Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

First Consultative Meeting on RNODCs and Climate Data Services

Wormley, United Kingdom, 15-19 February 1988

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In this Series, entitled

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1984 and which is published in English only, unless otherwise specified, the reports of the following meetings have already been issued:

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
3. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of «El Niño» *(Also printed in Spanish)*
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP (SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping *(Also printed in French and Spanish)*
12. Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
13. Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
18. Second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica *(Spanish only)*
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. Second Session of the IODE Group of Experts on Marine Information Management
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in relation to Non-Living Resources *(Also printed in French and Spanish)*
25. Third Session of the IOC Group of Experts on Effects of Pollutants
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans *(Also printed in French)*
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
30. First Session of the IOCARIBE Group of Experts on Recruitment in Tropical Coastal Demersal Communities *(Also printed in Spanish)*
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources
33. Second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants

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1. OPENING OF, AND ARRANGEMENTS FOR THE MEETING

1 The first Consultative Meeting on RNODCs and Climate Data Services was opened at 10.00 a.m. on Monday 15 February 1988, at the Institute of Oceanographic Sciences, Deacon Laboratory of the UK.

2 Sir Anthony Laughton, FRS, Director of the Institute of Oceanographic Sciences, Deacon Laboratory, welcomed the participants to the Consultative Meeting. He said that the Institute had been renamed in October 1987 to give recognition to Sir George Deacon, the first Director of the Institute. He stated that IOSDL had been active in the international field of oceanography for many years, and had been active in international data management. The International Planning Office for the World Ocean Circulation Experiment is situated in IOSDL, and the British National Oceanographic Data Centre (MIAS), has carried the responsibility for several RNODC functions. The UK also operates the Permanent Service for Mean Sea Level at the Bidston Laboratory, now named the Proudman Oceanographic Laboratory.

3 Sir Anthony stressed the importance of climate research, the vital role of data management in the climate programme, and that the IOC Technical Committee on IODE, and this Group in particular, should continue to emphasize the development of new technology of data collection and data processing. He wished the participants every success in their deliberations.

4 The List of Participants is given in Annex III.

5 The Agenda was adopted with minor changes as presented in Annex I. Mr. G. Withee was designated as Chairman for the Meeting.

6 Dr. N. Flemming, Chairman of the IOC Technical Committee on IODE, and Dr. I. Oliounine, the IOC Senior Assistant Secretary, informed participants on local arrangements, introduced changes in the list of documents and informed the Meeting on administrative arrangements.

2. OVERVIEW OF CLIMATE RESEARCH AND OTHER GLOBAL SCIENTIFIC PROGRAMMES WITH EMPHASIS ON OCEANOGRAPHIC DATA REQUIREMENTS

7 Mr. J. Martellet gave an overview of the World Climate Research Programme, described main projects and the data management implications (Doc. IOC/IODE-CDS-I/17). The World Climate Research Programme requires consistent long-term series of global data describing the components of the climate system. Continuity in the operation of the basic World Weather Watch (WWW) and IGOSS systems is essential to the achievements of the goals of the programme. Additional appropriate data centres have been set up or planned to serve the climate community. Data centres will serve the purposes of one programme or several projects or experiments. Data sets will finally be archived in the ICSU World Data Centres (Meteorology and Oceanography).

8 The Meeting expressed the need for referral lists for data centres and data sets available among the various WCRP projects and discussed the mechanism for the preparation of these lists under Agenda Item 3.

9 The general view of the Meeting was to have more oceanographic data centres involved. The Meeting hoped that this would evolve as data

management requirements for WOCE or JGOFS are refined in the future.

10 Dr. F. Webster, representing the Joint IOC/SCOR Committee on Climatic Changes and the Ocean (CCCO) summarized CCCO activities over the past 5 years regarding IODE, IGOSS and climate data. At its Fifth Session in 1983, the Joint Committee noted that it had a number of particular concerns:

Timeliness: data should be available to scientists in a time appropriate for use to be made of them.

Operational-style data: when an observing system has become standardized (operationally in the meteorological sense), an effort must be made to agree on common formats for archiving and on mechanisms for efficient data dissemination and exchange.

Quality control: users must be able to appraise the appropriate confidence to give to the data.

Products: products, derived from some analysis of the data rather than the data themselves, may be the most appropriate material for archiving and exchange.

Completeness: a potential user must be quickly able to ascertain the address from which to seek data, and when the request is made, the user must be able to obtain all the relevant data, together with annotations with respect to quality control.

11 CCCO agreed that existing organizations should be used whenever possible. Accordingly,"it is CCCO's policy to seek the strengthening and upgrading of IGOSS and IODE as necessary to deal with these new demands, rather than to set up new bodies. To determine the extent to which this might be possible, the CCCO set up an ad-hoc group for the Ocean Observational System to assess the potential of existing ocean data management systems to meet the requirements of the World Climate Research Programme.

12 The ad-hoc group met in 1984 under the chairmanship of Dr. Klaus Voigt (GDR). It concluded that:

(i) IGOSS can provide a mechanism for collecting and distributing near-real-time subsurface oceanographic data for WCRP purposes, if certain improvements are made. The major IGOSS deficiencies were:

(a) only a small portion of the subsurface data obtained by research vessels enters the IGOSS system;

(b) only a few countries participate in the IGOSS BATHY-TESAC exchange;

(c) data availability is poor from many regions, particularly the tropics for TOGA purposes.

(ii) IODE can adequately function as the archiving mechanism for surface and subsurface data for WCRP purposes if certain conditions are met. The major

IODE deficiencies were:

(a) delays of up to several years in availability of data from WDCs;

(b) exchange and archiving methods for subsurface circulation data are not being used effectively.

(iii) IGOSS/IODE do not provide a mechanism for the exchange of data that could be submitted by observers after 30 days and prior to the data availability from WDCs.

(iv) IGOSS has the potential to organize ocean analysis centre support for the WCRP through its Specialized Oceanographic Centres (SOCs).

(v) TOGA and WOCE must define a time by which each data set must be available to its analysis centres and/or a time in which a particular data product must be available.

13 At its Sixth Session, in 1984, CCCO accepted a set of ocean data management principles that it instructed its subsidiary bodies to apply:

(i) there should be active involvement of scientists in planning, acquiring, processing and archiving of data;

(ii) oversight of scientific data management activities should be implemented through a peer-review process that involves the user community;

(iii) data should be made available in a manner suited to the scientific research needs;

(iv) a proper balance between cost and scientific productivity should govern the data-processing and storage capabilities provided to the scientist;

(v) special emphasis should be devoted to the acquisition or production of structured, transportable and adequately documented software;

(vi) scientific data should be suitably annotated and stored in permanent and retrievable form;

(vii) adequate financial resources should be set aside early to complete database management and computation activities.

14 CCCO also set up a Standing Group to oversee the oceanographic data management aspects of the WCRP. This group met in 1985 and proposed 2 new international ocean data management initiatives:

(i) the development of a distributed ocean data management system (the group proposed the creation of a distributed international data management system that will allow the individual scientist to locate, browse, obtain, analyze and share in data sets for WOCE

and TOGA. Such a distributed system can be carried out in parallel with, and as a supplement to a centralized system such as that outlined in the TOGA Implementation Plan);

(ii) the creation of a WOCE/TOGA Ocean Data Co-ordination Group (the standing group proposed the establishment of a WOCE/TOGA Ocean Data Co-ordination Group, to be an operational unit co-located with a university or oceanographic research centre. A pilot operation was proposed to begin in order to observe how such a unit would function. The principal tasks of the unit would be to:

(a) develop an inventory and tracking system for WOCE and TOGA data;

(b) organize a pilot distributed international TOGA/WOCE cean data management network;

(c) support the effective functioning of the international TOGA/WOCE ocean data system;

(d) report regularly to CCCO).

15 At its Seventh Session in 1986, CCCO accepted the offer of the United Kingdom to establish on a pilot basis a Data Information Unit at the Institute of Oceanographic Sciences at Wormley.

16 CCCO also decided that efforts should be taken to ensure that NODCs and RNODCs be included explicitly in the flow of data into the Sub-surface Centre, in parallel with the proposed regional support groups. It was agreed by the Committee that NODCs and RNODCs would be valuable sources of additional information from the tropical oceans.

