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Reports of Governing and Major Subsidiary Bodies



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Oceanographic Data
and Information Exchange**

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¹ For reasons of budgetary constraints, Annexes III to X remain in English only.

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1. OPENING

The Chairman of the Committee on International Oceanographic Data and Information Exchange, Dr. R. Wilson, opened the Fifteenth Session of the Committee at 10.00 on 23 January 1996 in the Zappeion International Conference Centre, Athens, Greece.

Dr. Wilson welcomed the participants and emphasized the truly international character of the IODE system, consisting of more than 60 national data centres and focal points. He expressed his appreciation to the participants for taking the time to come to the Meeting and noted that the large number of countries and international organizations in attendance was an indication of the strong interest and support that is accorded the IODE programme. He paid special tribute to the European Union MAST Programme for its generous contribution which made it possible to have the Session in Athens.

Dr. Wilson then stressed that the Session was organized to assess the progress at the national, regional and global levels, exchange information and views among national representatives and those of organizations and programmes, identify steps for taking maximum advantage of the technological developments, outline new directions for future activities and formulate policy for further system development. He also noted that the Session should endeavor to develop an intersessional programme that will build on the successes of GTSP, MIM, GODAR, and OceanPC and implement the most important ideas that were put forward by the IODE 'Think Tank' Meeting.

Dr. Wilson expressed his hope that by the time the Meeting closed new initiatives of the scope of GTSP or GODAR would be defined for developing new data and information projects.

The Committee received and noted with appreciation statements by the Executive Secretary IOC, Dr. G. Kullenberg, and the President and Director of the National Centre for Marine Research, Prof. D. Papanikolaou, on the occasion of the opening of the Fifteenth Session of the Committee on IODE. Full texts of their statements are given in Annex V, A and B.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

The Committee adopted Agenda (Annex I, hereto).

2.2 DESIGNATION OF A RAPPORTEUR

The Committee accepted the proposal by Bangladesh, seconded by Chile, to designate Dr. J. Wallace of Ireland, as Rapporteur for the Session.

2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

The Committee decided to establish *ad hoc* sessional working groups to deal with particular items from the very beginning of the Session, **agreed** on their composition and **requested** the Chairpersons of these groups to finalize their recommendations, as far as possible before a relevant agenda item was brought to the attention of the Session.

The Committee also invited Prof. P. Cornillon, from the University of Rhode Island, and Mr. S. Levitus to give scientific presentations on a Distributed Oceanographic Data System (DODS) and on the Scientific Application of the Results of the GODAR project. These presentations were included in the Timetable of the Session.

The Delegate of Turkey recommended that discussion of all agenda items to be finalized during the first week so as to give more time during the second week for adoption of the Summary Report, Resolutions and Recommendations. The Chairman noted that, taking into account the very heavy schedule of the Session, this proposal would be difficult to implement fully and promised to meet this request as far as it was feasible. **The Committee adopted** the Timetable (Doc.IOC/IODE-XV/1 Add.prov) with minor modifications.

11 The Technical Secretary, Dr. I. Oliounine briefly presented the technical arrangements for the Session and introduced changes to the Provisional List of Documents (Doc.IOC/IODE-XV/4 prov). The List of Working Documents is given in Annex IV. A complete List of Participants is presented in Annex III.

2.4 LOCAL ARRANGEMENTS

12 Dr. E. Balopoulos, Director of the Hellenic NODC, speaking on behalf of the local Organizing Committee informed the Session on local arrangements and stressed that the local organizing committee would make every effort to ensure the success of the Meeting.

3. STATUS OF THE GLOBAL DATA AND INFORMATION EXCHANGE

3.1 REPORT OF CHAIRMAN ON INTERSESSIONAL ACTIVITIES

13 The Chairman presented his report on intersessional activities (Doc.IOC/IODE-XV/6). He noted that during the last intersessional period there had been a complete revolution in computer and communications technology. Because of the available IODE mechanisms such as Groups of Experts and regular Officers meetings for adjusting the programme in the intersessional period, IODE had adapted its projects to the rapid evolution of data management technology and progressed.

14 During the intersessional period, the Chairman attended the Meeting of the IGOSS Bureau and meetings of the GCOS Data System Task Group. Co-operation with WOCE and TOGA were continued through GTSP, and through the work of various RNODCs. The participation of a number of IODE Data Centres in the work of the European Union MAST Programme was noted and put forward as an example of a successful collaboration with benefits to both parties.

15 The attention of the Session was directed to the Action Sheet of Document IOC/IODE-XV/6 (Annex VI). Most of the action items specified by the previous IODE Session were addressed. A few items were not achieved. In some cases, the action was not achieved because a better solution to the problem was discovered. In other cases, results were not achieved because of limited resources.

16 Meetings of two of the three Groups of Experts were held in the intersessional period. The Group of Experts on RNODCs and Global Programmes had not met but conducted some business by correspondence and produced a report and recommendations for the Fifteenth Session of the Committee.

17 Finally, IODE had again operated an impressive training programme during the intersessional period in spite of all budget and staff limitations. The Chairman noted that the IOC Secretariat was to be congratulated for being very resourceful in pursuing and obtaining extrabudgetary funds for the IODE programme.

18 The Session was informed of the establishment and staffing of the post for Marine Information Management in the Secretariat. Combined with the assistance of the IOC Consultant, Mr. J. Withrow, the IODE now has achieved critical mass and can look forward to a more active programme and increased liaison with partners and client programmes.

19 **The Committee expressed** thanks to the Chairman and the IOC Secretariat on the progress achieved and **recommended** that related parts of the Chairman's Report and the Action Sheet be used when other agenda items are under discussion.

20 **The Committee acknowledged** the efforts of the Executive Secretary IOC in obtaining a new professional post in the Secretariat for the IODE programme and his continuing interest and support to IODE activities.

3.2 MONITORING GLOBAL OCEAN DATA FLOW

21 The Technical Secretary, Dr. I. Oliounine introduced Document IOC/IODE-XV/7 and called the Committee's attention to the status of one of the data monitoring elements - announcement of National Oceanographic Programmes (NOPs) by IOC Member States, and related problems.

22 He referred to the decisions of previous sessions of the Committee and to requests encouraging Member States to increase their participation in this ocean data monitoring mechanism. He emphasized two advantages of timely NOPs submission: (i) provision of information on potential data availability; and (ii) the use of NOPs announcements as a mechanism to identify training opportunities.

23 Dr. Oliouline expressed concern that in spite of all efforts there was no increase in the number of participating Member States and presented statistics of the NOPs announcements for 1976-1995. He pointed out some related problems: delays of several months in NOPs submission; submission of NOPs in different formats (though there is an internationally agreed format presented as an Annex to the IOC-ICSU Manual on IODE) distribution of NOPs by the IOC Secretariat is time and energy consuming (until today, only one country, Japan, responded positively to the invitation to Member States to assist the Secretariat in distributing their NOPs) submission of NOPs is being carried out by other than IODE-related national institutions.

24 Dr. F. Webster, of the University of Delaware, summarized the oceanographic research vessel database maintained by his organization. The system, known as OCEANIC, is an online information source that is available over the World Wide Web (<http://diu.cms.udel.edu>). It contains information on hundreds of research ship cruises from almost 20 countries. In addition, a ship specification database provides information on the characteristics of almost a hundred research vessels. It also incorporates the FAO ship database.

25 Dr. Webster offered to work with IOC to improve the usefulness of OCEANIC to meet the needs of NOPs announcements. He also urged Member States to submit information on future cruises to OCEANIC or to the IOC Secretariat, noting that the timely submission of information was a major factor limiting the usefulness of the system.

26 After discussion, **the Committee agreed** that (i) NOPs submission should be continued and Member States encouraged; (ii) closer and probably, formal relations be established with OCEANIC to increase effectiveness of both sources of information; (iii) loading of NOPs on a WWW server be implemented while continuing the practice of distributing NOPs in hard copy to those countries which have no access to WWW facilities; (iv) ways of merging cruise summary reports (CSR) and NOPs should be explored.

27 **The Committee requested** the Chairman of the Group of Experts on TADE to study this matter and recommend technical solutions to the next IODE Officers Meeting, planned for 1997.

28 **The Committee expressed** thanks to Japan for their continuous support of the distribution of national oceanographic programmes announcements, and **urged** other Member States to follow this example.

29 The Delegate of Canada referred the Committee to the developments of procedures for monitoring drifting buoys data. He reported that for GTSP a procedure was implemented for monitoring the quality of the BATHY and TESAC messages and reporting the results to the ship operators. Also, monitoring is being carried out on the use of the new BATHY code. At the same time, CSRs have been built for all data gathered in Canada between 1990-1996 using the ICES software. RNODC for Drifting Buoys has worked to acquire the electronic mail describing the performance of buoys and this information is routinely archived. A weekly report was forwarded to NOS in the United States to ensure all of the real-time data submitted for the TOGA/TAO array was reaching the archive. Finally, work is on-going to resolve a difference in the reported data volumes between the RNODC and Service Argos.

30 **The Committee encouraged** the IOC-WMO Steering Group on GTSP and the RNODC for Drifting Buoys to continue their efforts in establishing an effective mechanism for monitoring drifting buoys data.

31 **The Committee recognized** that a significant proportion of oceanographic observations are being exchanged globally in real-time on the Global Telecommunications System (GTS) of WMO through IGOSS. The ocean research programmes within the WCRP and GTSP have already demonstrated the value of this real-time data exchange to global climate studies, as well as the contribution which such data can make to the volume of data in the IODE system. An extensive monitoring of real-time oceanographic data flow is undertaken by IGOSS and the WWW of WMO through the IGOSS Operations Co-ordinator at IOC, the WMO Secretariat, National Meteorological Centres, GTSP and the WOCE International Project Office.

- 32 The Representative of WMO informed the Committee that the recent Seventh Session of the Joint IOC-WMO Committee for IGOSS (Paris, November 1995) had agreed that it would be very beneficial if relevant oceanographic centres could also participate in these monitoring activities, and receive the results of the monitoring for follow-up work. It had therefore recommended, *inter alia*, that oceanographic and meteorological centres should identify appropriate contact points for the co-ordination and the exchange of information at the national level.
- 33 **The Committee noted** the decision of IGOSS-VII with interest, and **supported** the involvement of oceanographic centres in monitoring of real-time data flow. **The Committee agreed** on the importance of real-time oceanographic data exchange to IODE, as a significant component of the overall data exchange system, and **recognized** that IODE data archival centres would ultimately benefit from an improved real-time monitoring and efforts to ensure that no data was lost during the real-time exchange process.
- 34 Mr. P. Pissierssens provided an overview of the MEDI system. He recalled the objectives of the MEDI system "*to provide the marine community with referrals concerning the availability, location and characteristics of marine environmental data, to meet their specific needs, and to meet marine science sectoral needs...*" (cf. IOC Manuals and Guides No. 16, pages 5, 9th paragraph).
- 35 He reported that between 1979 and 1993, three issues of the MEDI Catalogue had been published, whereby the number of file descriptions had increased from 86 to 247, the latter provided by 40 institutions in 27 countries.
- 36 He referred to the observation of Fifth Session of the Group of Experts on MIM that MEDI's coverage of global oceanographic data holdings was inadequate and had not kept up with the advancements in technology.
- 37 The Delegate of Australia informed the Committee on the national data referral system project developed by the Australian Oceanographic Data Centre (AODC). He pointed out that the project had been very successful, thanks to an active data collection policy. It involved visits to national institutions, direct contacts with data collectors and holders, and had thus been able to include over 1,500 data file descriptions. The project provided input software to the scientists and access to the database through the WWW. The Delegate of Australia proposed the development of a pilot project involving a few countries whereby a common input format would be defined and tested.
- 38 The Delegate from Canada proposed that MEDI should become an umbrella containing not only metadata but also a directory of scientists, cruise information, etc. He referred to the Canadian inventory for the contaminant information project which had been very successful thanks to a regional approach. He suggested that after one year of the pilot project implementation, a Workshop should be organized to discuss further development of the system.
- 39 The Representative of the European Union MAST Programme noted the experiences of his programme in the development of catalogues and stressed that sustained input can only be ensured if service-oriented individuals are involved, e.g., ship captains for research vessel databases. The pilot project objectives should be close to the interests of the Member States.
- 40 The Delegate from the United Kingdom pointed out other referral systems besides MEDI and suggested that these be integrated. In particular, he drew attention to the EDMED (European Directory of Marine Environmental DataSets) system, developed within the European Union and containing some 2,000 dataset descriptions from 450 laboratories of 11 European Union countries. He also called attention to Member States who do not have access to the Internet and their need for access to the system.
- 41 Taking into account the proposals made by the participants, **the Committee recommended** the development of a Pilot Project for an electronic MEDI, and adopted Recommendation IODE-XV.1.

3.3 ACTIVITIES OF WORLD DATA CENTRES²

42 Dr. F. Webster, Chairman of the ICSU Panel on World Data Centres, discussed the outlook for the WDC System. He pointed out that the WDCs are facing the same challenges as IODE: adapting to new technology, such as the Internet; creating a central WDC directory; improving the submission of data into the system; and emphasizing quality of data holdings. Dr. Webster expressed the hope that IODE and WDC could work together to assure that new systems and procedures are compatible. He emphasized that the free exchange and open access principle should be preserved.

43 Dr. Webster viewed the working relationship between the two systems in oceanography as a model which he would like to see copied by other disciplines. He pledged the support of the ICSU Panel on WDCs to work closely with IODE in improving the effectiveness of both systems.

44 **The Committee agreed** that the connections between WDCs and IODE are an important positive element and **expressed** satisfaction with the state of co-operation with the ICSU Panel on WDCs. **The Committee decided** that the co-operation should be maintained and strengthened.

45 Mr. S. Levitus, Director of WDC-A, Oceanography reported on the activities of his Centre during the intersessional period. Through the end of 1994, WDC-A had received and tabulated a total of 21,213 ROSCOP forms of all types. For the period 1974-1994 there was a general decline in the number of forms received from the first half of the period to the last half. He identified some factors which could influence this decline: (i) occurrence of special projects of limited duration in the 1970's; (ii) possible overall decrease in many countries of national marine science programmes; (iii) policy changes or programmatic disruptions.

46 The WDC-A, Oceanography profile databases contain information on 1,200,000 stations (primarily temperature, salinity, with a smaller percentage containing observations of nutrients and gases), 143,000 CTD profiles, 1,900,000 MBT temperature profiles and 1,200,000 XBT temperature profiles. All this data is accessible and available to users. The WDC-A, Oceanography Director demonstrated a diagram showing a number of requests for data received by the Centre from users (Figure 1).

47 Dr. V. Smirnov, Director of WDC-B, Oceanography focused attention of the Committee on the problems relevant to data submission to his Centre. He informed the Session that during 1993-1995, WDC-B had received oceanographic data from 157 R/V cruises from 12 countries. The databases of the centre contain information for 15,852 cruises from 64 countries including more than one million oceanographic stations, 565,000 bathythermograph profiles, 25,000 CTD profiles, 4,000 deep-sea and surface current meter measurements. The analysis of the data flow into the Centre helped to conclude that the conventional form of data exchange using the NOP mechanism has to decrease. There were big delays in data submission far exceeding the agreed-upon period of two years.

48 During the last few years oceanographic data collected by scientific and data management projects started to flow into the Centre. During the intersessional period, 16 CD-ROMs with GODAR, TOGA, JGOFS, GTSP, WOCE and other data had been received by the Centre. However, before the end of the 1980's, data on computer-compatible carriers were arriving primarily in the US NODC and GF3 formats during the 1990-1995 period more than 20 formats had been used. This made the direct use of data much more difficult.

49 **The Committee invited** the Group of Experts on TADE to consider and propose actions targeted on the development of common data exchange format(s) which will satisfy data collectors, make the process of product development faster and simplify data archiving.

50 Prof. Hou Wenfeng, Director of WDC-D, Oceanography introduced his report on data management and exchange activities implemented by the Centre during the intersessional period. WDC-D received regularly the data catalogues and updates from WDCs-A and B for Oceanography, and WDCs-A and B for Marine Geology and Geophysics. Collaboration with the data centres of the region was going well. WDC-D, Oceanography compiled and published the third volume of the Data Catalogue which contains national coastal station data and oceanographic station data from the China Sea. Much attention was given to providing services to both national users and those from abroad. More than 3,480 requests for data and products had been met by the Centre in 1993-1995.

² Activities of the WDC-B, MGG were highlighted under agenda item 5.3.

[Note: Figure 1 was rotated for reader convenience]

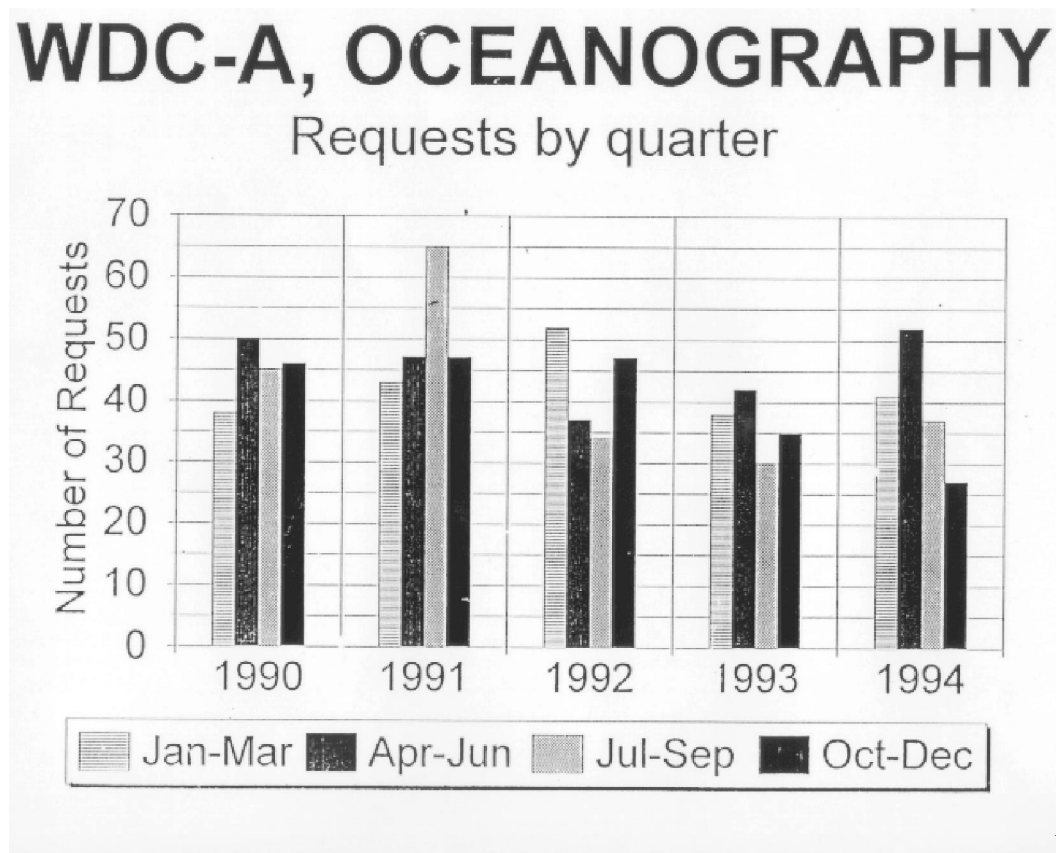


Figure 1

51 **The Committee commended** the progress achieved by the WDCs and expressed **satisfaction** with the increase of data flow to WDCs from Member States. **The Committee noted** a low number of CSRs received by WDC-B, Oceanography through the exchange mechanisms established between WDCs. **The Committee recommended** that the reasons for these shortcoming be identified and use, for this purpose, statistics of CSRs submission published regularly by WDC-A and WDC-D.

52 It was also noted that only 20% of CSRs submitted to ICES have track charts attached. Australia offered assistance in providing digital version of any paper-based CSR and also in providing guidelines on how to operate the ICES CSR software to the Member States. **The Committee recommended** that any CD-ROMs with CSRs should include these guidelines.

53 **The Committee gave** a great deal of credit to the efforts of ICES Oceanography Secretary, Dr. H. Dooley, in making the mechanism of CSRs submission and distribution an effective tool for ocean data monitoring.

54 The Delegate of Japan reminded the Committee of the two aspects of the WDC system: collection of data and provision of data to users. He noted that more emphasis should be placed on the second aspect and added that if data were supplied to users by WDCs via NODCs/DNAs, users would know and respect the IODE system more.

3.4 NATIONAL DATA AND INFORMATION MANAGEMENT ACTIVITIES

55 **The Committee acknowledged** the quality of reports presented in Document IOC/IODE-XV/9 and supplements to this Document provided by more than 30 Member States. They contained reviews of the national activities in the area of ocean data and information management. A few delegates highlighted briefly the activities which had not been included in the published reports and which required special actions.

56 The Delegate of the United Kingdom referred to the publication by the British Oceanographic Data Centre of the international inventory of moored current meter data, the last edition of which was issued in 1991. He called for help from Member States in submitting information for the next edition.

57 The Delegate of India informed that the Indian NODC is finalizing the development of a CD-ROM containing all types of oceanographic data for the northern Indian Ocean. It is expected that the CD-ROM will be finalized by the end of the year.

58 **The Committee supported** requests of the Delegates that any additional current meter data and from the Indian Ocean region be submitted immediately for inclusion in the inventory and on CD-ROM.

59 The Delegate of Nigeria emphasized the need for improving the data flow to newly developed NODCs and called on improved co-operation between neighbouring countries and regional and world data centres in assisting new NODCs in developing their data banks. **The Committee agreed** with this view.

60 The Delegate of Turkey noted the interesting observations and proposals contained in the Bulgarian National Report and suggested they be studied by the specially established sessional group. **The Committee established** the group and **suggested** that its findings be reported under the agenda item 5.2.3 on regional co-operation.

61 **The Committee reiterated** the need for the publication of a complete set of national reports submitted to the Session as an IOC Information Document immediately after the Session and **recommended** its distribution be properly targeted. **The Committee suggested** this document be made available to the Member States on paper, CD-ROM and on the WWW. Each national report should include the name of an IODE national contact, his address, telephone and fax numbers, and e-mail address. The US NODC committed to help distribute national reports on-line, on paper and CD-ROMs/diskettes. The Delegate of Australia offered to assist the USA with the WWW component of this task.

62 Noting that the national reports were presented in Document IOC/IODE-XV/9 in different formats, **the Committee recommended** that the Group of Experts on MIM consider the development of guidelines for the preparation of National Reports, taking into account some models existing in other international

organizations, e.g., the ICSU WDCs Panel, and make them available well in advance of the next Session of the Committee.

3.5 IODE AND THE GLOBAL OCEAN OBSERVING SYSTEM (GOOS)

63 The Delegate of Australia opened the agenda item noting that GOOS had two distinct levels of data requirements. The first is an operational level which has a high public profile because of the development of day-to-day products from this data. The second level of data requirements addresses the scientific requirements, and while this does not have the same visibility, it is of equal importance and must also be implemented.

64 He presented Document IOC/IODE-XV/11 which covers both IGOSS and IODE responses to GOOS data management and exchange requirements. The Document proposes an integrated data exchange and management system. To support this system IGOSS and IODE have proposed four goals which are to:

- (i) insure the widest, fastest access to the highest quality data;
- (ii) archive the data on a distributed data network in an easily accessible system;
- (iii) support real-time services and develop products to be used by governments and industry;
- (iv) provide scientifically sound quality control throughout the data continuum through partnerships between the operational and science communities.

65 Dr. D. McLain presented the draft IGOSS-IODE Data Management Plan. He noted that although GOOS is still being defined, several things are evident. GOOS will not be developed from scratch, but will be based on IODE, IGOSS and other programmes. Also, GOOS must be compatible with the World Weather Watch (WWW) and GCOS and be able to integrate oceanic and atmospheric data.

66 To meet the diverse data demands of GOOS and to improve co-operation between IODE and IGOSS, an End-to-End Data Management (ETEDM) plan was proposed. In ETEDM, an observation would be digitized at the sensor and not modified, only added to, during processing. Metadata such as QC flags and 'corrected' values would be added to the record during processing so that users would have a complete record of all the processing.

67 ETEDM also proposed to use a common data format for all ocean observations. Use of the WMO Binary Universal Format for data Representation (BUFR) was suggested as it is widely used for atmospheric data in the World Weather Watch and in national weather services. Dr. McLain claimed that the use of BUFR as a common format by IODE and IGOSS would reduce data delays and losses, promote sharing of data and software, significantly reduce costs of ocean data processing, and allow IGOSS and IODE to support the data management requirements of GOOS.

68 The Representative of WMO pointed out that IGOSS and IODE are complementary data programmes. Together they form the end-to-end data structure that Dr. McLain referred to in his presentation. Both systems form the basis of the data management system for GOOS. He referred to the recommendation of the joint IOC-WMO Committee for IGOSS that a single IGOSS-IODE data management strategy be proposed and an initial draft presented to the Second Session of the I-GOOS Strategy Sub-Committee in March 1996. A final draft will be presented to the I-GOOS Planning Session in May 1996. He requested that the IODE Committee identify a suitable expert to contribute to the development of this data management strategy. **The Committee nominated** Mr. B. Searle to act as the Rapporteur, who jointly with Dr. McLain from IGOSS will prepare a draft of the IGOSS-IODE data management strategy and **adopted** Recommendation IODE-XV.2.

