in response to the needs of the scientific programmes.

#### 4. GLOBAL OCEAN OBSERVING SYSTEM (GOOS) DEVELOPMENT

##### 4.1 IODE PRESENTATIONS AT GCOS AND GOOS PLANNING MEETINGS

- 107 The Committee recalled that the IOC Assembly at its Fifteenth Session in July 1989 decided to initiate the development of a Global Ocean Observing System (GOOS) and further re-affirmed this decision at its Sixteenth Session. The requirement for GOOS was reinforced by the conclusions of the Intergovernmental Panel for Climate Change (IPCC, 1990), the Second World Climate Conference in 1990, and by the Agenda 21 of the UN Conference on Environment and Development (UNCED, 1992), as well as the needs of the United Nations Framework Convention on Climate Change.
- 108 The Chairman referred the Committee to the various studies and reports already carried out by IOC in preparation for GOOS and among them to the establishment of a GOOS Support Office within the IOC Secretariat, and to the formation of the IOC Committee for GOOS (ICG) chaired by Dr. J. Baker. The formation of the ICG was approved by the Twenty-fifth Session of the IOC Executive Council, and the first meeting will be in February 1993 in Paris. IOC is negotiating with other agencies to co-sponsor GOOS, and a Joint GOOS Scientific and Technical Committee, in particular, which is planned to be established in early 1993.
- 109 **The Committee noted** that its Chairman and other IODE experts had participated in the various IOC meetings preparing the initial GOOS documents.
- 110 An essential part of the relationship between GCOS and GOOS is that the ocean component of GCOS is to be provided by GOOS. The Chairman invited Dr. W. Scherer, Head of the IOC GOOS Support Office, to address the Session.
- 111 Dr. Scherer explained that GOOS would be concerned with monitoring, assessment, and prediction of the processes in the world ocean and coastal seas. It will involve the collection of large quantities of data, with many new data types, and the generation and distribution of data and information products. There will be a continuing need for research to support GOOS, whilst the products from GOOS will be of benefit to research. GOOS will include four elements: data collection; data and information management; modelling and product distribution; and TEMA.
- 112 The applications and benefits of GOOS will be managed through 5 modules: Global climate monitoring and prediction; Coastal and shelf seas; Fisheries and other living resources; Health of the Ocean; Meteorology and Ocean services.
- 113 The implementation of GOOS will be built to the extent possible upon existing operational programmes like GLOSS, IGOSS and IODE.
- 114 Since oceanographic data are at present gathered either for research purposes or for specific operational uses, the geographic and temporal coverage of the global dataset is not optimum for modelling, monitoring, or prediction at either the basin scale or global scale. GOOS will therefore have to be engaged in data gathering in order to ensure adequate datasets. The Ocean Observing System Development Panel (OOSDP) is due to report at the end of 1994 on the required data for an ocean climate monitoring and prediction module. This report will be submitted by OOSDP to the JSTC for GCOS and to the corresponding GOOS Committee. Data requirements for other GOOS modules have yet to be defined. Dr. Scherer then invited the Committee to co-operate with ICG in designing and planning of data and information elements of GOOS.
- 115 **The Committee noted** that GCOS had established a Directorate and a Support Office at WMO, Geneva during 1992. The Chairman welcomed the Representative of the GCOS Support Office, Dr. J. Merle, to the Meeting and invited him to speak on behalf of GCOS. Dr. Merle said that the Second World Climate Conference had established GCOS, which had been confirmed by the General Congress Meeting of WMO in 1991. There was a subsequent Memorandum of Understanding between WMO, IOC, ICSU and UNEP to act as co-sponsors of GCOS. The Joint Planning Office was set up at WMO, and the Joint Scientific and Technical Committee established.



116 One of the principles of the GCOS development is to use existing systems wherever possible, and it was for that reason that GCOS wished to maintain communication with IODE. It was particularly important that GCOS should be based on modern technology in data telecommunications, processing, and storage. Dr. Merle explained that GCOS included several elements of climate relating to land, atmosphere, and ice, as well as the ocean. At the same time, GOOS involved many aspects of marine activities which did not correspond to GCOS activities. It was agreed that the ocean module of GCOS would be the same as the climate module of GOOS, and that IOC would be responsible for data gathering and processing in the ocean. GCOS has set up four working groups: Atmospheric processes; Atmospheric chemistry; Land Processes; Ocean (OOSDP, already in existence).

117 Dr. Merle described the concluding phase of TOGA as an example of the way in which GCOS would be implemented. As the research programme draws to an end in 1994, serious steps are already being taken to establish a long term monitoring and prediction programme in the tropical Pacific which will continue to study and predict the ENSO phenomenon.

118 **The Committee thanked** Dr. Merle for his presentation. **The Committee recognized the need** to spell out clearly the objectives of both organizations as Member States contributing funds to either or both organizations should be confident that there was no duplication or conflict. It was pointed out that after the first meeting of the ICG/GOOS it would be easier to hold formal discussions upon the relationship between GCOS and GOOS, and that a clear policy could be established and made clear to outside organizations.

119 **The Committee recognized the importance** of GOOS, and the major role which the IODE-WDC system should play in GOOS. With regard to the ICG, the Committee expressed the wish to be represented and invited the Secretary IOC to ensure the representation of IODE activities.

120 **The Committee requested** the Chairman to bring to the attention of the First Session of the IOC Committee for GOOS (16-19 February 1993, Paris) the intention of IODE to work closely with the IOC Committee on GOOS and the Joint GOOS Technical and Scientific Committee in designing and planning of the oceanographic data and information management element of GOOS and to discuss with the GOOS community the most appropriate forms of such a collaboration.

121 **The Committee also requested** the Chairman and the Secretary of the Committee on IODE to collaborate with the GOOS Support Office in preparing annual GOOS Status Reports which contain information on the status of international oceanographic data and information exchange and the availability of oceanographic datasets.

122 **The Committee adopted** Resolution IODE-XIV.1.

#### 4.2. PROJECTED DATA CHALLENGES ARISING FROM GOOS

123 The Chairman presented an issue paper summarizing his views and the views of different scientific groups on the place and the role of IODE in a future structure of GOOS and GCOS (Document IOC/IODE-XIV/9). He noted that the IODE community can perform valuable service by developing formats, meta data requirements, and quality control criteria for data types which will be given high priority by GOOS. This is particularly timely for ADCP data, CO<sub>2</sub> and biological parameters. He emphasized that if IODE data centres are to function effectively in supporting GOOS there will have to be specialization and concentration of resources onto key data types and services. This may be an extension of the existing RNODC formula.

124 **The Committee agreed** that the experience of the IODE community, both in relation to successes and to problems, will be valuable in establishing the data exchange for GOOS. **The Committee reiterated** the view expressed under Agenda Item 4.1 that it should work closely with the GOOS and GCOS organization to ensure that the services which can be provided by IODE, in collaboration, where appropriate, with IGOSS, are incorporated in the GOOS and GCOS planning.

125 **The Committee decided** that the IODE Group of Experts on RNODCs and Climate Data Services would be an appropriate group to discuss the many issues of data management in relation to GCOS and GOOS. Several delegations stressed that the Committee, additionally to the need to meet GOOS and GCOS requirements, would continue to have other interests besides GOOS, and so it should not be absorbed within GOOS, but should remain as a distinct entity.

126 In view of the extensive range of work which would be required of IODE to respond to the needs of GOOS, **the Committee decided** to list this work as a special component of the work plan for the next intersessional period.

127 The Representative of WMO informed the Committee on the development, now being undertaken within CBS, of a new system of Distributed Data Bases (DDB's). This work has been prompted in part by new requirements coming from programmes such as GCOS and GOOS, for the exchange of and access to both geophysical data and meta data which cannot be easily satisfied within the present WWW structure. The DDB's are envisaged as a sort of overlay of the present GTS structure with data from DDBs being accessed through request/reply communications procedures.

128 **The Committee recognized** that this development is also of considerable interest and relevance to the present data management system within IODE, and agreed that it should endeavor to co-ordinate more closely with CBS on the whole question of oceanographic data management. **It therefore requested** its' Chairman, as well as the IODE Group of Experts on TADE, to arrange for appropriate representation and collaboration with the CBS Working Group on Data Management on this issue.

## 5. PRODUCTS AND SERVICES

### 5.1 SUPPORT FOR IOC SCIENCE PROGRAMMES

129 The Committee considered from Document IOC/IODE-XIV/10 the reports of the Chairmen of the Task Team on Exchange of Marine Geological and Geophysical Data and of the Task Team on Marine Biological Data.

130 In his presentation, the Chairman of the Task Team on Exchange of Marine Geological and Geophysical Data referred to the successful establishment of the IHO Data Centre for Digital Bathymetry at the US National Geophysical Data Centre. This co-location has worked out to be of essential importance. He also mentioned the collaboration with WDC-B MGG and with GEBCO as well as the continuing work on the IOC-IHO Regional Mapping Projects.

131 In relation with IGBP, consideration is given to the possible extension of the present national index to include marine bottom samples of the whole world. These could prove to be of great value for climate related research and analysis. **The Committee decided to recommend** that IOC endorse the expansion of the "Index to Marine Geological Samples" beyond the present North American collection to worldwide proportions and **adopted** Resolution IODE-XIV.2.

132 The Committee gave attention to the possible usage of satellite altimeter data to detect gravity anomalies and to obtain bathymetry-related information. It was noted that CD-ROMs were produced containing gravity anomalies worldwide, ODP data and an electronic index to DSDP cruises. More global products are planned for next year.

133 The representative of GEBCO drew the Committee's attention to the recent completion of a programme for digitizing all bathymetric contours and coastlines portrayed on the eighteen printed sheets of the GEBCO 5th Edition at a scale of 1:10 million. This work had been co-ordinated through BODC with the digitizing work being carried out by centres in France, Japan, Russia and the UK. All sheets had been edge-matched, resulting in the first seamless global set of digital bathymetric contours of the world's oceans. The dataset is available from BODC as a single magnetic tape in GF3 format; individual sheets are also available on floppy disk. Work is now underway to digitize all the trackline control shown on the printed sheets, in preparation for the assembly of a GEBCO CD-ROM to be released in 1993.

- 134 During the ensuing discussion, the requirement was expressed for digital bathymetric data near-shore and extending into estuaries and rivers, e.g., for the North Sea. Such data would be extremely useful as a basis for numerical modelling applications. However, the problems of intercalibration between the many different agencies concerned are still too great to tackle. Furthermore, there is a problem of the shoal-bias of navigational charts when used for modelling.
- 135 **The Committee received** the report of the Task Team with great appreciation. Interest in the subject was strong. However, noting that the Task Team mechanism was inappropriate to achieving the objectives, **decided** to disband the Task Team and **requested** the Directors of WDC-A and B for MGG to follow the developments in the exchange and management of geological and geophysical data and report on the progress to IODE Officers' Meetings.
- 136 **The Committee noted with concern** that the Task Team on Marine Biological Data was not able to meet the objectives specified in its Terms of Reference. In the resulting discussion, reference was made to the experience with marine biological data built in the ICES data centre and within the Baltic Monitoring Programme. The ICES representative confirmed the experience of ICES in this field since the beginning of this century. Although the feasibility of exchanging biological data in general is still under discussion, in response to specific requirements ICES intends to build up a databank on primary production in the Baltic, the North Sea and the Northern Atlantic Ocean. Since 1979, the Helsinki Commission (HELCOM) has managed the Baltic Monitoring Programme (BMP) with an important component of biological data. Besides the experience of BMP, there is a close collaboration with ICES on data management within this programme.
- 137 The representative of CEC noted that the Commission's Bureau on References has developed the Quasimem project, aimed at establishing standards for quality assessment for marine biological data. This project is carried out in close interaction with ICES and HELCOM.
- 138 Dr. D. Troost, IOC/MRI Programme Officer, introduced the International Expert Centre for Taxonomic Identification (ETI), established in Amsterdam, based on an initiative of PROMAR, the UNESCO Programme for Promotion of Marine Sciences. The centre is partially funded by IOC/UNESCO. During 1991-1992, ETI published its first CD-ROMs on Algae and Protozoans of the Coastal Waters of Northern Europe and on the Birds of Europe (including coastal and sea birds). Other CD-ROMs are in preparation such as on the pelagic fishes of the North East Atlantic and Mediterranean Sea, on *Ateropods* and *Chaetognaths*, on Australian Sea Cucumbers, etc.
- 139 The goal for ETI's work is to create a standard format of species information, to allow easy exchanges between databanks in the future. An on-line link will become increasingly important as the shortage of trained taxonomists grows constantly.
- 140 Scientists wishing to contribute to the bio-diversity bank or to form or participate in a working group, should contact ETI for a demonstration disk and a copy of the data entry programme Linnaeus II. Those researchers who contribute will receive data for free, others will pay the cost of production. The CDs are available from ETI. Brochures on the ETI's activities were distributed to the participants.
- 141 On the basis of the given backgrounds and the discussion, **the Committee decided** to disband this Task Team.
- 142 However, **the Committee noted** that the requirements for biological data are increasing as well as the pressure from various sides on IODE to develop urgently procedures and guidelines for the exchange of marine biological data. In this context, the possibility of a pilot or demonstration project was proposed for consideration.
- 143 **The Committee adopted** Resolution IODE-XIV.3.

## 5.2 PRODUCTS OF IODE DATA CENTRES

- 144 **The Committee noted with interest** the report of the Chairman of the Task Team on Development of IODE Centre Services and Products (Document IOC/IODE-XIV/10). The Chairman recalled that IGOSS held a Workshop on data products and services in April 1991, Tokyo, Japan, and a regular bulletin on IGOSS Products is now published.

145 The Chairman of the Task Team observed that all NODCs needed information on available software used for providing services to data users. They also need information on the types of data products which are most appreciated by customers. It is expensive and in some cases not possible for each NODC to develop its own software. IODE was invited to consider the possibility of developing a "Shoebox" Inventory of freely available software used for product development analogous to the one developed by the OCEAN-PC project.

146 There was a lengthy discussion on the rapidly increasing number of CD-ROMs available, which often contained both large datasets and the software needed to analyze and present the data. **The Committee agreed** that, although these are very useful, it is not practical for NODCs to copy the software off CD-ROMs and use them for analysis of their own data holdings. In any case, this may also involve breach of commercial copyright.

147 **The Committee agreed** that the GE-TADE should take up the responsibility for developing an Inventory of appropriate software and CD-ROMs, thus continuing the work of the Task Team and fulfilling the request on products and services contained in the Recommendations of the Second Session of the Group of Experts on RNODCs and Climate Data Services (Document IOC/IODE-CDS-II/3).

148 The Chairman thanked Dr. Y. Sychev for the results that the Task Team had achieved and stressed that the list of software provided in the report of the Task Team would form the basis for the future work of the GE-TADE on this subject. **The Committee decided** to disband the Task Team.

### 5.3 GLOBAL TEMPERATURE AND SALINITY PILOT PROJECT (GTSP)

149 The Chairman of the IOC-WMO Steering Committee on the GTSP reported on the progress and future plans of the Global Temperature-Salinity Pilot Project (Document IOC/IODE-XIV/10).

150 Since the establishment of this project in 1990 a substantial amount of progress has been made. The handling of the real-time data within the project was very well in hand. Data are accumulated both daily and monthly from a number of links into the GTS and this has allowed checks to be made on the consistency of data receipt at the various centres as well as to capture a larger proportion of the data flowing in real-time than any one centre was capable of doing. These data are moved on a regular basis from the real-time data assembly centre (the Marine Environmental Data Service) to the continuously managed database maintained at the US NODC. Each month data are then passed to science centres in the US and Australia for scientific evaluations of data quality.

151 A number of reports and publications have been issued by this project. The list includes the Project Plan, the Real-time Data Quality Control Manual, GTSP brochure and monthly reports containing articles describing the project. The GTSP recently has changed its reporting so that from January 1992 onwards these regular reports have been issued quarterly. Statistics of the real-time data flow have been issued since the start of the project in January 1991.

152 During the intersessional period there were two meetings of the Steering Committee: one in France and one in Russia, at which planning of the project was discussed and advanced. The next meeting is scheduled to take place in the second quarter of 1993 in Canada.

153 **The Committee noted** that the Pilot Project was successful in attracting the very active participation of seven countries which all have contributed in a significant way during the past intersessional period. The Chairman of the Steering Group pointed out, however, that there were areas where progress had not been so rapid and these are to be the focus for the next period. Of great importance will be the development of the data flow from the science centres back to the continuously managed database. Discussions are taking place between the project and WOCE to improve management of the delayed mode data flow for the WOCE UOT project. Further work is required to develop the output product side to the project.

154 **The Committee congratulated** the GTSP with the work carried out so far and noted that this project had been recognized by other international bodies as having been quite successful. **The Committee encouraged** the participants of the Project to continue in their endeavors.