17 At its Eighth Session in 1987, CCCO considered general issues related to ocean data management. It noted that, as yet no standard formats had been proposed for the scientist-to-scientist, laboratory-to-laboratory or TOGA centre-to-individual exchanges. CCCO also recognized the need for scientists and institutions in developing countries who are likely to need small data sets. The Committee agreed to encourage efforts to develop and promote the use of standard personal computers by smaller institutions and agencies supporting and participating in the World Climate Programme.

18 The IOC Senior Assistant Secretary concluded the discussion by observing that the CCCO Group on Oceanographic Data Management Aspects of the WCRP which met in 1986 had felt that the problem of poor participation in IGOSS data exchange may not lie primarily with IGOSS and IODE. There may be technical problems:

(i) the transfer of data to the GTS;

(ii) the loss of ocean messages in the GTS;

(iii) the reluctance of those collecting data to submit them (including oceanographers, fisheries vessels, and naval vessels).

19 The Meeting noted the requirements formulated in CCCO and pointed out

that much progress had been made in IODE in the past few years to meet them.

2.1 PROGRESS OF TOGA

20 The requirements of TOGA data management were recalled and the present state of the TOGA Data Management System was given. Pending matters, especially where IODE can bring its contribution, were explained. Detailed information can be found in Document IOC/IODE-CDS-1/18.

21 TOGA data management implies the collection of atmospheric data as well as oceanographic data. Special TOGA data centres have been established. Some are already operational or will be fully operational in the course of 1988. The centres will produce data sets over the period 1985-1995, which will be provided to the World Data Centres A and B (Level III-A, atmospheric data, global sea surface temperature, sea level data, surface marine climatology, sub-surface data). The Global Precipitation Data Centre will be operational for managing satellites and surface data in a few years.

22 The altimeter and scatterometer data flow and the respective data producing centres will need to be clarified in the future when data will be operationally available. However, Geosat Level II data are already archived in the United States NODC and some Level III products and data sets have been created.

23 The IODE data centres could certainly play an important role for the collection and transmission of data to the TOGA Data Centres. The need for current data has been specially stressed. In that regard the Meeting specially noted that in accordance with TOGA implementation plans, it is envisaged that researchers will access ocean surface and sub-surface current information via the IODE. The Meeting also noted the request from TOGA IPO that the IODE centres should identify their facilities in this field.

24 Reports of the TOGA Sea Level Centre and Subsurface Data Centre were met with great interest.

25 The TOGA Sea Level Centre has been established at the University of Hawaii with the purpose of collecting all sea level data in the TOGA area between 30N and 30S during the 10 years of the TOGA project, 1984 to 1994. The Centre will also obtain and archive past sea level data for the same region. The scientific requirements of TOGA specify the need for daily mean sea level values at all observing stations.

26 Data acquisitions during the first year of operation of the Centre, have been concentrated on the Pacific Ocean, then was expanded to the Indian Ocean. In the following years, data from the Atlantic Ocean will also be included in the archive.

27 The resulting data are usually received, quality controlled and filtered in batches of one year. At present, the Centre maintains 4 data sets on magnetic tape, which contain high frequency sea level data, hourly data, daily averages and monthly averages for the Pacific Ocean. The main problem with the acquisition of the sea level data is the slow flow of the data (Doc. IOC/IODE-CDS-1/6).

28 Mr. Rebert described the activities of the TOGA Sub-surface Data Centre (see Doc. IOC/IODE-CDS-1/6). The Centre is operational for its main functions (Annex V). The input data flow is satisfactory for the IGOSS data, despite the poor quality of some data, which require additional quality controls. The situation is less satisfactory for delayed-mode data flow, other than from TOGA operators. No research cruise data have yet been received. Level II-B data sets are being sent to the WDC-A, using the GF-3 format, which will provide the whole set to WDC-B.

29 The Meeting recommended that NODCs and appropriate RNODCs send temperature and salinity data from the tropical region to the TOGA Sub-Surface Data Centre on a 6-monthly basis.

2.2 DATA MANAGEMENT FOR WOCE

30 Mr. J. Crease introduced the current incomplete draft of the data management section of the WOCE Implementation Plan.

31 Features of the plans particularly relevant to the IODE are that:

(i) WOCE requires a number of WOCE data centres to assemble and quality control the parameters of most critical importance to WOCE. These include for example T,S,O, tracers and nutrients, currents (from drifters, floats and current meters), sea-level from altimetry and tide-gauges. The list is not exhaustive. The structure of individual centres will depend very much on the suite of parameters needed for a particular product.

(ii) these data centres are seen, generically, to involve both research groups active in WOCE and traditional data centres. The overall responsibility for the operation and performance of the centre will be in the hands of a chief scientist from the research group.

(iii) the functional division between the "traditional data centre" and research group is generally rather clear. The "traditional data centre" makes available expertise in assembly, in formatting, distribution and archiving. The research group provides the scientific quality control and Level II and III data sets for the data centre to distribute.

32 In addition to these "parameter" oriented functions, WOCE expects there to be a number of special analysis centres based largely on research groups and performing analysis and synthesis of multi-parameter sets (possibly by assimilation in models) which would be available for use by WOCE scientists.

33 Another proposed data management activity is the establishment of a Data Information Unit. The essential activity of such a Unit, which the UK MIAS has offered to host, is to track the flow of data in the WOCE programme and also to be a central location for information about the programme. It is intended that this information should be on-line over some suitable network.

34 Mr. Crease noted that several of the data centres within the framework of IODE have the capability to play a role in this proposed structure. He

suggested that these centres should actively explore with their research colleagues their potential contribution. It should be noted that though the research group "traditional centre" combination will probably most often be within one country, the possibility of multi-national collaboration exists.

35 The Meeting considered that the national data centres have a role in providing to the DIU, information about the WOCE related activities in their countries, such as National Oceanographic Programmes, ROSCOPs, status reports, etc.

36 The WOCE Scientific Steering Group intends to establish a small Data Management Panel to oversee the development and performance of data management aspects of WOCE.

37 The Meeting welcomed the invitation of the representative of the WOCE IPO to provide advice, expertise and assistance in implementing the WOCE Data Management Plan. The Meeting looked forward to the participation of a member of the Group of Experts on RNODCs and Climate Data Services in the work of the WOCE Data Management Panel.

2.3 PLANS FOR JGOFS AND IGBP

38 Dr. N. Andersen briefly outlined the history of JGOFS development, stressing that the organization to date has been orchestrated to ensure that the science drives the programme. He pointed out that the initial steps began in February of 1986 at a meeting of the Royal Society and culminated in October of 1987 when the Executive Committee of SCOR created the Scientific Planning Committee for JGOFS. He also briefly outlined the present relationship between JGOFS and IOC/GIPME.

39 It was pointed out that the first meeting of the SCOR sponsored JGOFS, took place in February 1988 at the University of Miami, USA. The immediate activity is to follow-through on objectives of certain working groups that were formed, one being concerned with a data management system for JGOFS. In addition, the initial JGOFS field programme will be to study the Spring Bloom in the North Atlantic Ocean, in April-August 1989, and is anticipated to be a 5- or 6-month activity.

40 Mr. M. Fasham, a member of the SCOR JGOFS Scientific Planning Committee, briefly described the data management scheme which JGOFS has under consideration. Basically, it is an advanced non-centralized system which makes the technical aspects of data transparent to the user.

41 The Meeting recognized that in the area of formatting and archiving of marine data and chemical and biological data, in particular, (e.g., such as those that will be generated by JGOFS and in some cases WOCE), it would be constructive to have the topic addressed by working level individuals representing both the producer/user community and the data management community. The Meeting recommended that one action that the IOC/IODE could take would be to facilitate an international workshop concerned with data aspects of JGOFS, where scientists and data management individuals would work together. The workshop would have as an objective the establishment of a database in support of the JGOFS North Atlantic Project on the Spring Bloom. There would be a period of correspondence between participants prior

to the workshop which would ensure that data could be brought to this Meeting. The products of the workshop would be a series of tapes which would serve as a database for the JGOFS North Atlantic Project.

42 Further, the participants felt that IODE could be of assistance to JGOFS in the development of the data system presently under consideration. The Meeting recommended that an appropriate member of the data community attend the next JGOFS Scientific Planning Committee Meeting (7-9 September 1988, Amsterdam or Kiel), or an earlier meeting of its subsidiary Working Group on Data, if such a meeting takes place, to provide details of the collaboration and assistance being offered. This offer of collaboration and assistance would be made to the Chairman of JGOFS through the established lines of communication between IOC and JGOFS (i.e., the IOC/GIPME technical observer to JGOFS).