69 **The Committee noted** that the IODE and IGOSS experience up to now involved a relatively small number of physical variables. GOOS will have far more complex data requirements. For example, the monitoring of the coastal zone will require a more complex dataset than IODE and IGOSS have collected to date. This situation will require a two-tier approach. The data systems for the parameters with which IODE already has experience will move ahead rapidly. The systems handling non-standard data will have to develop. This is the challenge for IGOSS and IODE as they prepare for GOOS.

70 In preparing a joint response from IODE and IGOSS to the requirements outlined by GOOS, **the Committee recommended** the use of the findings of the Think Tank Meeting and **decided** also to prepare a skills and capabilities report which would have the following structure:

- 71 For each variable identified by GOOS as a priority:
- (i) Outline existing real-time data capture and transmission (if any);
 - (ii) Describe existing archival capability for that variable, archival formats, and data center experience;
 - (iii) Describe existing capability in the NODC-WDC system to produce quality controlled, delayed mode datasets, climate datasets, time-series, etc;
 - (iv) Identify deficiencies with regard to the total GOOS requirement for each variable and service in (i)-(iii) above in terms of:
 - (a) availability of standardized raw data using accepted instruments and sensors,
 - (b) adequacy of formats, software, and QC procedures for this data type,
 - (c) shortfall in geographical coverage and temporal and spatial resolution for GOOS purposes,
 - (d) competence of the data delivery schedule, reasons for delay or non-delivery,
 - (e) status of data processing software, data analysis, data product generation, data distribution.
- 72 Dr. N. Flemming was appointed to head a drafting group and prepare this report. The report should be as short as possible, referring to existing IODE and IGOSS documents whenever possible. Since GOOS data requirements are still not fully specified, this report shall be the first version of a series of progressive up-grades to be jointly reviewed by IODE, IGOSS and GOOS. **It was agreed** that the drafting group will be composed of B. Searle, P. Dexter, D. Kohnke and H. Dooley.
- 73 The skills and capabilities document will be presented to the GOOS planning session scheduled for May, as an information document in support of the IGOSS/IODE Data Management Strategy.
- 74 **The Committee acknowledged** the report of the Ocean Observing System Development Panel (OOSDP) which pointed out that *"through its close relationships with programmes like TOGA and WOCE, the IODE has been evolving into a system that can accommodate the needs of climate research. This association and development means the IODE is already partly attuned to the observing system needs, though the needs of an operational system and associated increase in the volumes of information will require further adaptations and development."*
- 75 The Director of the GOOS Support Office pointed out that GOOS must respond to a wide variety of users and that data management systems within GOOS can only be successful if they can produce products in the short term. He noted that EuroGOOS and GCOS have given some guidance on what products are needed. **An** internationally agreed data policy will be an important aspect of the system development.
- 76 **The Committee welcomed** the publication of the list of variables which are of most importance to GOOS in its early stages of development (Annex VII) and **noted** that IGOSS and IODE should use this list as a reference when making proposals to GOOS. **The Committee also noted** that an extended list will be included in the draft 'Initial Priorities for GOOS' which will be circulated later in 1996.
- 77 **The Committee noted** with interest the report provided by Mr. P. Dexter, the Representative of the Director of the Joint Planning Office for GCOS, on recent activities and publications of GCOS, in the field of data and information management of interest to IODE. These included, in particular, the work of the GCOS Data and Information Management Panel, the publication of version 1.0 of the GCOS Data and Information Management Plan, and the views of the JSTC for GCOS on co-operation and interaction with IODE. Most GCOS documents and reports are now available on the GCOS homepage at: <http://www.wmo.ch/web/gcos/gcoshome.html>.
- 78 **The Committee expressed** its support to the views of GCOS on the value of co-operation with IODE in general, data management areas such as the structure of data centers, distributed databases, quality assurance and metadata provision.
- 79 **The Committee also agreed** on the need to continue to co-operate closely with GCOS on the management of oceanographic data in support of global climate studies. In this context, **the Committee noted** that it had already been inputting to GCOS data management activities in a variety of ways, and **agreed** that this

input should be formalized in the future through the nomination of an IODE contact point for GCOS. **It therefore requested** the Chairman of IODE to identify such a contact point in consultation with the GCOS Secretariat and notify the GCOS JPO accordingly.

80 Finally, **the Committee reiterated** its strong commitment to providing support for GOOS and GCOS data management requirements, building on existing strengths and through implementation of new capabilities to meet these requirements.

4. PROGRAMME MATTERS

4.1 IODE GROUPS OF EXPERTS

4.1.1 Group of Experts on RNODCs and Global Programmes

81 The Chairman of the Group of Experts, Dr. J-P. Rebert, introduced this item by giving a brief overview of the developments (Doc.IOC/IODE-XV/12). Unfortunately, due to various reasons, the Group was not able to meet during the intersessional period and worked by correspondence. In his report, Dr. Rebert focussed on issues which his Group considered of special importance for successfully meeting new challenges facing the IODE system and its RNODCs component:

- (i) RNODC and Internet: Need to put all RNODCs on Internet, to use a web server for providing information on centres functions and activities;
- (ii) RNODC, GOOS and GCOS: Appropriate liaison should be established with the I-GOOS *ad hoc* Panel on Data Management which will be working on identifying problems from data acquisition to product delivery. RNODCs concept may be useful to meet the GOOS need for specialized centres. Taking a proactive approach, a way should be found for providing RNODCs facilities for GCOS purposes;
- (iii) RNODC and research programmes: There is a need to find a place of RNODCs in data managements schemes of scientific programmes and offer the services of the RNODC structure for ensuring data preservation and the development and distribution of data and information products of interest to research programmes;
- (iv) RNODCs and regional programmes: A network of regional RNODCs should be further developed. It may be an effective contribution to the capacity building of Member States and a valuable mechanism for promoting development of IODE in the regions.

82 Dr. Rebert presented the views of the sessional group which had been established to decide on the future of the Group of Experts and, if necessary, modify the existing Terms of Reference.

83 The sessional group recommended that the Group of Experts as it exists now, with the very broad and poorly identified responsibilities, should be abolished. The sessional group suggested that the IODE Officers, in consultation with the Executive Secretary IOC, interested Member States and/or selected experts, would take responsibility for studying and evaluating proposals and identifying the needs of Member States and programmes for new RNODCs.

84 **The Committee accepted** the recommendation and **requested** the Secretariat in consultation with the Chairman on IODE to make the necessary amendments in the IOC Manual and Guides N° 9, Annex II, 1982, on the procedures for the establishment of RNODCs.

85 **The Committee felt** a strong need for a special mechanism which will be responsible for keeping the Committee abreast with the development of oceanographic data management plans within the global research and monitoring programme and be responsible for the co-ordination of efforts.

86 A sessional group worked under the Chairmanship of Dr. E. Lindström to find a way to meet the above need to work across other international programmes with co-ordination and collaboration as the aim. This group and **the Committee concluded** that a small *ad hoc* Strategy Sub-Committee be formed to operate during the next intersessional period composed of the IODE Chairman, the immediate past IODE Chairman, IOC

Secretariat and a small number of additional outside experts. **It was recommended** that the sub-committee meet in the coming few months and be charged with organizing a high-level expert consultation on ocean data on the following themes:

- (i) identify groups needing/using data services and determine their general requirements;
- (ii) achieve better co-operation and collaboration for improved global ocean data flow, exchange and use;
- (iii) develop joint data management strategies and partnerships.

87 This expert consultation meeting would convene with the highest-level data managers from global programmes and programme managers from key agencies with ocean data interests. The Committee thought that such a meeting could catalyze an on-going communication of benefit to IODE and all participants. The Strategy Sub-Committee would be tasked to promote follow-up activities and partnerships identified at the expert consultation and provide a full report of results at IODE-XVI.

88 **The Committee adopted Recommendation IODE-XV.3.**

89 The Director of RNODC-SOC from Argentina suggested some modifications of editorial character to the Terms of Reference of his Centre.

90 **The Committee noted** that the proposed modifications are common to the Terms of Reference of other centres and **requested** the IODE Officers to make updates and editorial changes in the Terms of Reference of existing centres based on the comments made. **The Committee requested** the Secretariat to publish the agreed-upon updates in the next issue of the IODE Handbook.

91 The Director of RNODC-SOC had also expressed concern that in spite of all his and the Secretariat's efforts, there was a low flow of data to the Centre. **The Committee encouraged** directors of data centres who possess oceanographic data for the Southern Ocean to make them available to RNODC-SOC and **advised** the Executive Secretary IOC to circulate a letter of request to all Member States and relevant international organizations.

92 The Delegate of Japan informed the Committee of the plans of RNODC-WESTPAC to update the Guide for WESTPAC Data Management, as the previous version was published many years ago and is now obsolete in its contents.

93 The Director of RNODC-Waves informed the Session of the decision to terminate the activities of this centre due to the changes of focus in the national centre activities. He noted that originally the main responsibility was to set up an international inventory of wave measurements sites worldwide. This responsibility has been successfully implemented in the beginning of the 1980's and very little work has been done to update the inventory since then.

94 The Representative of WMO expressed appreciation to BODC for its work over the many years and noted with regret this decision. He indicated that the wave data holdings catalogue and metadata archive previously maintained by this RNODC had been a very valuable source of information for national meteorological services in the operation of numerical wave forecast and hindcast models, and the provision of other wave-related services. He therefore requested the Committee, if it was at all possible, to find ways of maintaining the activities and services of RNODC-Waves. In the event that this was not possible, the Representative of WMO offered to refer the question to the relevant groups of the WMO/CMM (Sub-Groups on Numerical Wave Analysis and Forecasting and on Marine Climatology) in an endeavour to find other means of maintaining valuable metadata and information sources.

95 **The Committee expressed thanks** to the United Kingdom for providing support to RNODC-Waves and for publishing the Catalogue of Wave Measuring Sites worldwide.

96 **The Committee echoed** the regrets of the Representative of WMO and **requested** the Chairman and Secretariat to recommend ways of maintaining IODE services in collecting and exchanging global wave datasets and to report the findings to the next session of the IODE Offices Meeting.

97 **The Committee considered** Document IOC/IODE-XV/22 with the proposal of India to become an RNODC-INDO and comments of the Group of Experts on RNODCs and Global Programmes to this proposal.

The Committee adopted Resolution IODE-XV.1 on the establishment of the RNODC for the Indian Ocean (RNODC-INDO).

4.1.2 Group of Experts on Technical Aspects of Data Exchange (GETADE)

98 The Chairman of the Group of Experts highlighted different aspects of the Group activities (Doc.IOC/IODE-XV/12).

99 In meeting the needs for a common format for data exchange, a generalized ASCII form using the principles of GF-3 had been developed and had undergone some testing. At the same time, work to include oceanographic parameters in the WMO BUFR tables had progressed such that WMO recognized the requirement for a set of tables built and maintained by IODE to meet their requirements.

100 The Chairman proposed a project within TADE involving a few centers to experiment with encoding and decoding data into BUFR. ICES, the US NODC and Canada expressed interest in participating in the experiment. **The Committee noted** that an overlapping meeting of GETADE and the IGOSS Group of Experts on Communications and Products Group (the former IGOSS Group of Experts on Operations and Technical Applications) had proved very productive. **The Committee agreed** that as arrangements would permit, these groups should continue to hold overlapping sessions. The Representative WMO expressed thanks to the Chairman and urged this work to proceed.

101 **The Committee adopted** the Summary Report of the Sixth Session of the Group (Doc.IOC/TADE-VI/3) and all recommendations contained therein.

102 At IODE-XIV, GETADE was tasked to develop a follow-on meeting to the Ocean Climate Data Workshop. The goal had been defined and work was on-going to refine the structure of the workshop. The Irish Oceanographic Data Center has offered to host the meeting in March 1997. **The Committee expressed** its appreciation to the Irish Oceanographic Data Center for offering to host this meeting and **wished** the coming workshop every success.

103 The GETADE Chairman proposed new Terms of Reference in response to changing technology and the needs of IODE. **The Committee discussed** these Terms of Reference and **made** changes to them to reflect other concerns expressed. The new Terms of Reference are shown below.

Terms of Reference

- (i) collaborate with IGOSS-CP, IODE GEMIM and the data management groups of other international bodies and scientific programmes in the development of technical solutions for the management, exchange and easier integration of oceanographic data and information with data from other disciplines;
- (ii) collaborate with IODE GEMIM in the development of a common WWW interface for IODE Centers to deliver data and information in a consistent manner;
- (iii) develop a set of documents to be used by data originators or data centers which describes guidelines for formatting ocean data and information;
- (iv) continue the developments in a common data format which conforms to other major data collection programmes, meets the needs to handle more diverse data types and is independent of the exchange medium. This will include, as appropriate, the specifications of software modules that may be required;
- (v) Liaison with other programmes and agencies concerned with oceanographic data exchange, to ensure as much as possible, closer alignment of data structure and content.

104 **The Committee recommended** that the revised Terms of Reference be forwarded to the IOC Executive Council for approval.

4.1.3 Group of Experts on Marine Information Management (GEMIM)

105 **The Committee received with appreciation** the report on intersessional activities presented by the Chairperson, Ms. P. Simpson (Doc.IOC/IODE-XV/12), the Summary Report of the Fourth Session of GEMIM (Doc.IOC/IODE-MIM-IV/3) and the Summary Report of the Fifth Session of GEMIM (Doc.IOC/IODE-MIM-V/3).

106 An extensive Action Plan was identified during both GEMIM-IV and GEMIM-V. Over two thirds of the action items have been fully implemented during the GEMIM-IV intersessional, while others are on-going.

107 The GEMIM Chairperson provided a detailed overview of the wide variety of activities implemented during the intersessional period or planned by the Group. These include:

- (i) MIM Publication Series: in order to better reach its target audience, the Group created the MIM Publication Series as volumes of IOC Manuals and Guides N° 30. During 1994-1995, three volumes were produced;
- (ii) options for developing countries to obtain scientific literature: RECOSCIX was identified as the appropriate mechanism for regional marine bibliographic services;
- (iii) Internet: an IOC WWW server has been developed (See Agenda Item 4.2.3). MIM information product development will make all possible use of this system. Loading of some UNEP/MEDU bibliographic databases on the IOC Web Server will be implemented. Alternate options will also be utilized to serve Member States without any or with only partial Internet access. These include use of the ioc-news listserv and printed materials;
- (iv) electronic document delivery technologies: the Group recommended the development of information CD-ROMs for the dissemination of IOC publications. The GEMIM is also developing a pilot project on document delivery over the Internet involving some marine libraries in both developed and developing countries;
- (v) International Directory of Marine Science Libraries and Information Centres: in order to facilitate exchange of information and documentation between marine science libraries and information centres, an international directory will be developed;
- (vi) MIM training opportunities: a database of global training opportunities in MIM will be developed, loaded on the Internet and distributed through other appropriate media;
- (vii) MEDI Catalogue: this issue was covered under agenda item 3.2;
- (viii) Global Directory of Marine Science Institutions and Scientists: this issue was covered under agenda item 4.2.3;
- (ix) incorporation of information components on the GTSPPCD-ROM: this issue is covered under agenda item 4.2.1.

108 Recalling its Recommendation MIM-IV.2, the Chairperson reported that GEMIM-V had recommended the organization of a meeting of marine information managers from within the UN agencies.

109 Recalling its Recommendation MIM-IV.4, requesting a balance between developed and developing countries in its composition and urging participation of UN agencies in its sessions, **the Committee noted with appreciation** the addition of Mr. M. Tapaswi of India and the participation of UNEP/MEDU and FAO in the work of GEMIM.

110 The Delegate from Turkey supported the Recommendations and Action Plan of the Group but called on GEMIM to focus its activities on actions which would produce results in the short-term.

111 The Representative of IAMSLIC noted with satisfaction the participation of IOC in the annual IAMSLIC conference and the activities developed between IAMSLIC and IOC.

112 The Representative of EURASLIC expressed appreciation for his organization's involvement in this Session of the IODE Committee. He informed the Committee of a EURASLIC project on the development of a European List of Libraries and Information Centres and pointed out that information on some countries was missing. He also suggested that the IODE National Reports should include an information component.

113 **The Committee invited** the IOC Executive Secretary to issue a Circular Letter to the IODE contact points requesting them to (i) identify existing libraries in their country; (ii) include a section on MIM in the IODE National reports; (iii) identify a national IODE-MIM contact point; and (iv) identify suitable experts for the GEMIM.

114 **The Committee noted with satisfaction** the activities and initiatives of the Group, **accepted** the Reports of the Fourth and Fifth Session of the Group of Experts on Marine Information Management and **adopted** the Recommendations. **The Committee invited** the IOC Executive Secretary to contact the Heads of UN agencies and invite them to participate at meeting of marine information managers.

115 With regard to ASFIS/ASFA, Mr. P. Pissierssens provided a report to the Committee on the implementation of Resolution XVII-7 *'Development of ASFIS/ASFA and the IOC Future Role in it'*.

116 In response to the Resolution, the IOC Secretariat called on FAO and an inter-agency meeting was held in Rome in June 1993. Following this meeting, FAO revised its position and during the ASFA Board Meeting of that year, confirmed its willingness to maintain its role as the ASFA Secretariat.

117 During the 1994 and 1995 sessions of the ASFA Advisory Board, a new Partnership Agreement and Production Agreement were developed. Under the new Partnership Agreement, the UN agencies take on the following responsibilities with regard to ASFA:

- (i) provide ASFA input related to their own mandates;
- (ii) provide capacity building assistance to developing countries in order to enable active participation of developing countries in ASFA.

118 IOC's active participation in the ASFA development is clearly demonstrated by the inclusion of ASFIS/ASFA in the agenda of its GEMIM sessions.

119 During the intersessional period, two proposals were developed by GEMIM for joint projects between the Group and the ASFA Board: one, to develop an "off the shelf" product for the management of bibliographic records; and second to develop an ASFA-MIM CDS/ISIS user-friendly data entry interface. The project proposals were adopted by the ASFA Advisory Board in 1994 and subsequently implemented and funded by the Board. A consultant identified by IOC was hired for the development of the software which was completed and distributed to the ASFA input centres in January 1996.

120 The software called ASFISIS provides extensive assistance to the user through controlled authority lists for fields such as corporate authors, subject descriptors, geographic descriptors, and serial titles, thereby improving data quality at the input level. The software will be useful for developing countries as it provides a standard tool for the building of a library holdings database. Such databases, especially in view of the large amount of "grey literature" in developing country libraries, maybe of special interest to the marine science community. The acquired experience in data input will furthermore facilitate participation of developing countries in ASFA at national or regional input centres.

121 The recent development of a WWW interface for CDS/ISIS databases by the ASFISIS developer opens up many new exciting possibilities whereby the databases developed using ASFISIS can immediately be loaded on the Internet.

122 Mr. D. Moulder, in his capacity as Member of the ASFA Advisory Board for the United Kingdom, thanked IOC for its active support in recent years in preparing and establishing a new ASFA agreement.

123 ASFA is now undergoing a phase of increased growth with several National Partners joining recently, including Australia, Cuba, Lithuania, Poland and the Ukraine. Several South American countries will soon join. RECOSCIX-WIO had joined as an East African regional partner and there were new international partners ICLARM, IUCN and ICES.

124 Many of the ASFA tools are used extensively by scientists, publishers and libraries. In this respect, Mr. Moulder referred especially to the ASFIS Thesaurus and ASFIS Geographic Authority List which were rapidly becoming *de facto* standards for the aquatic research community. He emphasized that with the continued support of IOC and its Member States, ASFA will continue to meet the needs of the users of marine information and data.

125 **The Committee noted with appreciation** the actions undertaken by IOC with a view of safeguarding the future of ASFA.

126 **The Committee urged** the IOC Executive Secretary to continue full support for the further development of ASFA.

4.2 PRODUCTS AND SERVICES

4.2.1 Global Temperature and Salinity Pilot Project (GTSP)

127 The Chairman of the IOC-WMO Steering Group on the GTSP reported on the progress during the last intersessional period. The real-time data management part of GTSP was functioning very well and had improved the capture of BATHY and TESAC data. There had been an increase of more than 30% in the number of available reports. In addition, monitoring systems were in place to provide a mechanism for Member States to ensure they were getting all the available data and to feed information on recurring errors to the ships collecting and reporting the data.

128 During the past two years, the delayed mode portion of the GTSP data flow has begun to function. The data is passed to the WOCE Upper Ocean Thermal Data Assembly Centres. A standardized QC is in the final stages of agreement and data is now flowing back to the GTSP Continuously Managed Database (CMD) in the US NODC. The scientific quality control flags are then merged into the earlier version of the data in the CMD.

129 The GTSP CD-ROM containing data and information from the Project is in the final stages of preparation. This important product of the GTSP will be available for mass production at the end of March. The IOC will receive 250 copies for distribution to Member States.

130 GTSP has a variety of users. The data is passed on a daily or 3-times per week schedule to agencies running operational coupled ocean-atmosphere models, to weather forecasting centres, and from time-to-time, to fishing companies. The data is also passed on a monthly basis to WOCE researchers in the WOCE UOI Programme. In fact, all research and operational users benefit from the GTSP because of the more complete and timely database that is available. In the USA, students have used the data to do school projects on the Gulf Stream.

131 The next meeting of GTSP is scheduled for April 1996 in Washington, USA. It is expected that the meeting will finalize the specifications for a standardized scientific QC, finalize the rules for the update of the data that has received scientific QC into the CMD, and make recommendations on the future of the Project.

132 The Chairman of the Steering Group noted that one possible recommendation for the future of GTSP would be that the programme become a permanent programme of IODE and IGOSS and that the Steering Committee would complete its work by 1998 and disband. After this time, development of GTSP would have been completed and the programme could be expected to operate on its own.

133 The Representative of WMO reported that the IOC-WMO Committee for IGOSS at its Seventh Session had reviewed GTSP and had recommended that GTSP should become a permanent joint IGOSS-IODE programme with the name Global Temperature-Salinity Programme, subject to the agreement of IODE-XV.

134 **The Committee agreed** with this recommendation of IGOSS. The name will be changed to Global Temperature-Salinity Programme although **the Committee recommended** that the acronym GTSP continue to be used because of the familiarity of the IGOSS and IODE user communities with this acronym. **The Committee adopted** Recommendation IODE-XV.4.

135 **The Committee also noted** with thanks the offer of WMO to continue its support for the GTSP Steering Committee meetings.

136 The Representative of WOCE, Dr. E. Lindstrom, emphasized that GTSP and WOCE have had an extensive and productive collaboration. The global time-series of upper ocean thermal data provided by GTSP are of significant value to WOCE.

137 GTSP has fully integrated the scientific quality control standards of WOCE into its system, assuring that the final product is of the best quality.

138 The distributed nature of the system has allowed GTSP to take advantage of the best talent in the IODE/IGOSS and research communities for the various aspects of the processing, quality control, and distribution of the data. Monitoring of data flow in this system has provided a more comprehensive product to the end users.

139 GTSP and the WOCE Upper Ocean Thermal Programme have in fact co-operated to build an end-to-end data management system for temperature and salinity data.

140 **The Committee stressed** with satisfaction its on-going interaction with WOCE and **restated** that it stands ready to lend assistance to scientific and monitoring programmes in meeting their needs in oceanographic data and information.

141 **The Committee recognized** the major contribution which GTSP is making to a large variety of operational and research applications, including the global science programmes such as WOCE, as well as the important support provided by the GTSP data flow monitoring arrangements to the overall IGOS monitoring effort undertaken by the IGOS Operations Co-ordinator and WMO. **The Committee further recognized** that GTSP represents a successful example of a joint IGOS/IODE data management activity that is likely to be essential for future GOOS implementation.

4.2.2 **Global Ocean Data Archeology and Rescue Project (GODAR)**

142 Mr. S. Levitus, the Project Leader for GODAR, informed the Committee that the project had been developing successfully since its inception in 1993 by the IOC Assembly.

143 Four regional GODAR workshops have been held: in 1993, for Eastern and Western Europe in WDC-B, Oceanography, Obninsk, Russia; in 1994, for the Western and Southern Pacific in WDC-D, Oceanography, Tianjin, China and in the National Institute of Oceanography, Goa, India for the Indian Ocean and adjacent seas; in 1995, in Valletta, Malta at the Foundation for International Studies for the Member States of the Mediterranean. The workshops helped to identify and describe large amounts of data held in manuscript and digital form in each participating Member State. IOC Workshop Reports Nos. 88, 100, 107, 110 have been produced and published for each Workshop describing national and regional datasets, the state of their preservation and ways to help Member States in digitizing the data and making them available to the international community.

144 As a result of the first three years of GODAR activities, the size of the global temperature profile database has been increased by approximately 1.4 million temperature and 300,000 salinity profiles. This data has been made available on 10 CD-ROMs produced by WDC-A for Oceanography, and has been widely distributed without restriction. The CD-ROM set and products based on this data are known as the World Ocean Atlas 1994.