## 6. NEW DATA TYPES

### 6.1 REMOTELY SENSED DATA

155 The Committee was informed of the activities that had taken place during the intersessional period (Document IOC/IODE-XIV/10). **The Committee noted with satisfaction** the completion of the Guide to Satellite Remote Sensing of the Marine Environment (IOC Manuals and Guides No. 24, 1992). It thanked the Task Team on Remotely Sensed Oceanographic Data, in particular the Chairman, Dr. T. Allan, for the effort that had been put into publishing this very useful document. **The Committee also recognized** the significant effort that went into the training courses conducted during the intersessional period. This accomplishment was viewed as very important. **The Committee urged** Member States and the Secretary IOC to provide the funds necessary to conduct such future training activities.

156 **The Committee noted** the IOC-WMO Technical Conference on Space Based Ocean Observations planned for September 1993 and **agreed** to provide input to the conveners on remote-sensed data management topics, and on potential speakers for these topics. **The Committee noted** the contribution of the Workshop on Ocean Climate Data to the increased awareness of the importance of the remotely-sensed data in the context of climate change. The Committee conducted an extensive discussion on the draft Recommendations to the London CEOS Plenary Meeting adopted by the participants at the CEOS Data Policy *ad hoc* Meeting (28-29 October 1992, Paris). This Meeting recommended that IOC continues to support the free and open exchange of environmental data in support of climate change studies. Should the data not be made available free or at cost of reproduction, then IOC should pursue data availability at the lowest possible cost. **The Committee felt** that CEOS data policy was very important and **requested** that the Secretary IOC provides a summary of data policy activities of international bodies involved in remotely-sensed data management for the next session of IODE.

157 The Chairman referred to the request of the ICSU Panel on WDCs for guidance on the role of WDCs, Oceanography in the management and archival of remote-sensed oceanographic data. It was agreed that this matter should be brought to the attention of the proposed Joint CMM-IGOSS-IODE *ad hoc* group on ocean satellites and remote sensing. **The Committee resolved** to terminate the IODE Task Team on Remotely-Sensed Oceanographic Data. The responsibility for the implementation of training activities which are taking place in the context of the old Task Team was passed to the new joint *ad hoc* group.

158 **The Committee adopted** Recommendation IODE-XIV.2.

### 6.2 PROGRESS WITH CHEMICAL, BIOLOGICAL, POLLUTION AND CURRENTS DATA

159 The Committee considered Document IOC/IODE-XIV/11 and noted that aspects of biological data management included in this Agenda Item had already been treated under agenda item 5.1 and others.

160 In response to the proposal on CO<sub>2</sub> and chlorophyll data management, **the Committee adopted Resolution IODE-XIV.4** and invited GIPME to nominate experts who will work jointly with data management experts in solving the problems. It was agreed that a formal routine procedure for developing IODE systems for new data types should not be standardized. Experience in the IODE community has shown that there is always a period of several years during which procedures can be built up in the way most appropriate to each data type.

161 **The Committee then discussed** problems in the management of tomographic data and data collected by current meter measurements, undulating sensors and HF surface radar. **The Committee was informed** about the success of the Current Meter Inventory, produced by BODC and initially published as a product of the ICES Marine Data Management Working Group. The Inventory now contains 29,000 entries from 16 countries. **The Committee agreed** with the proposal to publish the Current Meter Inventory in future as an IODE product.

162 It was mentioned that at the Sixth Session of the Joint IOC-WMO Committee for IGOS the idea of a global current data project, similar to GTSP, had been discussed. An informal working group of the IGOS Committee was established to proceed with a feasibility study and come up with the proposal for submission to the next IGOS and IODE meetings. Mention was also made of an idea for a global ADCP project that had been generated by the recent IGOS meeting and of the need for guidelines on the handling of acoustic tomography data. In the latter context, the CEC Representative informed the Committee of an experiment in the Mediterranean Sea with acoustic tomography, to take place in the near future. The Committee offered its assistance in the form of its GE-TADE in the planning and implementation of this experiment.

163 The Committee was informed that the ICES Marine Data Management working group at its last Session had developed draft formats and guidelines for handling of data from ADCP and undulating temperature-salinity-fluorescence recorders. **It was decided** to make the full report of this Meeting available to the Committee. During the next intersessional period, the GE-TADE will study these and develop a further approach in close contact with the ICES working group and with JODC.

164 The Delegate of Japan drew attention to the activities of JODC in acting as the RNODC for the management of data collected by ship-mounted Acoustic Doppler Current Profiler (RNODC-ADCP). **The Committee clearly recognized** the importance of these data to climate and global change studies and of ensuring their proper management. Dr. Jones provided information on draft guidelines for managing undulatory data and underway ADCP data as formulated by the ICES Working Group on Marine Data Management. These would be provided to JODC for consideration. At the request of JODC, and with the approval of the Committee, the Terms of Reference of the RNODC-ADCP were modified as presented in Annex VIII.

165 In discussing a possible future requirement for the exchange and archival within IODE of ocean surface current and wave measurements derived from ground-based HF surface radars, **the Committee noted with interest** that the Joint CMM-IGOSS *ad hoc* group on ocean satellites and remote sensing had amongst its Terms of Reference to keep under review the application of HF and microwave radars for the collection of oceanographic data. The WMO representative informed the Committee that a member of this *ad hoc* group was at present preparing a comprehensive status report on this subject, which was expected to be published jointly by WMO and IOC, within the first half of 1993. **The Committee therefore decided** to defer further action on this topic pending completion of this report. A copy should be made available to the GE-TADE for consideration.

166 Increasingly data, are exchanged, generated by numerical circulation models. The Representative of the TOGA Data Centre referred to the availability of TOGA model data on CD-ROM. **The Committee agreed** on the importance of this type of data and **requested** its Group of Experts on RNODCs and Global Programmes to keep these developments under review.

### 6.3 LONG TIME-SERIES OF OBSERVATIONS

167 The Committee received a presentation by Dr. S. Levitus on this subject. In past sessions, **the Committee has explicitly recognized** the utmost importance of long time-series of observations in relation to climate-related research.

168 The Committee was informed about the joint efforts of NODCs of Russia and the USA to save long time-series collected by the former Soviet Union and now in danger of being lost. This is a tremendous effort for which both new technology and new funding will be required. Subsequent to an earlier CD-ROM produced by US NODC of time-series of T/S profiles, a joint US-Russian CD-ROM is under consideration that will also contain such data from P.R. Korea and China. The Representative of ICES described a programme of digitizing old data, in which it had been found that the original documentation was quite good.

169 Special attention was given to the importance of adequate documentation and annotation to go with the long time-series in order to maintain their usability over the years. Usually the quality and consistency of old time-series data were reasonably reliable, but old nutrient data are not accurate by modern standards.

170 **The Committee noted** that the oceanographic measurements made by the Ocean Weather Ships (OWS) in the North Atlantic Ocean represent long time-series of fixed-station ocean observations of great and unique value to ocean climate and related studies. In this context, it **noted with concern** that OWC 'C' operated first by the USA and then by the former USSR, had ceased operations in 1990 because of funding difficulties. The two remaining OWS, maintained by Norway (with support from Germany and the Netherlands) and by the US respectively, were still operational but may come under threat in the future because of the difficulties in justifying their high cost of maintenance (US\$ 1.5 M-2.0 M per year) for meteorological reasons alone.

171 **The Committee reiterated** its belief in the continuing high value of the time-series of oceanographic observations made by these OWS and **concluded** that disbanding of these stations would probably be premature, in view of the limited capability of satellites to provide long time-series of comparable quality and the lack of subsurface data. **It therefore urged** oceanographic institutes and national agencies in countries surrounding the North Atlantic Ocean in particular, to give serious consideration to collaborating with their national meteorological services in the provision of the necessary funding support both to maintain the two existing OWS. **The Committee invited** WMO to consider the possibilities of re-instating OWS "C".

#### 6.4 DATA ARCHAEOLOGY AND RESCUE

172 Under this Agenda Item, the Committee considered Document IOC/IODE-XIV/13. The Chairman opened the discussion by inquiring about the situation with data preservation and data archeology in the developing countries and in the countries who attended the IODE Session for the first time.

173 In Argentina, data exist since the beginning of this century, but good quality can be guaranteed only after 1954. Chile started collecting sea-level data in 1941 and afterwards also other data types. The quality of data is good. No immediate priority was given to processing historical data although this might prove to be interesting. In Brazil there is a growing interest for historical oceanographic data. However, funds are lacking to proceed with the processing of those datasets and, therefore, external assistance would be welcomed.

174 A proposal for an "*International Oceanographic Data Archeology and Rescue Project*" was presented by the Director, WDC-A, Oceanography. The immediate objective of the project is to locate and digitize oceanographic data that exist in manuscript or analogue form, thus being at risk of being lost to the international research community. The goal of this project is to help produce the most comprehensive global oceanographic databases possible for use by the international research community.

175 **The Committee favorably received** this proposal and noted the existing appreciable efforts and accomplishments of these activities within the IODE system. **The Committee adopted Recommendation IODE-XIV.3, and requested** its Chairman and Dr. Levitus to prepare an Annex to the Recommendation with a description of the objectives of the project and mechanisms of its implementation.

176 **The Committee noted with thanks** the kind invitation of Russia to host a first Workshop on Data Archeology and Rescue for the Member States of Eastern Europe. Taking into account the availability of unique datasets in Russia, Poland, Ukraine and the real danger to lose them due to financial problems, **the Committee supported** the offer and requested its Chairman and the Secretary IOC to make efforts in order to arrange the Workshop in Russia at no or minimal cost to the IOC, in the first half of 1993, provided the project proposal is adopted by the IOC Assembly.

### 7. IODE DEVELOPMENT OF TECHNOLOGY AND SYSTEMS

#### 7.1 ACTIVITIES OF THE GROUP OF EXPERTS ON TECHNICAL ASPECTS OF DATA EXCHANGE

177 **The Committee received with appreciation** the report on intersessional activities presented by the Chairman of the Group of Experts, Mr. R. Keeley (Document IOC/IODE-XIV/10) and the report of the Fifth Session of GETADE (Document IOC/GETADE-V/3) which took place in July 1992 at BODC.

178 In past years, the GF3 formatting system was the dominant topic of this group. **The Committee acknowledged** the efforts made by the Group and noted that the development of the GF3 format had come to a final stage. The Committee was presented with a draft of Volume 1 of the IOC Manuals and Guides 17: "*The Introductory Guide to GF3 and GF3-Proc*". **The Committee requested** Dr. M. Jones and the Chairman of GETADE to review the draft and submit the volume to the IOC Secretariat for publication by March 1993. The still remaining Volume 3 on GF3 subsets of the GF3 documentation series will be available to the IOC Secretariat for publication by the spring of 1993.

179 Mr. Keeley then informed the Committee on the discussions taken at the fifth GE-TADE meeting on the role of RNODC-Formats and on the decision to revise the Terms of Reference of this RNODC. **The Committee recognized** the on-going need for the ready availability of documentation on formats and code tables and **decided** to include this element in the modified Terms of Reference. **The Committee agreed** that the commencement of large international oceanographic programmes and the design of special data formats for their needs, required these changes. **The Committee adopted** the new terms of reference of RNODC-Formats as they are presented in Annex VIII. **The Committee urged** the Secretary IOC to notify Member States on the changes made.

180 The rapid changes in the technology, developments of new formats and recommendations from the Ocean Climate Data Workshop all pointed to a pressing need to examine the whole issue of modern formats. It was recognized that a simple extension of GF3 will not meet this need. **The Committee decided** to discuss this item under agenda item 7.6.

181 The Committee was informed that the Group of Experts discussed topics relating to technologies development including new instrumentation such as ADCP, Remote Sensing, and Communications Technologies such as the rapid spread in accessibility of electronic networks. **The Committee noted** the view of the Ocean Climate Data Workshop that technology development has reached a point that it could considerably improve data management. **The Committee recommended** to have the next workshop in 1995 on this topic and **requested** the Chairman of GE-TADE to take the lead in organizing this workshop. **The Committee also recommended** that this workshop should be organized with an invitation of computer manufacturers, data managers and scientists.

182 **The Committee took note** of developments in the OCEAN-PC project relevant to GE-TADE, the desire of WMO to work together with the oceanographic community to include GF3 parameter codes in BUFR, the studies in electronic management of Cruise Summary Reports (ROSCOP) and **recommended** that changes in the Terms of Reference of the Group would be needed to reflect the above issues. **The Committee also noted** that a greater degree of co-operation would be needed with other international bodies in meeting new demands.

183 **The Committee adopted** Recommendation IODE-XIV.4 with the revised Terms of Reference of the GE-TADE.

184 **The Committee extended its thanks** to Dr. M.T. Jones for his outstanding work as the previous Chairman of the Group.

## 7.2 QUALITY CONTROL OF OCEANOGRAPHIC DATA

185 The Committee was presented a draft of the IOC-CEC Manual on Quality Control Procedures for Validation of Oceanographic Data as Document IOC/IODE-XIV/25. IOC expressed its thanks to the IODE Task Team on Data Quality Control for the preparation of the chapter to this Manual on Quality Control Algorithms and Procedures for Oceanographic Data going into IODE. **The Committee acknowledged** the valuable support received from the CEC-MAST programme in the production of this final draft.

186 **The Committee approved** the draft of this Manual taking into account comments made by the delegates and **instructed** Dr. N. Flemming to submit the Manual to IOC for publication early in 1993. A digital version of this manual will also be available from the IOC Secretariat.

187 **The Committee stressed** that apart from the usefulness of the procedures mentioned in this Manual, it was also important that exchanged datasets should record the quality control procedures applied and the actions taken on the data. **The Committee instructed** the GE-TADE in close concert with the IGOSS GE-OTA and other relevant international bodies to address this issue and take necessary actions.

188 **The Committee decided** to continue the activities of the Task Team on Oceanographic Data Quality Control with revised Terms of Reference and **adopted** Resolution IODE-XIV.5.



### 7.3 OCEAN-PC AND SOFTWARE DEVELOPMENT

- 189 The Committee was informed of the activities under the OCEAN-PC project by the project leader Dr. D. McLain (Document IOC/IODE-XIV/14). **The Committee noted with pleasure** the progress that had been made and **congratulated** the contributors in particular Dr. McLain and Dr. H. Dooley for their excellent work. The Delegate of Japan, noting that a regional training course for WESTPAC countries is planned to be held in Malaysia in 1993 to promote the use of PC's in oceanography and an information network of JODC, offered to present OCEAN-PC in conjunction with this course. **The Committee noted with thanks** the offer of the GLOSS programme to provide software developed by the University of Hawaii to process sea level data for the inclusion in the OCEAN-PC inventory and the software package.
- 190 **The Committee emphasized** that OCEAN-PC also provided functions required by the global ocean observing system and **recommended** that funding of this project should partly come from the GOOS budget.
- 191 **The Committee felt** that the IOC VCP would be a good vehicle for the provision of the needed hard- and software to the project. The experience of WMO in providing support through the WMO VCP programme was noted with interest. **The Committee agreed** that this experience should be used to further the OCEAN-PC development and **requested** the IOC Member States and the IOC Secretariat to encourage assistance through the IOC VCP.
- 192 **The Committee noted** that there was a need for dedicated staff to manage the project and requested the Secretary IOC and Member States to make provision for the proper staffing and funding of the project.
- 193 **The Committee approved** the Implementation Plan contained in IOC/IODE-XIV/14 and **adopted** Recommendation IODE-XIV.5.

### 7.4 DATA EXCHANGE SYSTEMS DEVELOPMENT

- 194 Under this agenda item, the Committee considered Document IOC/IODE-XIV/15.
- 195 The Chairman of the Committee summarized the major issues confronting the continued development of the IODE data exchange system.
- 196 The Delegates expressed concern with the quantities of data being submitted to the IODE network and described the mechanisms used to improve data submission on a national basis. A multi-agency policy promoting full and open sharing of data for global change research had achieved good results in the USA. Another mechanism which is being successfully used in the UK and Japan, was the establishment of close links with the scientific community through providing assistance already in the planning phase of research activities. In this regard, **the Committee noted** the excellent efforts of BODC with its involvement in the North Sea Project. **The Committee recognized** the need to widely publicize cooperation between data managers and scientists and **recommended** other data centres to use this experience.
- 197 **The Committee agreed** that IODE needed to more closely examine the specific needs of the user community which is expanding rapidly, particularly as a result of the WCRP. Also the introduction of new data types and new instruments necessitated an evaluation of existing methods of data management. New technologies such as CD-ROM's and modern software were changing the way data centres operated and increased their ability to disseminate data. With these new technologies many data centres had capabilities that exceeded the information management capabilities of research agencies and were therefore in an excellent position to provide assistance.
- 198 Many delegations expressed the opinion that often policy makers were unaware of the problems associated with data management. **The Committee considered** that it was extremely important to convince both scientists and policy makers of the benefits of proper data management. The Delegate of Japan pointed out that his data center gained good experience in advocating widely a need and usefulness in implementing the oceanographic data exchange policy agreed upon by ICSU and IOC and presented in the IOC-ICSU Manual No. 9 on IODE. **The Committee urged** the national IODE representatives to bring this view to the attention of scientists and policy makers in their respective countries.