43 Finally, Dr. Andersen suggested that any discussions on data requirements for IGBP was premature. He pointed out that a Special Committee created by ICSU, and chaired by Dr. James McCarthy, had only had its first Meeting recently. There is a need for time to be given to develop perspectives for IGBP before any further action be taken with regard to IODE involvement.

44 The Meeting noted that IGBP was cosponsoring a meeting on data management in Moscow in August 1988, and further noted that as many members of the Group of Experts on RCDS will be in attendance, it will be a good opportunity to continue discussions of this matter.

3. PLACE AND ROLE OF THE IODE SYSTEM TO MEET DATA REQUIREMENTS

3.1 ROLE OF NODCs AND RNODCs

45 The Meeting was informed of the progress in the development of the IODE data centres network. At present there are 42 NODCs/DNAs and 13 RNODCs operating under the IODE umbrella (Doc. IOC/IODE-CDS-1/7). Though it means that only less than 50% of all IOC Member States established NODCs, these Centres are located in the Member States which possess more than 80% of all marine data globally collected. The last few years were marked with an increase of interest among IOC Member States in data collection and management - 7 new data centres have been established, 11 Member States considering the establishment of NODCs, and few of them receive support from the IOC.

46 However, the IODE network continues to have big gaps in Africa and Asia, many NODCs are understaffed and have facilities which do not permit them to copy effectively with increasing demands in oceanographic data management from national and international communities. In fact, only about 15 NODCs are in a position to take RNODC responsibilities and out of these, 7 carry out RNODC activities. They are Argentina, Canada, Japan, UK, USA and the USSR. France is providing services for TOGA.

47 The Meeting was then presented with the reports of some RNODCs and data

centres, the activities of which may meet the needs of TOGA and WOCE[1]

48 Dr. Jones reported on the activities of RNODC-JASIN and stated that steady progress was being maintained, assembling the JASIN data set. He commented on the great diversity of different types of meteorology and physical oceanography data that were involved. The following JASIN data had already been screened and assembled: radiosonde, tethered balloons, turbulent fluxes, shipboard meteorological reports, meteorological buoys, wave spectra, thermistor chains, and moored current meter data. All of the appropriate data had been acquired by RNODC-JASIN and the main outstanding task was to re-format and screen the towed and depth profile CTD data. Once this had been completed, the whole JASIN data set would be made available as a collection of GF3 tape. Dr. Jones then described the computerized inventory system maintained by MIAS, referencing the moored current meter data collected by UK laboratories - at present, the inventory contains over 5,000 entries. He recalled a pilot scheme that MIAS had operated in 1985 involving other centres in Europe and North America, including the USA, Canada, FRG, France, Sweden, the Netherlands, Belgium, Norway and Portugal. The pilot scheme had clearly established the practicality of setting up a global system, updating entries on an annual basis. Dr. Jones stated that, following a successful computer changeover, he was now prepared to re-establish the system on an operational basis, and was receiving updated submissions from the ICES countries.

49 The Meeting recognized that the MIAS inventory work would provide a useful contribution to ascertain what data existed and where they were held. The Meeting stressed that it is important that the inventory should include information on data availability and contact points. As far as WOCE is concerned it would be useful to include statistical digests of the data with the inventory entries so as to support studies of eddy statistics. For this purpose, only time series longer than 9 months in regions exposed to the open oceans, need to be considered. The WOCE IPO would make available, copy of the standard algorithms to produce these statistics.

50 Noting also Recommendation of IODE-XII, he expressed his willingness to extend the system globally and agreed to contact the various NODCs to solicit their co-operation. Prof. Webster volunteered to collaborate with MIAS on an ad-hoc basis to investigate and test ways and means of providing on-line user access to the inventory.

51 In considering a proposal to develop the terms of reference of establishing an RNODC for currents data, the Meeting agreed that such an action would be premature at the present time, as no clear user need for such a centre had yet been established. However, the Meeting requested the Chairman of the Group of Experts on RCDS to co-operate with the TOGA IPO in the preparation of the Terms of Reference if IPO decides to take this action.

52 The Director of MEDS, Dr. R. Wilson, informed of the progress at the

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[1]Reports of RNODC-IGOSS are presented in the Doc. IOC/WMO-IGOSS/IODE-II/3, Summary Report of the Joint IOC/WMO Meeting of Experts on IGOSS/IODE Data Flow, Ottawa, 18-22 January 1988

RNODC for Drifting Buoys. Quality control has been completed on the 1987 data received via the GTS. The 1986 data will be completed by the end of April and the data will be forwarded to the WDCs in GF3. During the past year, the efforts at the centre have been directed towards acquiring data that are not circulated on the GTS. These higher quality data would replace the GTS data where duplication exists.

53 The efforts to acquire the delayed mode data are based on the availability of an up-to-date list of the principal investigators operating drifting buoy programmes. Discussions with Service ARGOS to acquire such a list have been proceeding. Progress has been slower than is desirable and the RNODC is pursuing additional alternatives for acquisition of the delayed mode data.

54 The Vice-Chairman of the Technical Committee on IODE, Dr. V. Smirnov, presented a report on the activities of the RNODC MARPOLMON in the Soviet Union. As of 1 January 1988, the oil pollution data set included over 310,000 observations for the period 1975-1987. The data was stored on magnetic tape and the complete data set was submitted to WDCs. The RNODC MARPOLMON is ready to render the following services to the users:

(i) MARPOLMON oil pollution data processing,
(ii) recording data on technical media,
copying original data, proxy data, data sets,
(iii) tabulation and report compilation on request.

55 The Director of JODC, Mr. T. Mori, informed the Meeting that the Japanese members concerned are planning to participate in the TOPEX/POSEIDON experiment and JODC expects to be responsible for the distribution of altimetry data to the members concerned. The JODC started the establishment of a new database management system to serve a regional marine information service system through a computer network. Although the project aims initially at linking eleven regional branches by computer network, it expects to be capable of international work in the future.

56 Summarizing information provided by RNODCs and NODCs and taking into account requirements for data management from global science programmes the Meeting felt that the strength of IODE could be greatly increased by each of the following steps:

(i) The Secretariat will bring the data types listed in Table I to this Report to the attention of all NODCs and DNAs: to see what data types not currently handled by RNODCs could be managed by them;

(ii) To examine the RNODCs' responsibilities with the prospect of taking up additional parameters and services. For countries with sufficient capacity to consider establishing an RNODC, for smaller NODCs, to take on limited but special functions to assist RNODCs.

57 The Director, WDC-A, Oceanography, commented on the usefulness of the RNODC Summaries now being published annually by WDCs, Oceanography. He suggested that further improvements could be made if other marine centres which are not formally accepted status of RNODCs would also provide,

annually, brief reports of their activities. Examples of centres that would be addressed are the TOGA related Sub-Surface Centre in Brest, France, and the Sea Level Centre in Hawaii, USA. Since these centres are not officially part of the IODE system, their contributions would be voluntary. The Meeting accepted this suggestion and recommended that the IOC Secretariat send letters to appropriate centres requesting brief annual summaries of activities to be sent to WDC-A and WDC-B, Oceanography.

58 During the discussion, the experts recognized that at present there were no guidelines provided to RNODCs for the annual reports. The Meeting recommended that the WDC-A in collaboration with the WDC-B will prepare the guidelines and submit them to the Chairman of the Group of Experts on RCDS and the IOC Secretariat by September 1988.

3.2 MONITORING OF DATA FLOW

59 Prof. Kohnke introduced Document IOC/IODE-CDS-1/8 on Monitoring of the IODE Data Flow. With the increasing volume and diversity of oceanographic data, with the growing number of NODCs and RNODCs, the knowledge about the whereabouts of data which have entered the IODE data centre system become less and less. Large amounts of data no longer reach the WDCs, Oceanography. They are either archived in NODCs or in RNODCs. A much better transparency of the existence and flow of data in the IODE system is urgently required to better serve the needs of users of the system.