145 In 1996, the following amounts of data identified through regional workshops are expected to become available via CD-ROM: 400,000 bathythermograph profiles, 150,000 Nansen casts. The production of the second set of CD-ROMs, collectively known as the 'Global Ocean Database 1996' is planned for 1996. This new database will include all GODAR data, plus data held at NODC/WDC-A, Oceanography, Washington, DC. It will be a joint product of the IOC/IODE and the ICSU/WDC systems. The database will contain parameters not previously included in the World Ocean Atlas Database such as meteorological data, nitrite, pH, alkalinity, chlorophyll and plankton observations, as well as metadata. Distribution will be made using CD-ROMs and magnetic tape media.

146 In 1996, it is planned to have a Regional GODAR Workshop for the IOC Member States of Central and South America. In 1997, there will be a Regional Workshop for IOCEA and the International Conference on GODAR which will summarize the progress achieved during the 5-year period and identify future actions.

147 **The Committee expressed appreciation** for the efforts of the Project Leader and Secretariat in making the GODAR project successful and **considered** the co-operation of Member States and international organizations in the project implementation as outstanding. **The Committee specially thanked** IOC, ICSU, ICES and the European Union MAST Programme for their contribution to the project and **requested** the Secretariat bring this view to the attention of the heads of the relevant organizations. **The Committee endorsed** the plans of the Project Leader to the further development of GODAR and **invited** Member States to continue and expand their collaboration with the project.

148 **The Committee emphasized** the importance of the GODAR training component and **called** on the Project Leader and Secretariat to consider its further development.

149 The Delegate of ICES identified two matters of concern related to GODAR: tracking data in the GODAR is difficult because of the limited amount of meta data that has been included. There should also be more targeting of efforts to set the best quality datasets into the system.

150 **The Committee advised** the Project Leader to address these concerns while developing the second set of CD-ROMs.

151 **The Delegates of Colombia and Nigeria congratulated** the Committee on the development of this flagship IODE project and offered to host the GODAR-V Workshop in Colombia in the second half of 1996, and GODAR-VI in Nigeria, in the first half of 1997.

152 **The Committee thanked** Colombia and Nigeria for their kind offers and **noted** that having the GODAR-V Workshop in the Caribbean geographical region, will not only cater to the objectives of the project, but will also help to respond to concerns expressed by the participants of IOCARIBE-V held in Barbados, in December 1995, about the lack of information on historical data in the region.

153 The Representative of the European Union MAST Programme acknowledged the concept of GODAR and informed the Committee of the MAST projects of the GODAR nature on coastal environment data and the North Sea. He also encouraged that the scientific community, when planning marine research programmes, include a GODAR-type component in them.

154 **The Committee noted** this information with interest and **invited** the Project Leader to take the experiences of the European Union MAST Programme into account and extend co-operation between GODAR and the European Union.

155 The Director of WDC-B, MGG supported the GODAR activities and proposed to expand data types of interest to GODAR to include:

- (i) magnetic (and gravity) field analog profiles (T, g; on-board and air-borne under the seas) together with the bathymetry data;
- (ii) chemical and mineralogical composition, physical, mechanical and geo-technical properties of sediments; rate of sedimentation;
- (iii) isotope analysis and age of sediments and rocks of sea-bottom;
- (iv) seismic and seismo-acoustic data (analog, digital profiles on old magnetic tapes or in different formats);
- (v) heat-flow data; near-bottom water temperature and current velocity and direction; bottom photos and TV survey.

156 **The Committee decided** that the planned International Conference on GODAR will be the most appropriate forum to discuss this proposal and identify necessary actions.

157 Under the same agenda item, **the Committee considered** the progress in the declassification of naval data and making them internationally available as it was recommended at IODE-XIV.

158 The GODAR Project Leader informed the Committee that in response to IODE-XIV Recommendation and to the IOC Circular Letter N° 1439 a few Member States started the data declassification process. A list of countries is presented in Figure 2. He introduced a brochure entitled "*Scientific Utility of Naval Environmental Data*" published by the USA in June 1995, which contains important information on the declassification issue and the usage of identified data holdings for ocean sciences and a wide range of civilian purposes.

DECLASSIFICATION OF NAVAL OCEAN PROFILE DATA DURING 1990 - 1995

Argentina Declassified 7,102 BT profiles in 1995
Australia Regularly declassifies navy data including measurements taken in the Australian EEZ
New Zealand Regularly declassifies navy data including measurements taken in the New Zealand EEZ
Russia Declassified many historical profiles including data from the Russian EEZ. Naval Station Data archive is approximately 1.46 million profiles of which only 880,000 have been digitized. Naval MBT archive is approximately 580,000 profiles of which 232,000 have been digitized.
United Kingdom Declassified 17,600 BT profiles during 1994-1995
United States Regularly declassifies data from US Navy ships after one month delay. NODC holds 430,176 US Navy XBT profiles. NODC holds 302,000 US Navy XBT profiles.
Namibia Submission is planned for January 1996.
Turkey 50,000 XBT profiles.

Figure 2

159 **The Committee commended** the IOC Executive Secretary and the GODAR Project Leader for their efforts in declassification and **called** on Member States to support this initiative on a wide basis.

160 **The Committee recommended** that a Circular Letter be sent under the signature of the IOC Executive Secretary, acknowledging the efforts of the Member States which have already joined the project and inviting others to contribute to the declassification activity.

4.2.3 Publications and Information Products

161 Mr. P. Pissierssens provided a status report on various IODE publications and information products:

Updating of the IOC Manuals and Guides N° 5

162 In order to evaluate the progress in updating the IOC Guide N° 5 "*Establishing a National Oceanographic Data Centre*" published in 1975, a sessional group was established.

163 The sessional group recommended that the guide be updated as a matter of priority, and that a working group be set up for updating the document.

164 **The Committee adopted** Resolution IODE-XV.2.

MIM Publication Series

165 As reported by the Chairperson of GEMIM, three volumes were published since the creation of a new series N° 30 in the IOC Manuals and Guides. The purpose of the MIM Publication Series is to create a clearly identifiable and visible product with the marine information management community as a target audience. Three new volumes were identified: the IOC WWW server; various issues related to the Internet; print and electronic tools for the publication of marine information and loading information databases on the WWW.

166 The Representative of EURASLIC noted with appreciation the wide distribution of the MIM Publication Series. He called the attention of the Committee to the need to have a clear picture of the community which uses these publications. He mentioned that Volume 1 (Diagnostic Procedures) is used by FAO when assessing new ASFA Partners, by the International Federation of Library Associations (IFLA) for a project in Vietnam, and by an EURASLIC expert working for the Danish Government on a project in Vietnam. He reported the use of Volume 3 (Standard Directory Record Structure) by RECOSCIX-WIO and RECOSCIX-CEA, and by a Chilean group of marine librarians.

167 The Representative of IAMSLIC reported on the use of Volume 3. She also called on Member States to ensure that all marine scientific publications are submitted to ASFA input centres for addition to the ASFA database.

168 **The Committee requested** the IOC Secretariat to make a survey among Member States on how the MIM Publication Series are being used.

Marine Environmental Data Information Referral System (MEDI)

169 This was discussed under agenda item 3.2.

Global Directory

170 The International Directory of Marine Scientists has a long history. Three editions have been produced, the last in 1983, as a co-operative effort involving UNESCO, UNEP and FAO.

171 The Global Directory has been discussed by GEMIM on several occasions. One of the conclusions was that the centralized approach to obtain information for entries is not recommended as it is too costly and too time-consuming. Within the framework of the RECOSCIX-WIO project, a very successful regional directory has been developed for the IOCINCWIO region, maintained by the RECOSCIX-WIO Regional Dispatch Centre in Mombasa. It currently contains information on over 200 marine scientists and is being updated twice a year. Another regional directory is being prepared for the IOCEA region.

172 A standard directory record structure format was developed by GEMIM and published in the MIM Publication Series.

173 **The Committee endorsed** merging national and regional directories to begin to create a global directory to be made available through the IOC WWW Server. To serve Member States without access to the Internet, the Directory will be included in the IOC CD-ROM and in other media. A compact data entry form will be developed to enable individuals to submit their biographical information for inclusion in the directory. Traditional ways of canvassing input must also be considered.

174 The Representative of EURASLIC reported on his discussions with the European Union MAST Programme, the European Science Foundation and IOC concerning the preparation of a European component of the Global Directory. The MAST Programme already funded a survey of 600 potential users in 6 European countries. The survey clearly confirmed GEMIM's view of the need for the Directory and actions are now being taken to identify required funding.

Electronic Document Delivery

175 GEMIM recommended a pilot project on document delivery over the Internet involving the Scripps Institution of Oceanography and marine libraries in Côte d'Ivoire, Fiji, India and Kenya, in co-operation with

IAMSLIC. The pilot project will set up a system enabling the transmission of printed documents over the Internet using the ARIEL system. **The Committee invited** Member States to support the pilot project.

176 It was also reported that IOC publications can now be downloaded - in full text - from the IOC WWW Server (<http://www.unesco.org/ioc>). Thanks to the development of a CDS/ISIS database search and retrieval interface for WWW, a searchable catalogue of IOC publications with a download option will soon be developed at the IOC Secretariat.

The IOC WWW Server

177 IOC traditionally communicates with the scientific community through its Action Addresses and IOC Depository Centres. However, scientists and other audiences demand a more direct access to the IOC information and data resources. Often, it is observed that knowledge about IOC and its activities is not widely distributed amongst the scientific community.

178 In July 1995, the first release of the WWW server was developed with the objectives:

- (i) to provide information on IOC activities and programmes;
- (ii) to provide access to IOC publications, data and software products;
- (iii) to guide users to WWW servers in Member States;
- (iv) to assist users in locating marine data and information in Member States.

179 Full Internet access is available in 70% of the Member States; 15% has access to e-mail only; and 15% has no access to Internet at all. **The Committee noted** that although these figures are most favorable, they were not necessarily representative of the situation in marine science institutions, NODCs and DNAs.

180 The Delegate of Bulgaria pointed out that many institutions do not have access to the Internet due to the high cost and the need for additional equipment and software.

181 **The Committee urged** Member States to ensure access by National Institutions to Internet in general, and to WWW in particular.

182 Mr. Pissierssens also noted the recent establishment of the IOC-News listserv which was intended as a complement to the IOC WWW Server, as a bulletin board service and means to disseminate time-sensitive information related to IOC programmes and activities. Subscription to the listserv only requires an e-mail facility, not full Internet access as needed for accessing the IOC WWW Server. A demonstration of the Server was organized.

183 The Representative of LOICZ recommended loading the list of acronyms on the IOC WWW server and pointed out the need for collaboration with other organizations in making the list as comprehensive as possible.

184 The Delegate of the United States requested IOC to include a list of IOC and other meetings related to marine science on the Server.

185 The Representative of ICES called the attention of the Committee to the WWW compilation developed by ICES.

186 The Delegate of Japan noted that JODC is preparing a small brochure with information on WWW and FTP servers at JODC, and it will be distributed to relevant organizations.

187 The Representative of LOICZ recalled that many marine science centres in the world still have none, or limited access to Internet. He pointed out that the speed of Internet is often low during the (working) day and proposed that IOC should consider the periodic compilation and distribution of a CD-ROM containing a large part of WWW pages available on Internet related to marine sciences. He stressed that such a product would be useful, not only for those without access to Internet, but also to the entire community, reducing online time and thus the cost for the user. He recommended that this product could be developed as a joint effort between several IOC Member States, UN agencies and other interested organizations.

188 **The Committee took up** the suggestion made by the Representative of LOICZ for the production of a CD-ROM of WWW pages. The IOC Executive Secretary was invited to issue a Circular Letter to IOC Member States requesting them to compile WWW pages of relevance to IODE activities in their country and to submit these to the Secretariat in electronic form for inclusion on the proposed CD-ROM along with the IOC WWW pages as described above. **The Committee further invited** the IOC Executive Secretary and IOC Member States to identify resources required for the production and distribution of this CD-ROM product.

189 A sessional group was set up to make a more detailed evaluation of the current IOC WWW Server and to recommend future actions. The sessional group stressed the usefulness of WWW Servers as a means to reach the scientific and other communities interested in the marine environment.

190 The group identified the need for a 'National IOC Homepage' to be included on Member State WWW servers. To facilitate effective 'browsing' it was agreed that this 'National IOC Homepage' should have a standard structure including a brief statement of support for IOC activities and the national IOC Action Addresses. It should further contain a table of contents providing links to relevant topics on the national WWW server(s).

191 **The Committee adopted** Recommendation IODE-XV.5.

192 **The Committee commended** the IOC Secretariat on the work already done on the IOC WWW Server and **urged** the IOC Executive Secretary to ensure the availability of funds for its maintenance and further development.

4.2.4 **Quality Control of Oceanographic Data**

193 The Task Team on Data Quality Control worked by correspondence from 1986 to 1988, and assembled key documents on well-proven quality control procedures. During the period 1988-1992, the European Union provided funds for meetings on quality control and for electronic scanning, and publishing a compendium of documents. This volume was published jointly by IOC and EU in 1992.

194 The quality control documents included in the volume (IOC Manuals and Guides N^o. 26) are those for which there has been extensive international proof of their practical use through major collaborative marine science programmes.

195 The variables included are:

- Wind;
- Waves;
- Icing;
- Sea-Surface temperature;
- CTD profiles;
- XBT profiles;
- Sea-Level;
- Tides;
- Current Meter data;
- Drifting buoys;
- Ship tracks;
- Bathymetry, single beam echo-sounder.

196 The European MAST Programme has supplied the scientific co-ordinator of every MAST-II research project with a copy of the Quality Control manual. IOC distributed almost 1,000 volumes to Member States and IODE National Co-ordinators.

197 Since 1992, several further documents have been obtained and several science programmes such as WOCE and JGOFS have published standard procedures. New met-ocean data standards have been published for the North Sea oil and gas industry. In discussions of new quality control requirements, the following additional variables and parameters emerge as most important:

Acoustic Doppler Current Profiles (ADCP);
Nutrients (Nitrate, Phosphate);
Oxygen;
CO₂;
Swath Bathymetry;
H.F. Radar;
Fluorescence, Chlorophyll;
Phytoplankton, algal blooms;
Petroleum in sea water.

198 **The Committee noted** that automatic real-time quality control is an essential component of GOOS, since there must be a check on the validity of data assimilated into numerical oceanographic models. GTSIP provides an example of the techniques required. The quality control procedures published in the EU-IOC Quality Control Manual therefore provides a basis for subsequent automation of quality control efforts in support of GOOS.

199 **The Committee invited** Dr. N.C. Flemming to collect quality control standards from a range of programmes and propose a list of new texts which should be included in a second edition of the Quality Control Manual. He kindly agreed to fulfill this task by the end of April 1996.

200 Dr. M. Bohle-Carbonell proposed that there should then be a discussion arranged between the officials of European Union MAST Programme and IOC to agree whether the publication of a second edition is timely and how to share resources for doing so.

201 **The Committee recommended** that the Manual should be published, it so decided, in hard copy as well as being made available in electronic form, on-line and on CD-ROM.

4.3 CAPACITY BUILDING

4.3.1 OceanPC and Software Development

202 The OceanPC software package was developed to promote entry and international exchange of oceanographic data, particularly in developing countries. The software includes modules for general purpose mapping, ROSCOP oceanographic cruise inventories, and entry and processing of vertical profile data. Access to global datasets on CD-ROMs is supported. The first version of the OceanPC software has been distributed to over 300 users. The reaction of the users was that while the software is useful, additional modules should be added and the system should be modernized and made more user-friendly.

203 **The Committee decided** on a two phase approach:

- (i) continue to promote and develop the present system; and
- (ii) seek funds for a re-engineering of the system providing a fully integrated system based on a modular framework using a modern graphical user interface.

204 **The Committee expressed** its appreciation to IOC, ICES, CEC, US NOAA and US MMS for their support in the project development. **The Committee thanked** the Executive Secretary IOC and US NOAA for the publication of the latest version of OceanPC and associated software which was distributed to all the IODE-XV participants.

205 **The Committee noted** that the wide distribution of a fully integrated software package for oceanographic data processing would assist in setting standards for oceanographic data exchange. The inclusion of a number of Cds would turn the system into an instant data center. It would provide for data entry, QC, data delivery, display, and ROSCOP formulation. A more appealing package would be to assemble the system complete with the computer itself. This would require a major effort to bring together the resources needed. Mr. B. Searle distributed a prototype proposal illustrating the kind of activities and resources required. **The Committee expressed** considerable interest in this approach and **adopted** Resolution IODE-XV.3 in this regard.

206 The Representative of WMO informed the Committee of the results of a review of IGOSS participation in OceanPC. The IGOSS Committee noted that there was little support in the existing package for

operational data of interest to IGOSS. It did, however, recognize the potential of such an activity and directed the IGOSS Group of Experts on Communications and Services to maintain contact with and review the progress of the OceanPC Project.

207 **The Committee recognized** the utility of the applications included in the present package and **considered** this as a demonstration of what is possible. However, the development of the package has reached a point where a significant input of new resources is required to take the system development to the next stage. **The Committee realized** that the next step could take two to three years. Thus, there would be a need to continue the existing programme while the upgrading of the system takes place. A sound distribution system was considered a key element of the programme.

208 **The Committee observed** that if suitable arrangements could be made, commercial software could be included in the package. For special software applications developed for OceanPC, the package would also benefit from a common programming language such as Basic that would allow countries and institutions to participate not only as users of the system but also as developers of modules for the package. A parallel effort in obtaining a detailed analysis of user requirements would permit better targeting of the system.

4.3.2 **Training Programmes in Marine Data and Information Management**

209 The Vice-Chairman of the Committee presented Document IOC/IODE-XV/16 and summarized training activities implemented by the IOC Committee on IODE in 1993-1995.

210 He noted that the training component of IODE was marked by continuous development and regional expansion. More than 10 training courses have been arranged in Japan, Malaysia, China (for WESTPAC) Argentina, Colombia (South America), the Russian Federation and Malta (Eastern and Southern Europe, North Africa), the Islamic Republic of Iran (Asia) and Kenya (Africa). During these courses, almost 100 participants received training in oceanographic data management. IODE started a new type of training course for trainers. The first training course of this type was implemented for OceanPC in Copenhagen in 1994.

211 As it was recommended, the regional approach laid the foundation for IODE-TEMA activities. The regional implementation was based on centres of excellence in Japan, Russia and Argentina which provided training on a regular and continuous basis.

212 In response to the requests from regions or Member States, IODE missions to make feasibility studies have been arranged to the Islamic Republic of Iran, and Western and Eastern Africa. The result of these missions was the development of an NODC in Tehran equipped by UNESCO/IOC, and the establishment of effective regional co-operation through data and information exchange networks. Unfortunately, the lack of funds did not permit IODE to meet all the requests for missions from Member States. Results of these missions and training courses have been published and widely distributed.

213 Holding six scientific workshops on different issues of ocean data and information handling allowed experts from developed and developing countries to share information and to present projects results.

214 The Vice-Chairman referred to new challenges identified by UNCED, UNCLOS and GOOS, and specified their requirements in collection and exchange of data and information. He emphasized that to meet these requirements, there will be a strong need in the further development of the IODE training component. He recommended the following activities to make it more effective:

- (i) further improvement of regional co-operation and co-ordination;
- (ii) continuous training should be further developed;
- (iii) training programmes should be more focused with the best knowledge provided to trainees;
- (iv) training of trainers should be widened to also cover other than OceanPC projects;
- (v) regular evaluation of the results of training courses and missions should be arranged;
- (vi) education component should be put in the agenda and developed with an innovative approach.

215 **The Committee accepted** the report of the Vice-Chairman and **acknowledged** with thanks the contributions of Member States to the implementation of the IODE-TEMA activities.

- 216 **Special tribute was given** to Japan for its more than 10 years of support for annual training courses on oceanographic data management for the Member States of WESTPAC.
- 217 **The Committee reiterated** its support to the regional approach in training and **recommended** that closer links of co-ordination with the UNESCO Regional Offices and IOC regional programmes be explored. **The Committee felt** that though short-term training courses will continue to be an important tool in capacity building, more in-depth long-term training, from a few months to 2-3 years is needed, and **invited** the Executive Secretary IOC to consider providing study grants and fellowships to meet IODE requests.
- 218 **The Committee acknowledged** the individual training provided by Member States on a bilateral and multilateral basis and **noted** with thanks, the readiness of the USA, Germany, Australia, Russia (WDC-B, MGG), India and EURASLIC to provide long-term training free of charge to IOC, provided the Commission will cover travel and daily allowance expenses.
- 219 The Delegate of Malta highlighted the advantages which would be gained through an on-the-job training schemes. Such schemes allow personnel to gain the relevant experience by working in an actual data centre environment. He requested the Committee to consider the possibility of supporting long-term training of Maltese experts in leading NODCs.
- 220 **The Committee acknowledged** the offer of a few delegations to provide necessary facilities for hosting short-term training courses, **recommended** that countries provide detailed descriptions of these planned activities and **requested** its Chairman, Vice-Chairman and Secretariat to make a critical review of the proposed courses, identify priorities and take this into account while finalizing the programme and budget for 1996-1999. The complete list of planned training courses is presented in Recommendation IODE-XV.11.
- 221 **The Committee requested** that the IODE-TEMA activities should be widely announced in a timely manner through all types of communication. **The Committee noted with thanks** the decision of GEMIM to put the directory of training opportunities on the IOC WWW server.
- 222 **The Committee considered** requests from Member States (Ecuador, Colombia, Cuba, ROPME/PERSGA Geographical Area, Western Africa) for feasibility and assistance missions, **reiterated** their importance for facilitating development and up-grading of ocean data and information management infrastructures, **appreciated** the readiness of these countries to cover local costs and **urged** the Secretariat to make sure these missions were implemented during the coming years. The Committee noted with satisfaction the interest of the WDC-A, Oceanography Director to study the possibility of sending an expert to Ecuador on an assistance mission free of charge to IOC.
- 223 **The Committee recommended** the conduct of an evaluation of the IODE-TEMA activities during the intersessional period in order to identify the effectiveness of training and support efforts, shortcomings and success stories.
- 224 The Chairperson of the sessional group on training modules, Ms. H. Cameron from Canada, reported on the results of the evaluation of a set of draft standard modules for courses in marine data and information management. The group concluded that the modules, as presented, should not be recommended for approval. This decision was based on the following:
- (i) the modules lack sufficient detail to assess the knowledge and experience requirements of trainees and the amount of time allocated to each topic;
 - (ii) the outline is skewed to data management. While the subjects presented for data management training were generally considered to be comprehensive by the group's data-managers, the information management section was deemed inadequate by GEMIM.
- 225 The group noted that training for data managers must focus on practical experience and that hands-on training in existing data centres provides this in a timely and cost-effective manner.
- 226 Taking into consideration the conclusions of the group, as well as the fact that new technological development gives opportunities for developing training materials of a more advanced and sophisticated nature,

the Committee decided to terminate the activities for the development of training modules in the present form and format.

227 **The Committee recommended** that the IODE Officers will study other ways of providing this type of a training tool.

4.3.3 **Voluntary Co-operation Programme (VCP) and IODE Needs**

228 This item was introduced by Dr. I. Oliounine who briefly described the mechanism which exists in the framework of the IOC/TEMA programme for providing support to developing countries. He then referred to the state of the implementation of the IODE-XIV decision related to the provision of available surplus and new equipment to developing countries. In response to the IOC Circular Letter N° 1368 of 12 January 1993 on this matter, only two countries offered readiness to provide equipment: Netherlands provided PCs to Costa Rica and Kuwait and USA to the Russian Federation. This equipment had been delivered or is in the process of being delivered.

229 Dr. Oliounine identified the drawbacks which IOC and donor/recipient countries faced in implementing the project: complicated delivery procedure that requires additional funding; spare parts and consumables are not provided, and problems with maintenance of the equipment.

230 After some extensive discussions, **the Committee recommended** the continuation of efforts in fully utilizing the benefits of the VCP for the IODE system development and the circulation of another letter of request for equipment.

231 **The Committee advised** that the needs of developing countries for surplus equipment should be better specified and include information on the plans for its utilization in oceanographic data and information management; that recipient countries should be ready to cover or share costs of custom duties, maintenance and spare parts; that the possibilities of using diplomatic channels (embassies, national permanent delegations for UNESCO) should be explored; and that recipients should examine the availability and use, as far as possible, of national teams of specialists to provide maintenance.

232 **The Committee acknowledged** with thanks the readiness of the European Union MAST Programme to use its channels for the dissemination of the IOC Circular Letter related to VCP and surplus equipment in support of the IOC/IODE programme.

233 **The Committee noted** that for many countries and data centres, equipment which is considered by some experts from developed countries as obsolete, may be very useful for meeting educational needs and limited ocean data and information management activities. Model 286 personal computers were specifically mentioned as still having some use in developing countries.

5. **RESULTS OF THE THINK-TANK MEETING**

234 The Chairman presented an overview of the deliberations of the IODE Think Tank Meeting (Doc.IOC/IODE-XV/15).

235 Changes in the client community of IODE included the development of many large, multi-disciplinary, global scale projects. Other changes included the revolution in computer and communications technologies, and increased expectations from the IODE client community because of these technological changes.