199 **The Committee noted** the lack of an adopted ocean data management policy statement of IOC. Such a statement would provide a useful instrument for Member States to influence their policy makers and scientists to support the IODE programme and participate actively in oceanographic data exchange.

200 **The Committee adopted** Recommendation IODE-XIV.6 for submission to the IOC Assembly in March 1993.

## 7.5 EXTENT OF NETWORK ACCESS

201 **The Committee was informed** of the considerable experience in the benefits of electronic communications networks gained during the implementation and operation of GTSP. The communications networks, which are developing rapidly, are providing a significant improvement over other data exchange and dissemination mechanisms. It is now possible to exchange data, meta-data, documents and software electronically. As a result data centres could give a more timely and effective service to their users, such as on-line access to directories and to data files. An additional benefit is the increased cooperation and exchange between data collectors, archive centres and users.

202 The technical differences between the various networks were acknowledged and it was suggested that care be taken when selecting an electronic network to ensure it met the needs of the data centre. For example, SCIENCEnet (available through the Telenet and Internet networks) is most effective for personalized world-wide exchange of messages (mail) and information (bulletin boards) while computer networks such as Internet, EARN and COSINE provide the high speed more suitable for the exchange of data sets, as well as software and documents.

203 The Delegate of Japan informed the Committee about the success in the development and operation of the telemail system named JOIDES (JODC On-line Information and Data Exchange Service). The system is now being widely used among the ocean scientists in Japan. It provides telemail service with which mails can be exchanged among not only JOIDES members but subscribers of Omnet and Internet and bulletin board service (BBS). The BBS provides updated NOPs and CSR of Japan, information relating to Climate and Global Change Programmes and Ocean Abbreviation/Acronym Dictionary in which some 1200 abbreviations and acronyms are stored. **The Committee welcomed** these initiatives **and specially pointed out** that JOIDES has its access points internationally and is open to the IODE data centres free of charge.

204 **The Committee strongly urged** Member States to take all possible measures to link their marine science community to the appropriate electronic networks and systems and **further urged** the Member States already experienced in this field to provide assistance to countries developing this capability.

205 **The Committee recognized** the very rapid developments in networking and communications technologies which was changing at such a pace that policy makers generally had limited knowledge of the potential capabilities. **The Committee requested** its Chairman to investigate the means of bringing the issue of present and future network technology to the attention of the IOC Assembly. **The Committee felt** that it would be very important to provide policy makers with an understanding of the many benefits arising from the use of this technology.

## 7.6 FORMATS FOR THE FUTURE

206 **The Committee was informed** about the changing demands placed on formats due to the desire for inclusion of additional information and the increasing capabilities of exchange media. Both these issues were raised by the Ocean Climate Data Workshop.

207 At the same time, it was noted that there was a stronger spirit of co-operation between international bodies such as IODE, IGOSS and relevant subsidiary bodies of WMO to work together to more effectively manage data and formatting practices. **The Committee noted** that GE-TADE had addressed this issue at its last meeting and had modified its Terms of Reference to reflect this.

208 **The Committee established** a small *ad hoc* task team under the auspices of GETADE to undertake a review of the major international oceanographic data exchange formats with the following tasks:

- (i) to examine the major formats used in international oceanographic data exchange, to define the underlying structures of oceanographic data collection and their associated information;
- (ii) to decide on how data collections may be represented by data structures;
- (iii) to use the data structures to demonstrate the strengths, weaknesses, commonalities and differences of existing international formats;
- (iv) to use the data structures to describe an optional format for data and information on a variety of exchange media.

209 **The Committee noted with appreciation** the offer by ICES to host a meeting of this task team in the middle of 1993.

## 8. MARINE INFORMATION MANAGEMENT

### 8.1 ACTIVITIES OF THE GROUP OF EXPERTS ON MARINE INFORMATION MANAGEMENT

210 The Committee was presented with the report of the Third Session of the IODE Group of Experts on Marine Information Management (Document IOC/IODE-MIM-III/3) and with the report on intersessional activities (Document IOC/IODE-XIV/10) by Mrs. P. Simpson, Chair of the Group.

211 The major topics addressed by the Group during GEMIM-III included: policy development in meeting needs of developing countries in Marine Information Management; place of the IOC Marine Information Management programme among UN agencies and other initiatives in marine information; development of the Marine Information Management publication/products programme; ASFIS/ASFA - status, problems and search for a solution; International Global Centre on Marine Information; and preparation of a marine information management action plan for the next intersessional period. The Group made seven recommendations on: revised terms of reference of GEMIM; development of regional information networks; provision of literature to developing countries; new technologies and their implementation in Marine Information Management; ASFIS/ASFA; international global centre on marine information; and the action plan for the next intersessional period. The Chair informed the Committee that, of the 16 action items defined by the Group, over 50% had already been completed.

212 The Chair highlighted actions for which support of the Committee was required. These included: support for Marine Information Management training activities in developing countries; implementation of new technologies for Marine Information Management in developing countries; the undertaking of a pilot project for document delivery over the Internet; the development of a CD-ROM of IOC publications; and support for a professional post at the IOC Secretariat for Marine Information Management. Special attention was also given to the future of ASFA which is discussed in detail under Agenda Item 8.2. The Chair of the Group concluded by stressing the importance of Marine Information Management as a natural complement to Data Management and she regretted that Marine Information Management is still often omitted in marine scientific programmes, projects and products, giving OCEAN-PC as an example.

213 **The Committee recognized the importance** of Marine Information Management and noted with satisfaction the revitalization of the Group. The completion of numerous items of the action plan in the short period between the Session of the Group and IODE-XIV was praised. **The Committee congratulated** the Chair of the Group with the dynamism shown by the new Group and **expressed** its hope for an efficient data-information integration in IODE programmes and projects.

214 During the ensuing discussions the Delegate from the USA provided some information on the Ocean Drilling Programme CD-ROM, which included a hypertext look-alike software section allowing topical text searching in a WINDOWS environment.

215 Mr. P. Pissierssens of IOC praised the IDRC of Canada for their extensive activities related to bibliographic information management and referred to MIBIS and MINISIS as examples. He mentioned that the GEMIM, in co-operation with IAMSLIC, was currently evaluating MIBIS as a standard structure for bibliographic databases. **The Committee expressed its hope** that Canada would be able to continue its highly appreciated activities, possibly in collaboration with the Group of Experts on MIM.

216 The Chairman of the IOC-WMO Steering Committee on the GTSP, Dr. J.R. Wilson, proposed a joint project between GTSP and GEMIM to produce a CD-ROM containing data, meta-data and publications with the necessary software to browse, search, and extract, and provide logical connections between the data and information. With the concurrence of the Chairman of GEMIM **the Committee welcomed** the proposal and GTSP and GEMIM were requested to proceed with the project in the coming intersessional period.

217 The Delegate from the Russian Federation, Dr. V.I. Smirnov, stressed the importance of Marine Information Management and gave some examples of marine information services provided by the VNIIGMI, Obninsk.

218 Referring to Recommendation IOC/IODE-MIM-III/6 on the International Global Centre on Marine Information, Mrs. Simpson referred to Document IOC/IODE-XIV/23. She said that this feasibility study had not yet been discussed within the Group of Experts and she therefore suggested to postpone any decision on this subject until the feasibility study would be discussed at the Group's next Session.

219 **The Committee accepted** the Report of the Third Session of the Group of Experts on Marine Information Management.

## 8.2 ASFIS/ASFA

220 Mr. P. Pissierssens of IOC presented Document IOC/IODE-XIV/16 entitled 'Future Development of ASFIS/ASFA and the IOC Role in it'. He informed the Committee of FAO's decision to terminate its contract with ASFA's publisher CSA in December 1994, and of the concern of the aquatic science community about the future of ASFA, following this decision. Unfortunately this matter has not yet been fully discussed at ICSPRO. It was therefore not clear which role FAO was ready to continue to play in the future of ASFA and ASFIS. Taking into account the value of ASFA for developed and developing countries, and as one of the ASFA co-sponsors, the IOC had to consider taking over the role as lead agency for ASFA from FAO. Mr. Pissierssens then introduced some of the possible scenarios detailed in Document IOC/IODE-XIV/16. The scenarios clearly showed that the cost for IOC to take over the role as lead agency would exceed the financial capabilities of the IOC considerably, and substantial extra-budgetary support would be required in order to enable IOC to play the role of ASFA lead agency in a satisfactory manner.

221 The Delegate from China stressed the importance of ASFA and said that China, which became a National Partner in 1986, had currently established 6 input centres. He said that the support of the Recommendations of the Group of Experts with regard to ASFIS/ASFA was indispensable. He further appealed to the UN agencies to urgently undertake concerted actions to safeguard the future of ASFA. He also urged National Partners to provide more input and local information services. This concern and strong support to ASFA was echoed by Delegates from Kuwait, Russia, USA and some other countries.

222 The Delegate from Russia said that with the very limited budget for IODE there was a clear need to be very rational and therefore suggested to reduce the coverage of ASFA to the minimum. This resulted in several interventions with regard to the need to increase or decrease the ASFA coverage. The Delegates from Kuwait and Norway said that subject coverage should be increased to meet the needs for information following the growing multi-disciplinary approach to marine environmental problems.

223 The Delegate from the USA urged for further negotiations with FAO in order for this organization to continue its role as lead agency.

224 **The Committee therefore strongly recommended:** (i) for FAO to continue its mission as lead agency of ASFA; (ii) to emphasize on equal sharing of the support of ASFA by the co-sponsors; (iii) for the IOC Assembly to obtain extra-budgetary funding to ensure the future of ASFA on a medium to long-term basis as co-sponsor and/or lead agency.

225 Taking note of the limited financial resources available to the IODE, the observer from CSA then proposed several measures it would be willing to take in order to reduce the possible lead agency's cost burden for continuing ASFA/ASFIS beyond 1994. The measures would include: (a) ensuring the current production level (35,000 records annually) without cost to the lead agency; (b) supplying one free CD-ROM reader to new national partners in developing countries (up to a maximum of 10); (c) supplying one ASFA CD-ROM to each actively participating national partner and co-sponsor; (d) training personnel in ASFA input at CSA site; and (e) producing and maintaining two key reference aids (serial list and thesaurus). CSA strongly favors the expansion of ASFA's coverage in areas of interest to the IOC, and anticipates this will result in increased revenue for the ASFA Trust Fund. The full text of the CSA statement to IODE-XIV is given in Annex IX.

226 **The Committee acknowledged with thanks** the offer made by CSA and **requested** the Chairman of the Group of Experts on MIM and the IOC Secretariat to take this into account when the revision of Document IOC/IODE-XIV/16 is made.

227 **The Committee adopted** Recommendation IOC/IODE-XIV.7.

### 8.3 MARINE INFORMATION PRODUCTS

228 The Committee was presented with an overview of Marine Information Products developed during the past and planned for the next intersessional period.

#### **Marine Environmental Data Information Referral System (MEDI)**

229 Mr. Pissierssens reported on the status of MEDI of which the third edition is now ready for printing. He said that, after three printed-only versions, a computer searchable version should now be envisaged. **The Committee noted** that, although the number of contributing institutions has increased, the catalogue is still very incomplete and Member States were urged to stimulate their institutions to contribute more inputs to the catalogue. A product quality evaluation was announced to result in a well founded management policy for MEDI. Because of the lack of staff in the IOC Secretariat to provide a continuous monitoring, updating and editing of the MEDI entries it was mentioned that GEMIM had discussed possible alternatives to the IOC's management of MEDI, referring to the BODC's EDMED. The Delegate from the UK provided detailed information on EDMED, saying that EDMED, funded by the CEC, is intended to be a catalogue of all existing marine environmental datasets in the European Community. Through sub-contracting the task of information collection to national co-ordinators in EC Member States, the project had already realized over 1,000 datasets descriptions from nearly 300 scientific groups. **The Committee noted** that MEDI has global coverage, whereas at present EDMED is limited to the European Community and ICES, and requested the IOC Secretariat to investigate with BODC the future possibilities of improving MEDI.

230 **The Committee fully supported** the efforts made by IOC in the development of the MEDI Catalogue, and CEC in the preparation of the European directories of data holdings and **acknowledged** with thanks the publication of the third issue of the MEDI Catalogue and the Directory for Ireland.

231 The Chair of GEMIM, referring to the planned expansion of ASFA subject coverage, suggested to expand the format coverage of the ASFA CD-ROM to include inventories of data holdings and possibly imagery. The representatives from CSA were highly appreciative of this suggestion and promised to look into the matter. They further commented that it would create an excellent combination and would most certainly increase the appeal of the product. **The Committee urged** the Chair of GEMIM to take additionally steps to investigate the possibility of including inventories of data holdings like MEDI on the ASFA CD-ROM.

232 **The Committee concluded expressing its appreciation** for the MEDI product and **requested** the IOC Secretariat to negotiate the updating of MEDI with relevant oceanographic data centres.

#### **IOC Manuals and Guides**

233 The Committee then proceeded with the consideration of the status of the 'Handbook on Marine Science and Technology Resources' and noted the recommendation of the GEMIM to terminate this project, in view of commercial and other publications available at this time. **The Committee agreed** with the GEMIM recommendation.

234 With regard to Manuals **the Committee noted with satisfaction** the publication of the IOC Manual No. 23 on Marine Information Centre Development.

### Directories of Scientists

- 235 On the issue of directories of scientists, Mr. Pissierssens mentioned the publication of the Directory of Marine Scientists of the Western Indian Ocean (UNEP Regional Seas directories and bibliographies No. 36, 1992), in co-operation with KMFRI, LUC, RECOSCIX, as a pilot project of a regional approach in the development of such directories. Following its success he announced plans to develop a parallel product for the Central Eastern Atlantic region within the framework of the proposed RECOSCIX-CEA project.
- 236 The Delegate from Canada, Dr. J.R. Wilson, stressed the importance of directories and mentioned that, unfortunately, the national directory of Canada had to be ceased due to lack of resources.
- 237 The Delegate from China stressed the importance of a global directory of scientists and highlighted the efforts of China in developing a national directory as a supplement to the international directory.
- 238 **The Committee recognized the importance** of a Global Directory but pointed out that the traditional methodology did not allow an up-to-date product. **The Committee therefore recommended** the use of new technologies to develop a continuously updated Global Directory, taking into account the efforts which are being made on national and regional level.

### CD-ROM of IOC Documents

- 239 Mr. Pissierssens informed the Committee on the GEMIM request to the IOC Secretariat to develop a full-text searchable CD-ROM of IOC publications, taking into consideration the technical, as well as practical advantages of such a product for the dissemination of IOC publications.
- 240 The Delegate from Japan strongly supported this initiative saying that a computer searchable database would be specially useful for non-English speaking countries like Japan.
- 241 The Delegate from the USA, Dr. M. Loughridge, then gave extensive details on his organization's experience with document scanning, storage and retrieval.
- 242 **The Committee welcomed** the CD-ROM project proposal of GEMIM and **invited** the IOC Secretariat to investigate the possibilities to develop the product in co-operation with WDC-A and other relevant experienced institutions and organizations.

### IODE Handbook

- 243 **The Committee reviewed** the last issue of the IODE Handbook and **recommended** its updating, taking into account the decisions of this Session. **The Committee called on** Member States to provide the IOC Secretariat with any changes to the list of national representatives for IODE and members of the IODE Subsidiary Bodies.

### 8.4 NEW TECHNOLOGY FOR DOCUMENT IMAGING AND DELIVERY

- 244 The Chair of GEMIM identified the two papers relevant to this item, Document IOC/INF-910 and Document IOC/IODE-XIV/17. In view of the extensive discussions on new technologies under item 8.3 only two aspects were presented under this topic.
- 245 Mrs. Simpson reminded delegates of the converging utilization of the same technologies by data and information communities and emphasized the need for information products integrating text information, numeric data, bibliographic records and imagery.
- 246 She noted that GEMIM had planned to investigate the inter-operability between bibliographic and meta-data catalogues reminding delegates that on-line library databases of marine information centres were major channels to disseminate information on data holdings.
- 247 She referred the Committee to the fact that the concept of using Internet for document delivery was already a proven concept and informed delegates of the GEMIM's proposal to implement electronic document delivery over Internet within the marine sciences community. She explained that the prime need of developing countries was access to core literature. The pilot project requires the minimum funding for hardware and software as defined in Document IOC/IODE-XIV/17.

248 Referring to problems of developing countries obtaining access to the Internet, Mrs. Simpson referred to the BDSM (Base de données sous-régionale maritime) project which is being initiated in the IOCEA region, as an innovative but rare solution. She requested Member States currently active in marine information exchange between developing and developed countries to fund Internet document delivery nodes within their programmes.