60 Exchange of oceanographic data within the IODE system is monitored through the following mechanisms:

(i) the announcement of National Oceanographic Programmes (NOPs) informing on planned research activities;

(ii) the "Report of Observations/Samples Collected by Oceanographic Programmes" (ROSCOP) which contains information about measurements taken in completed research activities;

(iii) Data Inventories published by WDCs, Oceanography, some NODCs and RNODCs;

(iv) the Marine Environmental Data Information Referral System Catalogue (MEDI Catalogue). MEDI is undergoing a major revision. The next MEDI directory data sets will contain descriptions of holdings in national centres and in organizations with data set holdings such as, e.g., TOGA and WOCE Analysis Centres. If a significant number of data sets are described, they will form an excellent basis for a monitoring mechanism, as well as an information product of general use.

61 The Meeting noted that the proposals to simplify the existing ROSCOP inventory had been tabled at IODE-XII and that the Group of Experts on Technical Aspects of Data Exchange had been asked to make recommendations. It seems likely that the existing parameter scheme of ROSCOP will be inadequate for WOCE data tracking. The ROSCOP form at the same time contains parameters which may be relevant to other Programmes e.g., JGOFS. The Meeting felt that it makes sense to use WOCE needs for a first level inventory as a prototype for a revision of the ROSCOP form, whilst

maintaining for the time being the existing ROSCOP forms for other cruises.

62 The Meeting was informed that the Joint IOC/WMO Meeting of Experts on IGOSS/IODE Data Flow (18-22 January 1988, Ottawa, Canada) developed an initial proposal for reports that would permit tracking the flow of data from IGOSS to the IODE system.

63 The Meeting considered two aspects which need further extensive discussions:

(i) the mechanisms which have to be established or improved to get more data and to get it faster into the system;

(ii) the establishment of a catalogue on all marine environmental data available to the IODE data centre system.

64 The Meeting recommended holding ad hoc consultations in conjunction with the Fourth Session of the Group of Experts on Technical Aspects of Data Exchange planned for July 1988 in Ottawa, Canada. The objectives of the ad hoc Meeting will be to:

(i) establish mechanisms for improved data tracking. This includes a revision of the ROSCOP form and discussions of ways to improve the submission of National Oceanographic Programmes and ROSCOP information;

(ii) agree upon the content of a catalogue for unique data holdings of the various oceanographic centres, aiming at the establishment of a global catalogue of those oceanographic data available to the IODE data centre system;

(iii) suggest ways and means on how best to make the catalogue information available to the public.

3.3 DATA FORMATTING AND IMPROVEMENT OF DATA QUALITY

65 The Chairman of the Group of Experts on TADE reported on recent developments on the GF3 Formatting System and presented his report in the form of a draft Newsletter planned for wider distribution (Doc. IOC/IODE-CDS-1/16). Good progress had been maintained in 4 areas:

(i) enhancements to the GF3-Proc software;

(ii) development of new subsets particularly those for the TOGA thermal data, for XBT's and for the IGOSS DRIBU and TRACKOB reporting forms;

(iii) expansion of the GF3 parameter codes especially for meteorology, nutrients, wave, marine geophysics, and physical oceanographic parameters;

(iv) GF3 publications.

66 The GF3-Proc software has been distributed for installation at 26 laboratories (both data centres and research institutes) and in 16 different

countries across the globe. A new Level IV release of the software has been successfully tested and is now available on general release from MIAS. The Level IV release is a Fortran 77 implementation of GF 3-Proc designed for multi-user machines where data are coded in either ASCII or EBCDIC. This release outperforms the earlier Fortran 66 version by roughly a factor of 2 in both memory requirement and execution speed. The sub-routing count has been reduced from 260 to 160, although the GF3-proc User Interface (approx. 50 routines) remains virtually unchanged. Consideration is now being given by MIAS to the development of a Level V version tailored for use with Fortran 77 compilers on personal computers. The main purpose of this release will be to facilitate the exchange of GF3 data on floppy disks and to allow PCs to be used as work stations in conjunction with GF3-Proc applications on mainframe computers.

67 The TOGA representative informed the Meeting of the BUFR format developed by the WMO for the real time transmission of operational data in binary form. It was agreed that the Group of Experts on TADE should examine the compatibility of the BUFR with the GF3 format. The TOGA representative offered to make the relevant documentation available.

68 WOCE has expressed itself willing, where appropriate, to use existing data management systems including formats (Doc. IOC/IODE-CDS-1/9). GF3 is well adapted to many data sets to be assembled during WOCE, but is not at present economical for some of the very large data sets due to its character format. The Meeting recommended the Group of Experts on TADE to examine the possibility of introducing binary data into GF3; explore the implications for GF3 of transmitting data over networks and of the increased use of PCs for data processing. The Meeting felt that the GF3 Newsletter was a good way of conveying information about GF3 developments. The Meeting also stressed the importance of the GF3 formatting system for the documentation of data. It is the experience of users that being included with the data this results in improved knowledge on instrumentation, calibration, principal investigators, data analysis techniques etc., to the benefit of secondary users. Other codes and formats are deficient in this area and as we develop to accommodate high volume data, we must not lose this documentation facility. Another major benefit of the GF3 system is its character nature which permits preparation of header records and the viewing of all types of records using standard text editing packages on all types of computers.

69 The Meeting stressed the importance of having unified quality control procedures and in this regard noted the findings of the meeting in Ottawa on IGOSS/IODE data flow applied to the IGOSS data quality control. The IGOSS/IODE Meeting identified a requirement to compile a universal set of quality control procedures that could be applied at each centre. In addition, a need was identified to inter-compare instruments and automatic systems, such as SEAS, to determine the accuracy and quality of the data.

70 The Meeting thanked the Chairman of the Task Team on Oceanographic Data Quality Control for the preparation of a draft Manual on Quality Control Algorithms and Procedures for International Oceanographic Data Exchange Systems (Doc. IOC/IODE-CDS-1/10) and encouraged his Task Team to prepare the final draft of the Manual before the first quarter of 1989.

3.4 EXCHANGE OF TIME CONTINUOUS DATA

71 The Meeting considered two major aspects of data management pertinent to the support of data requirements from large ocean programmes such as WOCE, TOGA, and JGOFS. These aspects are continuously updated databases, and networking. These aspects address major deficiencies of IODE as noted by CCCO: timeliness, comprehensiveness and data quality.

72 The concept of a continuously updated database was introduced by the Chairman of the Group of Experts on RCDS, Mr. G. Withee (Doc. IOC/IODE-CDS-1/12) database is to ingest as much data from all sources in the shortest period of time into a database. This database can be improved in quality in a timely manner through a scientific effort concerned with an application of the database in a research setting. The database is kept on magnetic disk and therefore can be made available for regional access to outside users, namely the ocean research community. The concept is based on a collaborative effort called the Joint Environmental Data Analysis Centre (JEDA), between the US NODC and Scripps Institute of Oceanography. The Meeting noted that the thermal salinity database of the TOGA Subsurface Data Centre in France was also based on this concept.

73 The Meeting fully supported this concept as a useful one, and noted that it could be considered supportive of the data management scheme as described in the Draft of the WOCE Data Implementation Plan (see Figure 1).

74 The Meeting noted that the draft global thermal database project was formulated at the IGOSS/IODE Meeting in Ottawa (Annex VI). The Meeting discussed in some detail the global thermal salinity database project under consideration in the US, Canada and France as a joint effort. It was pointed out that in addition to the database being a valuable contribution to the World Climate Research Programme, there would be at least 2 other benefits. The first benefit would be the development of improved and more timely regional databases for requirements such as fisheries and transportation. The second benefit would be to IODE itself. Such a global project is needed to develop the IODE mechanisms to respond to the global challenges being presented by coming programmes such as WOCE, JGOFS and IGBP. The Meeting felt that the suggested project was timely and would demonstrate the ability of IODE to meet the needs of global programmes. The Meeting supported that a pilot project be started to prove the value of the concept. This project, if successful, could be of interest to WOCE. The Representative of the TOGA Subsurface Data Centre expressed his interest in participating in the project.

75 The Meeting further noted that an experimental system has been implemented by TOGA and IGOSS to track ships collecting data in the TOGA area and that experts on IGOSS/IODE data flow in Ottawa had recommended that the IOC Secretariat compile and circulate information on ships call-signs, names and national codes to assist in the identification of duplicate data. The IOC Secretariat was further instructed to solicit a volunteer centre or centres to compile this information into a single database and to maintain and update the information to assist NODCs with the problem of identification of duplicates.