236 The Think Tank Meeting concluded that the main client for IODE data and information services at the moment was still the scientific community, but that the operational and service industries would also become very important clients in the next few years. The development of GOOS would likely be the first example of this.

237 The main focus of IODE must become the upgrading of the skills of its data and information centres. This upgrading of skills include skills in managing many more data types, and in implementing and using the new data management and electronic publishing capabilities including the World Wide Web, Internet and CD-

ROMs. The best way for IODE to achieve this upgrading of skills was identified as the development of joint projects and partnerships with organizations and programmes, both inside IOC and with other bodies collecting and managing marine data. In fact, actively seeking development of such partnerships between IODE and these other centres of expertise was seen as the most urgent priority.

238 Programmes identified as a priority for IODE included support for GOOS, capacity building, coastal zone data management, further co-operation with IOC regional bodies, management of pollution data and JGOFS.

239 The Chairman noted that the agenda for the Fifteenth Session of IODE takes into consideration the results of the Think Tank Meeting and that these issues and many others that came from that meeting were being addressed under different agenda items of the Session.

5.1 NOT YET ROUTINELY EXCHANGED DATA TYPES - STATUS AND WAYS OF ACCOMMODATION

5.1.1 Remote-Sensed Data

240 Mr. J. Withrow presented a report describing the activities of the joint CMM-IGOSS-IODE Group of Experts on Ocean Satellites and Remote Sensing. This Group is in the final stages of completing a report on satellite sensors and capabilities relevant to the oceanographic community.

241 **The Committee noted** with interest that there would be a section on data management in this report.

242 Both the USA and the Representative of LOICZ commented that the Committee on Earth Observation Satellites had produced excellent documentation on satellites and sensors and that this information could assist the Group of Experts in their work. The Representative of WMO noted that it would be appropriate for IODE to continue nomination of experts to the Group.

243 The Representative of LOICZ informed the Session of the existence of the Third Edition of European Compendium on Remote-Sensing of the Marine Environment published in 1995, jointly by ESA and the European Union's Joint Research Center (JRC) in Italy. The Center for Earth Observation, CEO, which is an integral part of JRC, carries out environmental research of interest to IODE. The CEO is building a WWW page on ocean colour observations and this will be available in April 1996.

244 The Chairman of the sessional group formed to discuss remote-sensing data management issues then presented the results of their discussions. The group noted that some satellite data had been purged in the past. Considering the large investment in the data collection, the group asked if the WDCs could play some role to ensure that satellite data of interest to the oceanographic community would not be lost in this way.

245 The Representative of WDC-A, Oceanography cautioned that such a project often required significant resources, beyond the capabilities his Center could call on.

246 The Representative of the European Union MAST Programme suggested that IODE members must actively identify the data at risk of being purged and seek funding to preserve it.

247 **The Committee noted** the danger of loss of satellite imagery and other data as archives are purged and programmes are phased out. **The Committee requested** representatives of Member States, NODCs, and RNODCs to keep a watch for such situations and to encourage partner programmes to continuously consider the final archives for their data to prevent their loss.

248 The Delegate of the USA noted that NOAA and NASA were negotiating an agreement on archiving data from future satellite missions to avoid problems of the past.

249 **The Committee adopted** Recommendation IODE-XV.6.

5.1.2 Carbon Dioxide, Biological and Pollution Data

250 The *ad hoc* Group of Rapporteurs on Chemical and Carbon Dioxide Data was established during IODE-XIV as a result of the recognition of the important role that ocean chemical and carbon dioxide data play in understanding the World Ocean's bio-geochemical cycles, as well as of the significance of the ocean component in the global carbon cycle.

251 The Chairman of the *ad hoc* Group, Mr. S. Levitus, reported that during the intersessional period activities were slow to get started due to a lack of much-needed funding. The funding problem has now, to a large extent, been resolved and a Marine Biological and Chemical Data Management Workshop is planned to be held in 1996.

252 The Workshop is expected to bring together representatives from both government institutions (including data centres) and academic communities of several countries. Objectives of the Workshop include: (i) determining the requirements for managing marine chemical and biological data, including minimum metadata and general format requirements; (ii) describing procedures for merging historical biological and chemical data into a single database, with a common format; (iii) identifying the availability of data in both manuscript and digital form; and (iv) determining means of distributing biological and chemical oceanographic data globally.

253 The topic '*Biological and Chemical Data Management*' encompasses many parameters from bacteria to large mammals and from tracer gases to complex organic compounds. However, in order to focus on data management issues, case studies planned should be limited to parameters routinely sampled, processed and archived by the data centres of IODE. The IOC has designated Dr. M. Conkright, of the US NODC's Ocean Climate Laboratory, as Workshop Co-ordinator.

254 The participants of the Session received the Provisional Workshop programme for discussion and comments.

255 **The Delegate of Germany invited** the Committee to have the Workshop in May 1996 in the BSH, Hamburg and expressed readiness to provide the necessary facilities for a successful meeting of up to 30 participants.

256 The Committee, noting the experience of the NODC of Germany and its contribution to the biological and pollution data collection and management activities, **acknowledged** the kind offer of Germany and **requested** the Workshop Co-ordinator and Secretariat to take all necessary actions for Workshop implementation.

257 **The Committee noted** that it was important to have appropriate representation of scientists and data managers at the Workshop in order to achieve the best results. **The Committee recommended** that the Workshop concentrate on a few parameters to ensure that good progress is made in understanding how best to manage this data. **The Committee invited** the Executive Secretary IOC, Member States and international agencies to provide necessary funding for this meeting.

258 **The Committee noted** an urgent requirement to address the subject of marine pollution data, in order to respond to GIPME and other environmental programme's concerns and needs.

259 The Representative of the European Union expressed the interest of the EU in the management of chemical and CO₂ data, as well as pollution data. He recommended IODE to study the problems of managing pollution data as is being done for chemical and CO₂ data, and invited the Committee to prepare a joint action related to the management of marine pollution data.

260 **The Committee took note** that some IODE centres have experience with pollution data and **recommended** that the group of rapporteurs should identify these centres and find and co-operate with other centres with such experience, outside of the IODE system. **The Committee recommended** co-operation with the European Union in this activity.

261 The MARPOLMON data management scheme and RNODCs have been in operation for many years. In addition, there are regional oil pollution monitoring systems for which the data in general do not get

transferred to the RNODCs MARPOLMON. Examples of such oil pollution monitoring systems exist in the region of N.W. Europe (OSPARCOM) and in other areas of high off-shore oil and gas pollution.

262 GOOS has identified monitoring of petroleum hydrocarbons in seawater as an important priority of the Health of the Ocean (HOTO) module. IODE should consider a review of how it can support this objective.

263 Such a review should include all types of measurements of petroleum in seawater, visual observation of oil slicks and tarballs, airborne detection, satellite observation by Synthetic Aperture Radar (SAR), chemical detection in seawater samples and data from shordines and beaches. IODE, through such a review, should identify these data types for which there is a need for data quality control and archival management of long-term datasets. The design of a suitable proposal should be discussed with the HOTO Module Panel of GOOS, with a view to implementation at RNODCs. **The Committee requested** its Chairman in consultation with the GOOS Support Office to identify and implement necessary actions.

264 The Chairman of the Group of Experts on RNODCs and Global Programmes noted the reports of existing RNODCs for MARPOLMON. In accordance with these reports, the centre in Japan had continued to receive and archive data on oil pollution, but the other two Centres had been inactive.

265 **The Committee directed** the IODE Officers, as the new mechanism for approving and monitoring the activities of RNODCs, to review the Terms of Reference and activities of these RNODCs and take appropriate actions to solve the problem.

266 **The Committee was also informed** that there are already programmes such as the Joint Global Ocean Flux Study (JGOFS) and the Arctic Monitoring and Assessment Programme (AMAP) which are managing multi-disciplinary datasets, including a large number of CO₂, pollution and biological parameters. Working with these programmes is also a way of increasing the skills of IODE data centres.

267 **The Committee encouraged** IODE centres to actively pursue co-operation with these programmes at the national level.

5.1.3 Marine Data from Coastal Areas

268 The Representative of LOICZ informed the Committee about the LOICZ project. The Land-Ocean Interactions in the Coastal Zone (LOICZ) project is one of the 8 core projects which comprise the International Geosphere-Biosphere Programme. The overall goal of LOICZ is to determine at regional and global scales: the nature of the dynamic interactions in the coastal zone; how changes in various compartments of the earth system are affecting coastal zones and altering their role in global cycles; to assess how future changes in these areas will affect their use by people; and to provide a sound scientific basis for future integrated management of coastal areas on a sustainable basis.

269 LOICZ is currently developing its data system plan, which will incorporate guidance on data quality and availability, management, exchange and application in global syntheses and modelling activities. The overall objectives of the data and information system for LOICZ include:

- (i) identify existing sources of data required for LOICZ;
- (ii) assemble the necessary datasets from existing sources, on-going national and regional LOICZ research which are required to address the overall goals of LOICZ;
- (iii) prepare and distribute directories of existing data and information where these exist and which are required for LOICZ research activities within the different Foci;
- (iv) facilitate the access of LOICZ researchers to data held in existing international systems for purposes of modelling and synthesis within the context of LOICZ.

270 The achievements of IOC and IODE could form a vital support for the implementation of LOICZ and the operations of its data and information system. The IODE community was invited to investigate in what way a collaboration between IODE and LOICZ could be implemented.

271 **The Committee reviewed** the requirements for coastal data from LOICZ, as well as other coastal programmes. **It noted** that much more work was necessary within IODE to begin to address the variety of data types found in the coastal zone. The wide variety of parameters in the coastal zone creates a challenge for IODE. **The Committee agreed** that one area that IODE could contribute, was in creating an inventory of marine data already available in the coastal zone. It could provide standards for the archiving, collection and processing of coastal datasets, utilizing such resources as OceanPC and the IODE QC Manual.

272 **The Committee felt** that there is room for collaboration between partner programmes such as GOOS, GCOS, GTOS and IGBP and projects already on-going in various regions and IODE, in the development of data and information management systems. In particular, NODCs should be organized to assist partner programmes in the assembly of relevant datasets.

273 Regional projects such as the Gulf of Guinée Project, the Coastal Resource DataBase in the Eastern Africa Project, ROPME, the Black Sea Project and others present IODE and its partner programmes with a number of areas in which they can develop, implement and test the regional facilities for data and information management. The objective is to provide the databases required to begin to respond to the questions of coastal zone managers regarding environmental management.

274 The Delegate of the European Union reiterated the findings of the IODE Think Tank Meeting in regard to upgrading IODE skills by linking the existing systems, such as HELCOM, OSPARCOM and AMAP.

275 **The Committee expressed** the need to closely integrate its efforts with these activities.

276 **The Committee adopted** Recommendation IODE-XV.7.

5.2 IMPLEMENTATION OF NEW TECHNOLOGIES IN THE IODE SYSTEM

5.2.1 Extent of Network Access

277 The Chairman pointed out that the use of Internet as a means for the exchange of data and information had expanded to the extent that there has been a significant change in the way data centres provide their services and products to their user communities. This was clearly demonstrated by the numerous references to Internet and WWW in many other agenda items.

278 **The Committee recalled** that the IOC Secretariat had distributed a Circular Letter in 1995, requesting Member States to inform the Secretariat of a national 'first point of entry' WWW URL. Unfortunately, this request had received only limited response. **The Committee requested** Member States to submit the URL of their national IOC homepage and other relevant national URLs at the earliest.

279 The Delegate of Guinée pointed out that governments need more information on the use of Internet and the benefits of access to it for national institutions. He said that an IOC Circular Letter could assist in this matter.

280 **The Committee requested** the IOC Secretariat to issue a Circular Letter on the need to provide Internet access to national marine science institutions as illustrated in agenda item 4.2.3. **The Committee provided** other suggestions as to how IOC might make it clear to Member States that it would be very important that their national data centres be connected to Internet. In particular, it was important that IODE should include the benefits of Internet in future publications and brochures. The numerous other suggestions provided by Member States on this matter will be compiled by the Secretariat and used by the IODE Officers and Groups of Experts, where possible, to increase access to Internet.

281 The Delegate of Canada invited Member States to share their experiences related to Internet and proposed to package these into a paper.

282 **The Committee recommended** that Member States send their contributions by 1 April 1996 to Dr. Keeley for his follow-up and preparation of the paper.

283 The Delegate of France referred to the RIO electronic mail network developed by ORSTOM and suggested that this network could benefit national institutions in francophone Africa. France offered the use of its RIO network to IOCEA Member States during the Fourth Session of IOCEA held in 1995.

284 **The Committee requested** that the IOC Secretariat urgently contact ORSTOM in order to encourage Internet access to IOCEA Member States.

285 The Delegate of Kenya expressed gratitude to Belgium, Sweden and the United States for providing financial assistance for e-mail access to the Member States of the Western part of the Indian Ocean: Kenya, Mauritius, Mozambique, Seychelles and Tanzania.

286 The Delegate of the United States proposed that the substantial gain in efficiency in terms of manpower and time-saving be stressed in the planned IGOSS/IODE brochure. The US NODC for example, where 85% of all data is now provided through Internet, has it proved to be a very effective mechanism.

287 The Representative of WOCE suggested that a Netscape bookmark list of useful URLs should be distributed regularly to Member States. It was noted that this list could be included in the IOC WWW Server CD-ROM.

5.2.2 New Technology for Data, Documents, Products, Imagery and Delivery

288 The Chairman introduced this item saying that during the intersessional period, technology has changed drastically to the point that a complete examination of the way data and information centres do their work is needed. Such a review is necessary since the client community has adopted these new technologies and expects IODE to provide its services using them.

289 The IODE Think Tank Meeting has pointed out the requirement for IODE Data and Information Centres to upgrade their skills. This requirement is not only for skills leading to understanding and relating new data types. It is just as important for these IODE Centres to have and demonstrate up-to-date technical skills.

290 He recalled previous discussions on the Internet and World Wide Web and pointed out that new generations of PCs are launched on the market nearly every 6 months. He compared computing power of today's PCs at a cost of approximately US\$ 5,000 with that of mainframes in the 1960's costing hundreds of thousands of dollars. This, together with the availability of low-cost software packages, has brought computer power to the desk of the scientists. The fact that scientists can deal with large amounts of data and information has also dramatically increased the demands on the IODE system for data and information.

291 The increase in product and service demand calls for increased joint projects amongst the data and information management communities. The Chairman referred to the joint pilot project between the data and information community for the development of a new MEDI discussed under agenda item 3.2, as an example.

292 He mentioned CD-ROMs as another important milestone in data and information management allowing the storage and easy dissemination of large amounts of data and information. The CD-ROM can provide the user with an 'instant' data and information centre. Even though we now see the loading of data and information on the Internet, the CD-ROM remains the most appropriate medium for access to large volumes of historical data and information.

293 The Delegate from the United States pointed out that planning for acquisition of information technology has become difficult due to the rapid changes in technology. He recommended that GEMIM should consider monitoring information technology journals to ensure that the marine data and information management community remains up-to-date with the advancements.

294 The Representative of the European Union referred to a MAST-II project - EDAP, implemented by the Irish Oceanographic Data Centre which involves the defining of requirements for the publication of scientific project data and information on CD-ROM. He informed the Committee that the project would prepare a detailed manual which he offered to send to IOC when it becomes available.

295 Considering the need to increase the visibility of IODE programmes and to provide the scientific community with clear and concise data and information products, **the Committee recommended** the publication of electronic versions of the reports of IODE projects.

296 The Representative of WOCE announced the WOCE plan to publish a CD-ROM providing highlight information on the entire WOCE programme.

297 **The Committee urged** the IODE Data and Information Centres to upgrade their skills and infrastructure to ensure their capability to serve the increased demands by end-users.

5.2.3 Improvements to the Regional Data and Information Exchange

298 Dr. I. Oliounine presented Document IOC/IODE-XV/20 with information on the IOC regional policy and on the status of data and information exchange within the IOC regional programmes. He recalled that this issue had been always in the agenda of the Committee sessions, as this is considered a key element in the IODE system and service development.

299 IODE has made enormous efforts to explore ways to support regional co-operation. In many cases, it was considered more effective to address ocean data and information management problems on a regional, rather than a national or global basis, because this approach helped define priorities and needs, fostered regional and national development and supported a multi-lateral economy.

300 Dr. Oliounine then described the requests of IOC regional bodies for IODE support based on the decisions of the IOC regional subsidiary bodies (IOCARIBE, WESTPAC, IOCEA, IOCINCWIO, IOCINDIO and the Black Sea) taken in 1992-1995. He informed the Committee of the IODE regional activities in response to these requests. He emphasized that the IODE regional component was building on the success of activities such as RECOSCIX for information management and data harmonization, and dissemination. Dr. Oliounine noted that the IOC regional subsidiary bodies had initiated a number of operational programme activities which will greatly benefit from data and information exchange networks within the IODE context. Growth and development of IODE national and regional infrastructures depend strongly on financial investments, capacity building and transfer of technology.

301 **The Committee supported** the views presented in the Document and **requested** that urgent actions needed to be taken to build up the human capacity in the regions for the management of marine data and information using IODE standard methods and formats.

302 **The Committee expressed** caution that the process towards regional integration should not lead to protectionist barriers in marine data and information exchange or exclusionary data policies. Regional integration and co-operation should be regarded as complimentary to multi-lateralism.

303 **The Committee recommended** that target training should be arranged across a carefully selected array of the IODE programme and that electronic mail facilities be established in the regions to enable efficient communications, as well as information and data exchange.

304 **The Committee decided** to appoint IODE Regional Co-ordinators within the Committee, which may help to increase the effectiveness of the IODE support to regional needs, and **adopted** Resolution IODE-XV.4.

305 **The Committee also supported** the need for close co-operation between data collectors and managers and **advised** the IODE co-ordinators to facilitate national seminars where both communities can meet and share views on the problems and ways to overcome them.

306 **The Committee discussed and adopted** four Resolutions and Recommendations related to IODE regional activities: Recommendation IODE-XV.8 on upgrading connections between NODCs and NMCs in the Black Sea region (submitted by the sessional group Chaired by the Delegate of Bulgaria); Recommendation IODE-XV.9 on the proposal for the development of the IODE infrastructure in the ROPME and PERSGA regions (submitted by the Representatives of ROPME and PERSGA); Recommendation IODE-XV.10 on MEDAR/MEDATLAS and development and updating of the Mediterranean dataset (submitted by the sessional group Chaired by the Delegate of France) and Resolution IODE-XV.5 on the development of national and regional data and information centres for the IOCEA Region (submitted by a group of African countries).

- 307 The Delegate of Turkey, while supporting the ROPME proposal, reminded the participants of the Iranian offer to host a regional training course, presented under agenda item 4.3.2, and advised that training activities recommended by Greece, Russia, Iran and ROPME should be, as far as possible, merged in order to have a larger geographical coverage and to avoid duplication of effort.
- 308 Some delegates recommended that the proposal on Upgrading Connections between NODCs and NMCs in the Black Sea region should be verified with the WMO, and that the IOC Black Sea Programme Committee should be consulted before the implementation will start.
- 309 The Delegate of Malta informed the Committee about the initiative by the International Commission for the Scientific Exploration of the Mediterranean (ICSEM) in co-operation with IOC, to establish in the Mediterranean and Black Sea, a network of water-level recording stations on the lines of GLOSS (MedGloss). A preliminary meeting of interested parties on this project is scheduled in Monaco on 15 February 1996. This project aims to develop a common platform for the Mediterranean and Black Sea region for a future effective operational network that includes other oceanographic parameters and lays the groundwork for the implementation of GOOS in the region. He noted that the project put forward by Bulgaria for the upgrading of connections between NODCs and NMCs in the Black Sea will certainly gain from co-operation, especially in the sea-level data component of the project with the ICSEM-IOC MedGLOSS initiative.
- 310 The Representative of ICES expressed concern that the project on MEDAR/MEDATLAS and Development and Upgrading of the Mediterranean Dataset has a very narrow focus on ocean data types and recommended the inclusion of O₂ and nutrients which will help bring fishery laboratories of the region into the scene.
- 311 The Delegate of Turkey expressed his readiness to host the meeting of experts to evaluate the progress in MEDAR/MEDATLAS project implementation, if the need arose.
- 312 The Delegate of Côte d'Ivoire reported on the advancements in the RECOSCIX-CEA project. She informed the Committee that the Regional Dispatch Centre of the project has now been set up at the Centre de Recherches Oceanologiques in Abidjan, with assistance provided by IOC. However, she pointed out that still a lot is needed to be done and substantial assistance would be needed to develop the operational phase of the project.
- 313 The Delegate of Nigeria welcomed the start of the RECOSCIX-CEA project, but pointed out that communication was a crucial problem in the region. Recalling the offer expressed during IOCEA-IV, he called on ORSTOM to provide Internet access to IOCEA countries.
- 314 The Delegate of Mauritania expressed his appreciation for the development of the RECOSCIX-CEA project. However, with regard to data management, he pointed out that capacity building was urgently needed. He said that the marine science community in the region was not sufficiently familiar with OceanPC and called on IOC to organize a training course on OceanPC which could be hosted by Mauritania. He also identified GODAR as an important activity which needed to be promoted and implemented in the IOCEA region.
- 315 The Delegate of Kenya provided a brief review of the RECOSCIX-WIO project which had been launched by the IOC in 1989, following a recommendation by IOCINCWIO-II. Since 1989, RECOSCIX-WIO has been able to develop an information exchange network involving Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Malawi, Mozambique, Seychelles, Tanzania, Uganda and Zimbabwe. It was also able to attract participation of 22 co-operating libraries in 8 countries outside the region. The project provides services such as query handling and document delivery, maintains a regional directory of marine science institutions and scientists, publishes a regional newsletter (WINDOW), and provided PC equipment and training to marine science libraries in the region. Whereas the pilot phase of the project was funded by IOC between 1989 and 1991, the operational phase of the project funding has been funded by Belgium since 1991. The 4-year project ended in December 1995, but has now been succeeded by another 3-year project (1996-1999) which will continue and improve the information services, and will also focus on the development of information CD-ROMs.
- 316 Mr. M. Odido proceeded with a presentation on a pilot project for the development for a regional ocean data exchange project for the IOCINCWIO region (Doc.IOC/IODE-XV/13). This proposal has been formulated in response to the identification during IOCINCWIO-III of the need to (i) strengthen national data

management capacity and; (ii) to develop a regional data and information network, noting that RECOSCIX-WIO could be adapted to serve these needs. In response, IOC organized a consultant mission in the region to identify capacity in the region for collection/storage/analysis and interpretation of data in national institutions. The consultant concluded that oceanographic data in the different institutions in the region vary widely in volume, type and quality. Several organizations active in the region have developed some initiatives for management of data collected in the region such as ORSTOM, IUCN, UNEP, the regional centre for services in surveying, mapping and remote-sensing, and IOC. However, so far, no comprehensive mechanism for data management exists in the region.

317 On the basis of the information acquired, it was proposed to develop a regional network with the objectives as given in Annex VIII.

318 The project is to be developed in a 2-phase approach: (i) development phase (3 years); and (ii) operational phase.

319 A few delegates supported the project but called attention to the need for Internet access. Mr. Odido explained that support for e-mail access has been provided by Belgium, Sweden and the USA. **The Committee endorsed** the project proposal and called on IOC Member States to provide support for its implementation. **The Committee requested** the donors to continue their support for Internet access as a matter of priority.

5.3 EXISTING PARTNERSHIPS AND OPPORTUNITIES FOR NEW ONES

320 The Chairman introduced the agenda item. He pointed out that the most important priority identified by the Think Tank Meeting was the development of partnerships to improve the skills of IODE centres for managing other data types to meet the needs of multi-disciplinary science programmes addressing problems on global scales and in the coastal zone. He also noted that such partnerships provided an opportunity for sharing the work with resulting savings in resources.

Marine Geology/Geophysical Data

321 The Director of the WDC-B for Marine Geology and Geophysics, Dr. V. Scherbakov, reported on the very active programme of his Centre. New databases are being prepared from more than 320 Russian missions and from data submitted by 15 other countries. Exchanges of data with other World Data Centres for Marine Geology and Geophysics have been successful and are being improved through the establishment of new mechanisms. New data and new programmes have resulted from projects like GODAR.

322 The WDC-B MGG has received more than 500 requests from users. Installation of a World Wide Web Site has increased the activity with more than 100 references in December 1995 and January 1996. The Centre has also had a very active training programme over the intersessional period training almost 40 experts.

323 Dr. Scherbakov also reported on the exchange visits that occurred between the WDCs in the intersessional period. He noted that these visits and the International Conference of all WDCs reported on earlier by the Chairman of the ICSU Panel on WDCs had been extremely useful in allowing the centres to exchange information and expertise on ocean data management.

324 Dr. Scherbakov also indicated his support for the IODE programme on data and information exchange and for the continued co-operation of the IODE and WDC Systems.

325 **The Committee welcomed** the offer of the WDC-B for MGG to host more training courses in the future.

Joint Global Ocean Flux Study (JGOFS)

326 The Representative of JGOFS, Dr. M.T. Jones, reported that the JGOFS programme was critically dependent on the proper management of its data and welcomed the initiatives being undertaken by IODE to compile global datasets of certain key biological and chemical parameters. However, he noted that the data being collected by JGOFS were highly diverse and covered a multitude of data types for which there were no well-developed standards for data archiving and exchange.