249 The Chairman of GE-TADE commented on the importance of electronic communication means for data and information. Using the same carrier for both will undoubtedly bring them closer together.

250 **The Committee strongly supported** these developments and **encouraged** GEMIM to proceed on its present course.

## 9. TRAINING PROGRAMME IN MARINE DATA AND INFORMATION MANAGEMENT

251 The Committee was informed about the documents relevant to this item: IOC/IODE-XIV/10 and IOC/IODE-XIV/18. The Chairman in his introduction noted that, in spite of the severe limitations of financial resources and staff, still an impressive number of training courses and workshops had been held in the past intersessional period.

252 The IOC Consultant presented the activities under this heading that took place since IODE-XIII. He mentioned the different training courses and workshops that were organized, as well as the individual training opportunities that were provided. These courses formed an excellent way to create the necessary awareness of IOC activities and to advertise concepts of the IODE data management. Specifically he mentioned that the OCEAN-PC package and the TREDMAR Training Modules on Remote Sensing had been used during recent courses and had been made available to the participants. He also brought a number of the recommendations resulting from recent courses to the attention of the Committee. These related to:

- (i) the need for a mechanism to make surplus equipment, specifically PC's available to countries and centres needing these;
- (ii) the need for a timely availability in the required number and in the required language of supporting documents such as specific IOC and IODE manuals and guides;
- (iii) the necessary updating of promotional material such as: the IODE Slide Show, the IODE Brochure, the IODE Handbook and the Guide on How to Establish a National Oceanographic Data Centre;
- (iv) the needs for additional, more detailed training in marine data management, both regionally and nationally.

253 The IOC Consultant also introduced the Implementation Plan for the IODE modules, a development that started at IODE-XII. A basis had been laid for a number of required modules, now it was time to professionalize their presentation.

254 **The Committee supported** the regional approach of training. This approach would have the advantage of a common language and common problem fields between the participants, which could facilitate and enhance the training process.

255 Several countries, especially from South America, strongly supported the proposed concepts with emphasis on the need for substantive and more detailed training in marine data management in this region. In addition, Argentina made an offer to produce training material on various subjects in the form of video cassettes. Greece and Argentina expressed thanks for specific training opportunities provided through IOC and US NODC.

256 In spite of many efforts made by the IOC Secretariat to provide Member States with advanced information on planned training courses, there was still a concern that some Member States did not receive any information on training activities. **The Committee recommended** the IOC Secretariat to improve the announcement procedures by using additionally the IMS Newsletter and electronic mail bulletin boards.

- 257 The Delegate of Japan reminded the Committee on the planned JODC regional training course on the PC usage planned to be held in Malaysia in 1993. JODC would provide travel costs for a limited number of trainees and some hard- and software, and would also fund travel and subsistence of lecturers. Support was needed in the form of funding to cover travel cost of more trainees to participate in the course.
- 258 The Delegate of Gambia presented its requirement for assistance to set up an NODC and to obtain training in marine data management for national experts. Also other countries in the Central and Eastern Atlantic Region had such requirements.
- 259 The Delegate of Malta, while expressing the need for regional training opportunities on marine data management, noted the possibility of Malta hosting such a course. This course would facilitate the participation of North African countries in the IODE system.
- 260 The Delegates of Oman and Kuwait voiced strong support for the recommendations that resulted from the regional training course held at ROPME, Kuwait in October 1992, specifically for those relating to follow-up training needs, both regionally and nationally, and to the regional mission related to the future establishment of NODCs and an RNODC.
- 261 **The Committee noted with satisfaction** the proposal of Russia to host in 1993 a training course on marine data management and GF3 usage for the countries bordering the Black Sea.
- 262 **The Committee noted with appreciation** recent achievements made by IODE in delivering computer hardware to oceanographic data centres by using the IOC-VCP: Germany provided Russia with mainframe computers and the Netherlands is in the process of transferring a PC-AT to Costa Rica.
- 263 The Committee was informed about the background of the UNESCO TREDMAR Modules on the Applications of Marine and Coastal Image data from satellite, airborne and *in situ* sensors. This project, started in the mid-1980s mainly in response to the requirements for world-wide training in oceanography from space, has developed three computer-based learning modules with over twenty lessons. The modules are being used at over 500 institutes in about 70 countries in all regions of the world and have also been used at regional and national training courses in Nairobi (Kenya), Caracas (Venezuela), Enschede (The Netherlands), Dakar (Senegal), Porto Alegre (Brazil) and Lepe (Spain).
- 264 Increasingly the lessons are being created by scientists around the world using data from a variety of sensors to explain local or regional phenomena. For module 3, published in February 1992, the emphasis is on the application of Remote Sensing to coastal management. Module 4 is scheduled for early 1993 and will include the first 'African' lesson: on coastal upwelling off Senegal and Mauritania. Module 5, the first module fully in Spanish, is expected in mid-1993 and will contain lessons generated by the participants of the above-mentioned course in Lepe, Spain, half of whom were from Latin America.
- 265 **The Committee noted** that the collaboration between lesson users and producers is gradually becoming a global facility with the ultimate goal of a self-perpetuating network for the exchange of lessons in marine and related sciences. **The Committee fully supported** this collaboration and **invited** to use TREDMAR experience.
- 266 Australia expressed its willingness to investigate the feasibility of producing an updated version of the IODE Slide Show in a digital form. It should be noted that once the material is in a digital form, output to other media such as slides or overhead transparencies will always be possible. **The Committee expressed its preference** for a digital form and for overheads.
- 267 The Delegate of Mexico voiced the requirement for training on the national level, aimed at subjects including marine data management, procedures and guidelines of IOC and IODE, quality control, usage of the GF3 format and remotely-sensed data. He offered to investigate the possibilities of INEGI to host such a course and organize it in close collaboration with the IOC/ARIBE Secretariat. He noted that this course could result in the establishment of an NODC in Mexico.



268 **The Committee agreed** with the importance of training opportunities in marine data and information management, also relating this to GCOS and GOOS development and **commended the Secretariat** for its achievements during the last intersessional period.

269 **The Committee welcomed** the kind offers made by Argentina, Australia, Japan, Malta, Mexico and Russia. **The Committee also acknowledged** the requirements for training in special fields of ocean data management and **requested** the IOC Secretariat to seek for ways to meet these requirements as soon as feasible.

270 **The Committee stressed** that a more intensive implementation of the IOC-VCP programme would strongly enhance the capabilities of several Member Countries to participate in present and future IOC and IODE programmes. **The Committee requested** the IOC Secretariat to collect and distribute information on available surplus equipment using SCIENCEnet and other appropriate means and to provide support to transfers whenever possible. **The Committee urged** Member States in possession of surplus equipment to use this medium to inform the IOC Secretariat of the availability of such equipment.

271 **The Committee further agreed** with the Implementation Plan for the Modules Development as proposed and **urged** the IOC Secretariat to proceed with its execution.

#### 10. DEVELOPMENT OF WORK PLAN FOR THE NEXT INTERSESSIONAL PERI OD - STAFF AND BUDGET CONSEQUENCES

272 The Committee was presented with the findings of the Funding Committee which was established on the first day of the Session. The Chairman of this Committee conveyed to IODE-XIV his views on the evolution of IODE and its important role, both within the IOC and within the ocean-science community in general.

273 Based on the decisions taken under previous Agenda Items and taking into account the information provided by the IOC Secretariat on heavy financial constraints IOC will face in 1993, **the Committee adopted Recommendation IODE-XIV.8.**

274 This Recommendation contains the view of the Committee on IODE on the main principles of providing support to the ocean data management activities; on possible sources of funding and the list of projects, the implementation of which would need funding from the IOC regular and trust funds or from extra-budgetary sources.

275 **The Committee recognized** that accelerated implementation of the IODE programme would only be possible if Member States and the national representatives for IODE help to mobilize additional contribution to the IOC Trust Fund earmarked for IODE activities. **The Committee acknowledged with thanks** the efforts made by the Secretary IOC and some Member States in attracting extra-budgetary resources to the implementation of the IODE programme. **The Committee urged** all Member States and the Chairmen of the Committee and its subsidiary bodies to continue these efforts. **The Committee fully recognized** that the implementation of the projects targeted to assist developing countries in capacity building, such as data archeology and rescue, OCEAN-PC, publication of ASFA, TEMA, can not be successful without investing extra-budgetary funds. It noted that a rough estimation of funds provisionally available from extra-budgetary sources for 1993-1995 are approximately 3-4 times larger than the funds requested from IOC.

276 The Committee indicated that funds should not be cut from those projects which were already underway, and where a reduction would decrease the chance of successful completion.

277 **The Committee reiterated its concern** with the critical staffing situation in the Secretariat and **requested** that the Secretary IOC study the possibility of strengthening the Ocean Services Unit, responsible for ocean data and information management, by one or two full-time professional staff members.

## 11. ELECTION OF THE CHAIRMAN AND VICE-CHAIRMAN OF THE COMMITTEE

278 The Committee was informed on the Rules and Procedures for the election of the officers of the IOC  
Subsidiary Bodies as they are presented in the IOC Manual, 1989, UNESCO.

279 The Chairman of the Committee offered his resignation, due to other duties in the UK which had continued  
to increase and to diverge from pure data management. He stressed that he had enjoyed serving the IODE  
community and had the privilege of working with excellent staff at IOC and professional colleagues around the  
world. The Chairman expressed belief that under a new Chairmanship, IODE will continue to prosper in future.

280 **The Committee unanimously elected** Dr. R. Wilson (Canada) as its Chairman.

281 **The Committee noted** that the present Vice-Chairman, Dr. V. Smirnov (Russia) took active part in the  
Committee activities and initiated a number of projects which had been successfully implemented. **The  
Committee elected** Dr. V. Smirnov as its Vice-Chairman to hold this position until the end of the Fifteenth  
Session of the IODE Committee. **The Committee re-stated** its policy that the Vice-Chairman is responsible not  
only for assisting the Chairman, but also for IODE/TEMA activities.

282 **The Committee paid a special tribute** to Dr. N. Flemming who had undertaken the Chairmanship during  
the past two intersessional periods with continuous energy and enthusiasm and friendly spirit. Dr. Flemming was  
presented with the IOC Certificate of Appreciation in recognition of his contribution to the IOC.

## 12. DATE AND PLACE OF THE NEXT SESSION

283 Following a discussion during which some delegations stressed the need to shorten the period between the  
Sessions of the IODE Committee in light of the accelerated rate of the GOOS development, **the Committee  
agreed** that its next Session be organized at the end of 1995 or beginning of 1996.

284 The Secretary reminded the Committee on the main principles accepted by its Twelfth Session that all local  
arrangements for the IODE Session, full interpretation facilities and translation in the working languages of IOC  
should be provided free of charge to IOC.

285 The Delegate of Greece informed the Committee that his country always attached a deep interest to the  
activities of the IOC Committee on IODE, and in this spirit expressed readiness to explore the possibility of  
hosting its Fifteenth Session, provided that appropriate support is available from the European Community and  
other sources in order to meet the requirements for full interpretation facilities and translation in four working  
languages of IOC.

286 **The Committee welcomed** the generous offer of Greece and **requested** its Chairman and the IOC  
Secretariat to investigate this question further in order to take a final decision on the place of IODE-XV before  
the end of 1993.

## 13. ADOPTION OF THE SUMMARY REPORT, RESOLUTIONS AND RECOMMENDATIONS

287 **The Committee adopted** the Draft Summary Report of the Session and the Resolutions and  
Recommendations as they are presented in Annex II. **The Committee requested** the IOC Secretariat, its present  
and past Chairmen to make the corrections taking into account discussions held under this Agenda Item.

288 **The Committee requested** the Chairman to present the Summary Report, Resolutions and  
Recommendations to the Seventeenth Session of the IOC Assembly, planned for February-March 1993, in Paris.

#### 14. CLOSING OF THE SESSION

289 The Chairman thanked the participants for their efforts, co-operation and for the frank and open atmosphere that prevailed during the Session, and on behalf of the Committee extended his thanks to the Secretary IOC for hosting the Session.

290 Speaking on behalf of the Secretary IOC, Dr. Y. Oliounine wished Dr. N. Flemming, the past Chairman of the IOC Committee on IODE, all the best in his future work. He stressed that much of the success achieved by the Committee was due to Dr. Flemming's energy, experience and knowledge and that the Committee will remember his friendliness, kindness and good humor. Following this, he presented Dr. N. Flemming, on behalf of the Committee, with a token of their esteem.

291 Dr. Flemming thanked the participants for their kindness and assured them that he will always remember the assistance and understanding he received from all IODE experts.

292 **The Committee expressed its satisfaction** with the arrangements for the Session and paid a special tribute to the members of the IOC/MRI Secretariat for the software and posters demonstration, and the exhibition of publications and products generated by different centres of the IODE system. A list of software which was demonstrated at IODE-XIV is presented in Annex X to the Summary Report. **The Committee recommended** to continue this practice.

293 The Session closed at 13.00 hours on 9 December 1992.

**ANNEX I**

**AGENDA**

- 1. ORGANIZATION OF THE SESSION**
- 2. STATUS OF THE GLOBAL DATA EXCHANGE**
  - 2.1 MANAGING GLOBAL OCEAN DATA FLOW
  - 2.2 ACTIVITIES OF WDCs
  - 2.3 NATIONAL AND REGIONAL DATA & INFORMATION MANAGEMENT ACTIVITIES
  - 2.4 LINKS BETWEEN IODE & IGOSS
- 3. PARTICIPATION IN GLOBAL OCEAN CLIMATE PROJECTS**
  - 3.1 ACTIVITIES OF THE GROUP OF EXPERTS ON RNODCs & CLIMATE DATA SERVICES
  - 3.2 CO-OPERATION WITH OCEAN CLIMATE EXPERIMENTS' DATA GROUPS
- 4. GLOBAL OCEAN OBSERVING SYSTEM (GOOS) DEVELOPMENT**
  - 4.1 IODE PRESENTATIONS AT GCOS & GOOS PLANNING MEETINGS
  - 4.2 PROJECTED DATA CHALLENGES ARISING FROM GOOS
- 5. PRODUCTS & SERVICES**
  - 5.1 SUPPORT FOR IOC SCIENCE PROGRAMMES
  - 5.2 PRODUCTS OF IODE DATA CENTRES
  - 5.3 GLOBAL TEMPERATURE & SALINITY PILOT PROJECT (GTSP)
- 6. NEW DATA TYPES**
  - 6.1 REMOTELY SENSED DATA
  - 6.2 PROGRESS WITH CHEMICAL, BIOLOGICAL, POLLUTION & CURRENTS DATA
  - 6.3 LONG TIME-SERIES OF OBSERVATIONS
  - 6.4 DATA ARCHEOLOGY & RESCUE
- 7. IODE DEVELOPMENT OF TECHNOLOGY & SYSTEMS**
  - 7.1 ACTIVITIES OF THE GROUP OF EXPERTS ON TECHNICAL ASPECTS OF DATA EXCHANGE
  - 7.2 QUALITY CONTROL OF OCEANOGRAPHIC DATA
  - 7.3 OCEAN-PC & SOFTWARE DEVELOPMENT
  - 7.4 DATA EXCHANGE SYSTEMS DEVELOPMENT
  - 7.5 EXTENT OF NETWORK ACCESS
  - 7.6 FORMATS FOR THE FUTURE
- 8. MARINE INFORMATION MANAGEMENT (MIM)**
  - 8.1 ACTIVITIES OF THE GROUP OF EXPERTS ON MARINE INFORMATION MANAGEMENT
  - 8.2 ASFIS/ASFA
  - 8.3 MARINE INFORMATION PRODUCTS
  - 8.4 NEW TECHNOLOGY FOR DOCUMENTS IMAGING & DELIVERY
- 9. TRAINING PROGRAMME IN MARINE DATA & INFORMATION MANAGEMENT**
- 10. DEVELOPMENT OF WORK PLAN FOR THE NEXT INTERSESSIONAL PERIOD - STAFF & BUDGET CONSEQUENCES**
- 11. ELECTION OF THE CHAIRMAN & VICE-CHAIRMAN OF THE COMMITTEE**
- 12. DATE & PLACE OF THE NEXT SESSION**
- 13. ADOPTION OF THE SUMMARY REPORT, RESOLUTIONS & RECOMMENDATIONS**
- 14. CLOSING OF THE SESSION**

## ANNEX II

### RESOLUTIONS AND RECOMMENDATIONS

Code	Title
<b>Resolutions</b>	
Resolution IODE-XIV.1	Role of IODE in GOOS and GCOS
Resolution IODE-XIV.2	Marine Sediment Cores & Past Climate Changes
Resolution IODE-XIV.3	Establishment of an <i>ad hoc</i> Group of Rapporteurs on Marine Biological Data Management
Resolution IODE-XIV.4	Management of Chemical & Carbon Dioxide Data
Resolution IODE-XIV.5	Task Team on Data Quality Control
<b>Recommendations</b>	
Recommendation IODE-XIV.1	IODC Activities in Support to Global Programmes
Recommendation IODE-XIV.2	Co-operation with WMO in Ocean Satellites and Remote-sensing Data Management
Recommendation IODE-XIV.3	Data Archaeology and Rescue Project
Recommendation IODE-XIV.4	Re-establishment of the Group of Experts on TADE with Modified Terms of Reference
Recommendation IODE-XIV.5	Development of Ocean Personal Computer Project (OCEAN-PC)
Recommendation IODE-XIV.6	Policy Statement on Ocean Data Management for Global Science Programmes
Recommendation IODE-XIV.7	Development of ASFIS/ASFA and the IOC Future Role in it
Recommendation IODE-XIV.8	Programme and Budget for 1993-1995

## **Resolution IODE-XIV.1**

### **ROLE OF IODE IN GOOS AND GCOS**

The IOC Committee on International Oceanographic Data & Information Exchange,

#### **Noting:**

- (i) the decisions of the IOC Assembly to initiate the development of a Global Ocean Observing System (GOOS) and relevant recommendations of the Second World Climate Conference and the UNCED that support this initiative of IOC to be undertaken in co-operation with WMO, ICSU, UNEP and other international organizations;
- (ii) that the GOOS climate module will provide the ocean component of the Global Climate Observing System (GCOS) as a joint effort of WMO, ICSU, IOC & UNEP;
- (iii) that GOOS will be built upon existing ocean observing and data management systems such as IGOSS, GLOSS, IODE, WWW & MARPOLMON (GIPME), e.g., by strengthening and accelerating their implementation as well as upon progressive implementation of new elements and capabilities;
- (iv) that GOOS will be updated and improved in response to the results of research programmes such as TOGA, WOCE, JGOFS and to the development of new technology.