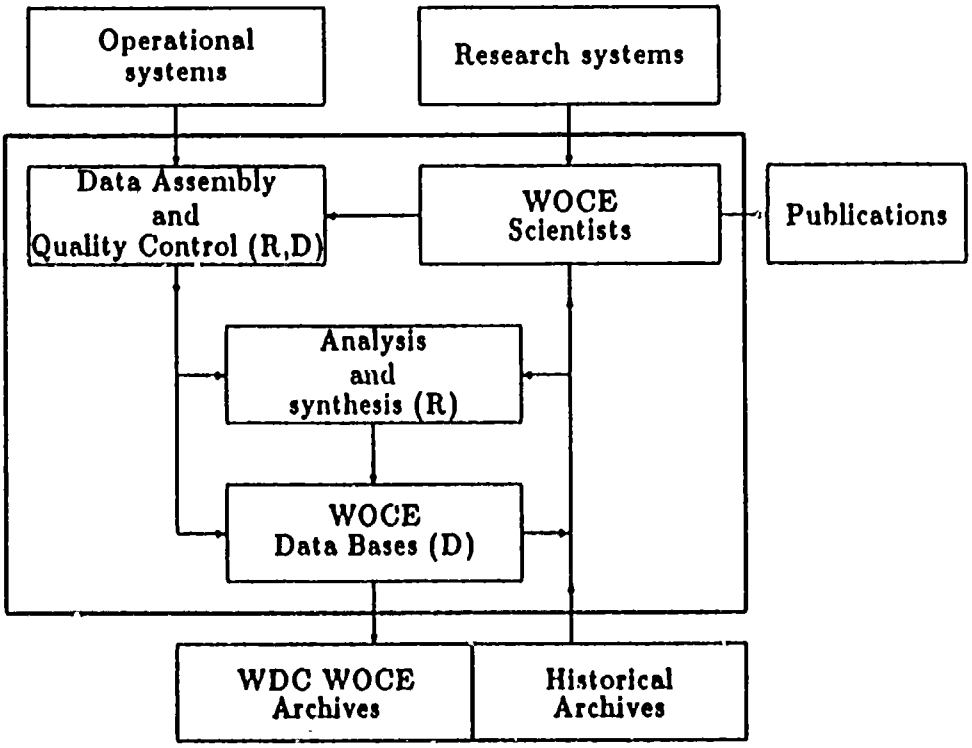

Figure 1: Functional Diagram of WOCE Data Management

76 The Meeting recommended that:

(i) the IGOSS Operations Co-ordinator continue to distribute the monthly bulletin and that this information be put in a database by a volunteer centre and regularly updated due to the fast turn-over of ships-of-opportunity.

(ii) the IOC Secretariat solicit the necessary information from NODCs and IGOSS SOCs and at the same time solicit a volunteer centre to maintain the database;

(iii) the volunteer centre also maintain in the databases cross references to the type of vessel, ship name, and relevant national and international ship codes.

77 Prof. F. Webster then reviewed Document IOC/IODE-CDS-I/11 on International Computer Networking for the Ocean Sciences. He observed that many of the plans discussed at the meeting to meet the ocean data management requirements of the World Climate Research Programme would depend on international computer networking to be effective.

78 He proposed that the national data centres serve as locations within their respective countries where ocean and climate researchers could have access to international digital data networks. In addition, the national centres could serve as a source of ocean data into an international network. This could lead to true two-way sharing of information and data between countries.

79 The Meeting pointed out that there are already a number of existing national computer networks. The challenge for ocean climate data management is to develop links between them. Dr. Flemming reported that the European Economic Community is sponsoring a feasibility study of linking European national data centres on a routine basis through existing academic and commercial networks. Prof. F. Webster noted that the Space Physics Analysis Network (SPAN) was working effectively to link a number of US oceanographic research centres with NODC, NSSDC, and other database holdings. Though there are existing SPAN links to Europe and Japan, there does not seem to be enough bandwidth on these links to allow additional access by ocean scientists. The Meeting expressed strong support for an extension of SPAN to Europe and Japan, noting that the exchange of climate data of such a link would be of great value to the World Climate Research Programme. Prof. Webster agreed to present the case for international oceanographic SPAN links to Europe and Asia. If such SPAN links can be set up, it should be the responsibility of national authorities to establish links to oceanographic centres within a country.

80 Dr. R. Wilson informed the Meeting of the study performed in Canada which has recommended installation of a computer network connecting all regional and headquarters science units in the Department of Fisheries and Oceans commencing next year.

81 The Meeting pointed out that networks are no longer an issue of the future. They are here now and will play an increasingly important role in

the management of data and the delivery of data and information to users. The impact of networks will be more significant than might be initially expected because they will change in a fundamental way the manner in which data centres operate, interact and serve their users. Dr. M. Jones, speaking for the Group of Experts on Technical Aspects of Data Exchange of which he is the Chairman, offered to establish an ad hoc group of representatives from interested nations to work intersessionally on developing the technical arrangements whereby international network links could be developed for ocean data management. The Meeting accepted his offer and agreed to co-operate with the ad hoc group.

3.5 PRODUCTS

82 Prof. F. Webster summarized Document IOC/IODE-CDS-1/13 on Climate Programme Products and the RNODCs. He noted that products are being prepared for climate purposes by scientific groups in many countries. The number and variety of such products is likely to grow with the WOCE and JGOFS programmes. The product examples for TOGA in the document illustrate a few of the kinds of products that are being prepared.

83 The national data centres may have a role to play in:

(i) helping scientific groups in their countries to obtain data for product preparation;

(ii) distributing products within their countries;

(iii) acting as an interface for the exchange of products with other countries.

84 Prof. Webster questioned whether there was a need to archive climate products, but recognized a need for archiving Level III data sets. In the discussion that followed, the Meeting noted that national centres are producing a profusion of ocean products. The IOC and WMO are producing on a regular basis a summary catalogue of ocean products, but national responses have not been complete, and the majority of the products in this catalogue would probably not be suitable for climate research purposes. The Meeting noted that an international catalogue of products of value to ocean climate research would be useful. As a prelude to the possible preparation of such a catalogue, national data centres were urged to submit examples of products being prepared in their countries to the IOC Secretariat. An example of what would be informative is the Ocean Climate Environmental Analysis News (OCEAN) being prepared by the US NODC. In the context of data products, the Meeting noted the value of NODCs, RNODCs and WDCs to produce data summaries and catalogues, such as produced by the WDCs and by Canada. The representatives of the RNODCs in the room responded favorably to preparing such a data product. The Chairman of the Group of Experts on RCDS was requested to bring this matter to the attention of the RNODCs.

85 To conclude, the Meeting requested the Chairman of the Group of Experts on RCDS to urge RNODCs to assist scientific groups in the production and dissemination of products for climate research.

86 The report of the Chairman of the Task Team on Development of IODE Data

Centre Services was presented by the Vice-Chairman of the TC/IODE (Doc. IOC/IODE-CDS-1/14). Special emphasis is being made on the need to improve data centre services to meet new demands of different groups of users. The Meeting agreed with the views presented in this document and recommended that at this stage the Task Team should concentrate its efforts on a few high priority activities. One of these could be the development of the project proposal of the WMO/CLICOM type. The implementation of this proposal would help developing countries to play a more active role in the oceanographic data exchange at national, regional and international levels. It was recommended that the draft of the proposal should be brought to the attention of the coming session of the Group of Experts on TADE, planned for July of this year. The Meeting also felt that in the future there may be a need to investigate possibilities for establishing an RNODC for data services.

4. POLICY AND PROGRAMME

87 Under this item Dr. N. Flemming introduced a number of ideas to promote a discussion of what changes need to be accommodated within the framework of IODE to improve IODE deficiencies noted by various scientific groups for the last number of years (Doc. IOC/IODE-CDS-1/15).

88 The Meeting agreed that new technology such as mass storage and networks, new database management concepts such as the continuously updated database, and new resources will aid greatly the capability of national centres within the framework of IODE to be more responsive to scientific needs. The need for, and benefits from networks and continuously updated databases, have already been discussed under Item 3.4. However, lack of clear uniform communication between scientists and data managers has prevented a successful relationship, regardless of any of the aforementioned improvements. Therefore, the Meeting re-emphasized that communication with these scientific groups must be improved.