327 Dr. Jones was pleased to announce that a working model for a system which is able to accommodate diverse data in an integrated fashion could be found in the CD-ROM published by BODC in March 1994. The CD-ROM contains over 98% of the data collected on the 11 UK cruises contributing to the JGOFS North Atlantic Bloom Experiment between 1989 and 1991. As well as data types conventionally handled by the IODE system, the CD-ROM also contains such diverse data as measurements on biogenic trace gases, radio nuclides, productivity experiments, zooplankton grazing and biomass, marine snow profiles, sediment trap fluxes, benthic chemistry, core sedimentology, plankton species, etc. The CD-ROM also contains AVHRR satellite images and Kasten core X-ray images. A critical component of the CD-ROM is the inclusion of full documentation on the techniques and procedures for collecting each of the different sets of data.

328 Dr. Jones stated that the production of the CD-ROM had demonstrated that the compilation of complex bio-geochemical datasets was a readily solvable problem and that a data centre did not need to have expertise in each and every data type handled. However, it was important that data centres should establish a close working relationship with the scientists in the field and be prepared to carry out a proper dialogue with them. Dr. Jones stated that BODC was prepared to make available a complementary copy of the CD-ROM to any other data centre or research laboratory interested in managing such complex datasets.

329 Dr. Jones concluded by reporting on the international aspects of managing data within JGOFS. This work was overseen by the JGOFS Data Management Task Team chaired by Dr. R. Lowry of BODC and which last met at JODC in November 1994. One of the outputs of this Meeting was the compilation of an inventory identifying over 500 JGOFS-related cruises carried out by laboratories in 14 different countries. This included major experiments in the North Atlantic, the Southern Ocean, the Indian Ocean and the Pacific. Responsibility for managing these data was vested in national centres, each responsible for their own country's data collection programme. As yet, it was proving difficult to integrate these data into pan-national datasets and the success achieved by each centre was highly variable. However, it was reassuring to note the positive role being played by the NODCs in Canada, India, Japan, the UK and the USA, in support of their national JGOFS activities. This was a striking example of how the IODE system could be used to the benefit of major marine programmes.

330 The ICES Representative drew attention to the difficulties in bringing together an international JGOFS dataset of certain data types which was seen as a shortcoming of the distributed data management philosophy. However, a merged dataset is essential in order to carry out full quality control of such data. What ICES had achieved so far by merging some UK, USA and Dutch JGOFS data, pointed to the fact that certain datasets are lacking in quality.

World Meteorological Organization (WMO)

331 WMO, IGOSS and GCOS are all very appreciative of the present high-level of interaction and co-ordination which exists with IODE. WMO is confident that this interaction and co-ordination will increase in the future, and that in particular, efforts will be expanded in the development of joint end-to-end oceanographic data management strategies to support GOOS and GCOS. At a practical level, the maintenance of joint working groups, the holding of overlapping sessions of expert groups with related functions, cross-representation on working groups, and close interactions among the officers and secretariats of the different committees are all highly valuable and should be continued.

332 There is one other area in which close interaction between the WMO Commission for Marine Meteorology (CMM) and IODE might be valuable. Since the 1960's, the Commission has maintained a global system for the non real-time collection, quality control and archival of observations from the WMO voluntary observing ships, and the preparation of various types of climatological analyses based on these data. The data themselves comprise both marine meteorological and surface oceanographic variables and the system has, for example, been the basis for the existing comprehensive ocean-atmosphere dataset (COADS) maintained by the National Climate Data Centre (NCDC), USA.

333 Recently the system, called the Marine Climatological Summaries Scheme (MCCS), has been substantially revised to speed up data submissions and data delivery, to support the global programmes. The MCCS now operates through 8 regional and 2 global data centres, and data submissions should be made regularly, on a quarterly basis. Increasingly, electronic logbooks on board the VOS are being used to facilitate formatting, first level quality control and dataset compilations.

334 The MCSS is managed by a CMM Sub-Group on Marine Climatology, which has concerns very similar to those of IODE:

- (i) non real-time data submissions;
- (ii) exchange and archival formats;
- (iii) quality control issues;
- (iv) database management;
- (v) data and product delivery;
- (vi) new data types;
- (vii) support for global programmes.

335 This Sub-Group will have its next meeting in Geneva, at the end of April 1996. IOC was invited to participate, and it was suggested to the Committee that it might be advantageous if this representation could be, or at least include, someone from the IODE community.

336 The Delegate from Australia, speaking as the past Vice-Chairman of IGOSS, recalled the last Session of IGOSS in November 1995, where discussions were held on a review of IODE-IGOSS co-operation to improve its effectiveness. This review exercise had been included in the IGOSS Workplan, and IODE had been requested to endorse and support the review.

337 **The Committee considered** co-operation with IGOSS as most valuable and **endorsed** the review proposal formulated by IGOSS.

General Bathymetric Chart of the Oceans (GEBCO)

338 The Representative of GEBCO, Dr. M.T. Jones, reported on the very productive collaboration between the IOC and the IHO in the development of GEBCO and highlighted two significant recent achievements - the establishment of an international database of digital echo-sounding data and the publication of the first release of the GEBCO Digital Atlas, both of which are available on CD-ROM.

339 Dr. Jones reported that until recent times, the IHO as the World Data Centre for Bathymetry had maintained its global archive of echo-sounding data on a system of 1:1 million scale collected soundings sheets maintained by a worldwide network of Volunteering Hydrographic Offices. This system was now being phased out in favour of a centralized computer database maintained on behalf of the IHO at the IHO Data Centre for Digital Bathymetry co-located at the US National Geophysical Data Centre in Boulder, Colorado. This database is maintained within NGDC's GEODAS database, global copies of which are published by NGDC on CD-ROM from time to time. The latest release published in 1994 contains over 30 million echo-sounding measurements worldwide.

340 Dr. Jones further reported on a complementary activity at BODC concerning the maintenance and updating of the GEBCO Digital Atlas. He was pleased to announce that the First Edition of this Digital Atlas had been published on CD-ROM by BODC in March 1994. It represented a complete digitization of the eighteen 1:10 million scale printed sheets of the GEBCO (Fifth Edition) and represented the first high quality seamless bathymetric contour chart of the world available in digital form. It would be used as the basis for the future updating of GEBCO and it was envisaged that this updating would no longer be constrained to the 1:10 million scale of the printed paper sheets. Indeed, a collaborative venture between BODC and the Scripps Institution of Oceanography is now well underway, aimed at producing a complete revision of the bathymetry of the Indian Ocean at a scale of 1:2 million scale. Updates to the GEBCO Digital Atlas CD-ROM will be produced on a regular basis - the first update is scheduled for release in late 1996 and will include revised material for the Northeast Atlantic and for the Indian Ocean South of 30°S.

341 Dr. Jones promised to make freely available, complementary copies of the GEBCO Digital Atlas CD-ROM to all participants at the Meeting from developing countries. **The Committee expressed appreciation** for this kind offer.

International Council for the Exploration of the Seas (ICES)

342 The Representative of ICES informed the Committee that ICES will be setting up a Project Office for the North Atlantic Component of GLOBEC which will have a significant data management function. The

details of this function have yet to be formulated, but are likely to be based on the conclusions of a recent ICES/GLOBEC Workshop on Databases. A distributed data management scheme based on the JGOFS model, and including the section of the ICES Global Office is presently the preferred option. ICES intends to closely examine the experiences of WOCE and JGOFS, so that lessons learned can be incorporated into GLOBEC. As part of this examination, ICES will hold a series of lectures and discussions at its next Annual Science Conference to be held in Reykjavik later this year.

European Union MAST Programme

343 The Representative of the European Union reported that the EU MAST Programme has had very good results in increasing the co-operation between data centres and scientists by bringing them together in research projects on the basis of an established policy, which is outlined in the 'Code for Data Management in MAST Projects'. End-to-end data management, combining skills of various partners, sharing of efforts and mutual benefits are the aims of this policy.

344 The Delegate of the United Kingdom welcomed the recognition of the importance of data management by various funding agencies. He described it as a most positive evolution that national research authorities increasingly request scientists to provide data as part of their project reports.

World Ocean Circulation Experiment (WOCE)

345 The Representative of WOCE noted that an excellent partnership between WOCE and GTSP had developed over the last several years. Part of this success was because GTSP was designed to deliver fields of temperature and salinity which scientists and other users need. Additionally, the partnership was quite comprehensive with respect to data sources and embraced management of data from point of origin to final merging and delivery.

346 WOCE has other partnerships and collaborations with IODE facilities as well:

- (i) WDC-A, Oceanography: the WOCE archive is a special project and the Centre maintains a WOCE liaison officer;
- (ii) RNODC for Drifting Buoys (MEDS) is responsible for part of the WOCE drifter data assembly activities;
- (iii) RNODC for ADCP (JODC) is currently working to attain capabilities need to serve as the WOCE Data Assembly Centre for ADCP data;
- (iv) NODC (Germany) plays a key role in WOCE Hydrographic Programme data delivery;
- (v) BODC is responsible for assembly and archive of delayed mode sea-level data from the WOCE tide gauge network.

347 New and additional partnerships between WOCE and IODE are needed and welcomed. A programme similar to GTSP, except focusing on ocean velocity data, would be very helpful. Such a 'Global Ocean Velocity Pilot Project' (GOVPP) might assemble velocity data from various sources (ADCP, surface drifters, floats and current meters) into a single temporal and spatial compilation of ocean velocity measurements. End-to-end data management of this ocean parameter would assist on-going data assembly activities that, at present, are centered around measurement techniques instead of the measured quantity.

348 **The Committee requested** the Strategy Sub-Committee to consider ways of meeting this request.

5.4 AVAILABLE RESOURCES - STAFF AND FUNDS AND WHAT SHOULD BE DONE TO MEET THE NECESSARY REQUIREMENTS

349 Dr. Oliouline informed the Committee of the resources (staff and funds), which was available in 1993-1995 for the IODE programme implementation. He emphasized that the last few years marked an increased support from Member States and international agencies which were allocating funds for the IODE activities. He paid a special tribute to Canada, Sweden, the USA, ICSU and the European Community MAST Programme for their generous contributions. However, the requested funding presented in Recommendation IODE-XIV.8 on

the Programme and Budget for 1994-1995 has not been achieved. This hampered the implementation of some IODE projects and brought others to a standstill.

350 The staff situation continued to be critical with only one full-time staff member (P-3) implementing the programme, and two (P-5), sharing other IOC programmes' responsibilities.

351 **The Committee appreciated** the efforts made in an increase of the financial support through the IOC Trust Fund, **thanked** Member States and international agencies contributing to the IODE programme and **recommended** the actions in this direction should be encouraged.

352 **The Chairman reminded** the Committee of the Think Tank Recommendations to approach aid agencies in search of support to IODE development and to develop a partnership with one or more aid agencies to address agreed-upon problems. **The Committee noted** that it is important for IODE to know senior people in the aid agencies and procedures for getting support.

353 **The Committee supported** the Think Tank view regarding the possibility of the secondment of national experts to the IOC Secretariat to deal with the IODE programme.

354 **It was also recommended** that the mechanism for providing temporary assistance to the Secretariat through financial contributions for hiring local people or sending people for a short time period be explored. The role of the National Co-ordinator was emphasized and they were requested to take a proactive approach by contacting national decision makers and advising them on the importance and benefits of providing support to the IODE programme.

355 **The Committee agreed** that while speaking about the support to the programme, the in-kind contribution should not be overlooked and **reiterated** its thanks to the Member States who arranged meetings, took responsibility for the RNODC activities, provided equipment, played leading roles in project implementation, etc.

5.5 WAYS AND ACTIONS TO BE TAKEN TO INCREASE AWARENESS OF THE IODE SYSTEM

356 The Chairman introduced the agenda item and reminded the Committee of the findings of the Think Tank Meeting in regard to partnerships, setting of priorities and the necessity to have a presence on the Internet and the World Wide Web. In addition to developing activities based on these ideas, the present Session of the Committee has decided to organize an expert consultation among senior data management elements of major potential client programmes. **The Committee saw** all these initiatives as increasing the awareness of IODE.

357 Dr. Oliounine directed the attention of the Meeting to the IGOSS-IODE brochure that has been proposed at IGOSS-VII, to the idea of an IODE logo, to updating of the IODE posters and to the IODE slide presentation. He drew the attention of the Committee to the Year of the Ocean and requested they to identify actions to participate actively in this event.

358 **The Committee accepted** an IGOSS invitation to develop a joint IGOSS/IODE brochure and adopted Resolution IODE-XV.6. **The Committee noted** that it is very important that IODE prepare a high quality exhibition of the programme for the International Year of the Ocean to be held in Lisbon in 1998. Therefore, **it was decided** that the IODE Officers should seek a team of volunteers to undertake the design and preparation of these materials and appropriate software demonstrations, taking into account the ideas expressed at the Session.

359 The posters and other exhibit materials were considered as very important contributions, not only for 1998, but they could also be used at the Ocean Data Workshop being organized for Dublin in 1997. In addition, the material could be used by IODE National Co-ordinators to demonstrate the IODE programme to national clients. Other suggestions included the idea of a competition among students to design the IODE logo. It was also noted that the IODE slide presentation should be designed to run on OceanPC.

360 **The Committee welcomed** the offer of the USA to distribute posters once they are updated. The Representative of the European Union MAST Programme reported that an exhibition like the one being planned is held every two years for the conferences of the EU MAST Programme. Such an exhibition is also being

planned for Lisbon in 1998. The IODE exhibit could be arranged in co-operation with this exhibit, if this is helpful to IODE. **The Committee thanked** him for this offer.

361 **The Committee also decided** that the IODE Handbook should continue to be issued as soon as possible after a Session of the Committee. Some delegates noted that it would be useful to consider a joint publication of the IODE Handbook and the Composition of IGOSS Document, if it was possible to do so. **The Secretariat was asked** to examine whether there are ways of better co-ordinating with IGOSS on the publication of these documents.

6. PLAN OF ACTION FOR 1996-1999

362 **The Committee noted** the decision of the IOC Assembly taken at its Seventeenth Session (Paris, 25 February - 11 March 1993) as presented in the Annex to Resolution XVII-20, by which subsidiary bodies were requested *"to provide an executive summary of its deliberations, to which should be attached: an Action Plan with a proposed project implementation schedule; a summary of financial and staff requirements, including indications of Member State commitments; draft resolution(s) concerning any decision required of the Assembly."* **The Committee expressed satisfaction** with the decisions of the Assembly to have as one of the main objectives of the organization's activities to strengthen data exchange and ocean services.

363 **The Committee discussed and adopted** the Programme and Budget for 1996-1999 as presented in Recommendation IOC/IODE-XV.11. **The Committee requested** its Chairman jointly with the Secretariat check and verify the completeness and accuracy of action items presented in the Action Plan *vis-a-vis* the text of the Summary Report and make necessary modifications. **The Committee further requested** that the Executive Summary should be prepared by the Chairman, taking into account priorities identified during the Session.

7. ELECTION OF THE OFFICERS OF THE COMMITTEE

364 Dr. Oliouline reviewed the rules and practical arrangements for the election of the officers of the IOC Subsidiary Bodies as they are presented in the IOC Manual 1989 and in the Revised Rules of Procedure, as of June 1994 (Doc.IOC/EC-XXVII/Inf.1).

365 **The Committee noted** that there was only one candidate for each post of Chairman and Vice-Chairman. They were elected by acclamation. The newly elected officers of the Committee are:

Mr. B. Searle	(Australia)	Chairman
Dr. E. Balopoulos	(Greece)	Vice-Chairman

366 A number of delegates and members of the IOC Secretariat paid tribute to the very effective, energetic and competent way in which the former Chairman, Dr. R. Wilson and Vice-Chairman, Dr. V. Smirnov had fulfilled their tasks. Dr. Wilson and Dr. Smirnov were presented with the IOC Certificate of Appreciation in recognition of their contribution to IOC.

367 Mr. A. Villanueva (Argentina) and Ms. D. Bergamaschi (USA) presented Dr. Wilson and Dr. Smirnov a token of their esteem on behalf of all of the participants. They thanked the past officers for their contribution to the IODE programme and congratulated them on their many accomplishments, both within and outside the IODE programme. The Committee was particularly grateful to them for their initiative, dedication and commitment, and for their leadership in strengthening IODE.

368 The Chairman and Vice-Chairman expressed their thanks for the many kind remarks made by several of the delegations. They noted that the IODE community is a special one, in which many close friendships develop and that they value and hope to maintain these friendships. The work of the Committee had also been very rewarding because of the progress achieved towards very important goals. They expressed the hope that they could continue to work on IODE projects in the future and contribute to the progress of the IODE programme.

8. DATE AND PLACE OF THE NEXT SESSION

369 With a view to more adequately address and complete the intersessional work, **the Committee decided** to have its Sixteenth Session during the second half of 1999, or the first half of the year 2000.

370 **The Committee requested** its Chairman to fix dates in consultation with the IOC Secretariat and advise Member States accordingly.

371 If there are no Member States expressing willingness before the end of 1997 to host IODE-XVI, the IOC Secretariat should explore the possibility of having the Session at Headquarters of one of the ICSPRO agencies, keeping in mind the principle that the Session should be arranged with the lowest possible cost to IOC.

372 **The Committee appreciated** the efforts of the IODE Committee Officers and of the Secretariat in allocating time for software demonstrations and arranging an exhibition of posters and publications related to ocean data collection, management and exchange and **requested** to continue efforts targeted to make Committee sessions more educational and useful for participants. A list of software which was demonstrated at IODE-XV is presented in Annex IX to the Summary Report.

373 **The Committee recommended** to continue and expand the practice of including scientific presentations in the schedule of the future Session.

9. ADOPTION OF THE SUMMARY REPORT

374 **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 and its present and past Chairman to make any editorial corrections they deem necessary, taking into account the discussions held under this agenda item.

375 **The Committee requested** the Chairman to present the Executive Summary, Resolutions and Recommendations to the Twenty-ninth Session of the IOC Executive Council, planned for October 1996, in Paris.

10. CLOSURE OF THE SESSION

376 The Session was closed at 14.00 on 31 January 1996.

377 **The Committee expressed** its appreciation for the hospitality extended to all participants by the local organizers, **noted** with satisfaction the wonderful arrangements of the Session and **paid** special tribute to Dr. E. Balopoulos, Head of the local organizing committee, for his energy and readiness to help.

378 It was especially gratifying to note that approximately half of the participants came from developing countries of Africa, Asia and South America. The Session provided an opportunity to express needs, compare views and register actions to help developing countries in establishing national data and information management infrastructures.

ANNEX I

AGENDA

1. OPENING

2. ADMINISTRATIVE ARRANGEMENTS

- 2.1 ADOPTION OF THE AGENDA
- 2.2 DESIGNATION OF A RAPPORTEUR
- 2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION
- 2.4 LOCAL ARRANGEMENTS

3. STATUS OF THE GLOBAL DATA AND INFORMATION EXCHANGE

- 3.1 REPORT OF CHAIRMAN ON INTERSESSIONAL ACTIVITIES
- 3.2 MONITORING GLOBAL OCEAN DATA FLOW
- 3.3 ACTIVITIES OF WORLD DATA CENTRES
- 3.4 NATIONAL DATA AND INFORMATION MANAGEMENT ACTIVITIES
- 3.5 IODE AND THE GLOBAL OCEAN OBSERVING SYSTEM (GOOS)

4. PROGRAMME MATTERS

4.1 IODE GROUPS OF EXPERTS

- 4.1.1 Group of Experts on RNODCs and Global Programmes**
- 4.1.2 Group of Experts on Technical Aspects of Data Exchange (GETADE)**
- 4.1.3 Group of Experts on Marine Information Management (GEMIM)**

4.2 PRODUCTS AND SERVICES

- 4.2.1 Global Temperature and Salinity Pilot Project (GTSP)**
- 4.2.2 Global Ocean Data Archeology and Rescue Project (GODAR)**
- 4.2.3 Publications and Information Products**
- 4.2.4 Quality Control of Oceanographic Data**

4.3 CAPACITY BUILDING

- 4.3.1 OceanPC and Software Development**
- 4.3.2 Training Programmes in Marine Data and Information Management**
- 4.3.3 Voluntary Co-operation Programme (VCP) and IODE Needs**

5. RESULTS OF THE THINK-TANK MEETING

5.1 NOT YET ROUTINELY EXCHANGED DATA TYPES - STATUS AND WAYS OF ACCOMMODATION

- 5.1.1 Remote-Sensed Data**
- 5.1.2 Carbon Dioxide, Biological and Pollution Data**
- 5.1.3 Marine Data from Coastal Areas**

5.2 IMPLEMENTATION OF NEW TECHNOLOGIES IN THE IODE SYSTEM

- 5.2.1 Extent of Network Access**
- 5.2.2 New Technology for Data, Documents, Products, Imagery and Delivery**
- 5.2.3 Improvements to the Regional Data and Information Exchange**

5.3 EXISTING PARTNERSHIPS AND OPPORTUNITIES FOR NEW ONES

- 5.4 AVAILABLE RESOURCES - STAFF AND FUNDS AND WHAT SHOULD BE DONE TO MEET THE NECESSARY REQUIREMENTS
- 5.5 WAYS AND ACTIONS TO BE TAKEN TO INCREASE AWARENESS OF THE IODE SYSTEM

- 6. PLAN OF ACTION FOR 1996-1999**
- 7. ELECTION OF THE OFFICERS OF THE COMMITTEE**
- 8. DATE AND PLACE OF THE NEXT SESSION**
- 9. ADOPTION OF THE SUMMARY REPORT**
- 10. CLOSURE OF THE SESSION**

ANNEX II

RESOLUTIONS AND RECOMMENDATIONS

Code	Title
Resolutions	
Resolution IODE-XV.1	Establishment of the RNODC for the Indian Ocean
Resolution IODE-XV.2	An Update of IOC Guide N° 5 for Establishing a National Oceanographic Data Centre
Resolution IODE-XV.3	OceanPC
Resolution IODE-XV.4	IODE Regional Co-ordinators
Resolution IODE-XV.5	Development of National and Regional Data and Information Centres for the IOCEA Region
Resolution IODE-XV.6	An IGOSS/IODE Brochure
Recommendations	
Recommendation IODE-XV.1	Development of MEDI
Recommendation IODE-XV.2	IGOSS-IODE Data Management Strategy
Recommendation IODE-XV.3	IODE and Global Scientific and Monitoring Programmes
Recommendation IODE-XV.4	Global Temperature-Salinity Pilot Project
Recommendation IODE-XV.5	IOC World Wide Web Server
Recommendation IODE-XV.6	Remote-Sensing
Recommendation IODE-XV.7	Coastal Zone Data Management
Recommendation IODE-XV.8	Upgrading Connections between NODCs and NMCs in the Black Sea Region
Recommendation IODE-XV.9	Development of the IODE Infrastructure in the ROPME and PERSGA Regions
Recommendation IODE-XV.10	MEDAR/MEDATLAS and Development and Updating of the Mediterranean Dataset
Recommendation IODE-XV.11	Programme and Budget 1996 - 1999

RESOLUTIONS

Resolution IODE-XV.1

ESTABLISHMENT OF THE RNODC FOR THE INDIAN OCEAN

The IOC Committee on International Oceanographic Data and Information Exchange,

Acknowledging the significant role of the Indian Ocean in world climate,

Taking note that a number of large-scale research activities are being planned for implementation in the Indian Ocean such as those within IGBP and WOCE, as well as an expected increase in operational ocean monitoring activities within the framework of GOOS,

Noting that there is a crucial need for data in this still data- sparse area and that any activity that may improve data collection will be helpful,

Recognizing that India has technical capabilities to carry out responsibilities of an RNODC for the Indian Ocean,

Appreciating the efforts undertaken by NIO to eliminate restriction in international distribution of data collected in the Indian EEZ, to establish bi-lateral exchange arrangements and to provide collected data on CD-ROMs for the international community,

Realizing that a regional data centre can be successful only if countries of the region participate actively in the data submission and exchange process: An established centre can provide effective capacity building in less developed countries in their geographical area of responsibility,

Approves the proposal of India to establish an RNODC for the Indian Ocean (RNODC-INDO) at NIO in Goa with the Terms of Reference which is attached in the Annex to this Resolution;

Encourages the countries bordering the Indian Ocean to support the activities of the Centre and fully participate in regional oceanographic data and information exchange using the facilities of the newly established RNODC;

Requests IOC, other international organizations, RNODC-INDO and Member States to take every action for establishing and improving national oceanographic data and information management infrastructures in developing countries of the region.