#### **Considering:**

- (i) that the IODE system represents an established and successful international mechanism for the delayed-mode exchange and management of oceanographic data based upon internationally accepted formats and procedures;
- (ii) that the Joint IGOSS/IODC Global Temperature and Salinity Pilot project (GTSP) has already developed procedures for the merging and quality control of operational and delayed mode oceanic data in support of global ocean research and global climate studies.

#### **Recommends:**

- (i) that the IOC Committee on IODE should work with the Joint GOOS Technical and Scientific Committee in designing and planning the oceanographic data and information management elements of GOOS;
- (ii) that the IOC Committee on IODE collaborate with GOOS, the ICSU Panel on WDCs and the Directors of WDCs, Oceanography to identify the resources, funding base, and the support needed to provide appropriate data management capabilities to handle oceanographic data sets needed by GOOS & GCOS.

**Invites** the Directors of NODCs to consult with their funding agencies and national committees for GOOS & GCOS to ensure that their resources are adequate to support the operation of GOOS & GCOS.

## **Resolution IODE-XIV.2**

### **MARINE SEDIMENT CORES & PAST CLIMATE CHANGES**

The IOC Committee on International Oceanographic Data & Information Exchange,

**Recognizing** the importance of analyses deriving from ocean sediment cores to studies of past climates and to paleo-oceanography,

**Being concerned with** the diminishing amount of sample material and with the difficulty of locating material available for analysis,

**Noting** the need to identify, catalog and curate all such remaining material so that these materials can be fully utilized for analyses beyond those for which the samples were collected originally,

**Noting further** the report of the Task Team on exchange of Marine Geological and Geophysical Data (Document IOC/IODE-XIV/10),

**Being aware** of the interests of the International Geosphere Biosphere Programme (IGBP) in its Past Global Changes (PAGES) core programme, in the data which can be derived from ocean sediments, and of the importance of these data,

**Accepts** the offer of the World Data Centers A and B for Marine Geology and Geophysics and the newly established World Data Center A for Paleo-climatology to expand the existing Index to Marine Geological Samples Database beyond the North American core collections;

**Invites** WDC-A-MGG to provide additional information about the Index to Marine Geological Samples to Member States through the IOC Secretariat;

**Encourages** Member States to locate and catalog marine sediment cores available for sampling and analysis and contribute information (meta-data) about these cores to the Index to Marine Geological Samples database maintained by WDC-A-MGG;

**Urges** Member States to establish procedures to provide access to these cores for sampling.

### Resolution IODE-XIV.3

#### ESTABLISHMENT OF AN *AD HOC* GROUP OF RAPORTEURS ON MARINE BIOLOGICAL DATA MANAGEMENT

The IOC Committee on International Oceanographic Data & Information Exchange,

**Considering** the growing need for management of Marine Biological Data resulting from global marine climate and environmental research programmes, as well as environmental monitoring programmes,

**Recognizing** the need for the provision of meta-data to describe marine biological datasets such as BIOMASS, JGOFS, GLOBEC, CALCOFI and the HELCOM data, and the need to define the types of marine biological data relevant to the requirements of the above programmes and of GOOS,

**Taking into account** the benefits that would result from merging of relevant marine biological data sets in the long-run to produce truly global datasets,

**Decides** to have an *ad hoc* Group of Rapporteurs on Marine Biological Data Management, which shall establish an electronic mail communication to

- (i) identify and list the relevant data sets together with any appropriate meta data;
- (ii) give information about a cross-checked Taxonomic Code List;
- (iii) give information on inter-calibration exercises for marine biological research and monitoring for which marine biological stations are asked to take responsibility;
- (iv) communicate with the relevant groups in GOOS, and support the related needs for biological data management in GOOS;
- (v) prepare a progress report to be submitted to IODE-XV;

**Decides also** that the *ad hoc* Group of Rapporteurs will be composed of J.R. Keeley (Canada), F. Nast (Germany), Shin Tani (Japan), S. Levitus (USA), H. Dooley (ICES) and E. Yamachenko (Russia);

**Invites** HELCOM to propose an expert to participate in the activities of the *ad hoc* Group of Rapporteurs.



## **Resolution IODE-XIV.4**

### **MANAGEMENT OF CHEMICAL & CARBON DIOXIDE DATA**

The IOC Committee on International Oceanographic Data & Information Exchange,

#### **Considering**

- (i) the role of the World Ocean as a major component of the Earth's bio-geochemical cycling system and climate system;
- (ii) the importance of oceanic chemical and carbon dioxide data for understanding bio-geochemical cycles of the World Ocean;

#### **Noting:**

- (i) the conclusions and recommendations of the Sub-panel on standards for CO<sub>2</sub> measurements of the Joint Panel on Oceanographic Tables and Standards (JPOTS) presented in UNESCO Technical papers in Marine Science No. 42, 51 & 60;
- (ii) the importance of understanding the global carbon cycle and its ocean component in order to meet the requirements of UNCED and the Framework Convention on Climate Change;

**Decides** to accept the offer of the US NODC to work with the CCCO/JGOFS CO<sub>2</sub> Panel to:

- (i) identify the chemical variables for which collecting and processing standards and user needs support development of global databases;
- (ii) co-ordinate the development of common processing and archiving procedures, with special emphasis on CO<sub>2</sub> and chlorophyll data;
- (iii) identify the meta data required to document the data to ensure its usefulness to secondary users;
- (iv) identify jointly with the IOC Committee for GIPME the need for an RNODC for chemical carbon dioxide, and/or chlorophyll data;
- (v) work with the Group of Experts on RNODCs and Global Programmes and the Committee for GIPME to establish Terms of Reference for such an RNODC(s) and seek a volunteer centre;

**Establishes** an *ad hoc* Group of Rapporteurs to work with the US NODC including experts from data centres of Sweden, UK and Japan;

**Urges** Member States to consider assuming the responsibility of becoming RNODC for chemical and carbon dioxide data when the time is appropriate.

## **Resolution IODE-XIV.5**

### **TASK TEAM ON DATA QUALITY CONTROL**

The IOC Committee on International Oceanographic Data & Information Exchange,

**Noting** the Report of the Chairman of the Task Team on Oceanographic Data Quality Control to IODE-XIV (Document IOC/ODE-XIV/10),

**Welcoming** the collaboration between the office of the Marine Science and Technology Programme (MAST) of the CEC-DG-XII and the Secretariat IOC which had resulted in the preparation of a substantial Manual on Quality Control Procedures for Validation of Oceanographic Data which comprise available documents describing oceanographic data quality control procedures,

**Considering** that various organizations are producing new guidelines for data quality control of marine data types not yet included within the Manual, and that therefore updates of the Manual will be required,

**Noting** that some Member States may require text or software on QC procedures to be provided on diskette so that they can be translated into other languages, or used directly on computers,

**Decides** to continue the Task Team on Oceanographic Data Quality Control; with the revised Terms of Reference to:

- (i) support the publication and distribution, of the IOC/CEC Manual on Quality Control Procedures for Validation of Oceanographic Data, and undertake revision, addition, or publication of further volumes as required;
- (ii) collaborate with organizations and bodies directly concerned with handling different data types so as to obtain from them published quality control procedures, with permission to reproduce and publish the documents on behalf of IOC;
- (iii) identify published quality control procedures for oceanographic data types which have been agreed by international or multinational bodies and which have been used and proven through experience and testing;
- (iv) maintain collaboration with the CEC-DG-XII MAST Programme so as to ensure that QC procedures identified as important by IODE are consistent, if possible, with those used by the Member States of the EC and in MAST research programmes;
- (v) submit a report to IODE-XV identifying QC publications which could be included in a further Manual and its updates, with recommendations concerning possible co-sponsors for their publication and recommendations concerning provision of QC material in machine readable form;
- (vi) interact with and support data quality control requirements of GOOS.

## **Recommendation IODE-XIV.1**

### **IODE ACTIVITIES IN SUPPORT TO GLOBAL PROGRAMMES**

The IOC Committee on International Oceanographic Data & Information Exchange,

**Noting** the recommendations of its Group of Experts on RNODCs and Climate Data Systems with regard to the need to revise the Group's Terms of Reference (Document IOC/IODE-XIV/10);

**Noting further** the requirements of UNCED and of the Framework Convention on Climate Change for global datasets including marine data,

**Having considered** the recommendations of the Ocean Climate Data Workshop, held in February 1992 at Greenbelt, Maryland (USA), on the need to develop a data management strategy and programme in support of ocean observing systems, such as GOOS,

**Recognizing** the need for IODE to respond to the ocean data system requirements of climate and global change research and monitoring programmes,

**Recognizing further** the need for a continuing process to advise IOC on the creation of new RNODCs and to review the operation of existing RNODCs,

**Recommends** that IOC approve the new Terms of Reference and a revised title of the Group of Experts on RNODCs and Global Programmes, as shown in the Annex to this Recommendation.

### **Annex to Recommendation IODE-XIV.1**

#### **TERMS OF REFERENCE FOR THE GROUP OF EXPERTS ON RNODCS & GLOBAL PROGRAMMES**

1. Identify RNODCs needed to meet IODE responsibilities in accordance with the guidelines specified in the IOC Guide on RNODCs (IOC Manuals & Guides No. 9, Annex II).
2. Review the activities and progress of RNODCs.
3. Recommend activities to meet the ocean data needs of climate and global change research and monitoring activities: GOOS, GCOS and scientific programmes such as TOGA, WOCE, JGOFS and IGBP.
4. Serve as a link between the ocean data needs of the research and monitoring programmes and RNODCs.
5. Identify regional and global data sets of specific parameters needed by the global programmes and recommend projects like GTSP that might be established or enhanced to produce them.

## Recommendation IODE-XIV.2

### CO-OPERATION WITH WMO IN OCEAN SATELLITES AND REMOTE-SENSING DATA MANAGEMENT

The IOC Committee on International Oceanographic Data & Information Exchange,

#### Noting:

- (i) Resolution 5 of the Tenth Session of the WMO Commission for Marine Meteorology, which established *inter alia* the CMM/IGOSS *ad hoc* Group on Ocean Satellites and Remote Sensing,
- (ii) the Report of the Chairman of the IODE Task Team on Remotely Sensed Oceanographic Data on intersessional activities (Document IOC/IODE/10),
- (iii) Recommendation 1 (JC-IGOSS-VI) of the Sixth Session of the Joint IOC/WMO Committee for IGOSS by which, *inter alia*, WMO/CMM was invited to re-establish the *ad hoc* Group at its Eleventh Session (Lisbon, April 1993);

#### Considering:

- (i) the considerably increasing demand for various kinds of remotely sensed oceanographic data on all time scales in the context of major environmental programmes;
- (ii) that several tasks entrusted to the IODE Task Team are included in the Terms of Reference of the Joint CMM-IGOSS *ad hoc* Group;
- (iii) that advice and guidance on the management of remotely sensed oceanographic data is important for many countries to enable them to take full advantage of these data as they become available;

**Invites** the WMO Commission for Marine Meteorology, at its forthcoming Eleventh Session, to re-establish an *ad hoc* Group on Ocean Satellites and Remote Sensing, jointly with IGOSS and IODE, and **recommends** that:

- (i) the Terms of Reference of the Joint *ad hoc* Group be revised to include the following:
  - "a) develop a range of printed and electronic information products on remotely sensed ocean data for the marine scientific and operational communities;
  - b) consolidate the requirements for and assist in the developing of formats for the international exchange of remotely sensed ocean data and data products in various time frames, through the use of IOC and WMO formats and code forms such as GF-3, BUFR, GRIB and FLEX, in endeavouring to ensure as much compatibility as possible amongst the various formats and code forms used;
  - c) contribute to the development of training courses on the remote sensing of the marine environment through appropriate IOC and WMO mechanisms."
- (ii) the membership of the *ad hoc* Group include two or three IODE experts.

**Requests** its Chairman to consult with the President of CMM, the Chairman of IGOSS and IOC and WMO Secretariats in order to finalize the membership and make necessary revision of the Terms of Reference for the *ad hoc* Group.

## **Recommendation IOC/IODE-XIV.DR.3**

### **DATA ARCHAEOLOGY AND RESCUE PROJECT**

The IOC Committee on International Oceanographic & Information Exchange,

**Noting** that historical observations of oceanographic parameters are not repeatable if lost,

**Acknowledging** that substantial amounts of historical ocean observations are at risk of being lost due to media degradation or neglect,

**Recognizing** that the international scientific and engineering communities need the most comprehensive oceanographic multi-decadal databases possible for research purposes, particularly for use in studies describing the role of the World Ocean as part of the earth's climate system as well as for Global Change research,

**Emphasizing** that in order to make sound policy decisions national governments and intergovernmental advisory groups need scientific observations of the state of the World Ocean and for understanding of the role of the World Ocean as part of the earth's climate system,

**Recommends** that:

- (i) IOC establish a Global Oceanographic Data Archaeology and Rescue Project under the IOC Committee on IODE as presented in the Annex to this recommendation subject to condition that the additional funds be made available;
- (ii) a project leader be designated by the Secretary IOC in consultation with the Chairman of the IOC Committee on IODE to supervise its implementation;
- (iii) IOC invite Member States and International Organizations to participate in and support this project, including the possibility of direct funding ear-marked for this purpose within the IOC Trust Fund.

### **Annex to Recommendation IODE-XIV.3**

#### **Introduction**

All countries of the world have a concern about climate change because of the global impact of climate variability, whether natural or anthropogenic,

If international agreements are to be implemented due to concern about climate change, the science on which these agreements is based must be international in scope. All data on which these studies are based must therefore be available to the international scientific community without restriction.

Historical oceanographic data is of fundamental importance to scientists studying the role of the ocean as part of the earth's climate system. Regardless of any particular view an individual scientist or nation has on these issues, it is necessary that scientific assessments and national and international actions be based on the most complete environmental data bases possible.

Recognizing that oceanography is an observational science and that the world ocean is a major component of the earth's climate system it is suggested that the IOC sponsor activities that will result in more complete global oceanographic databases. These activities should be viewed as an enhancement of existing IODE activities. The new and enhanced oceanographic databases will be available without restriction to the international science community. We call this effort the "*Global Oceanographic Data Archaeology and Rescue Project*" (GODAR). To do the most thorough job possible this project must have a lifetime of 5 to 10 years. Funds to support the activities of this project will be obtained through as many sources independent of IOC as possible, including foundations.

"Data Archaeology" is the term used to describe the process of seeking out, restoring, evaluating, correcting and interpreting historical datasets.

"Rescue" refers to the effort to save data at risk from being lost to the science community.

Physical, chemical, and biological oceanographic data as well as surface marine meteorological observations are the specific types of data this project will focus on. These are the data types of greatest concern to IODE and climate research activities. Advances in computer technology both hardware and software (e.g., Relational Database technology) now allow for the construction of integrated global oceanographic data bases that include widely disparate types of oceanographic data from different oceanographic disciplines.

The data gathered as a result of this project will be of particular benefit to developing countries. The international availability of comprehensive global oceanographic datasets represent a policy of both information sharing as well as knowledge and technology transfer since the data can be used to study regional environmental oceanographic problems.