89 The Meeting noted that links between the data managers and the scientific programmes were needed to bring about a good working relationship. The Group was encouraged by the fact that at this Meeting some further links had been proposed or established: for example, JGOFS was establishing a data management group and an invitation to work jointly with IODE data management was being arranged. WOCE is establishing a data management working group and is considering formal ocean data management representatives as members of the group. TOGA had not established such a group, but has a data management focal point in the International TOGA Project Office, in Geneva. This focal point, M. Martellet agreed to interface with IODE on relevant matters. The Meeting also noted that many members of the Group of Experts on RCDS had links with other relevant scientific bodies, such as TOGA, WOCE, JGOFS, IGOSS.

90 The Meeting discussed the fact that more and more requirements are being placed on the WDCs, Oceanography by global programmes. While the WDCs are anxious to respond, these requirements are coming at a time when resources are dwindling. Furthermore, the WDCs, Oceanography and their supporting system of RNODCs are the backbone of the international oceanographic data exchange system. While the Chairman of the TC/IODE is a member of the ICSU Panel on World Data Centres, he has been unable to attend

the past meeting of the Panel. Even when IODE did attend, the Panel was not active in developing a uniform strategy for data centre involvement with scientific programmes. With the advent of the IGBP, the Panel has now indicated its willingness to take a more active role. After some discussion, the Meeting endorsed the recommendation of the ad-hoc IODE Editorial Meeting of 10-12 February 1988, that the Panel be notified immediately that Dr. Flemming is the current IOC/IODE representative on the Panel and that he will attend the next Meeting of the Panel currently scheduled for August 1988 in Moscow. It further recommended that IOC provide funding for the IODE representative.

91 Finally, a summary was made of where ocean data management stands in terms of support for large ocean scientific programmes - related to climate. Table 1 attempts to summarize efforts that are underway and efforts that are planned or are being contemplated as a result of the Meeting. In addition, there are a number of global activities underway which are supportive of scientific projects in general, and they are identified as data management projects of interest.

92 The Meeting concluded that much has to be done jointly with scientists to successfully carry out these activities, and requested the IOC Secretariat to provide for travel funds where possible, to improve dialogue, work out agreements, technical working relationships, etc..

5. WORKSHOP ON OCEAN CLIMATE DATA MANAGEMENT

93 The Meeting considered the benefits of holding an Ocean Climate Data Management Workshop in 1988-1989. Discussions centered around the desirability of having a major Workshop with both scientists and data managers in attendance. The Meeting noted that such a Workshop could be organized along the line of environmental variables, such as currents, sea level, etc., of interest to scientists or along the data handling elements, such as database development, etc. The Meeting agreed that the latter approach would be more productive.

94 The Meeting noted that an Organizing Committee would be necessary to assist in the formulation and preparations for the Workshop. It agreed on the following composition:

Chairman:	G. Withee
*WOCE Rep:	to be designated
*TOGA Rep:	to be designated
*JGOFS Rep:	to be designated
IOC Secretariat	
R. Wilson	MEDS
V. Keondjian	USSR
A. Ratier	France, CNES

95 *The IOC Secretariat was instructed to bring the Workshop to the attention of these interested bodies, and to request them to designate a representative to the Organizing Committee.

96 The Meeting proposed the following objectives for the Workshop: to provide a forum to discuss scientific needs for data management support, the interchange of ideas and technical information on ocean science and data management and ways that scientists and data managers, working together, can meet the requirements of large ocean programmes in the 1990s. In addition, the Meeting noted that other considerations or activities need to take

place:

(i) Chairman of the TC/IODE should bring to the attention of the coming session of the IOC Executive Council, the IODE's intention to hold the Workshop, calling for its funding to be high priority.

(ii) IOC Secretariat should announce the intention to have a Workshop in the May-June 1989 time-frame, to relevant bodies and ask for their support. Such bodies should include:

- ICSU panel on WDCs
- CODATA of ICSU
- TOGA, SSG, IPO
- WOCE, SSG, IPO
- JGOFS Chairman
- WCRP Director
- WMO
- SCOR

97 The Meeting expressed the hope that IOC could support some 20 participants to attend the Workshop (invited speakers) with a total participation of around 50.

6. INVENTORIES OF LONG-TIME SERIES OF OBSERVATIONS

98 At IODE-XII, the "Committee requested the GE/RCDS to review both documents (IOC Manuals and Guides N° 2 and the Inventory of North Pacific Time Series) and advise the Secretariat and the Director WDC-A, Oceanography on the usefulness of these documents." The IOC Senior Assistant Secretary informed the Meeting that since IODE-XII, no additional work has been done on the Manual N° 2. The Director WDC-A, Oceanography stated that the Inventory of the North Pacific Time Series had been reformatted and entered on SONIC, but without graphical representation on section locations. The Meeting noted that the concept was useful and should be further pursued. It was thus decided that the ad hoc Meeting which will be held in Ottawa prior to the Fourth Session of the Group of Experts on TADE, should consider these items in the overall context of global catalogues, and make recommendations on the future direction of time series representations.

7. ADOPTION OF THE SUMMARY REPORT

99 The Meeting adopted the text of the Summary Report and all Recommendations (Annex II). It instructed the Chairman of the Meeting and the IOC Senior Assistant Secretary to make the necessary editorial corrections and improvements in the final version. The Meeting requested the IOC Secretariat to finalize publication of the Summary Report in April 1988.

8. CLOSURE OF THE SESSION

100 The Chairman closed the Meeting at 14.00 on 19 February 1988. On behalf of the Meeting he expressed thanks to the local organizers for their efforts in helping make the Meeting a successful one.

TABLE I OCEAN DATA ACTIVITIES OF RELEVANCE TO CLIMATE PROGRAMS

ACTIVITIES UNDERWAY	REGION	PARTICIPATION	STATUS	POSSIBLE INTEREST	DATA AVAILABILE
Digital bathymetry data base updated gridded data set	global	MGG, IHO, GEBCO	ongoing	WOCE	now
Current meter catalog including updating WOCE current observations	global	MIAS, all data centers, subsets defined by scientists	ongoing expanded global in 1988	WOCE TOGA	1989
Surface drifting buoy data	global	MEDS, AOML participation recommended	ongoing	WOCE TOGA	now
Archiving of IGOSS BATHY/TESAC data	global	Japan, USA USSR	ongoing	TOGA	now
TOGA subsurface data center	tropical oceans	IFREMER, France SIO, WNOC (JEDA)	Began 1987	TOGA	now
Pilot pigment data base	global	US NODC, Univ. of Miami	Began 1987	GOFS	late 1988
TOGA sea level data center	tropical	Uni. of Hawaii, US NODC	ongoing	TOGA	now
ACTIVITIES PLANNED OR BEING CONSIDERED					
WOCE Hydrographic Program data sets, chemical tracers	global	DOD, IFM-HH, MPI - HH	being considered	WOCE	1992
PILOT temperature Salinity data base	global	MEDS, US NODC, SIO (JEDA), ORSTOM	being formulated for start in late 1988	multi-purpose WOCE TOGA	1990

TABLE I (cont)

ACTIVITIES PLANNED OR BEING CONSIDERED	REGION	PARTICIPATION	STATUS	POSSIBLE INTEREST	DATA AVAILABLE
Sea level - quick response data base	global	U. of Hawaii U.S. NODC...	being considered	WOCE	1990
Sea level - long term	global	MIAS, PSMSL	being considered	WCCE	1990
Global catalog of ocean data	global	?	being formulated at GE/TADE July 1988	multi-purpose TOGA WOCE	?
MEDI Directory for climate	global	?	ongoing	WCP multi-purpose	late 1988
WDC catalogs	global	WDC-A WDC-B	ongoing	multi-purpose	annual report
Time series documents	N. Pacific N. Atlantic	WDC-A	ongoing	multi-purpose	late 1988

ANNEX I

AGENDA

1. OPENING OF, AND ARRANGEMENTS FOR THE MEETING

2. OVERVIEW OF CLIMATE RESEARCH AND OTHER GLOBAL SCIENTIFIC PROGRAMMES WITH EMPHASIS ON OCEANOGRAPHIC DATA REQUIREMENTS

   2.1 PROGRESS OF TOGA
   2.2 DATA MANAGEMENT FOR WOCE
   2.3 PLANS FOR JGOFS AND IGBP

3. PLACE AND ROLE OF THE IODE SYSTEM TO MEET DATA REQUIREMENTS

   3.1 ROLE OF NODCs AND RNODCs
   3.2 MONITORING OF DATA FLOW
   3.3 DATA FORMATTING AND IMPROVEMENT OF DATA QUALITY
   3.4 EXCHANGE OF TIME CONTINUOUS DATA
   3.5 PRODUCTS

4. POLICY AND PROGRAMME

5. WORKSHOP ON OCEAN CLIMATE DATA MANAGEMENT

6. INVENTORIES OF LONG-TIME SERIES OF OBSERVATIONS

7. ADOPTION OF THE SUMMARY REPORT

8. CLOSURE OF THE SESSION

ANNEX II

RECOMMENDATIONS AND DECISIONS

The Meeting recommended that NODCs and appropriate RNODCs send temperature and salinity data from the tropical region to the TOGA Subsurface Data Centre on a 6-monthly basis.