Annex to Resolution IODE-XV.1

Terms of Reference

- (i) actively acquire, quality control and store in standard format the physical, chemical, biological, marine geological and marine geophysical data obtained from the declared National Oceanographic Programmes (NOP), research programmes and other data collection activities in the Indian Ocean (INDO);
- (ii) distribute on request data and information to the users and provide services to the user community;
- (iii) co-operate closely with WDCs, Oceanography and WDCs, MGG sending shipments of complete datasets on magnetic media in GF3 format, inventories, data summaries and in other data products from the Indian Ocean (INDO) in accordance with IODE procedures;
- (iv) submit the ROSCOP forms to World Data Centres as and when received by RNODC;
- (v) maintain databases and inventories;
- (vi) exchange documentation and software regarding quality control and processing procedures with other RNODCs, WDCs and NODCs;

- (vii) conduct formal or informal training sessions for data experts from the region;
- (viii) work closely with the relevant IOC regional bodies IOCINDIO and IOCINCWIO in the execution of and support for regional programmes;
- (ix) report regularly the progress of RNODC to the IODE Officers meetings and to the sessions of the IOC Committee on IODE.

Resolution IODE-XV.2

AN UPDATE OF IOC MANUALS AND GUIDES N° 5 FOR ESTABLISHING A NATIONAL OCEANOGRAPHIC DATA CENTRE

The IOC Committee on International Oceanographic Data and Information Exchange,

Recognizing the continuous requirement to establish new NODCs within the IODE System,

Recognizing further that the establishment of a sustainable NODC is a substantive commitment requiring careful consideration based on well-defined terms of reference,

Noting that the IOC Manuals and Guides N° 5 for establishing a National Oceanographic Data Centre was published in 1975 and is now significantly out of date,

Recommends:

- (i) that the IOC Manuals and Guides N° 5 should be updated, published and made available for distribution as a matter of priority;
- (ii) that a working group should be set up for the updating of this document composed of experts with a mixture of expertise and experiences ranging from those from centres of excellence in ocean data management, to representatives from Member States currently considering the establishment of an NODC;

Requests that the IODE Chairman, will identify a Project Co-ordinator and jointly with the IOC Secretariat identify a group of appropriate experts for the updating of the manual;

Invites the IOC Executive Secretary to identify sufficient resources to ensure the successful preparation and publication of this document by September 1996.

Resolution IODE-XV.3

OCEANPC

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting

- (i) the needs of the marine scientific community for computer facilities to input, access, process, manage, analyze, display and disseminate marine data and information;
- (ii) the technological advances in data management such as the dissemination of large global datasets on CD-ROM and the capabilities of Internet and the WWW;

Recognizing

- (i) the considerable interest in the IOC's OceanPC oceanographic data computer management system, particularly from developing countries;
- (ii) the potential for creating a standard software platform to facilitate and simplify data exchange;

Acknowledging the considerable efforts put into the development of OceanPC by a number of agencies and various individuals,

Recommends

- (i) to further develop and distribute OceanPC as a mechanism to provide technology transfer and strengthen marine data management capabilities particularly in developing countries;
- (ii) to develop an enhanced OceanPC as a fully integrated computer software package that addresses the needs of the IODE community with modern technology.

Invites the IOC Executive Secretary to issue a Circular Letter exploring Member States interest for an IODE project to develop an enhanced OceanPC; the Circular Letter would include a draft proposal for use by Member States when discussing the project with funding agencies and a questionnaire requesting user requirements for this project;

Requests that all responses to the Circular Letter together with any details regarding potential funding sources for the project be given to the IOC Secretariat;

Further requests the Secretariat to keep Member States well-informed of the progress and the development of the OceanPC Project;

Recommends that a Meeting of Experts on OceanPC be held in 1997 to review the development of the OceanPC project.

Resolution IODE-XV.4

IODE REGIONAL CO-ORDINATORS

The IOC Committee on International Oceanographic Data and Information Exchange,

Having considered Document IOC/IODE-XV/20 containing the compilation of the needs of IOC Regional programmes in ocean data and information programmes expressed at their meetings during 1992-1995,

Acknowledging the progress achieved by IODE in some regions through implementing capacity building activities,

Recognizing that the absence at the IOC Regional Programmes meetings of qualified experts in ocean data and information management well-acquainted with the IODE practices and procedures may create problems in taking effective decisions,

Realizing that there are very few data and information managers in the UNESCO and IOC Regional Offices who may provide competent advice based on the knowledge of the development of IODE and of the regional needs,

Agrees to appoint IODE Regional Co-ordinators for each of the IOC regional programmes with the following terms of reference:

- (i) keep IOC regional bodies and programmes informed on the IODE data policy and rules of procedure;
- (ii) be a link between the IOC regional bodies and the IODE Committee;
- (iii) publicize IODE activities;
- (iv) help the IODE Committee implement regional activities in data and information management by providing advice and establishing necessary contacts;

Recommends that the IODE Chairman jointly with the Secretariat and in consultation with the Chairmen of Regional Programmes and Heads of UNESCO and IOC Regional Bodies, identify experts in the regions who may take this important responsibility;

Invites the IOC Executive Secretary to arrange in 1997 a seminar of the IODE Regional Co-ordinators with the objective of providing the necessary briefing on the latest developments in the IODE activities in ocean data and

information management, making them acquainted with other IOC scientific, monitoring and TEMA programmes and activities of other agencies and exchanging views on the most effective ways of co-operation.

Resolution IODE-XV.5

DEVELOPMENT OF NATIONAL AND REGIONAL DATA AND INFORMATION CENTRES FOR THE IOCEA REGION

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting the requests of IOCEA's Second, Third and Fourth Sessions to develop regional data and information infrastructure in Member States of the IOCEA region,

Noting further the recommendations of UNCED for the encouragement of regional co-operative mechanisms as well as capacity building programmes,

Recalling the recommendations of the Think Tank Meeting related to the importance of facilitating regional co-operation,

Considering the need to promote data and information exchange between the IOCEA region and the global ocean community for realization of the IOC Science and Monitoring Programmes and to improve communication among the Member States of the IOCEA region,

Noting with appreciation the success of the RECOSCIX-WIO network in the IOCINCWIO region,

Requests IOCEA Member States identify suitable institutions for the establishment of NODCs and allocate the necessary resources for their development and maintenance;

Invites the IOC Executive Secretary and Member States to assist IOCEA Member States in the establishment of national and regional data and information centres through appropriate infrastructure and human capacity building and the launching of the RECOSCIX-CEA project;

Invites the IOC Executive Secretary to explore the possibility of having the regional GODAR Workshop for the Member States of WESTPAC Africa.

Resolution IODE-XV.6

AN IGOSS-IODE BROCHURE

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting

- (i) Joint IOC-WMO Committee for IGOSS, Seventh Session (Paris, November 1995) Summary Report, paras. 164 and 165 on the need for a joint IGOSS-IODE brochure;
- (ii) Rec.5 (JC-IGOSS-VII) - Draft IGOSS-IODE Data Management Strategy;

Considering

- (i) the value of co-ordinated IODE and IGOSS action in oceanographic data management, already demonstrated in projects such as GTSP;
- (ii) the development of a joint IGOSS-IODE data management strategy;
- (iii) the significant contribution which end-to-end IGOSS-IODE data management can make to the implementation of GOOS and GCOS;

- (iv) the applications of oceanographic data delivered in both real-time and non real-time to a wide range of operational and research users;

Recognizing

- (i) the urgent need to maintain and if possible enhance existing data collection, exchange and management activities under IGOSS and IODE;
- (ii) the need to raise the awareness of national decision makers to the value of joint IGOSS-IODE activities and to the many users of data managed under IGOSS and IODE;

Agrees that a joint IGOSS-IODE brochure, as described in the Annex to this Recommendation, should be prepared, published and distributed by IOC and WMO, for use at national and international levels;

Requests the Chairman of IODE and the Secretariat, in consultation with the Chairman of IGOSS to:

- (i) arrange for the compilation of appropriate textual, graphical and photographic material for consideration for inclusion in the brochure;
- (ii) identify an appropriate professional mechanism for the preparation and publication of the brochure and to arrange for this publication;
- (iii) undertake global distribution of the brochure;

Invites

- (i) the IOC Executive Secretary to approach the Secretary-General of WMO to assist in this activity;
- (ii) Member States also to assist in the activity, in particular through the provision of material for the brochure and also, if possible, its publication.

Annex to Resolution IODE-XV.6

The target community for the brochure is the group interested in participating in the IGOSS-IODE programme either financially or through data exchange.

The brochure will be of the 3-page (A-4 size) foldout variety with a flap for extra documents. The overall tenor of the document will follow the pressing need for environmental information ("How do we know?"). The brochure will follow the data collection process from point of collection to archive with diversions showing the real life activities/benefits. It will show that there is only one global source for this information and will point clearly to the stepwise benefits from increased resources.

Excerpts from individuals benefiting from participation will be included to answer commonly asked questions like "What's in it for me?" to make the brochure more interesting and relevant. The links to GOOS will be emphasized.

Sufficient resources need to be made available to accomplish the task. These will include one or two people to formulate the document and bring together the statistics and graphics. A contractor will be required to assist with the layout and advise on current strategies for promoting this kind of activity.

Parallel to brochure development will be the possibility of including access to the same and more detailed material on Internet through an IGOSS-IODE home page. The flow chart should be made interactive, so that clicking on an individual item will produce more detailed information on that item including whatever products might be available. The web site and the brochure will be built along similar lines so that the brochure, which will contain the Internet address (URL), can serve as both an information product and an entry point for more detailed information.

RECOMMENDATIONS

Recommendation IODE-XV.1

DEVELOPMENT OF MEDI

The IOC Committee on International Oceanographic Data and Information Exchange,

Recognizing the value of a top level directory of marine data holdings within the IOC Member States to a broad user community, including the IOC programmes and related activities within other global programmes such as IGBP, WCRP and GCOS,

Recognizing further the significance of such projects as GODAR for locating and identifying datasets not already exchanged as a fundamental requirement to support national, regional and global data requirements arising from GOOS,

Noting its longstanding involvement in the development of the MEDI system and that past efforts have been inhibited by the lack of appropriate supporting technology,

Further noting that recent developments in computer technology, particularly the World Wide Web, provide new opportunities for the proper development of MEDI;

Recommends that a pilot project be developed to test the ways and means of applying modern technology to the further development of the MEDI system and, on the basis of these investigations, to draft a specification for a revised MEDI,

Further recommends that the pilot project should include:

- (i) a review of relevant existing national and international data directory systems;
- (ii) an assessment of the potential application of existing bibliographic systems to MEDI;
- (iii) consideration of the implications of inter-operability with similar systems on the international scene such as those being developed by GCOS and the ICSU Panel on WDCs;

Supports the Terms of Reference of the Pilot Project, as shown in the Annex to this Recommendation;

Recommends that a 2-3 day Technical Workshop of experts should be held at the end of the pilot project (between May/August 1997) to review the results of investigations carried out, to agree on a specification for a revised MEDI system and to prepare plans for its implementation;

Invites the IOC Executive Secretary, Member States and relevant agencies to support the pilot project and the Technical Workshop.

Annex to Recommendation IODE-XV.1

TERMS OF REFERENCE FOR THE PILOT PROJECT ON THE REVISION OF MEDI

Objectives of MEDI:

To develop a global database of information on data holdings held in the IOC Member States and agencies with the following specifications:

- (i) the database will be a compilation of input assembled by IOC Member States and relevant agencies;
- (ii) the database will allow the end-user to search, as a minimum, on location, data type, temporal resolution and organizational parameters;

- (iii) the database will provide the end-user with information describing the selected data holdings and their sources;
- (iv) the system will be designed in such a manner as to ensure the widest possible coverage of data holdings in Member States.

Objectives of the Pilot Project:

The Pilot Project will:

- (i) prepare a clear statement on the level and breadth of information to be included in the system;
- (ii) identify a core set of fields necessary to constitute a MEDI entry;
- (iii) identify the technical requirements of the database;
- (iv) develop transfer interfaces between existing databases and the agreed-upon system;
- (v) develop suitable end-user interfaces for the database also bearing in mind the needs of users not connected to the Internet;
- (vi) define necessary structures for the maintenance and further development of the system,
- (vii) make the MEDI system compatible developed with initiatives developed by other programmes, e.g., GCOS, WCP, INFOTERRA.

The Participants in the Pilot Project:

The Pilot Project will be carried out by a Working Group composed of:

BODC (UK);
NODC (Russian Federation)
ISMARE (Ireland);
AODC (Australia);
Chair GEMIM;
Chair GETADE;
IOC Secretariat.

The activities of the Working Group will be co-ordinated by Dr. M.T. Jones, Director, British Oceanographic Data Centre.

Work Plan and Timing:

The Group will work by correspondence (e-mail). The Group will present its report during a 2-3 days Technical Workshop to be held during the first half of 1997.

Recommendation IODE-XV.2

IGOSS-IODE DATA MANAGEMENT STRATEGY

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting

- (i) recommendations of the IODE Think Tank Meeting for more joint projects and partnerships in developing data management strategies and systems;

- (ii) proposals of the Chairman of the IODE Group of Experts on Technical Aspects of Data Exchange and the Chairman of the IGOSS Group of Experts on Operations and Technical Applications presented in Document IOC-WMO/IGOSS-VII/15;
- (iii) proposals of the IODE Consultant presented in Document IOC/IODE-XV/11;
- (iv) repeated references that GOOS must be built as much as possible on existing systems such as IGOSS and IODE;

Considering Recommendation 5 of the Seventh Session of the IOC-WMO Joint Committee for IGOSS,

Acknowledging an urgent need to develop a coherent and unique data management strategy for IGOSS and IODE to better serve the clients of these programmes,

Recommends:

- (i) a single coherent IGOSS-IODE data management strategy document be developed, based on material from the IGOSS and IODE documents referenced above;
- (ii) an initial draft of this document be presented to the Second Session of the I-GOOS Strategy Sub-Committee planned to take place in Paris in March 1996, for its review and comments;
- (iii) the full strategy document be offered to the Second Planning Session of I-GOOS, Washington, DC, May 1996, as a contribution from IGOSS and IODE towards the development of GOOS data management procedures.

Recommendation IODE-XV.3

IODE AND GLOBAL SCIENTIFIC AND MONITORING PROGRAMMES

The IOC Committee on International Oceanographic Data and Information Exchange,

Considering

- (i) The value of close co-operation of IODE with the Global Scientific and Monitoring Programmes as major data originators and primary users of data services;
- (ii) An economic environment favouring closer collaboration between ocean data managers to achieve greater efficiency;

Recognizing

- (i) The need for an on-going strategic planning activity in IODE;
- (ii) The need for improved communication among the complex web of global scientific and monitoring programmes, ocean agencies and national and world data centres;
- (iii) The success of IODE programmes such as GTSP, GODAR, etc. which embody partnerships between IODE centres and global programmes and embrace the end-to-end data management strategy;

Recommends the formation of an IODE *ad hoc* Strategy Sub-Committee to:

- (i) create additional collaborative and co-operative linkages with other Global and Regional Programmes in the field of marine data and information management and exchange;
- (ii) undertake these tasks through expert consultations with appropriate data managers and other senior managers from programmes and funding agencies;

- (iii) work at a senior level to maintain the linkages as they are developed and assist the IODE Committee with planning and implementation of the joint projects that may arise between IODE and other programmes.

Invites the Executive Secretary IOC to support, in conjunction with other sponsors to be identified by the *ad hoc* Strategy Sub-Committee, expert consultations on ocean data.

Recommendation IODE-XV.4

GLOBAL TEMPERATURE-SALINITY PILOT PROJECT

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting with appreciation the progress achieved in the development of the IGOSS-IODE Global Temperature Salinity Pilot Project (GTSP) since 1989,

Further noting the commitments by the Canadian Marine Environmental Data Service (MEDS) and the US Responsible National Oceanographic Data Centre for IGOSS to continue to operate the real-time and continuously managed database aspects of the programme,

Noting Recommendation 3 of the Seventh Session of the JC on IGOSS that GTSP become a permanent project of IGOSS and IODE,

Recommends that the IGOSS-IODE Global Temperature-Salinity Pilot Project become a permanent operational programme under the co-sponsorship of IGOSS and IODE with the title the IGOSS-IODE Global Temperature-Salinity Programme;

Further recommends that GTSP be kept as the short name for the programme because of its familiarity to many IODE and IGOSS clients and its presence in many published documents and electronic media;

Appreciates the renewed commitment of MEDS and the US RNOCD for IGOSS to continue their support to the programme.

Recommendation IODE-XV.5

IOC WORLD WIDE WEB SERVER

The IOC Committee on International Oceanographic Data and Information Exchange,

Recognizing the need to provide the marine science community with an effective tool to locate information and data,

Acknowledging the support expressed by the Eighteenth Session of the IOC Assembly for the development of an IOC WWW Server "*as a central information point for users interested in IOC's activities and will include jumps to Member States Home Pages if available, thereby emphasizing the partnership philosophy of the IOC programmes*" (Document SC/MD/106, para. 341),

Confirming the need to better highlight the partnership philosophy of IOC and its Member States, and to promote co-operation amongst scientists of IOC Member States through improved access to information on national activities and institutions,

Noting with appreciation the efforts of the IOC Secretariat in establishing a comprehensive IOC WWW Server (<http://www.unesco.org/ioc>),

Recommends:

- (i) that the IOC Secretariat continue to maintain the IOC WWW Server and further develop it;

- (ii) that Member States develop WWW servers and inform the IOC Secretariat of their URL(s);
- (iii) that Member States's WWW Servers include a 'National IOC Homepage';
- (iv) that the 'National IOC Homepage' should have a standard structure including a brief statement of support for IOC activities and the national IOC Action Address. It should further contain a table of contents providing links to relevant topics in the national WWW server(s). This table should include:
 - (a) a link back to the IOC WWW Server,
 - (b) a link to national data management resources (including IODE national co-ordinator),
 - (c) a link to national information,
 - (d) a link to the national IOC depository centre,
 - (e) links to information on national participation in IOC programmes,
 - (f) where possible: a link to a list of national marine science related institutions and organizations.

This list may include further links to the institutions' and organizations' WWW servers.

- (v) that, in order to facilitate communication, languages used in the IOC National Home Page should include English and possibly other IOC working languages;
- (vi) that, where a Member State does not have the infrastructure to host a WWW Server, the IOC WWW Server will host that Server;
- (vii) that IOC assist Member States in establishing WWW servers, through appropriate TEMA-related activities;
- (viii) that IOC publishes its IOC WWW Server and appropriate elements of Member States servers on disk or CD-ROM for periodic distribution to Member States and other interested users without access to the World Wide Web;
- (ix) that continuously updated printed copies of the IOC WWW Server pages should be available upon request;

Invites the IOC Executive Secretary to allocate the necessary resources for the maintenance and further development of the IOC WWW Server;

Invites IOC Member States to contribute to the organization of appropriate TEMA activities to enable all Member States to fully participate in the development of national WWW Servers.

Recommendation IODE-XV.6

REMOTE SENSING

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting the report of the First Session of the Joint CMM-IGOSS-IODE Group of Experts on Oceanic Satellites and Remote Sensing (OSRS) and the need to continue support for this Group as an important element of both IGOS and IODE activities in remote sensing,

Requests the OSRS to continue and expand their work as follows:

- (i) complete the report on Ocean Remote Sensing Systems and Capabilities;
- (ii) identify contact points for access to remotely-sensed data both raw and in product form that can be widely distributed to Member States and regularly maintained and be a contribution to the MEDI system;
- (iii) consider the development of guidelines for the archive of remotely sensed products. This should consider the requirements for algorithm descriptions and detailed parameter settings;

Recommends the appointment of 2 experts from IODE to the OSRS Group;

Recognizing the importance of continued interaction with the space agencies through organizations such as the Committee on Earth Observation Satellites and the WMO CBS Working Group on Satellites,

Requests the Chairman IODE to identify an expert to continue to represent IODE interests in these groups and to work closely with CEOS to provide information on market arrangements for remotely-sensed data;

Noting that the development of one or two pilot projects in conjunction with the satellite agencies would be an important first step in documenting the resource requirements as well as the implementation strategy and benefits particularly for developing countries,

Directs the Chairman IODE and Secretariat to identify these pilot projects and take necessary action to insure the preparation of the appropriate documentation for presentation to the next Session of the Committee;

Resolves to encourage active participation of Member States in these projects in their respective regions and subsequently report on the experience to IODE-XVI;

Requests the Chairman IODE to insure that the importance of remote-sensed data for scientific and monitoring studies is adequately covered in the IGOSS/IODE Data management strategy as well as in the GOOS Data Management Plan.

Recommendation IODE-XV.7

COASTAL ZONE DATA MANAGEMENT

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting the existing national, regional and international programmes and activities in the field of coastal data management,

Realizing the need to inform other programmes of the activities of IODE and to establish a link between these programmes and IODE,

Invites the Executive Secretary IOC to send a Circular Letter to the IODE data centres requesting information on coastal zone data management activities in which they are involved;

Directs the Chairman of the Committee to appoint a rapporteur to (i) compile the material from the IODE centres into an information paper; (ii) contact international and regional bodies already engaged in coastal zone activities to solicit information on their objectives and data management plans to be included in the above-mentioned information paper;

Recommends the inclusion of relevant coastal zone issues in the IGOSS/IODE data management strategy;

Recommends further that the strategy sub-committee will establish close contacts and offers its assistance to LOICZ in the preparation of the management plan and policy document for coastal data management.

Recommendation IODE-XV.8

UPGRADING CONNECTIONS BETWEEN NODCs AND NMCs IN THE BLACK SEA REGIONS

The IOC Committee on International Oceanographic Data and Information Exchange,

Noting Resolutions of the IOC Assembly XIV-7 'Black Sea Project', XVII-15 'Regional Black Sea Co-operation Programme' and XVIII-17 'IOC Black Sea Regional Programme in Marine Sciences and Services',

Recalling the implementation of the decision of the IOC Executive Council (Doc.IOC/EC-XXV/3, paras. 84 and 85) to take action towards sponsorship of the 'Co-operative Marine Science Programme for the Black Sea (COMSBlack) (Doc.IOC/INF-924) and the support provided by IOC,

Noting the existing status of the WMO Global Telecommunication System (GTS) in the region, as well as upgrade projects for 1996-1997 by National Meteorological Centres (NMC) in the Black Sea area, and the capabilities provided by GTS for the efficient exchange of oceanographic and other environmental data free of charge, in both real-time and non real-time mode,

Recognizing the present difficulties of NODCs in the Black Sea region, both to access and exchange and distribute oceanographic data and information,

Considering

- (i) importance of oceanographic data and their many potential applications to a wide variety of users in the region;
- (ii) importance of regional oceanographic data exchange for many IOC and WMO programmes including IODE, IGOSS and GOOS;
- (iii) good telecommunications as a necessary base for successful international scientific marine co-operation and data exchange;

Endorses the proposal contained in the Annex to this Recommendation;

Invites the IOC Secretary to bring this project proposal to the attention of the Black Sea regional committee and the Secretary-General of WMO in order to have their comments and proposals on the ways of co-operation;

Invites the Executive Secretary IOC, provided the proposal is approved by the Black Sea Regional Committee and WMO, to consider measures, jointly with WMO, for the organization of operational and non real-time data and information exchange in the Black Sea region of such data as sea-level, temperature and salinity, wave and wind forecasts, marine meteorological information and marine research information;

Recommends project participants consider the most effective way to use of existing GTS facilities for exchange of real-time and non real-time oceanographic data.

Annex to Recommendation IODE-XV.8

PILOT PROJECT

1. Region: Black Sea area
2. Participants: Oceanographic and meteorological institutions in Bulgaria, Romania, Ukraine, Turkey, Russian Federation, Georgia and Greece.
3. Duration: 1 year
4. Overall project aims:

Improve capabilities of participating institutions in regional oceanographic data exchange and management, to facilitate their participation in IODE, IGOSS and GOOS.
5. Specific project objective:

Implement, on an experimental basis, an effective operational network for oceanographic data exchange among all participating NMCs and NODCs in the Black Sea region.

6. Background:

(i) The atmospheric and oceanographic processes of the Black Sea region affect all the countries of the region. Joint investigation of these processes and joint acquisition, accumulation, processing and dissemination of both meteorological and oceanographic data would therefore benefit all the coastal states.

(ii) There is at present a limited national and regional exchange of oceanographic data and information on a regular basis in the Black Sea region. Existing communication links between NODCs, National Oceanographic Centres and National Meteorological Centres in the Black Sea region are inadequate.

(iii) The Global Telecommunication System of WMO has a large capacity and high reliability using medium and high speed channels for data transmission and powerful computer systems for databases and data exchange management. Costs for operation and maintenance of GTS are borne by National Meteorological Services. The GTS is available for use by oceanographic institutions free of charge.

(iv) Information exchange in the southeastern part of Europe (including the Black Sea region) is carried out through direct channels for data transmission between RTH Sofia, RTH Prague, RTH Moscow and the National Meteorological Centres of Romania, Turkey, Greece, the former Yugoslavia, Albania, FYR of Macedonia, Cyprus, Syria, Jordan.

(v) Existing regional GTS links could be used to implement oceanographic data and product exchange in the Black Sea region.

(vi) Under present financial constraints, many institutions in the countries of the Black Sea region have no funds to have Internet access as the costs are still significant.

7. Pilot Experiment activities:

(i) Identify requirements for the establishment of effective communications between oceanographic institutions and National Meteorological Services within each participating country and where feasible implement these communications.

(ii) Implement an experimental exchange of relevant oceanographic and meteorological data and products among participating centres, using the GTS as an international exchange facility.

(iii) Exchange progress reports on the pilot experiment quarterly.