## **Rationale**

Many oceanographic data are at risk of being lost to future use because of media degradation, hence the need for a "data rescue" effort in conjunction with the data archaeology effort. Sole copies of manuscript data are easily lost due to environmental damage or catastrophe such as fire. In addition manuscript data are of minimal use to researchers who require data in digital form with all pertinent meta-data in order to perform the most comprehensive studies possible. It is the international scientific community which must advise national and international bodies on such issues as climate change. Thus the most complete well-documented databases possible must be available to the international community. Data archaeology and rescue activities at WDC-A, Washington; WDC-B, Obninsk; WDC-D, Tianjin; ICES, Denmark; the Japanese Oceanographic Data Center, and other institutions all have identified major oceanographic databases that exist only in manuscript form. Efforts sponsored by these institutions have resulted in digitization of some of these data and further digitization ("data rescue") is planned. For example the US NODC has located 150,000 MBT profiles in manuscript form and is contracting to have these data digitized. All the above institutions are already closely cooperating on archaeology and rescue activities to avoid duplication of effort and to maximize their resources.

## **Purpose**

To facilitate the creation of global oceanographic databases for use by the international research community for the study of the role of the world ocean as part of the earth's climate system.

## **Main Emphasis**

Specifically the project will emphasize:

- (i) Digitization of data now known to exist only in manuscript and/or analog form. This effort will have highest priority of all activities.
- (ii) Ensuring that all oceanographic data available for international exchange is archived at two or more international data centers in digital form.
- (iii) Preparing catalogues (inventories) of:
  - a) Data now available only in manuscript form;
  - b) Data now available only in analog form;
  - c) Digital data not presently available to the international scientific community.
- (iv) Making all data accessible on various media including CD-ROM's as well as standard magnetic tape.

These efforts represent implicit acknowledgement of the value of the ICSU-IOC International Oceanographic Data and Exchange (IODE) system but also recognize the need to enhance and expand the existing scope and efforts of this system as well as other international exchange mechanisms such as bilateral agreements. In fact this International Data Archaeology and Rescue Programme will build on existing data archaeology programs at WDC-A, WDC-B, and ICES.

The enhanced data bases will be made available as ASCII files on CD-ROM disks as this is the technology that represents the least expensive and most efficient means of distribution of large datasets.

The World Data Center-A for Oceanography (WDC-A) volunteers its services for these activities. WDC-A will work with data centers and research institutions around the world to compile the most complete oceanographic data bases possible and will arrange for the production and distribution of the resulting databases on CD-ROM's and magnetic tapes.

## **Proposed Activities**

- (i) IOC Secretary in consultation with the Chairman of the Committee on IODE appoint a project leader to direct the project (March 1993) - no funds required.
- (ii) A project leader with the assistance, if necessary, of selected experts, will prepare an implementation plan and identify priorities (April 1993) - no funds required.
- (iii) Workshop on GODAR will be arranged in Russian for Eastern Europe countries (May-June 1993) -20K from IOC RF and 40K from extra-budgetary sources.
- (iv) IOC will mobilize and provide resources to sponsor series of regional and international meetings on the formation of global oceanographic databases for international distribution as part of GODAR (1994-...) - funds from IOC RF and extra-budgetary sources.
- (v) IOC provide support via its VCP and by using extra-budgetary sources for the delivery of hardware/software required, and by arranging contracts with the staff of data centres to implement specific projects (1993-...) - funds from extra-budgetary sources.
- (vi) IOC request its Member States declassify as much militarily-restricted oceanographic data as possible for international distribution.

#### **Data Types of Interest**

- (i) Hydrographic casts including all chemical and biological observations;
- (ii) Salinity/Conductivity Temperature-Depth casts;
- (iii) Expendable Bathythermograph casts;
- (iv) Mechanical Bathythermograph casts.

## **Recommendation IODE-XIV.4**

### **RE-ESTABLISHMENT OF THE GROUP OF EXPERTS ON TADE WITH MODIFIED TERMS OF REFERENCE**

The IOC Committee on International Oceanographic Data & Information Exchange,

**Noting** the continuing need for a group of experts to deal with technical issues in international oceanographic data exchange,

**Noting further** the Terms of Reference of the IGOSS Group of Experts on Operations and Technical Applications, as they are stated in Resolution 5 (JC-IGOSS-VI) of the Sixth Session of the Joint IOC-WMO Committee for IGOSS,

**Recognizing** that the substantial work in the design and development of GF3 is nearing completion and that new opportunities in data exchange mechanisms have appeared with improvements in computer technology and electronic networks,

**Taking into account** the developments in data exchange activities and needs that have been expressed by international oceanographic programmes, as well as the needs of GOOS,

**Recommends** that the Group of Experts on Technical Aspects of Data Exchange be re-established with the following Terms of Reference:

1. Evaluate and support the demands on IODE for new technical solutions for oceanographic data exchange, particularly with reference to the needs expressed by the Ocean Climate Data Workshop;
2. Collaborate with IGOSS GE/OTA and the data management groups of other international bodies and scientific programmes in the development of technical solutions to support the management and exchange of oceanographic data;
3. Keep under review the formatting systems being used in the exchange of oceanographic data and ensure the proper development of such systems in support of the needs of IODE, of scientific programmes and for the developments of GOOS;
4. Provide advice and guidance on the use of the GF3 formatting system, maintain and develop the system including its code tables, documentation and supporting software;
5. Continually review the impacts of new technologies which increase capabilities in data collection and the integration and co-management of both data and information on these collections, to identify opportunities and propose solutions for the evolution of the IODE system in light of these developments;
6. Compile and maintain an inventory of software and expertise available from members of the IODE system which may be freely exchanged and which may be used by other members of the system to enhance their products and services capabilities.



## **Recommendation IODE-XIV.5**

### **DEVELOPMENT OF OCEAN PERSONAL COMPUTER PROJECT (OCEAN-PC)**

The IOC Committee on International Oceanographic Data and Information Exchange,

**Recognizing** the needs of the ocean science community for software and for an access to modern computer technology and standards for processing, particularly in developing countries,

**Further recognizing** the importance of data collected by developing countries to major global ocean programmes such as GOOS and to other programmes with ocean science components such as WCRP and IGBP,

**Wishing** to further stimulate ocean data exchange and input of data from every possible source,

**Having viewed** the prototype OCEAN-PC software package,

**Taking into account** the OCEAN-PC Implementation Plan (Document IOC/IODE-XIV/14) and comments made by the Committee Members,

**Recommends** that IOC:

- (i) continue the OCEAN-PC project with an emphasis on the use of CD-ROM's;
- (ii) investigate mechanisms to provide CD-ROM readers and necessary software to institutes in developing countries wishing to make use of OCEAN-PC;
- (iii) encourage the use of OCEAN-PC technology in TEMA;
- (iv) invite contributions from Member States of resources, expertise, and hardware for use in developing countries to support installation of the OCEAN-PC technology and its use to meet national, regional and global objectives;
- (v) urge Member States to continue collecting and contributing the latest relevant software for use by the developing countries;
- (vi) request the participation of interested national and world data centers to review the prototype OCEAN-PC software package and to identify and contribute new software appropriate to global ocean programmes.

## **Recommendation IODE-XIV.6**

### **POLICY STATEMENT ON OCEAN DATA MANAGEMENT FOR GLOBAL SCIENCE PROGRAMMES**

The IOC Committee on International Oceanographic Data & Information Exchange,

#### **Noting**

- (i) the IOC/ICSU Manual on IODE (1992, UNESCO);
- (ii) the proposed ICSU Data Policy for the International Geosphere-Biosphere Programme;
- (iii) the proposed CEOS Satellite Data Exchange Principles in support of global change research;
- (iv) the WMO policy on free and open international exchange of meteorological data.

#### **Recognizing**

- (i) that global ocean programmes, including the Global Ocean Observing System, require an international commitment to establish, maintain, and make available high quality, long-term datasets for co-operative projects and programmes;
- (ii) that the objectives of the United Nations Framework Convention on Climate Change and of the United Nations Convention on Biological Diversity can best be achieved if there is a full and open access to global data sets of oceanographic and marine biological data;

**Submits** to the IOC Assembly for its consideration and eventual approval the Draft Statement on Data Management Policy for Global Ocean Programmes contained in the Annex to the Recommendation.

## **Annex to Recommendation IODE-XIV.6**

### **DRAFT STATEMENT ON DATA MANAGEMENT POLICY FOR GLOBAL OCEAN PROGRAMMES**

The overall purpose of this policy statement is to facilitate full and open access to quality ocean data for global ocean research programmes. The Global Ocean Programme to be carried out under GOOS requires an early and continuing commitment to the establishment, maintenance, validation, description, accessibility and distribution of high-quality, long-term datasets.

- (i) Full and open sharing of a wide spectrum of global international data sets for all ocean programmes is a fundamental objective.
- (ii) Data submitted for international exchange should be provided at the lowest possible cost to global ocean researchers 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.
- (iii) Preferably, all data should be made available in the public domain of IODE data centers within one year of collection (chemical, biological and geological data may require longer intervals). For those global ocean programmes in which selected principal investigators have initial periods of exclusive data use, data should be made available as soon as they become widely useful or at the maximum two years after data collection.
- (iv) Preservation of data needed for long-term global ocean programmes is required. For each and every global ocean data parameter, there should be at least one explicitly designated archive.
- (v) 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.
- (vi) National and international standards should be used to the greatest extent possible for media and for processing and communication of global oceanographic data sets.

## **Recommendation IODE-XIV.7**

### **DEVELOPMENT OF ASFIS/ASFA AND THE IOC FUTURE ROLE IN IT**

The IOC Committee on International Oceanographic Data and Information Exchange,

**Recognizing** the essential role of ASFA as the main reference tool for aquatic scientists throughout the world, developing and developed countries alike,

**Recognizing further** the need for a multi-disciplinary approach in environmental research and the importance of information to capacity building stressed in Agenda 21 of UNCED,

**Taking note** of Document IOC/IODE-XIV/16 entitled "*Future Development of ASFIS/ASFA and the IOC Role in it*",

**Having been informed** of FAO's decision to terminate its existing contract with ASFA's publisher, CSA by December 1994,

**Emphasizing** the urgent need for the ASFA international co-sponsors to discuss future arrangements in order to find constructive solutions to the problem,

**Taking into account** the concerns expressed by the international marine information community on this matter, especially those of IAMSLIC,

**Being convinced** that it is essential to maintain appropriate support for ASFA in order to ensure the quality of the ASFA product,

**Recommends** that IOC jointly with the other ASFA co-sponsors shall continue efforts to convince FAO that its role as lead agency and co-sponsor of ASFA shall be maintained;

**Encourages** the IOC Member States, through appropriate channels, to convey to FAO the importance of maintaining a coherent inter-agency and multi-disciplinary approach to ASFA;

**Requests** the Secretary IOC to explore with other international organizations and Member States their interest in supporting and sharing the cost of ASFA;

**Requests** the Secretary IOC to bring a revised version of Document IOC/IODE-XIV/16, and results of any subsequent negotiations, to the attention of ICSPRO and the IOC Assembly;

**Invites** the IOC Assembly to evaluate the implications of an IOC takeover as lead agency.

## **Recommendation IODE-XIV.8**

### **PROGRAMME AND BUDGET FOR 1993-1995**

The IOC Committee on International Oceanographic Data & Information Exchange,

**Having reviewed** its ongoing activities and forecast programme implementation requirements through 1995,

**Having been informed** of the likely resources to be made available for IODE activities in 1993 and the budgetary framework for the 1994-95 biennium,

**Being aware** of the severe financial constraints under which IOC is operating,

**Emphasizing** the importance of ensuring adequate oceanographic data and information requirements and services for Member States and for the scientific and observational programmes of the Commission in support of the Global Climate and Environmental Research and Global Change,

**Recognizing** with thanks the considerable resources and efforts already being contributed by national experts, NODCs, and other institutions of Member States, to implement ocean data and information management activities,

**Calls on** Member States to continue, whenever possible, the financial responsibilities associated with execution of the IODE programme as undertaken by their experts, national oceanographic data centres and other institutions;

**Urges** both donor and recipient Member States to commit funding specifically for IODE projects within their multi-lateral and bilateral assistance programmes;

**Encourages** Member States to submit proposals for IODE activities, both national and regional, for consideration by the UNESCO Participation Programme;

**Requests** the Chairman of IODE to bring to the attention of the Seventeenth Session of the IOC Assembly, a framework proposal for the IODE programme of work and budget for the period 1993-1995, as found in the Annexes to this Recommendation.

### **Annex I to Recommendation IODE-XIV.8**

#### **IODE PROGRAMME OVERVIEW FOR THE 1993 TO 1995 INTERSESSIONAL PERIOD**

The major thrusts of IODE efforts for the period 1993 to 1995 inclusive will be oriented to meet the objectives of IOC programmes related to climate and global changes, environmental protection, coastal zone management and sustainable development. IODE will continue to work in close co-operation with international organizations including FAO, WMO, UNEP, SCOR, IMO, IAEA, ICES, ICSEM, EEC, ESA, ICSU, etc. IODE will co-operate and collaborate to assist in the development of IGBP and GOOS, the need for which has been restated by many international meetings including UNCED.

The situation with the IOC budget is viewed as critical at this time. At a time when data management has the highest profile it has ever achieved, the IODE budget is being reduced. It has become necessary to review priorities and opportunities of IODE for obtaining extra-budgetary financing. The work plan presented here is based on the following principles:

- (i) noting that meetings of IODE subsidiary bodies are critical to the general success and development of the programme and that without them IODE Programme will quickly come to a stop, the Committee recommended that travel of experts to the meetings to confer and develop the IODE programme should be as far as possible supported by IOC;
- (ii) noting that increased commitments have been made at the Fourteenth Session of the IOC Committee on IODE by Member States and representatives of international organizations for the GTSP, data archeology, marine information management, TEMA and OCEAN-PC, the Committee recommended that the Secretary IOC will take into account and give a priority in supporting those projects that already have a strong extra-budgetary commitment;

- (iii) the Committee urged Member States to provide increased support to IODE by taking on additional work and funding and requested IODE national representatives and the IOC Secretariat to seek additional funds from all available extra-budgetary sources. If the necessary extra-budgetary support cannot be found, the IODE programme will not be achieved for this intersessional period.

Major efforts in the intersessional period (not in order of priority) will be devoted:

- (i) To the implementation of the IODE Global Data Archeology and Rescue Project. The urgency of this project cannot be overstated. In terms of funding, the project will require a small contribution from IOC which will attract Member States' contributions many times larger;
- (ii) To assist IOC in pursuing strongly an appropriate solution to ensure the continuation of ASFA at least at the present level;
- (iii) To assist in the development of the data management activities of GOOS and IGBP, WOCE, JGOFS and TOGA through provision of expert advice, further development of enhanced data management through GTSP, assistance in the design of the data flows improved quality control procedures, and strengthening the network of IODE Data Centers;
- (iv) To assist Member States who are attempting to develop regional data and information management facilities and services;
- (v) To progress the state of integration of data and information technology in IODE and improve the distribution of meta data and publication information via telecommunication methods and CD-ROMs;
- (vi) To further develop OCEAN-PC as a delivery mechanism for IODE and IOC products and services, particularly for developing countries;
- (vii) To undertake a training programme which will include, not only traditional IODE subjects, but also new initiatives like data archeology and OCEAN-PC.