The Meeting considered that the national data centres have a role in providing to the Data Information Unit (DIU) information about the WOCE-related activities in their countries, such as National Oceanographic Programmes, ROSCOPs, status reports, etc.

The Meeting welcomed the invitation of the Representative of the WOCE IPO to provide advice, expertise and assistance in implementing the WOCE Data Management Plan. The Meeting looked forward to the participation of a member of the Group of Experts on RNODCs and Climate Data Services in the work of the WOCE Data Management Plan.

The Meeting recommended that one action that the IOC/IODE could take would be to facilitate an international workshop concerned with data aspects of JGOFS, where scientists and data management individuals would work together.

The Meeting recommended that an appropriate member of the data community attend the next JGOFS Scientific Planning Committee Meeting (7-9 September 1988, Amsterdam or Kiel) or an earlier meeting of its Subsidiary Working Group on Data, if such a meeting takes place, to provide details of the collaboration and assistance being offered.

The Meeting stressed that it is important that the inventory (moored current meter data) should include information on data availability and contact points. As far as WOCE is concerned, it would be useful to include statistical digests of the data with the inventory entries so as to support studies of eddy statistics.

The Meeting requested the Chairman of the Group of Experts on RCDS to co-operate with TOGA IPO in the preparation of the Terms of Reference (for an RNODC for currents data), if IPO decides to take this action.

The Meeting felt that the strength of IODE could be greatly increased by each of the following steps:

(i) The IOC Secretariat will bring the data types listed in Table I to this Report to the attention of all NODCs and DNAs: to see what data types not currently handled by RNODCs could be managed by them;

(ii) to examine the RNODCs' responsibilities with the prospect of taking
up additional parameters and services. For countries with sufficient capacity to consider establishing an RNODC for smaller NODCs, to take on limited but special functions to assist RNODCs.

The Meeting accepted this suggestion and recommended that the IOC Secretariat send letters to appropriate centres requesting brief annual summaries of activities to be sent to WDC-A and WDC-B, Oceanography.

The Meeting recommended that the WDC-A in collaboration with the WDC-B, will prepare the guidelines (for annual reports) and submit them to the Chairman of the Group of Experts on RCDS and the IOC Secretariat by September 1988.

The Meeting felt that it makes sense to use WOCE needs for a first level inventory as a prototype for a revision of the ROSCOP form, whilst maintaining for the time being, the existing ROSCOP forms for other cruises.

The Meeting recommended holding ad-hoc consultations in conjunction with the Fourth Session of the Group of Experts on Technical Aspects of Data Exchange planned for July 1988 in Ottawa, Canada. The objectives of the ad-hoc meeting will be to:

(i) establish mechanisms for improved data tracking. This includes a revision of the ROSCOP form and discussions of ways to improve the submission of National Oceanographic Programmes and ROSCOP information;

(ii) agree upon the content of a catalogue for unique data holdings of the various oceanographic centres, aiming at the establishment of a global catalogue of those oceanographic data available to the IODE data centre system;

(iii) suggest ways and means on how best to make the catalogue information available to the public.

The Meeting recommended the Group of Experts on TADE to examine the possibility of introducing binary data into GF3; explore the implications for GF3 of transmitting data over networks and of the increased use of PCs for data processing.

The Meeting supported that a pilot project (global thermal database) be started to prove the value of the concept. This Project, if successful, would be of interest to WOCE.

The Meeting recommended that:

(i) the IGOSS Operations Co-ordinator continue to distribute the monthly bulletin and that this information be put in a database by a volunteer centre and regularly updated due to the fast turnover of ships-of-opportunity;

(ii) the IOC Secretariat solicit the necessary information from NODCs and IGOSS SOCs and at the same time solicit a volunteer centre to maintain the database;

(iii) the volunteer centre also maintain in the databases cross references to the type of vessel, ship name, and relevant national and international ship codes.

The Meeting expressed strong support for an extension of SPAN (Space Physics Analysis Network) to Europe and Japan, noting that the exchange of climate data of such a link would be of great value to the World Climate Research Programme.

The Meeting noted that an international catalogue of products of value to ocean climate research would be useful. As a prelude to the possible preparation of such a catalogue, national data centres were urged to submit examples of products being prepared in their countries to the IOC Secretariat.

The Meeting requested the Chairman of the Group of Experts on RCDS to urge RNODCs to assist scientific groups in the production and dissemination of products for climate research.

The Meeting recommended that at this stage the Task Team (on Development of IODE Data Centre Services) should concentrate its efforts on a few high priority activities. One of these could be the development of the project proposal of the WMO\CLICOM type.

It was recommended that the draft of the proposal should be brought to the attention of the coming session of the Group of Experts on TADE, planned for July of this year.

The Meeting concluded that much has to be done jointly with scientists to successfully carry out these activities, and requested the IOC Secretariat to provide for travel funds where possible, to improve dialogue, work out agreements, technical working relationships, etc.

*The IOC Secretariat was instructed to bring the workshop to the attention of these groups, (WOCE, TOGA, JGOFS) and to request them to designate a representative to the Organizing Committee.

The Meeting expressed the hope that IOC could support some 20 participants to attend the workshop (invited speakers) with a total participation of around 50.

It was thus decided that the ad-hoc meeting which will be held in Ottawa prior to the Fourth Session of the Group of Experts on TADE, should consider these items in the overall context of global catalogues, and make recommendations on the future direction of time series representations.

The Meeting requested the IOC Secretariat to finalize publication of the Summary Report in April 1988.

ANNEX III

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ANNEX IV

LIST OF DOCUMENTS

Document Code	Title
IOC/IODE-CDS-I/1	Provisional Agenda
IOC/IODE-CDS-I/2	Annotated Provisional Agenda
IOC/IODE-CDS-I/3	Summary Report
IOC/IODE-CDS-I/4	List of Documents
IOC/IODE-CDS-I/5	List of Participants
IOC/IODE-CDS-I/6	Status Reports of TOGA Sub-Surface Data and TOGA Sea Level Centers
IOC/IODE-CDS-I/7	Statistics on Existing NODCs and RNODCs and Description of the RNODCs Services in Support of the WCRP Sbjectives
IOC/IODE-CDS-I/8	Monitoring of the IODE Data Flow
IOC/IODE-CDS-I/9	Formats for Climate Data
IOC/IODE-CDS-I/10	Report of the Chairman on the IODE Task Team on Oceanographic Data Quality Control
IOC/IODE-CDS-I/11	Network Communication Arrangements
IOC/IODE-CDS-I/12	Development and Management of Data Sets Continuously Up-dated
IOC/IODE-CDS-I/13	Climate Programme Products and RNODCs
IOC/IODE-CDS-I/14	Report of the Chairman of the IODE Task Team on Development of Data Centers Services
IOC/IODE-CDS-I/15	Policy and Programme Changes Required
IOC/IODE-CDS-I/16	Status of Report of GF3 Formatting System
IOC/IODE-CDS-I/17	Overview of WCRP Implementation and Data Management
IOC/IODE-CDS-I/18	TOGA Data Management

N.B. This list is for Reference only. No stocks of these documents are maintained.

ANNEX V

TERMS OF REFERENCE OF TOGA SEA LEVEL AND TOGA SUB-SURFACE DATA CENTRES

TOGA data centres have been established in order to generate the different types of data sets required.

The main tasks assigned to the data centres are the collections of observations, their careful monitoring, quality control, formatting and assembling to generate the output Level II data sets, and if necessary, analysis to create Level III data sets.

In most cases, the World Data Centres A and B for Meteorology and Oceanography will be the final archiving centres for the data sets which will be made available for the international scientific community.