(iv) Organize a co-ordination meeting for the pilot experiment.

(v) Organize a final evaluation meeting.

8. Pilot Experiment Strategy:

The pilot experiment will be implemented with the active involvement of the National Hydro-Meteorological Services and National Oceanographic Data Centres in all participating countries. The pilot experiment could start with the participation of institutions of two to three countries on a voluntary basis, with a progressive increase of the participants during the year.

9. Financial Requirements:

Organization of two meetings US\$ 2 x 5,000 = US\$ 10,000. Purchase of communication equipment for NODCs and NMCs as appropriate - approx. US\$ 4,000 per centre.

It is expected that contributions to meet these requirements will be coming from different interested parties.

10. Reporting and Co-ordination:

The pilot experiment will be co-ordinated with the Black Sea Regional Committee. Results of the experiment implementation will be reported to the Black Sea Regional Committee and the IODE Committee.

Recommendation IODE-XV.9

DEVELOPMENT OF THE IODE INFRASTRUCTURE IN THE ROPME AND PERSGA REGIONS

The IOC Committee on International Oceanographic Data and Information Exchange,

Recognizing that the marine environment of ROPME and PERSGA regions are vulnerable to oil spills and damage to the marine environment caused by chronic releases of oil resulting mainly from tankers traffic in both regions is increasing,

Realizing that oceanographic data and information constitute an integral and important component of all research and monitoring efforts in the regions and that the regions are lacking a developed infrastructure to manage data and develop data and information products,

Acknowledging the two regions need for the management of historical and current operational data in order to support national/regional capacity building as well as planning for natural resource management and coastal area development on a sustainable basis,

Noting with satisfaction the progress achieved between IOC, ROPME and PERSGA in establishing close links of co-operation in the fields of ocean data and information collection and management,

Approves the proposal submitted by representatives from the ROPME and PERSGA regions with the objectives and activities attached in the Annex to this Recommendation;

Recommends arrangement of an IOC/IODE mission in the region to make the feasibility study and identify actions to be taken by Member States to establish effective ocean data and information collection and management infrastructures;

Invites the Executive Secretary IOC and other international organizations, relevant bodies and Member States to support these efforts and provide necessary resources for the implementation of the proposal.

Annex to Recommendation IODE-XV.9

**A PROPOSAL ON THE SUPPORT TO ROPME³ AND PERSGA⁴
MEMBER STATES TO ESTABLISH NODCs**

The ROPME and PERSGA regions represent the world's largest source and route of exported petroleum. The Marine and Coastal areas of the two regions are characterized as being highly arid, rich in habitat and species biodiversity and ecologically sensitive. The impact of chronic releases of oil, mainly from oil tanker de-ballasting is evident on the shorelines of regions and extends to the other Indian Ocean countries. The vulnerability of the area to major oil spills has already been demonstrated through intentional and accidental releases.

³ ROPME: Regional Organization for the Protection of the Marine Environment, was established in accordance with the Kuwait Convention (1978) and comprises Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and UAE.

⁴ PERSGA: Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden, established in accordance with the Jeddah Convention (1982) and comprises Jordan, Egypt, Sudan, Saudi Arabia, Yemen, Palestine, Somalia.

Both the ROPME and PERSGA regions also suffer from decline in fisheries resources, encroachment on wetlands, mangroves and tidal flats by land reclamation and pollution as a result of the continued demand for resources and rapid rates of urbanization and industrial development.

The status of the marine environment in the two regions makes obvious the need for historical and up-to-date oceanographic data effectively managed as an aid for the planning of resource development, contingency planning and coastal zone management.

Representatives from the two regional organizations participating in the Fifteenth Session of the IODE Committee, welcoming the Committee's decision to support India's initiative to establish the RNODC-INDO, feel that Member States of the ROPME and PERSGA regions can only benefit from this and give a real support to the newly established centre if national data centres are established and supported via capacity building programmes.

The objective of the proposal is to support Member States of the ROPME and PERSGA Regions in establishing national oceanic data centers through co-operation between IOC, the ROPME and PERSGA Secretariats and the competent national authorities in Member States.

Implementation of the proposal is envisaged to be based on a cost sharing principle, taking into account the economic constraints and limitations of all parties involved. It is also recognized that support from other international organizations, bodies, programmes and developed countries is to be sought.

The proposal comprises the following activities:

- (i) a mission to identify Member States needs and capabilities in relation to the establishment of NODCs;
- (ii) based on the findings of the mission, workshops are to be organized in the region through co-ordination of IODE and that of ROPME and PERSGA, to prepare a programme of action to support the establishment of NODCs, identify linkages with other programmes and propose administrative and financial mechanisms to implement the programme. Participation of other concerned bodies in the workshops is also to be sought;
- (iii) training course(s) on data management is/are to be organized in the area, utilizing the national expertise from the region to the greatest extent possible;
- (iv) hands-on-training for nationals with outstanding performance to be organized at IODE designated centers of excellence.

Duration of the programme: 2 years, commencing in 1997.

Recommendation IODE-XV.10

MEDAR/MEDATLAS AND DEVELOPMENT AND UPDATING OF THE MEDITERRANEAN DATASET

The IOC Committee on International Oceanographic Data and Information Exchange,

Recognizing a need to:

- (i) safeguard a large number of marine datasets held by the bordering countries of the Mediterranean including the Black Sea;
- (ii) improve the data flow between the scientific organizations in the region;
- (iii) improve the communication among different data holding centres;

Recognizing further the lack of necessary resources for oceanographic data management in several Mediterranean countries,

Noting

- (i) the existence of several limited regional initiatives, such as the MEDATLAS project to facilitate the Mediterranean data banking;
- (ii) the value of close co-operation of the data managers to improve data quality standards and access to data;
- (iii) the large number of involved countries;

Considering the need to create appropriate national capabilities in data handling and develop reference data sets in order to facilitate further analysis and assessments for the success of the GOOS regional programmes implementation,

Accepts the project proposal presented in Document IOC/IODE-XV/23 as the basis for future development and **requests** the Delegate of France and GODAR Project Leader with the assistance of the Secretariat to finalize its formulation;

Recommends

- (i) implementation of the GODAR project for the Mediterranean region, through the co-operative effort of data managers of the bordering countries;
- (ii) implementation of archiving and data management tasks including: development of inventories, digitization, QC and encoding by means of a common exchange format;

Invites the IOC Executive Secretary and Heads of other international agencies to provide support to a major data rescue programme for the Mediterranean region;

Also invites Member States to provide complementary support to improve national and regional data management capabilities;

Requests NODCs and responsible data holders in each country to report to IOC on the necessary actions required to implement such a project;

Invites the IOC Executive Secretary to arrange a two-three day meeting in order to consider responses from Member States, identify other data banks outside the region including those in WDCs and other international organizations and prepare the implementation plan and schedule.

Recommendation IODE-XV.11

PROGRAMME AND BUDGET FOR 1996-1999

The IOC Committee on International Oceanographic Data and Information Exchange,

Having reviewed its on-going activities and forecast programme implementation requirements through 1999,

Noting Resolution XVII-20 which contains, in the Annex *inter alia*, the decision of the IOC Assembly on the organization and structure of IOC and reporting procedures of the IOC subsidiary bodies to the governing bodies of the Commission,

Having been informed of the likely resources to be made available for IODE activities in 1996-1997 and the set of priorities identified in the UNESCO Medium-Term Plan 1996-2001 for the IOC programmes and marine related activities,

Being aware of the severe financial constraints under which UNESCO and its IOC are 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 World Climate Research and Global Change Programme and GOOS,

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

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 Member States to commit funding through the IOC Trust Fund arrangements specifically for IODE projects and consider secondment of national experts to the IOC Secretariat to assist in implementing IODE;

Encourages Member States to submit proposals for IODE activities, both national and regional, for consideration by the UNESCO participation programme;

Requests the IODE Chairman to explore ways of co-operation with programmes and agencies and **invites** international organizations to support the development of the appropriate projects within IODE activities;

Requests the Chairman of IODE to bring to the attention of the IOC Executive Council a framework proposal of the IODE programme of work and budget for the period 1996-1999, as found in the Annexes to this Recommendation.

Annex I to Recommendation IODE-XV.11

IODE PROGRAMME DEVELOPMENT IN 1996-1999

A

Overview

The IOC Medium-Term Strategy for the ocean data and information programme identifies as one of the challenges the need to "ensure that ocean data and information obtained through research observations and monitoring are efficiently husbanded and made widely available". To implement this challenge successfully the focus of activities during 1996-1999 will cover 4 general directions.

The first focus is to maintain the momentum of IODE activities that have occurred within IODE during the previous Intersessional Period. This emphasis relates to a continuation of the successful training, education and assistance programmes which are having an important and valuable impact in IODE Member States and helping to strengthen and widen the network of IODE centres. Other activities such as OceanPC, GODAR and GTSP, which are viewed as very successful components of the IODE system, will be continued.

The second focus continues the work of the previous Intersessional Period in establishing relationships with global and regional scientific and monitoring programmes having a marine data and information management component and in promoting the capabilities and successes of all IODE activities. The importance of creating linkages and collaborative projects with other programmes cannot be over emphasized, and is partially addressed by the creation of a Strategy Sub Group.

The third focus addresses the rapidly developing technologies in computing, data and information management, communication technology and increasingly sophisticated data collection methods. An emphasis will be placed on the successful introduction of these technologies into IODE activities. This priority is addressed through workshops on ocean data management technology, information management, continuing development of OceanPC, modernization of MEDI and WWW development. The development, implementation and distribution of tools to support ocean data and information management to further enhance regional capacity will be an on-going activity to promote the use of new technology within the IODE network of centres.

The fourth focus is based on the increasing significance of regional programs and their contribution to global data and information management. Using the framework of regional structures enables a more focussed and relevant approach to be made in capacity building through technology transfer and training. The considerable development already achieved will be built upon and regional requirements will be addressed with training courses targeting specific regional needs and through the provision of other technical support. Strong regional programmes will strengthen the IODE network of centres as well as IOC regional programmes.

B

The Committee recognized declining budgets within many national programmes and the impact this may have on improving the capabilities of IODE to meet new challenges, particularly within developing regions. To expand capacity building and improve the exchange of technology and information the committee strongly supported the need to actively seek additional funding from external sources. The Strategy Group is seen as one of the mechanisms that can be used to achieve this.

The situation with the IOC budget is viewed as critical at this time. At a time when data and information 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 Fifteenth Session of the IOC Committee on IODE by Member States and representatives of international organizations of the GTSP, data archeology, marine information management, TEMA and OceanPC, 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) **noting** the IOC objectives presented in the Annex to Resolution XVIII-8 of the IOC Assembly and reaffirming that IODE is a service programme, the main goal of which is to assist other programmes in meeting their objectives, **the Committee recommended** closer collaboration with TEMA, and the regional programmes to promote mutual support and ensure the most effective use of the limited resources.

The Committee urged Member States to provide increased support to IODE by taking on additional work and funding and requested IODE national co-ordinators, IODE officers 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.

Annex II to Recommendation IODE-XV.11

IODE WORK PLAN AND PROVISIONAL BUDGETARY IMPLICATIONS

- Note: * Figures are given as (extra-budgetary)/(UNESCO regular funds) all in K US dollars;
 * An average of 2 - 2.5 K dollars per person is assumed for travel and per diem for meetings;
 * Secretariat support other than travel is not included.

Activity	1996	1997	1998	1999
Fifteenth Session of IOC Committee on IODE, GEMIM Meeting (Athens, Jan.'96)	>150/30			
Sixteenth Session of IOC Committee on IODE				>100/40
GTSP (Apr.'96, Washington; 1998, place to be identified)	10/15		10/10	
GODAR-V, for Central & South America (Colombia, Sept.'96)	35/20			
GODAR-VI for Western Africa (Lagos, Nigeria, Feb.'97)		40/10		

Activity	1996	1997	1998	1999
GODAR Global Conference (Washington DC, 2 nd half '97)		100/30		
OceanPC Meeting of Experts		10/10		
IODE Officers Meetings		15		15
Seminar of IODE Regional Co-ordinators (co-joint with IODE Officers Meeting)		10		
GETADE Meetings (1997, co-joint with Workshop on New Technology; 1999, co-joint with IODE Officers Meeting)		5/10		10
Strategy Sub-Committee Meeting (upto 8 participants, 2 nd half '96)	10/15			
Data Managers Consultation on Co-operation & Sharing Responsibilities		20/10		
Workshop on Biological & Chemical Data Management (Hamburg, May '96, upto 50 participants)	60/10			
Workshop on New Technology for Ocean Data Management, Ireland, Mar.'97		40/25		
GEMIM Meeting			15	
Meeting of UN Marine Information Managers			30/10	
Development & Maintenance of the IOC WWW Homepage (equipment, software)		10	5	5
Production, Distribution & Updating of IOC CD-ROM		10	5	5
IOC ASFA input	2	2	2	2
Support to IAMS LIC Conference participants	6	10	5	5
Support to EURAS LIC Conference participants	15/10		5/5	
MEDI Pilot Project Technical Workshop		30/10		
NOPs & MEDI WWW Server & System Development	6		5/5	5/5
Marine-related Document Delivery over Internet - Pilot Project	10/5	10/5		
Participation of IODE Officers, Experts & Staff in Data Management-related Meetings: of other International Organizations; IGBP & WCRP; GOOS & GCOS; Remote-sensed Data (CEOS & IGOSS/IODE/CMM)	10 3	10 10 5 3	10 10 5 3	10 10 5 3

Activity	1996	1997	1998	1999
TEMA <u>Training Courses</u> WESTPAC (Japanese NODC) ROPME/PERSGA & Caspian Sea area (Iranian NODC) Eastern Europe & former Republics of the Soviet Union (Russian NODC, for Trainers) Black & Caspian Sea Member States (WDC-B, MGG, On Marine Geological & Geophysical Data) RECOSCIX-CEA IOCINCWIO (MIM/ASFA) Eastern Africa (on OceanPC) Western Africa (Mauritania, on OceanPC) Central & South America (Argentinian NODC, for spanish-speaking countries) On Development of National WWW Servers IOCINCWIO/IOCINDIO (RNODC-INDO, Goa) Western & Eastern Europe (LOICZ/ICES, Copenhagen) Eastern Mediterranean & North African Countries (Hellenic NODC)	15/ 20/10 20/5 40/10	15/ 20/10 20/20 20/20 20/10	15/ 10/20 15/10 20/20 15	15/ 30/10
<u>Missions (Feasibility Study & Assistance)</u> Western Africa Cuba (Sept, co-joint with GODAR-V) Ecuador (WDC-A, Oceanography offer) Colombia (Sept, co-joint with GODAR-V) ROPME/PERSGA (Nov/Dec)	1/1 3/ 1/2 3/1.5	10/5		
<u>Study Grants & Fellowships</u> Not more than 2 per year		15	15	15
Regions RECOSCIX-CEA Development (staff travel & contract) RECOSCIX-CAR Feasibility Study & Implementation Black Sea Pilot Project Data Meeting ROPME/PERSGA Data Workshops MEDATLAS Implementation ODINEA Project	13 15/10	20 5/ 5/5 10/5 10 20/10	10 10/ 5/5 20/10 20/10	10 10/ 10/5 20/10
Publications Global Directory of Scientists & Marine Institutions IGOSS/IODE Brochure Manuals & Guides N° 5 (consultant contract) Revised version of IOC-CEC QC Manual	1/2 5/5 3	5/2.5		

Activity	1996	1997	1998	1999
Awareness IODE participation in the Year of the Oceans, 1998 (development of demonstration material, travel) Development & Publication of IODE Posters & Logo		5 5	5 5	
IODE Programme Implementation Communication costs, Office supplies, Word processing equipment, etc.	10	10	10	15
Total	>400/204.5	>400/357.5	<200/215	~200/180

ANNEX III

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ANNEX IV

LIST OF DOCUMENTS ¹

WORKING DOCUMENTS Title

IOC/IODE-XV/1	Agenda
IOC/IODE-XV/1 Add.	Timetable
IOC/IODE-XV/2	Annotated Agenda
IOC/IODE-XV/3	Summary Report
IOC/IODE-XV/4	List of Documents
IOC/IODE-XV/5	List of Participants
IOC/IODE-XV/6	Report on Intersessional Activities of the Chairman of the IOC Committee on IODE
IOC/IODE-XV/7	Report on NOPs Submission - Status & Future
IOC/IODE-XV/8	Future of the MEDI Referral System
IOC/IODE-XV/9	Reports on Activities of NODCs, RNODCs & WDCs
IOC/IODE-XV/10	Place & Role of WDCs in the Changing World
IOC/IODE-XV/11	IGOSS & IODE Data Management Goals to Support GOOS
IOC/IODE-XV/12	Reports of the Chairmen of the IODE Subsidiary Bodies & Project Leader on Intersessional Activities & Future Actions
IOC/IODE-XV/13	ODINEA: An Emerging Regional Exchange System for the IOCINCWIO Region (Project Proposal)
IOC/IODE-XV/14	Reaching IODE's Target Audience: Implementation of New Technologies & Developing Countries or How to Involve them in Cyberspace
IOC/IODE-XV/15	Results of the Think Tank Meeting - Where we are & where to go? (Paris, France, 13-15 March 1995)
IOC/IODE-XV/16	IODE & TEMA - New Requirements & Responses
IOC/IODE-XV/17	Standard Curriculum & Modules for Training Courses in Marine Data & Information Management (Cancelled)
IOC/IODE-XV/18	IODE's Role In Managing & Exchanging Ocean Data from Coastal Zones
IOC/IODE-XV/19	Future Directions for Interchange of Data & Information in the IODE Community
IOC/IODE-XV/20	Status of Exchange of Data & Information between the IOC Regional Programmes & the IODE System
IOC/IODE-XV/21	IODE Workplan for 1996-1999 (to be completed after IODE-XV) Cancelled
IOC/IODE-XV/22	Proposal for the Establishment of a Responsible National Oceanographic Data Centre for the Indian Ocean (RNODC-INDO)
IOC/IODE-XV/23	Co-operation with MEDAR/MEDATLAS in the Development & Updating of the Mediterranean Dataset

ANNEX V

OPENING ADDRESSES

A

by Dr. G. Kullenberg, Executive Secretary IOC

Mr. Chairman and Director of the National Centre for Marine Research,
Mr. Chairman,
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Mr. Vice-Chairman,
Ladies and Gentlemen,

First I wish to thank the Greek people for their hospitality and express my appreciation to the Government of Greece and the Conference organizers, especially Dr. E. Balopoulos, for making this important gathering possible, extend thanks to the European Union for the support provided for the organization of the Session on the basis of goodwill and understanding of the importance of interagency co-operation in data management in the spirit of UNCED and UNCLOS decisions. I want to refer also to the Lisbon Conference in 1994 and the Lisbon Declaration.

The IODE-XV objective is to define the agenda of ocean data management for the next 5-10 years relating to the Global Change, environment and capacity building. The Session will provide a perspective for the future direction of international ocean data collection and management.

This Session should not be seen as another isolated event. Instead, it should reinforce and expand the commitment to free and open exchange of oceanographic data and information already shown in the IOC Data Policy Statement, and put the IODE efforts in context of recent developments and issues facing society, highlighting how the ocean data community can help address these.

All the three compartments of the Earth System: land, oceans and atmosphere are connected with one another through the role of the interlocking bio-geochemical cycles of water and nutrients. All components of the Earth System must be monitored on a global scale and in sufficient detail. This requires support for substantially enhanced programmes of Earth System observation. Appropriate means need to be provided for the management of data obtained from those observing systems including storage, analysis, QC, dissemination and assimilation into numerical models. Ocean forecasting can now be achieved and we must help ensure that such a powerful tool is utilized. An integrated approach is needed.

IODE should take a wider vision of what should be considered as standard ocean data and continue efforts in bringing new data types under its data handling responsibility. Here I wish to recall the IOC Medium Term Strategy in IOC-XVIII Report which relates our programmes to the issues of society concern.

In order to establish more clearly the likely impact of climate change on natural and managed ecosystems, it is necessary to improve predictions of regional characteristics of environmental change. It is necessary to intensify interdisciplinary research on coastal zones where 75% of the world's population will live by the Year 2000, and which will be receiving increasing loads of nutrients and pollutants from the land, endangering its major role in marine food production.

Research results indicate the vast complexity of the system with its many dynamic interconnections. We must gain more understanding of these interactions if we are to be able to manage the systems sustainably. We must translate the results into applications. Sustainable development requires scientific understanding and inputs of forecasting.

Times change and we change with it!! It is once again time for a change and we are looking for a new IODE system which should be flexible and easily adjusted to urgent problems in environment and development.

Adequate resources, adjustment to technological developments, quick and efficient response to increasing needs in marine data are central for long-term IODE strategy.

A recognition of the link between data and research, environment and development would be an opportunity for data managers to raise their standing in society. Indeed, many people and governments do not yet see any "practical" use of science and produced data and therefore tend to underestimate or ignore this importance.

UNCED confirmed that the scientific community is willing and able to enter into partnership with organizations charged with addressing problems of environment and development, in such areas as, for example, availability of relevant data and provide information to society.

IODE-XV will be a forum to link scientists and data managers along with a strengthening partnership with organizations charged with addressing problems of environment and development.

Many institutional arrangements for systematic interdisciplinary investigation of the Earth System are in place or are being developed (e.g., WCRP, IGBP, GOOS) and they are capable of delivering new data to the IODE system with the understanding that the system will be responsive also to their needs.

If the IODE system does not meet the needs of the client programmes, the IODE programme will be undermined and the whole system will become much less effective. It is expected that the results of IODE-XV will make a major contribution to the formulation of the future directions in ocean data managing in support of world science, GOOS, industry and society at large.

The Committee is undertaking the daunting task of bringing IODE into the era of desk-top computers and cyberspace. Technology will be a major feature of the Session. WorldWide Web and CD-ROM publishing provide the facility for IODE to make a significant step forward in making data and information available for clients in a timely and technically advanced manner.

The key is gaining respectability, and is not just being on the leading edge of technology. IODE must improve its services. Success should be achieved by doing a good job.

The information component of IODE should be adapted in order to cope with the explosive growth in literature, meetings and institutions, to encourage creativity and to reduce the inequalities in access to and distribution of scientific literature and information.

It is important for the information side of IODE to address how the computer and communications technologies can help improving access to printed scientific and technical information. MIM can also help establish a new education approach through teleeducation and this must be pursued.

Regular appraisals of the most urgent problems in ocean data and information handling should be recommended through arranging meetings of groups of experts, IODE officers and Think Tank-like meetings with a wide invitation of data managers and users from other agencies and international programmes. However, these meetings should be through telecommunications and not by gathering people. We need change our mode of operation.

Increased efforts should be made by IODE to communicate with policy makers, the media, general public about the importance of data and information for sustainable development and capacity building. Continued efforts should be made to build bridges between data managers and scientists, industry and consumers. Everyone has to recognize that data management is a common good and that it will not be well done or successful unless there is a shared commitment to making it work.

I expect strengthened support from the Member States for the IODE system, as a whole and for its components at the local, regional and global scales.

In order to obtain this you must set priorities and transmit a concise signal in the form of an umbrella resolution that you wish the IOC Governing Body (Bodies) to adopt. You must realize that if you do not set priorities somebody less knowledgeable than you may do it! The funds we receive from UNESCO are only seed money and are not meant to cover programme implementation. Use the 1998 Ocean year and Expo '98 possibilities to draw attention.

B

by Dr. D. Papanikolaou, President and Director, National Centre for Marine Research

Mr. Chairman,
Mr. Vice-Chairman,
Mr. Executive Secretary of the IOC,
Distinguished Delegates,
Representatives of Governmental Organizations, Non-governmental Bodies and Organizations,
Ladies and Gentlemen,

It is a great honour and privilege for me to address this important Meeting, the Fifteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange on behalf of the Greek Government.

From the ancient times, the sea played a role in the everyday life of my country. Being at the crossroad between great civilizations of the past made Greece an important maritime state and helped to establish fruitful bonds of co-operation with our maritime neighbours. Hellenic ships were plying the waters of the Black Sea and the entire Mediterranean from Egypt to the Hercules Gate. Winds of the Atlantic and Indian Oceans were blowing into the red sails of Greek ships.

In present times, the recent decades have showed a remarkable increase in the interest of countries to the world ocean and its resources. It was marked by the entry into force of the Convention of the Law of the Sea, on Climate Change and Biological Diversity. The International Conference on Oceanography, held in Lisbon in November 1995, culminated with the adoption of the declaration which emphasized the importance of a concrete intergovernmental approach in meeting the objectives of the conventions, ocean services, systematic monitoring and the relevant capacity building. We consider IOC as a unique Governmental Agency with the commitment to meet these demands and to assist in attaining the goal of sustainable development of the oceans and coastal zones.

Recent decades are remarkable also for the rate of increase and scale of transformation of the marine environment, with effects both locally and globally. Within a lifetime, half of the world's present population has faced such changes related to the marine environment as:

- the world population doubling to 10 billion in only 30 years, with a dramatic increase of the population in the coastal areas, e.g., in Greece, 80% of the population live in the coastal areas,
- climate, sea-level rise and associated impacts on the biosphere,
- continued reduction and deterioration of the quality of natural resources, to name only a few.