## **Annex II to Recommendation IODE-XIV.8**

### **IODE WORK PLAN & PROVISIONAL BUDGETARY IMPLICATIONS**

Note: \* Figures are given as (extra-budgetary)/(IODC budget) all in K US dollars;  
 \* Secretarial support other than travel is not included;  
 \* An average of 2-2.5 K dollars/person is assumed for travel and per diem for meetings;  
 \* Items are arranged by agenda item

	<u>1993</u>	<u>1994-1995</u>
2.1 Global Ocean Data Flow		
Revision of IOC Guide		
No.5 (hire a consultant to write)	Extra-budgetary	-
2.4 IODE & IGOSS		
IGOSS/IODC Bureau Meeting	-	-/8
(4 people-late 1994)		
IODC Chairman to attend IGOSS-VII		
Session, Paris, 1995	-	-/3
3.1 GE RNO DCs & Climate Data Services		
Meeting, 1994 (France offers to host)	-	12/15

3.2	Ocean Climate Experiments Data Groups Travel of IODE Contact Persons to Meetings (IGBP, WOCE, TOGA, JGOFS)	4/4	8/8
4.	GOOS Consultant to prepare a strategy paper on IODC response to GOOS/GCOS Travel of IODE officers to GOOS meetings (2/year)	- -/5	-/2 -/10
5.2	Products of IODE Data Centres Consultant to prepare Guide to IODE products	-	-/3
5.3	GTSP 2 meetings (1993 Canada, & 1995)	10/5	10/5
6.1	Remote Sensed Data Meeting of CMM/IGOSS/IODC <i>Ad hoc</i> Group on Remote Sensed Data (IODC participation)	-/4	-/10
6.4	Data Archeology & Rescue Regional Workshop, 1993, Russia & annual workshops for 1994/1995 Undertake project including computer hardware/software, salaries, etc.	40/20 220/-	100/40 495/-
7.1	GETADE Meeting of <i>Ad hoc</i> Group on format development hosted by ICES, 1993 Full meeting of GETADE, 1994 Workshop on Computing Technologies for data management, 1995	-/8 - -	- -/20 100/20
7.2	Quality Control Publish quality control manual	5/-	
7.3	OCEAN-PC & Software Development Meeting of Experts to Review User experiences & future needs (1994)		-/20
8.1	GE-MIM Meetings of Group of Experts, 1993 & 1995 Missions to Africa to expand RECOSCIX-WIO project, 1993 & 1994	-/20 /10	/20 /10
8.2	ASFIS/ASFA (from extra-budgetary funds particularly post Dec. 1994)	-	(280-620)/-
9.	Training		
	* Development of training course modules	Extra- budgetary	
	* Hardware provision for OCEAN-PC (1994)	-	Extra- budgetary
	* Training courses in OCEAN-PC	-	/40
	* WESTPAC Training Course, Japan \$40K each year	40/-	80/-
	* Regional Training Course for S. American countries-June 1994-Argentina	-	/17
	* Regional Training Course on Geology & Geophysics, Gelendzhik, Russia, 1994		/22
	* Training Course on GF3 & oceanographic data management for the Black Sea		

	countries, Obninsk, 1993	/20	
* Regional Training Course on remote sensing data, ROPME area, 1993	25/12		
* Regional Training Course on Remote sensing data, for WESTPAC & Indian Ocean countries, Bangkok, 1994		/25	
* Regional Training Course for the Mediterranean Sea countries on oceanographic data management, Malta, 1995		/20	
* Regional Training Course on the Usage of PCs in Oceanographic Data Management, Malaysia, 1993	>100/15		
12. Next Meeting			
* 2 IODE Officers Meetings (7 people each) late 1993, early 1995	15/15	15/15	
* IODE-XV (Dec. 1995 or early 1996)		/30	
<hr/>			
<b>Totals</b>			
* Meetings of IODE Subsidiary Bodies	25/52	37/143	
* Workshops (DAR and Computing Technologies)	40/20	200/60	
* Participation of IODE Officers at the Meetings of other data management groups	4/9	8/11	
* Missions	-/10	-/10	
* Publications	5/-	-/5	
* Training & technical assistance	>385/47	>1mln/124	
	<hr/>		
	>450/138	~1.5mln/353	

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## ANNEX IV

### LIST OF DOCUMENTS <sup>1</sup>

Document Code	Title
<b>WORKING DOCUMENTS</b>	
IOC/IODE-XIV/1	Agenda
IOC/IODE-XIV/1 Add.	Timetable
IOC/IODE-XIV/2	Annotated Provisional Agenda
IOC/IODE-XIV/3	Summary Report
IOC/IODE-XIV/4	List of Documents
IOC/IODE-XIV/5	List of Participants
IOC/IODE-XIV/6	Report of the Chairman of the Committee on IODE on Intersessional Activities
IOC/IODE-XIV/7	Monitoring of IGOSS-IODE Data Flow. Status & Recommendations for Improvement
IOC/IODE-XIV/8	National Reports on Activities of NODCs, RNODCs & WDCs
IOC/IODE-XIV/9	Place & Role of IODE in a Future Structure of GOOS & GCOS
IOC/IODE-XIV/10	Reports of the Chairmen of the IODE Subsidiary Bodies on Intersessional Activities
IOC/IODE-XIV/11	Management of Chemical & CO <sub>2</sub> Data in the IODE System (draft project proposal)
IOC/IODE-XIV/12	CANCELLED
IOC/IODE-XIV/13	International Oceanographic Data Archeology & Rescue Project, (draft project proposal)
IOC/IODE-XIV/13 Add.	Data Archeology in NODC of Russia
IOC/IODE-XIV/14	Review of the Progress in OCEAN-PC Development. Implementation Plan
IOC/IODE-XIV/15	What Should be Done to Improve the Effectiveness of Oceanographic Data Exchange Systems?
IOC/IODE-XIV/16	Future Development of ASFIS/ASFA & the IOC role in it
IOC/IODE-XIV/17	New Technology for Document Imaging & Delivery
IOC/IODE-XIV/18 Modules	Report on Intersessional TEMA Activities & Implementation Plan for the Course
IOC/IODE-XIV/19	Work Plan for 1993-1995 (prepared during the Session)
IOC/IODE-XIV/20	Draft of the Revised Version of the Guide No.1 to IGOSS Data Archives & Exchange, 1992

IOC/IODE-XIV/21	IOC Country Codes Review
IOC/IODE-XIV/22	IGOSS-IODE Data Flow Diagram (rev)
IOC/IODE-XIV/23	Feasibility Studies of a Global Marine Information Analysis Network
IOC/IODE-XIV/24	WDCs in the New World of High Technology, Climate & Global Change Research & GOOS
IOC/IODE-XIV/25	Manual on Quality Control Procedures for Validation of Oceanographic Data
IOC/IODE-XIV/26	Suggestions to Increase Dataflow Towards RNODC/SOC & Proposed Modifications to the Terms of Reference

#### **INFORMATION DOCUMENTS**

IOC/IODE-XIV/Inf.1	Information on Arrangements & Services Available for the Session
IOC/IODE-XIV/Inf.2	World Data System of the Future A Proposal to ICSU, WDC Panel, CODATA, FAGS
IOC/IODE-XIV/Inf.3	Status Report on GCOS
IOC/IODE-XIV/Inf.4	Review of Existing Formats for Global Change Data
IOC/IODE-XIV/Inf.5	International Inventory of Moored Current Meter Data
IOC/IODE-XIV/Inf.6	CBS/IGOSS/IODE Co-operation in Formats' Development
IOC/IODE-XIV/Inf.7	International Workshop on Oceanographic Data Management & Exchange for WESTPAC Region & Indian Ocean
IOC/IODE-XIV/Inf.8	WWW Distributed Databases (DDB)
IOC/IODE-XIV/Inf.9	Draft Recommendations to the London CEOS Plenary Meeting Adopted by the Participants to the CEOS Data Policy <i>ad hoc</i> Meeting
IOC/IODE-XIV/Inf.10	The Management of ADCP & SeaSoar Data

## ANNEX V

### A PROPOSED MONITORING SYSTEM FOR GLOBAL TEMPERATURE AND SALINITY DATA

This is proposed as a joint IODE-IGOSS-WOCE endeavor to meet the needs of the 3 parties. It is further proposed that it be carried out within the framework of the GTSP, and that other IODE & IGOS centres in the member states become active participants in the GTSP by undertaking work related to the data flow monitoring.

#### Data to be Included:

The monitoring system will provide information on the data flow for temperature and salinity data collected in the open ocean by national and international operational, VOS, and research activities including that from ships and moored buoys.

#### Goals for the Monitoring:

The monitoring is being established to meet the following goals:

- (i) To provide a complete and timely inventory of the data collected in the form of a PC based ROSCOP data base that can be distributed on an annual basis to National Oceanographic Data Centres so that they can pursue the data with the originator for submission to the IODE & WOCE centres in a timely manner according to International agreements and agreed data management plans.
- (ii) To provide the necessary information to the WOCE-IPO on an on-going basis to enable the IPO to know quickly when the data collection is not proceeding as expected so that action can be taken to solve problems and avoid data gaps.
- (iii) To provide comprehensive information on a timely basis of the successes or failures of the GTS in delivering the real-time data around the world to the IOC, WMO, and to national operational centres so that routing problems can be solved quickly.
- (iv) To provide to WOCE-IPO and the centres participating in the WOCE UOT DAC, information on the progress of the data through the steps identified in the WOCE UOT data management plan for data collected by WOCE UOT and by other programmes that deliver data in the WOCE UOT time frames.
- (v) To provide a comprehensive annual report on the flow of temperature and salinity data internationally to be used by IODE, IGOS, GTSP, all IODE NODCs, WOCE centres, WDCs, etc. to identify failures in the data flow and to initiate resolution of the problems.

Each of the above goals has a specific deliverable that will be produced on a schedule and forwarded to the organization or parties requiring the information. Some initial thoughts on how and where the deliverables would be produced are given below.

For goal (i) the deliverable is a floppy disk containing compiled ROSCOPS for the temperature and salinity data collected during the previous two calendar years for global open ocean data as specified above. The disk would also contain PC software to view and extract data by several keys. The ICES system should be considered for this purpose.

It will be necessary for all active participants of the GTSP to develop interactions with the agencies that collect ocean temperature and salinity data in their countries to obtain completed ROSCOP forms. Member States who are not yet active participants of the GTSP will be encouraged to become active participants by contributing ROSCOPs.

The Marine Environmental Data Service (MEDS) in its role as the Real-Time QC and Assembly Centre for the GTSP should expand its services to include computer generation of ROSCOP forms for the IGOSS BATHY, TESAC & TRACKOB data that passes through the centre.

A volunteer centre should be sought to conduct a survey of member states on an annual basis to obtain ROSCOP forms for TRACKOB data that are collected for comparison with that copied from the GTS to ensure that the data are being successfully circulated on the GTS.

Finally, it will be necessary to find another volunteer centre to input the ROSCOP forms, resolve duplications, and produce the annual floppy disk for distribution to IODE centres including NODCs, RNODCs, and the ICSU WDCs.

For goal (ii) the deliverable to WOCE-IPO is a monthly summary of the data collected along the WOCE lines identified by line and ship that collected the data.

This deliverable should be produced from the GTSP real-time BATHY and TESAC database. The data for each month should be scanned to find and report all observations that are within a given distance of the WOCE lines. A summary should be prepared organized by WOCE line and delivered electronically each month. This requirement could be met by adding the appropriate algorithm to the processing system that produces the GTSP preliminary analysis of the international GTS data flow which is now run by MEDS about 15 days after the end of a month.

For goal (iii) the deliverable would be the 3 monthly reports now produced by GTSP on the data received by the 5 centres that are providing information on data copied from the GTS. These reports would be delivered electronically and the final analysis would be published in hard copy form in the GTSP Monthly Report series.

For goal (iv) a report would be produced every 6 months and circulated to the WOCE IPO and the UOT DACs. The report would identify which data had reached the various stages specified by the WOCE UOT data management plan and which had not. This report would be circulated electronically.

The tools for monitoring this data flow would be the ROSCOPS from the UOT programme data collectors, the WOCE UOT DAC Data Management Plan and knowledge of the actual data flow. Since the data flow proceeds through the GTSP CMD in the US NODC at all stages, this knowledge is available from one source and the monitoring should not be difficult to carry out if properly organized. A volunteer centre will have to be found to collate and interpret the information and prepare the report every 6 months.

For goal (v) there would be a comprehensive annual report that would include several sections on submission of ROSCOPS, submission of the data from laboratories to the NODCs, submission of data from the NODCs to WDCs and RNODCs etc. These sections would cover data submitted and data identified by ROSCOPs that was not submitted. There would also be a summary of IGOSS data flow compiled from the GTSP monthly analyses. The report would be published in the March issue of the GTSP Monthly Report for data flows during the previous calendar year.

This report would contain a synthesis of the information produced for the other 4 goals and a detailed analysis of the present whereabouts of all the temperature and salinity data reported on ROSCOPS. The report would thus provide a comprehensive picture of the IGOSS real-time data flows, the WOCE data flows, and the delayed mode IODE data flows for the previous year. To permit the analysis of the flow of data from the ROSCOPs, a system of reporting the arrival of data at the NODCs, RNODCs, and WDCs in electronic form and in a form by which the data can be related to a ROSCOP form will be necessary.

## **A MONITORING SYSTEM FOR DRIFTING BUOY DATA**

It is proposed that this monitoring system be developed as a joint project between the RNODC for Drifting Buoy Data, the WOCE SAP Programme, and the Drifting Buoy Technical Coordinator.

### **Data to be Included:**

The monitoring system is to provide information on all drifting buoy data collected in the open ocean by operational and research programmers that are now available for international exchange or will be available for international exchange in the future.

### **Goals for the Monitoring:**

The monitoring is being established to meet the following goals:

- (i) To prepare and distribute electronically and in published form on an annual basis to IODE, IGOSS & WOCE centres, a complete inventory of drifters and attached sensors for which data are or will be available for international exchange.
- (ii) To provide to the WOCE SAP Programme, on a monthly basis, information on the real-time data flow from WOCE drifters and from other research and operational drifters, in electronic form through the WOCE DIU, and in published form including map presentations.
- (iii) To provide an annual report on the holdings of drifter data in the RNODC and a comparison to data that has been collected and are or will be available for international exchange, but have not yet reached the RNODC.

Each of the above goals has a specific deliverable that will be produced on a schedule and forwarded to the organization or parties requiring the information. Some initial thoughts on how and where the deliverables would be produced are given below.

For goal (i) the deliverable is an inventory identifying each buoy operated during the year, the sensors it carried, the operating agency, area of operation and the current following characteristics of the buoy. If the data have been received in the RNODC there will be start and stop dates, statistics of data gaps, and the number of reports. The inventory will be available through the WOCE DIU or on floppy disk as an ASCII line file that can be loaded and browsed with a word processing application. The inventory will be published in hard copy in the annual report produced by the RNODC.

The basic tool for developing this inventory will be a form that will be circulated by the RNODC to principal investigators asking that one be completed for each buoy deployed. It is proposed that this form be sent directly to drifting buoy operators that are already known to the RNODC. In addition it is proposed that a group of blank forms be circulated to the NODC in each member state along with a list of the principal investigators already contacted in the member state. The NODC can then circulate the form to other principal investigators in their country that have not already been contacted. It is desirable that where possible the distribution and submission of inventory forms be conducted using electronic mail or network technologies.

The RNODC will compile an electronic inventory from the completed forms and provide diskette and published copies as described above.

For goal (ii) the information will be compiled by the RNODC from information provided by the Drifting Buoy Technical Co-ordinator on diskette on a monthly basis, from the data received via the GTS, and from information provided by the WOCE Drifter Centres in the Atlantic Oceanographic and Meteorological Laboratory of the US NOAA, and the Scripps Institute of Oceanography.

A report will be prepared on a monthly basis within 3 weeks of the end of the month and will be provided to the WOCE IPO, the SAP Drifter Centres, and the Drifting Buoy Technical Coordinator for use in managing the WOCE SAP data flow.

For goal (iii) the RNODC will carry out an analysis of the data in the RNODC in comparison to that identified by the inventory constructed from the completed inventory forms. The results will be interpreted and the interpretation and a presentation of the comparison in detail will be published in the annual report of the RNODC. The RNODC will actively seek to obtain the data that have not been submitted according to agreed time frames.



## **ANNEX VIII**

### **REVISED TERMS OF REFERENCE OF RNODC-SOC, RNODC-ADCP AND RNODC-FORMATS**

#### **RNODC-SOC**

- receive, control the quality and store in standard format the physical and chemical data obtained by the international scientific community from cruises and research programmes carried out in the Southern Oceans, and distribute on request the information contained in such files;
- co-operate closely with WDCs-Oceanography, sending regular shipments (at least once a year) free of charge of complete sets of physical and chemical data stored on magnetic tape and in GF3, inventories, data summaries and other data products related to the physical and chemical data from the Southern Oceans.

#### **RNODC-ADCP**

- compile, evaluate and keep updated information on existing datasets held by member States already active in ADCP measurements;
- produce and keep updated a catalogue of ADCP users which will include information about ADCP instruments, related instrumentation (GPS, Loran, measurement of ship motion, etc.), procedures for averaging and sampling (temporal and spatial, vertical and horizontal), quality control methods, formats and products;
- in consultation with other NODCs, ICES and SCOR, establish and maintain standards and procedures for the reduction, quality control, archiving and exchange of ADCP data;
- assemble an archive of ADCP data received from other Member States so as to assess the effectiveness of the proposed standards and procedures;
- prepare guidelines concerning different performance characteristics and data documentation relevant to each instrument type in order to formulate adequate data documentation and quality control procedures;
- report on the progress of RNODC ADCP to the Group of Experts on RNODCs and Global programmes and to the IOC Committee on IODE.

#### **RNODC-FORMATS**

- act as a Referral centre for international/project oriented oceanographic data formats, maintaining a full set of documentation on all such formats and on supporting software;
- act as a Referral Centre for parameter and other code tables used in oceanographic data formats;
- assist (in co-operation with BODC, UK) in the management and administration of GF3 format, in particular, the servicing of requests for GF3 supporting documentation and software;
- report on its activities to the IOC Committee on IODE and its Groups of Experts on RNODCs and Global Programmes and on the Technical Aspects of Data Exchange.