The following centres have so far been defined as official TOGA data centres to manage oceanographic data:

Tropical Sea Level Data Centre (Hawaii)

This Centre collects:

(i) hourly and\or filtered daily sea level values from countries in the tropical belt (30oN - 30oS);

(ii) monthly sea level values from all stations outside the tropical belt;

(iii) delayed data from pressure gauges deployed in shallow waters for the purpose of measuring sea level.

The following data sets will be produced at least over the 1985-1995:

(i) daily sea level values for all stations;

(ii) monthly averages of sea level values for all stations;

(iii) data from pressure gauges deployed in shallow waters for the purpose of measuring sea level.

The following products will be prepared:

(i) monthly synoptic maps of sea level topography, sea level anomaly and for atmospheric pressure;

(ii) representative monthly indices of selected sea level difference across the equatorial current system and of the east-west slope of sea level across the oceans.

Tropical Ocean Sub-Surface Data Centre

This Centre will collect the following sub-surface data over the tropical oceans (30oN - 30oS):

(i) observations from the IGOSS network either directly from the GTS or from an agency or a centre that can provide such data;

(ii) additional vertical temperature profiles from XBTs and from drifting buoys with thermistor chains not sent over the GTS;

(iii) time series of temperature and conductivity (salinity) at fix depths from moored thermistor chains;

(iv) surface temperature and conductivity (salinity) data and vertical profiles of temperature and conductivity as from CTDs, XCTDs and water casts;

(v) other sub-surface ocean temperature and conductivity (salinity) measurements from process-oriented intensive oceanographic observation projects in the tropical oceans.

Over the period it will produce quality-controlled Level II-B sub-surface ocean data sets (temperature and salinity) over the tropical oceans (30oN - 30oS) for the 10-year period (1985-1995). Where possible, these data sets are to have flags to provide an indication of the data quality. It will also perform sub-surface thermal analyses to produce specific sub-surface ocean data analysis products, which may be named and defined in the future after sufficient global tropical sub-surface data become available and after further research by the centre and\or the TOGA related operational\research institutions.

TOGA is a 10-year programme and the emergence of new scientific ideas and new technology may call for new actions, especially in the data management field, while the programme is continuing.

A summary of some of the problems is given below:

Ocean Surface Current Data

Tropical ocean surface circulation monthly field data sets are a requirement for TOGA scientists, as stated in Table 1. The implementation plan mentions that researchers will access ocean current information via the IODE. It would be useful to identify facilities of IODE centre(s) in this field.

Sub-surface Current Data

Sub-surface equatorial current data are also needed (see Table 1) for TOGA scientists. In this case too, it has been considered that IODE could be the means to obtain the information. Hence, it would be useful to identify IODE facilities in this field.

Wind Stress Data

The TOGA programme will also need to exploit the data from new oceanographic satellites carrying scatterometer instruments. When calibration problems are resolved and NSCAT (when satellite is available) and AMI (ERS-1 satellite) are operational, the need for daily and monthly wind stress data sets of analysed in situ observations combined with the scatterometer data will arise. At this point, the establishment of a surface wind data flow and a wind stress field production centre will have to be considered.

Satellite Altimeter Data

Sea level in the tropical Pacific is being monitored on a monthly basis using altimeter data from GEOSAT. Since 1987, this information has been made available through NOAA's Climate Diagnostics Bulletin, published each month by the Climate Analysis Centre (Washington).

When future altimeters will be in orbit in the TOPEX\POSEIDON mission and on ERS-1, altimetry data could be the best, if not the only source of large-scale (global) sea level anomaly information. Such large-scale fields would be ideal for the initialization and validation of ocean circulation models and might also prove to be an useful diagnostic of incipient circulation anomalies. Sea level data flow data products and production centre(s) will then have to be defined clearly.

Assembled Data Sets for Numerical Studies

Mean or averaged analysed atmospheric fields or air-sea interface Level III-A fields might be required for modelling, diagnostic or process studies. Composite daily Level II data sets, including all atmospheric and surface data might be needed as input files for analysis or special studies. Composite daily, 5-day or monthly Level III data set file, including all atmospheric, surface and ocean data fields might be needed for modelling, diagnostic or special process studies.

In view of these requirements, TOGA data centres for the merging of data sets might be identified.

ANNEX VI

PROPOSED IODE PROJECT (IGOSS/IODE DATA FLOW MEETING OTTAWA, JANUARY 1988)

Introduction

The Session considered the development of a project under IODE to develop a very high quality, scientifically acceptable Global Ocean Thermal Data Set.

The purpose of this project is three fold:

(a) to increase awareness of IODE, its services and benefits;

(b) to improve the flow of data into IODE with particular reference to the timeliness of data submission;

(c) to provide a quality data set to the world user community to assist with climatic and other global research projects.

Background

A data exchange system to improve the flow of oceanographic data under the framework of International Oceanographic Data Exchange (IODE) has been in existence for many years. This programme has resulted in the development of a number of very large global data sets. With the introduction of various global atmosphere and ocean/atmosphere research projects, there has developed a need for higher quality and more up-to-date global ocean data sets. These data sets must be of a sufficiently high standard so as to be acceptable to the scientific community, in both oceanographic and meteorological areas.

Procedures

A Global Ocean Thermal Data Set could be viewed as a pilot project under IODE. The project could have 2 parts. The first would be concerned with the improvement of quality, and the second part would be concerned with a continuously updated timely databases.

Part I : Data Quality

It is suggested that IODE data centres assist the World Data Centres (Oceanography) with the quality control of existing thermal data sets maintained by WDCs.

WDCs would provide subsets of their global data sets to volunteering NODCs who would undertake quality control checks, to a uniform standard, on data for agreed upon areas that would produce the world ocean coverage. Due to the quantities of data involved, it is likely that this process would take some time (2 years is a suggestion). The quality control efforts would be undertaken on all data available before the beginning of the project, e.g., pre-1987.

During the Q/C period, other centres, (perhaps in consultation with research agencies) could be devising appropriate standard products that would utilize the "clean" global data set. On completion of the Q/C checks, the WDCs will merge all "regional" data sets to form the Global, high quality, Thermal Data Set.

Also, during this period, the IODE Project should be widely promoted to the international scientific community via National IODE Co-ordinators. One method of promotion would be the issue of a "one-page" brochure on the Project, its aims, benefits and proposed outputs.

Outputs/Results

On completion of the main phase of the project, a single, high-quality data set would exist for all archived data of pre-1987 origin. The second phase would consist of the regional centres quality controlling WDCs post-1987 annual acquisitions. On completion, the data would be copied to WDCs to continue the continuity of a "clean" global data set. This procedure would continue on an annual basis.

The main phase of the IODE project should result in a tangible output that could consist of a CD-ROM containing a copy of the high quality data set. A sub-project would be the preparation of a climatology along the lines of the Levitus atlas, which could also be placed on the disk. These CDs could be distributed to the scientific community who assisted in providing data.

Part II : Continuously Updated Thermal Database

As a parallel effort to the quality control, an activity to improve the timeliness and completeness of the global data set would be undertaken. Under the leadership of a data centre(s) or World Data Centre or designated RNODC, continuously updated databases would be developed with the following properties:

- The databases would be updated with quality controlled global IGOSS data on a weekly basis. The data would be flagged as IGOSS.

- As a function of receipt of higher quality delayed mode data, these data would replace and augment IGOSS data if appropriately flagged and merged onto the data set on a monthly basis.

- All NODCs would be encouraged to expedite their data submissions to the agreed upon centres with a great effort being made to get the data within 6 months after observation through improved co-operation with data collectors.

- The WCRP or WOCE could consider funding a scientific effort to use this data set in a multi-year project that would produce applied products and good science. This effort could result in a further improvement in data quality.

- The data set would be available on line with an inventory, and accessible through a readily available network like SPAN or OMNET. Graphics could also be considered for delivery over the network.

- The data would be archived annually or bi-annually on a CD-ROM and become a companion to the complete historical data set, available from the first part of the project.

Benefits from this part of the project could be a two fold increase in data available to scientists within 2 years instead of the 4 to 8 years it takes now. Such turnover has been demonstrated by the TOGA/JEDA project.

Conclusion

This project should achieve a number of benefits for IODE including advertising its existence, its products and the project itself. The project provides feedback to the scientific community via the CD-ROM and on line products. It would also improve the quality of the Global Data Set and stimulates data flow.