**ANNEX IX**

**CAMBRIDGE SCIENTIFIC ABSTRACTS (CSA) STATEMENT TO THE FOURTEENTH  
SESSION OF THE IOC COMMITTEE ON INTERNATIONAL OCEANOGRAPHIC DATA  
AND INFORMATION EXCHANGE, PARIS, 7 DECEMBER 1992**

In view of the concerns expressed earlier about the ability of the IOC to assume the financial burden associated with becoming the ASFA cosponsor lead agency, CSA would like to present the following proposal as a means of continuing this vital information service beyond 1994.

Having reviewed the options proposed for the maintenance of the ASFA database beyond 1994, CSA agrees to ensure the current level of production (approximately 35,000 records annually) without an offset in the form of a contribution from the lead agency cosponsor toward the cost of such records.

In exchange for this commitment, the ASFA cosponsors and the participating national partners will be requested to forgo their claim to multiple free sets of the print edition of ASFA. In their place, CSA will supply each ASFA cosponsor and actively participating national partner with one free CD-ROM version of the entire ASFA file, updated on a quarterly basis, provided such copies are retained and used solely by the national partners or cosponsors on their premises.

Further, in order to facilitate speedy assimilation of their records into the ASFA database, CSA strongly urges the ASFA cosponsors and national partners to agree that all input from the input centers to CSA will, after a transition period of up to one year, be produced and acceptable only in machine-readable form. This action will relieve the ASFA cosponsor lead agency of the need to edit partners' input and will eliminate the costs associated with such efforts.

CSA further agrees that it will accept the responsibility for training ASFA cosponsor and/or national partner personnel in the editing and production of ASFA records at its facility in Bethesda, Maryland, USA, at no cost to the ASFA cosponsor lead agency, provided such personnel are furnished transport and maintenance by their parent organization or a donor organization.

To encourage and facilitate the addition of new national partners from developing countries, CSA agrees to contribute one free CD-ROM reader (in addition to one free CD-ROM copy of the ASFA database) to each new national partner located in those countries, up to a maximum of 10 such national partners. CSA agrees to cooperate with ASFA cosponsors, national partners and donor organizations in providing significant discounts for ASFA subscriptions, both in print and CD-ROM, to designated constituents in developing countries only. The amount of these discounts would range up to 50% depending upon the quantity, shipping and billing arrangements, and other cost-driven variables.

CSA firmly believes the expansion of ASFA to deepen and broaden its coverage in fields such as physical oceanography, marine geology, and related atmospheric sciences, plus the grey literature from developing countries, will greatly expand interest in ASFA. This will result in measurable increases of inflow to the ASFA Trust Fund, which in turn could be used to enhance continued cosponsor and national partner participation in ASFA.

To further lighten the burden on the ASFA cosponsors and national partners, CSA offers to assume the cost and sole editorial responsibility for periodically updating the source journals list and thesaurus, 2 invaluable reference tools for both the input centers and ASFA users.

We believe the above arrangements significantly reduce the material burden of the ASFA cosponsor lead agency in maintaining the ASFA database while still permitting it to perform its critical custodial role on behalf of the national partners and other ASFA cosponsors.

## **ANNEX X**

### **ANNOTATED LIST OF SOFTWARE DEMONSTRATIONS**

#### **OCEAN PC - Harry Dooley (ICES), Doug McLain (USA)**

OCEAN PC is integrated package of utilities for the entry, quality control, analysis and exchange of oceanographic data. OCEAN PC was developed under the joint auspices of IODE and IGOSS.

#### **NOAAPC - Paul Geerdens (Netherlands)**

NOAA-PC is an interactive PC software programme to carry out a number of processing and enhancement functions on image data from the NOAA meteorological satellites. Functions are included such as: assignment of colours, filtering and histogram analysis. The programme was developed by KNMI (Royal Netherlands Meteorological Institute), The Netherlands and is freely available. The diskette includes an extensive user manual which also describes the required format for the input data."

#### **ASFA CD - Ted Caris, Angela Hitti (USA)**

Cambridge Scientific Abstracts, publisher for the ASFA partnership of Aquatic Science and Fisheries Abstracts, demonstrated the Compact Cambridge ASFA CD-ROM, which allows searching and display of entries in the ASFA bibliographic database from 1982 to 1991.

#### **JOIDES - Shin Tani (Japan)**

JOIDES, JODC On-line Information and Data Exchange Service, is a dedicated free of charge telemail and electronic bulletin board service system (BBS) for oceanographers. BBS's prepared in JOIDES include Announcements and Information from JODC, NOP, ROSCOP, Dictionary of Abbreviations and Acronyms, Project News for J-WOCE, J-JGOFS, JEEEEEXAM, TOPEX/POSIDON, etc.

## ANNEX XI

### LIST OF ACRONYMS

ADCP	<b>A</b> coustic <b>D</b> oppler <b>C</b> urrent <b>P</b> rofiler
AOML	<b>A</b> tlantic <b>O</b> ceanographic & <b>M</b> arine <b>L</b> aboratory (Miami, USA)
ARGOS	<b>A</b> Satellite <b>L</b> ocation & <b>D</b> ata <b>C</b> ollection <b>S</b> ystem
ASFA	<b>A</b> quatic <b>S</b> ciences & <b>F</b> isheries <b>A</b> bstracts
ASFIS	<b>A</b> quatic <b>S</b> ciences & <b>F</b> isheries <b>I</b> nformation <b>S</b> ystem
AVHRR	<b>A</b> dvanced <b>V</b> ery <b>H</b> igh <b>R</b> esolution <b>R</b> adiometer
BATHY	<b>B</b> ath <b>y</b> thermograph
BBS	<b>B</b> ulletin <b>B</b> oard <b>S</b> ervice
BDSM	<b>B</b> ase de <b>d</b> onnées sous-régionale <b>m</b> aritime
BIOMASS	<b>B</b> iological <b>I</b> nvestigation <b>O</b> f <b>M</b> arine <b>A</b> ntarctic <b>S</b> ystems & <b>S</b> tocks
BMP	<b>B</b> altic <b>M</b> onitoring <b>P</b> rogramme
BODC	<b>B</b> ritish <b>O</b> ceanographic <b>D</b> ata <b>C</b> entre
BUFR	<b>B</b> inary <b>U</b> niversal <b>F</b> orm for <b>R</b> epresentation (of meteorological data)
CALCOFI	<b>C</b> alifornia <b>C</b> o-operative <b>F</b> isheries & <b>O</b> ceanography <b>I</b> nvestigations (USA)
CCCO	<b>S</b> COR- <b>I</b> OC <b>C</b> ommittee on <b>C</b> limatic <b>C</b> hanges & the <b>O</b> cean
CD-ROM	<b>C</b> ompact <b>D</b> isc <b>R</b> ead- <b>O</b> nly <b>M</b> emory
CEC	<b>C</b> ommission of the <b>E</b> uropean <b>C</b> ommunities
CEOS	<b>C</b> ommittee on <b>E</b> arth <b>O</b> bservation <b>S</b> atellites
CLIVAR	<b>C</b> limate <b>V</b> ariability & <b>P</b> redictability
CMM	<b>C</b> ommission for <b>M</b> arine <b>M</b> eteorology
CODATA	<b>C</b> ommission on <b>D</b> ata for <b>S</b> cience & <b>T</b> echnology (ICSU)
CSIRO	<b>C</b> ouncil for <b>S</b> cientific & <b>I</b> ndustrial <b>R</b> esearch <b>O</b> rganization (Australia)
CSR	<b>C</b> ruise <b>S</b> ummary <b>R</b> eport
CTD	<b>C</b> onductivity, <b>T</b> emperature, <b>D</b> epth
DAC	<b>D</b> ata <b>A</b> ssembly <b>C</b> enter
DDB	<b>D</b> istributed <b>D</b> ata <b>B</b> ase
DIS	<b>D</b> ata & <b>I</b> nformation <b>S</b> ystems (IGBP)
DIU	<b>D</b> ata <b>I</b> nformation <b>U</b> nit
DMC	<b>D</b> ata <b>M</b> anagement <b>C</b> ommittee (WOCE)
DOD	<b>D</b> epartment <b>O</b> f <b>D</b> efense
EC	<b>E</b> uropean <b>C</b> ommunity
EC	<b>E</b> xecutive <b>C</b> ouncil (IOC)
EDMED	<b>E</b> uropean <b>D</b> irectory of <b>M</b> arine <b>E</b> nvironmental <b>D</b> ata
EEC	<b>E</b> uropean <b>E</b> conomic <b>C</b> ommunity
ENSO	<b>E</b> l <b>N</b> iño <b>S</b> outhern <b>O</b> scillation
ESA	<b>E</b> uropean <b>S</b> pace <b>A</b> gency
ETI	<b>I</b> nternational <b>E</b> xpert <b>C</b> entre for <b>T</b> axonomic <b>I</b> dentification
FAGS	<b>F</b> ederation of <b>A</b> stronomical & <b>G</b> eophysical <b>S</b> ervices (ICSU)
FAO	<b>F</b> ood & <b>A</b> griculture <b>O</b> rganization of the <b>U</b> nited <b>N</b> ations
FLEX	<b>F</b> lexible <b>C</b> haracter <b>C</b> ode
GCOS	<b>G</b> lobal <b>C</b> limate <b>O</b> bserving <b>S</b> ystem
GE	<b>G</b> roup of <b>E</b> xperts
GEBCO	<b>G</b> eneral <b>B</b> athymetric <b>C</b> hart of the <b>O</b> ceans (IOC-IHO)
GEMIM	<b>G</b> roup of <b>E</b> xperts on <b>M</b> arine <b>I</b> nformation <b>M</b> anagement
GETADE	<b>G</b> roup of <b>E</b> xperts on <b>T</b> echnical <b>A</b> spects of <b>D</b> ata <b>E</b> xchange
GE-OTA	<b>I</b> GOSS <b>G</b> roup of <b>E</b> xperts on <b>O</b> peration & <b>T</b> echnical <b>A</b> pplication
GF3	<b>G</b> eneral <b>F</b> ormat <b>3</b> (IOC)
GIPME	<b>G</b> lobal <b>I</b> nvestigation of <b>P</b> ollution in the <b>M</b> arine <b>E</b> nvironment (IOC)
GLOBEC	<b>G</b> lobal <b>O</b> cean <b>E</b> cosystem <b>D</b> ynamics
GODAR	<b>G</b> lobal <b>O</b> ceanographic <b>D</b> ata <b>A</b> rchaeology & <b>R</b> escue <b>P</b> roject
GOOS	<b>G</b> lobal <b>O</b> cean <b>O</b> bserving <b>S</b> ystem
GPS	<b>G</b> lobal <b>P</b> ositioning <b>S</b> ystem
GRIB	<b>G</b> ridded <b>B</b> inary

GTS	<b>Global Telecommunication System (WMO)</b>
GTSP	<b>Global Temperature-Salinity Pilot Project</b>
HELCOM	<b>Helsinki Commission</b>
IAEA	<b>International Atomic Energy Agency</b>
IAMSLIC	<b>International Association of Aquatic &amp; Marine Science Libraries &amp; Information Centers</b>
ICES	<b>International Council for the Exploration of the Sea</b>
ICG	<b>IOC Committee for GOOS</b>
ICSEM	<b>International Council for the Scientific Exploration of the Mediterranean Sea</b>
ICSPRO	<b>Inter-Secretariat Committee on Scientific Programmes Relating to Oceanography</b>
ICSU	<b>International Council of Scientific Unions</b>
IDPSS	<b>IGOSS Data Processing &amp; Services System</b>
IDRC	<b>International Development Research Centre (Canada)</b>
IGBP	<b>International Geosphere-Biosphere Programme</b>
IGOSS	<b>Integrated Global Ocean Services System</b>
IHO	<b>International Hydrographic Organization</b>
IMO	<b>International Maritime Organization</b>
IMS	<b>International Marine Sciences (IOC Newsletter)</b>
INEGI	<b>National Institute of Statistics, Geography &amp; Information (Mexico)</b>
IOC	<b>Intergovernmental Oceanographic Commission</b>
IOCARIBE	<b>IOC Sub-Commission for the Caribbean &amp; Adjacent Regions</b>
IOCEA	<b>IOC Regional Committee for the Central Eastern Atlantic</b>
IOCINCWIO	<b>IOC Regional Committee of the Co-operative Investigation in the North &amp; Central Western Indian Ocean</b>
IODE	<b>International Oceanographic Data &amp; Information Exchange (IOC)</b>
IOS	<b>IGOSS Observing System</b>
IPCC	<b>Intergovernmental Panel on Climate Change (UNEP-WMO)</b>
IPO	<b>International Planning Office (WOCE)</b>
ITA	<b>IGOSS Telecommunication Arrangements</b>
JGOFS	<b>Joint Global Ocean Flux Study (SCOR-IOC)</b>
JODC	<b>Japan Oceanographic Data Centre (Japan)</b>
JOIDES	<b>JODC On-line Information and Data Exchange Service (Japan)</b>
JPOTS	<b>Joint Panel on Oceanographic Tables &amp; Standards</b>
JSTC	<b>Joint Scientific &amp; Technical Committee (GCOS)</b>
KMFRI	<b>Kenya Marine &amp; Fisheries Research Institute (Kenya)</b>
LUC	<b>Limburgs Universitair Centrum Diepenbeek (Belgium)</b>
MARPOLMON	<b>Marine Pollution Monitoring System (IOC)</b>
MAST	<b>Marine Science &amp; Technology (CEC)</b>
MBT	<b>Mechanical Bathythermograph</b>
MEDI	<b>Marine Environmental Data Information &amp; Referral System</b>
MEDS	<b>Marine Environmental Data Service (Canada)</b>
MGD77	<b>Data format</b>
MIBIS	<b>Microcomputer-based Bibliographic Information Systems (IDRC, Canada)</b>
MIM	<b>Marine Information Management</b>
MINISIS	<b>Mini ISIS Information Management System (IDRC, Canada)</b>
NERC	<b>Natural Environment Research Council (UK)</b>
NOAA	<b>National Oceanic &amp; Atmospheric Administration (USA)</b>
NODC	<b>National Oceanographic Data Centre (IODE)</b>
NOP	<b>National Oceanographic Programme (IODE)</b>
ODP	<b>Ocean Drilling Programme</b>
OOSDP	<b>CCCO-JSC Ocean Observing System Development Panel</b>
OWS	<b>Ocean Weather Ships</b>
PAGES	<b>Past Global Changes</b>
PI	<b>Principal Investigator</b>
PROMAR	<b>Promotion of Marine Sciences (UNESCO)</b>
QC	<b>Quality Control</b>
RECOSCIX	<b>Regional Co-operation in Scientific Information Exchange</b>

RECOSCIX-CEA	<b>Regional Co-operation in Scientific Information Exchange in the Central Eastern Atlantic Region</b>	
RECOSCIX-WIO	<b>Regional Co-operation in Scientific Information Exchange in the Western Indian Region</b>	<b>Qan</b>
RNODC	<b>Responsible National Oceanographic Data Centre (IODE)</b>	
ROPME	<b>Regional Organization for the Preservation of the Marine Environment</b>	
ROSCOP	<b>Report on Observations/Samples Collected by Oceanographic Programmes</b>	
SCOR	<b>Scientific Committee on Oceanic Research (ICSU)</b>	
SOC	<b>Specialized Oceanographic Centre</b>	
STD	<b>Salinity, Temperature, Depth</b>	
SVP	<b>Surface Velocity Programme</b>	
TEMA	<b>Training, Education &amp; Mutual Assistance in the Marine Sciences (IOC)</b>	
TESAC	<b>Temperature, Salinity, Currents</b>	
TOGA	<b>Tropical Ocean and Global Atmosphere Programme (WCRP)</b>	
TRACKOB	<b>Track Observation</b>	
TREDMAR	<b>Training &amp; Education in Marine Sciences (UNESCO)</b>	
TT/QCAS	<b>IGOSS Task Team on Quality Control for Automated Systems</b>	
UNCED	<b>United Nations Conference on Environment &amp; Development</b>	
UNEP	<b>United Nations Environment Programme</b>	
UOT	<b>Upper Ocean Thermal</b>	
VCP	<b>Voluntary Co-operation Programme</b>	
VNIIGMI	<b>All-Union Research Institute of Hydrometeorological Information (Russia)</b>	
VOS	<b>Volunteer Observation Ship</b>	
WCRP	<b>World Climate Research Programme</b>	
WDC	<b>World Data Centre (IODE)</b>	
WESTPAC	<b>IOC Sub-Commission for the Western Pacific Region</b>	
WHP	<b>WOCE Hydrographic Programme</b>	
WMO	<b>World Meteorological Organization</b>	
WOCE	<b>World Ocean Circulation Experiment (WCRP)</b>	
WWW	<b>World Weather Watch</b>	
XBT	<b>Expendable Bathythermograph Instrument</b>	
XCTD	<b>Expendable Conductivity, Temperature, Depth Instrument</b>	

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

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