The lack of knowledge of control mechanisms and their sensitivity to disturbance must prepare society for surprises which means that research should be closely followed and supported by improved data collection management and exchange procedures. Big volumes of reliable data become crucial to achieve this objective.

IODE-XV provides a unique platform to widen and deepen a long-term partnership between communities of data managers and users. It is especially important now when a range of marine disciplines increasing, customers are more demanding and needs for ocean data are skyrocketing. Achievements of the IODE programme are well known:

- development of forms and standards,
- implementation of GTSP and GODAR projects which have gained worldwide reputations,
- creation of the OceanPC, a delivery tool for data and information,
- organization of regional networks for collection and exchange of data and information, etc.

We expect that IODE-XV will identify new projects and will provide a model for a future *modus operandi* in which the assessment of scientific results based on high quality and high resolution data will serve as the basis for formulating policy options.

The achievement of sustainable societies requires an improved understanding of the complex forces which generate global environmental problems and hinder social and economic development. It cannot be achieved without reliable and vast data and information on natural and human made processes. Scientists and technologists cannot by themselves solve the problems. They need data and information which will support their conclusions and help to formulate informed opinions.

Need for more operational data has increased and IODE should consider the ways to meet this need. IODE centres must expand their expertise, skills and efficiency. IODE must be prepared to serve industry and operations.

Special efforts should be made in education, training and capacity building. A wider segment of the population should be involved in solving environment and development problems. By the 21st Century, IODE should be more actively involved in helping to share development. It is gratifying to note that almost half of the participants come from developing countries in Africa, the Arab regions, Asia and South America.

I expect that the Committee on IODE will take a new commitment to work hard for improving scientific research, for enabling policy options in environment and development to be evaluated on the basis of sound scientific data. I believe that it is important for IODE data centres comprising the network of the IODE system to maintain the momentum which will be generated by this Meeting, so that everyone can benefit from the mutual exchange of experiences, contacts and expertise.

One bottleneck of the system appears to be the lack of qualified data managers and supportive data managing infrastructures. This is particularly true for certain regions. Focussed capacity building is necessary to permit worldwide balanced participation in IODE, as well as to enable developing countries to strengthen their scientific capabilities to solve local and regional problems, and to participate on the international scale, existing regional networks for research and training which should be supported and new ones established. Efforts should be made to find partners for an enhanced capacity building component of the programme.

Finally, I would like to express my thanks to the staff of the Institute of Oceanography, particularly to the Head of the Hellenic National Oceanographic Data Centre, Dr. E. Balopoulos, to the MAST Programme of the European Union, particularly Dr. M. Bohle-Carbonell, without whose contribution and efforts the Meeting in Greece would not be possible.

I wish you a most successful Meeting, hope that you will be able to have time to get acquainted closer with the history and culture of my beloved country, and will have a pleasant stay washed by the Mediterranean sun and Greek hospitality.

ANNEX VI

STATUS OF THE IMPLEMENTATION OF THE 1993 - 1995 ACTION SHEET

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
2.	IOC/CEC Manual of QC Procedures	para.17	⁵ * Publication & distribution of Manual	IOC Secretariat	Done, published & distributed. CL with request to give new inputs issued in Jul.'93. Status of updates will be reported to IODE-XV.
2.1	Monitoring Ocean Data Flow	para.27	Development of monitoring systems for θ , S°_{∞} & drifting data	Chairman GTSP & Head of RNODC for Drift. Buoys Data	Report to IODE-XV.
	Co-operation with other international organizations in Data Management	para.28	Establish improved co-operation, consultation & collaboration between IODE & other data management structures to ensure consistent data for management procedures	Chairman IODE M. States	
			Letter to UNEP	Chairman IODE	
	NOPs	para.29	* CL to M. States informing on number of NOPs advertisements & inviting them to make new submissions	IOC Secretariat	CL N° 1377, 21 Apr.'93. CL N° 1474, 22 Nov.'95.
	IOC/Delaware University collaboration		* Continue & widen collaboration in exchange of OCEANIC information on planned & past oceanographic cruises	IOC Secretariat	Continuing. IOC regularly provides Delaware with NOPs & makes distribution of OCEANIC information to IOC M. States.
	IGOSS/IODE Data Flow Diagram	para.32	* To include diagram as an Annex to IODE-XIV SR & to Guide N° 1 of IGOS Data Archives & Exchange	IOC Secretariat	Done.

⁵ Full completion of a required action.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			* To publish revised version of Guide N° 1	IOC Secretariat Chairmen IGOSS & IODE	Done. Revised version was published in Jun.'93 & distributed among IOC-WMO M. States.
	Country Code List	para.33	* To send CL with decision of IODE-XIV on IOC country code list	IOC Secretariat, ICES	Done. Circulated with IODE-XIV SR. See report of RNODC-Formats for IODE-XV.
			* To review & update country code & ship code lists & report to next Session of GETADE	Chairman GETADE	Done at GETADE Mtg. IOC server will include country/ship codes.
2.2	Activities of WDCs	para.37	* To send CL to M. States, ICSU, CEC, WMO, UNEP, inviting them to make efforts for saving ocean data collections	IOC Secretariat	Done.
		para.46	* Letter to Mr. S. Ruttenberg to inform him on IODE-XIV decisions relevant to IODE-WDCs co-operation & formulation of recommendations on upgrading of WDCs' activities	IOC Secretariat Chairman IODE	Done. IODE-XIV SR was sent & general agreement was achieved on ways to increase data flow, & on free & open access to data.
		para.47	* Harmonization of WDCs data holdings. Usage of electronic bulletin board for distribution of WDCs semi-annual updates of data holdings	Director WDCs	Info is published in different publications & available on electronic bulletin board.
		para.47	To decide on projects & actions required to assemble & manage oceanographic satellite datasets	Chairmen IGOSS & IODE, Directors WDCs	Progress will be reported to IODE-XV.
2.3	National & Regional Activities	para.49	* To publish national reports as INF document for IOC-XVII (Mar. '93)	IOC Secretariat	Done. IOC/INF-917.
		para.50	* To write letter to Directors of NODCs & national co-ordinators inviting them to participate actively in meeting users' requirements & needs	IOC Secretariat	Though no special letter was circulated, this appeal has been made in numerous IOC & IODE publications.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
		para.52	* To write letter to newly established states, former republics of Soviet Union, calling on them to join the IODE system	IOC Secretariat	Done. Nov.'95.
		para.54	* To write letters to Gambia, Jordan & Kuwait, inviting them to join the IODE system	IOC Secretariat	Done. Dec.'95.
			To revise & publish IOC Manuals & Guide N ^o . 5	Consultant IODE Officers IOC Secretariat	Postponed. Revision will be completed after IODE-XV, taking into account new challenges facing NODCs.
		para.55	* To call on IOC M. States to make oceanographic data in possession of military & fishery institutions available internationally	IOC Secretariat	Done. IOC CL N ^o . 1439. Discussions will be continued at IODE-XV.
		para.56	To assist IOC Regional Committees in establishing & improving ocean data & information management infrastructure	Chairmen IODE, GERGP IOC Secretariat	Continuously. Ukraine-May'93; Iran, S.E.Asia, W.Africa-'94; E.Africa-'95.
2.4	IODE-IGOSS	para.61	* To arrange mtgs of Joint IGOSS-IODE Bureau	Chairmen IODE & IGOSS, IOC & WMO Secretariats	Done. Sydney, Australia '94. Planned for Nov.'95 in Paris & planned for 22 Jan.'96 in Athens.
			* Participation of Chairman IODE at IGOSS-VII in Paris	IOC Secretariat	Done.
		para.62 (see also Agenda 7.1)	* To arrange mtg of GETADE at same venue & period of time as IGOSS GE-OTA	Chairmen GETADE OTA, IOC & WMO Secretariats	Done. Jun.'94 in Geneva. SR available (Doc.IOC/TADE-VI/3).
		para.65	* To inform M. States of IODE & IGOSS by joint CL on target date for full implementation of revised XBT fall-rate equation - 1 Jan. '95	IOC & WMO Secretariats	Relevant document published in IOC Technical Series N ^o . 42 Dec.'94 & circulated to IOC & WMO M. States.
		para.69	* Inform Chairman of CBS Working Group on Data Management on name of IODE representative in Group	Chairmen IODE & IGOSS	Done. R.Keeley from Canada. CBS WG mtg. was held 1-10 Sep.'93 with R.Keeley representing IODE.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			Invite CBS Working Group to participate in GETADE mtgs of relevance to CBS	Chairmen IODE & GETADE	Invitation sent to Chairman of CBS WG. No person was nominated.
3.1	GE-RCDS	para.75	Follow closely implementation of decisions of Ocean Climate Data Workshops	IODE Officers	Continuously. GETADE, New Technology Workshop & some other actions are follow-up.
		para.76	* Publish report of International Workshop on Evaluation of Results of Training Course on Oceanographic Data Management for countries of WESTPAC & Indian Ocean	Nat. Co-ord. of Japan	Done. Limited number of copies available from JODC & IOC.
		para.78	* Send letter to IOC M. States requesting them to provide RNODCs regularly with marine data	IOC Secretariat M.States	Done. Letters sent, relevant to activities of RNODC-SOC & WESTPAC. See also IOC Regional Bodies reports.
		para.79	* Notify IOC M. States & IODE National Co-ordinators on changes in Terms of Reference of RNODCs-SOC, Format, ADCP & on termination of RNODC-MEDALPEX activities	IOC Secretariat M.States Nat. Co-ord's	Done. Through circulation of IODE-XIV SR & IODE Handbook.
		para.80	* Invite SCAR to assist in increasing data flow to RNODC-SOC	IOC Secretariat	Done. Links established between SCAR/BIOMASS & RNODC-SOC. See also GODAR-III SR for references.
		para.81	Request IOC M. States to include meta-data whenever oceanographic data is exchanged between NODCs, RNODCs & WDCs	IOC Secretariat M.States	
		para.82	Invite M. States to consider providing RNODC facilities for new types of data, such as biological, chlorophyll, chemical, CO ₂ & pollution data	IOC Secretariat Chairman GE-RGP	
		Rec. XIV.1	* Inform M. States on revised title & new Terms of Reference of Group	IOC Secretariat	Done. Through IOC Assembly, IODE-XIV SR & IODE Handbook.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			Arrange mtg of GE	IOC Secretariat Chairman GE-RGP	
3.2	Co-operation with Data Groups of TOGA, WOCE, JGOFS, IGBP	para.91	* Request USA to give name of IODE contact person for IGBP-DIS & inform IGBP-DIS accordingly	Chairman IODE Nat. Co-ord. USA	Done. J.Withrow
		para.97	Initiate discussions with WOCE on preparation of complete project dataset at end of experiment	Chairman IODE	Continuing. Through participation in WOCE Data Management scheme.
		para.100	* Inform WOCE that Mr. S. Tani will serve as IODE contact person in WOCE data management group	Chairman IODE Nat. Co-ord. Japan	Done. S.Tani & R.Wilson are representing IODE in the Group.
		para.106	Ensure continuous liaison & close co-operation with climate research programmes; report progress to IODE Officers mtgs	IODIE contact persons in WOCE, JGOFS IGBP-DISTOGA	Continuously. Progress was reported at IODE Officers mtgs & will be discussed at IODE-XV.
			Support participation of IODE contact persons at mtgs of Data Management Groups of climate research programmes	IOC Secretariat	No request been received so far.
4.1	IODIE-GCOS & GOOS	para.118	* Establish formal contacts between IODE & GOOS & GCOS in order to identify clear policy of co-operation	Chairman IODE	J-P.Rebert, Director of GOOS Support Office. R.Wilson & J.Withrow are representing IODE in GOOS & GCOS.
		para.119	Ensure representation of IODE activities in IGOOS	Chairman IODE Secretary IOC Chairman GE-RGP	
		para.120 Res. XIV.1	Inform 1 st Session of IOC Committee for GOOS on intention of IODE to work closely with Joint GOOS Technical Scientific Committee in designing & planning of oceanographic data & information management element of GOOS	Chairman IODE, IOC Secretariat Chairman GE-RGP	Done. Past IODE Chairman & Tech. Sec. informed GOOS-I on relevant IODE-XIV decisions. Further actions are needed to implement decisions.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
		para.121	Assist GOOS Support Office in preparing annual GOOS Status Reports	Chairman IODE, IOC Secretariat	Being done continuously on request.
4.2	Data Challenges Arising from GOOS	Rec. XIV.8	* Invite consultant to prepare strategy paper on IODE response to GOOS/GCOS needs	Chairmen IODE, GE-RGP IOC Secretariat	Done. Consultant was invited in '94.
			* Finalize strategy paper & submit it to IODE-XV	Consultant IODC Officers IOC Secretariat	Done. Was presented at I-GOOS in Melbourne. Available at IODE-XV as Doc.IOC/IODE-XV/11.
			Support travel of IODE Officers to GOOS mtgs	IOC Secretariat IODC Officers	Continuously, on request.
5.1	Support for IOC Science programmes	para.131	* Inform M. States by CL on decision of IOC/IODE to expand "Index" to Marine Geological samples	IOC Secretariat Directors WDC-A & B, MGG	Done. Nov.'95. Progress will be discussed at IODE-XV.
		Res. XIV.2	* Invite WDC-A, MGG to provide additional information about Index to M. States	IOC Secretariat Director WDC-A, MGG	Done. Nov.'95. Progress will be discussed at IODE-XV.
			Urge M. States to establish procedures to provide access to marine sediment cores for sampling	IOC Secretariat Director WDC-A, MGG	Done. Dec.'95. CL N° 1475.
		para.135	Follow developments in exchange & management of geophysical data & report on progress to IODE Officers' mtgs	Directors WDC-A & B, MGG	Continuously. Progress will be reported to IODE-XV.
		Res. XIV.3	* Inform M. States on establishment of ad hoc Group of Rapporteurs on Marine Biological Data Management	IOC Secretariat	Group has been established. No Chairman has been nominated.
			Invite HELCOM to propose an expert to Group & participate in its activities	IOC Secretariat	No answer received from Helcom in response to IODE recommendation. Helcom will be invited to participate at Workshop on Biological & Chemical Data Management planned for Apr.'96 in Hamburg.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			Implement activities identified in list of functions presented in Resolution, report progress to IODE Officers & submit final report to IODE-XV	Group of Rapporteurs	
5.2	Products	para.147	Develop inventory of available software & CD-ROMs	GETADE	Progress will be reported to IODE-XV.
			Prepare Guide on IODE products	Consultant	Consultant has not been hired due to lack of funds. Decision has not been implemented.
5.3	GTSP	para.153	Develop data flow from science centres back to continuously managed database	GTSP Steering Committee	In progress. Report will be given to IODE-XV.
			* Develop output product side to project	GTSP Steering Committee	Self contained GTSP CD-ROM was published & will be demonstrated at IODE-XV.
			* Arrange mtgs of GTSP Steering Committee	Chairman GTSP Steering Committee IOC Secretariat	15-19.XI.93, Ottawa, GTSP-III. It was decided not to have GTSP-IV in '95, it is planned for '96.
6.1	Remotely Sensed Data	para.156	* Provide input on remote-sensed data management topics & names of potential speakers to conveners of IOC/WMO Technical Conference on Space Based Ocean Observations	Chairman IODE, Past Chairman of Task Team on Remotely Sensed Data	Done. 4 speakers presented IODE views at Conference (see Bergen Conference proceedings).
			Prepare summary of data policy activities of international bodies involved in remotely-sensed ocean data management	IOC Secretariat	
		para.157	Develop guidance on role of WDCs, Oceanography in management & archival of remotely-sensed oceanographic data	CMM-IGOSS-IODE Group on Satellites & Remote Sensing, ICSU Panel on WDCs	

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
		Rec. XIV.8	* Consult President of CMM, Chairman of IGOSS & IOC & WMO Secretariats in order to finalize membership & make necessary revision of Terms of Reference of joint Group	Chairman IODE	Done. Terms of Reference of joint Group have been developed, taking into account IODE needs.
			* Arrange IODE experts' participation at mtgs of joint Group	IOC Secretariat	Done.
6.2	Chemical, Biological, Pollution & Currents Data	para.160	Invite GIPME to nominate experts in ad hoc Group of Rapporteurs which will work on management of chemical & CO ₂ data	Chairman of the <i>ad hoc</i> Group of Rapporteurs on Chemical & CO ₂ Data	
		Res. XIV.4	Implement tasks assigned to ad hoc Group of Rapporteurs by this Resolution & report progress to IODE-XV	Nat. Co-ord. USA Chairman GE on RGP	Progress report submitted to IODE-XV & is presented in Doc.IOC/IODE-XV/12.
		para.161	Support publication of current meter inventory as an IODE product	Nat. Co-ord. UK, IOC Secretariat	Progress will be reported to IODE-XV.
		para.161	Develop formats & guidelines for handling of data from ADCP & undulating temperature-salinity-fluorescence recorders. Report progress to next Session of GETADE	Chairman GETADE RNODC-Formats Nat. Co-ord. Japan	Progress was discussed at GETADE Mtg. in '94. Information is in Doc.IOC/IODE-XV/9 & will be discussed at IODE-XV.
		para.165	* Assist joint CMM-IGOSS-IODE Group on satellites & remote-sensing in preparation of review on application of HF & microwave radars for collection of oceanographic data	Chairman GETADE, IODE Experts of Joint Group	Question was discussed at IOC-WMO International Workshop, '93, Norway. Findings are published in proceedings of Workshop.
		para.166	Keep under review exchange procedures for data generated by numerical circulation models	IODE Contact in TOGA Data Management Group Chairman GE- RGP	Continuing. Progress will be reported to IODE-XV.
6.3	Long Time-Series of Observations	para.169	Prepare instructions on development of adequate documentation & annotation to go with long time-series	Project Leader of GODAR	

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
		para.171	* Inform WMO on concern expressed by Committee relevant to cease of operations of OWS "C"	IOC Secretariat Chairman IODE	Done. IOC representative raised this issue at WMO EC. Concern was noted, financial limitations.
6.4	GODAR	para.176	* Arrange 1 st Workshop on Data Archeology & Rescue for M. States of Eastern Europe in Russia	Nat. Co-ord. Russia GODAR Project Leader IOC Secretariat	Done. May'93 in Obninsk. Workshop Report N ^o . 88 available at IOC.
		Rec. XIV.3	* Establish Global Oceanographic Data Archeology & Rescue project	Chairman IODE GODAR Project Leader IOC Secretariat	Done. See relevant decisions of IOC-XVII.
			* Designate project leader	Secretary IOC Chairman IODE	Done. GK's letter to S.Levitus of 19.03.93.
			* Invite M. States & international organizations to participate in & support project	IODE Secretariat	Done. IOC CL of 23.04.94.
			* Undertake implementation of project & report progress to next mtg of IODE Officers	GODAR Project Leader M. States IOC Secretariat	Progress was reported to Cons-VIII in Dec.'93 & Cons-IX in Mar.'95 mtg. Info was published in numerous newsletters & brochures.
			* Arrange annual Workshops on Data Archeology & Rescue in Asia & in South America	GODAR Project Leader IOC Secretariat Relevant Nat.Co-ord's	GODAR-II for WESTPAC, '94 GODAR-III for Indian Ocean, '94, GODAR-IV for Med. Sea, GODAR-V planned for S. America in '96. Reports of I,II,III,IV are available.
7.1	GETADE	para.178	* Submit Vol. 1 of IOC Manual & Guides N ^o . 17 to IOC for publication	Chairman GETADE Nat. Co-ord. UK	Done. Published in Jul.'93
			* Submit Vol. 3 of IOC Manual & Guides N ^o . 17 to IOC for publication	Chairman GETADE Nat. Co-ord. UK	Done. Published in Jan.'96.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
		para.181	Make preparations for Workshop on Computing Technology for Ocean Data Management & implement it in '95	Chairman GETADE Chairman IODE Chairman of Org.Com. IOC Secretariat	Workshop is planned for mid '96 beginning '97. Progress & future actions will be discussed at IODE-XV.
			* Establish an organizing Committee	IODE Officers	Done. Chairman GETADE, Chairman IODE, Secretariat, Nat. Co-ord. Ireland.
			* Identify place, dates & participants	IODE Officers Secretary IOC	Mid '96 beginning '97, Dublin, Ireland.
		Rec. XIV.4	* Inform M. States on revised Terms of Reference of GETADE	IOC Secretariat	Done. IODE-XIV SR & Handbook were circulated containing revised Terms of Reference.
			* Finalize composition of Group	Chairman GETADE Secretary IOC	Done. List of Group members is presented in Handbook.
			* Arrange <i>ad hoc</i> mtg on format development in Copenhagen	Director RNODC- Formats Chairman GETADE IOC Secretariat	Done, 11-14.V.93 in Copenhagen. SR is available as IOC/INF-945.
			Ensure implementation of responsibilities assigned to Group by revised Terms of Reference	Chairmen GETADE IODE IOC Secretariat	Continuously. Progress will be reported to IODE-XV. See Doc.IOC/IODE-XV/12.
7.2	Quality Control	para.187	Request M. States to record quality control procedures applied & actions taken on data submitted for exchange	IOC Secretariat Chairman GETADE	
			Identify other actions to address this issue	Chairman GETADE (in co-operation with IGOS GE-OTA)	See Doc.IOC/IODE-XV/12.
		Res. XIV.5	Ensure implementation of Terms of Reference of Task Team on Oceanographic Data Quality Control	Chairman of Task Team	

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			* Update composition of Task Team	IOC Secretariat Chairman IODE	Done. New composition presented in Handbook, '94.
7.3	OCEAN-PC	para.189	Include software developed by University of Hawaii to process sea-level data for OceanPC inventory	Project Leader IOC Secretariat	
		para.191	Request M. States by IOC CL to encourage assistance for OceanPC through IOC VCP	IOC Secretariat	
		para.193	Ensure implementation of OceanPC implementation plan as presented in Doc. IOC/IODE-XIV/14 & in Recommendation IODE-XIV.5	Project Leader, IOC & WMO Secretariats	Continuously. See Doc.IOC/IODE-XV/12.
			* Ad hoc mtg to modify existing software package	Project Leader, IOC & WMO Secretariats, ICES	Done. 7-11.06.93, Copenhagen, SR is available.
			* Mtg of experts to review user experiences & future needs	Project Leader, IOC & WMO Secretariats	Done. Mar.'95, Mtg. in Norway with OCEANOR. Co-operation with GETADE.
7.4	Data Exchange Systems Development	para.196	Publicize experience gained by BODC in establishing good co-operation between data managers & scientists	Nat. Co-ord. UK, IOC Secretariat IODE Officers	
		para.200 Rec. XIV.6	* Submit draft statement on data management policy to IOC Assembly & finalize it taking into account comments made	Chairman IODE	Done. See relevant para. in IOC-XVII SR.
			* Make distribution of statement to M. States & international organizations	IOC Secretariat	Done. Jointly with IODE-XIV SR & Handbook.
7.5	Extent of Network Access	para.204	Urge M. States to link their marine science community to appropriate electronic networks & systems	IOC Secretariat	E.Africa: Done within framework of RECOSCIX-WIO. Further actions required.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			* Urge M. States with experience in this field to provide assistance to countries developing this capabilities	IOC Secretariat	Done. Support provided by Belgium, USA for E.Africa.
		para.205	* Bring this issue to attention of IOC Assembly with an accent on benefits arising from use of this technology	Chairman IODE	Done. See relevant paras. in IOC-XVII SR; IOC-XVIII, paras. 336-337.
7.6	Formats for future	para.208	* Establish ad hoc Task Team to undertake review of major oceanographic data exchange formats	Chairman GETADE RNODC-Formats	Done. See GETADE, '94, SR.
			* Organize mtg of experts on this issue in Copenhagen with agenda described in this para.	Chairman GETADE RNODC-Formats IOC Secretariat	Done. 11-14.V.93 in Copenhagen SR is available IOC/INF-945.
8.1	GE-MIM	para.215	* Evaluate MIBIS as standard structure for bibliographic databases	Chairman GE-MIM in co-operation with IDRC IOC Secretariat	In view of uncertainty of the future of MIBIS the GEMIM decided to implement ASFISIS structure developed by ASFA as standard bibliographic database structure. Input & output software based on this format was also developed.
		para.216	* Produce CD-ROM containing data, meta-data & publications with necessary software to provide logical connections between data & information. Report progress to next Sessions of GE-GTSPP & GE-MIM	Chairman GTSP & GE-MIM	Done. CD-ROM was finalized in Jun.'95 & distributed to IOC M. States, Jul.'95.
		para.218	* Decide on policy towards establishment of IGCMI & report to IODE-XV	Chairman GE-MIM Vice-Chairman IODE	Discussed at GEMIN-V. Not implemented due to high financial cost. Agreed that national & regional approach would be more feasible.
8.2	ASFIS/ASFA	para.226	* Finalize an IOC policy document on ASFIS/ASFA, taking into account discussions at IODE-XIV	IOC Secretariat Chairman GE-MIM	Done. IOC-XVII/Doc.8 Annex 6.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			* Send letter to FAO with request to clarify position towards ASFIS/ASFA	Secretary IOC	Done. Response received on 2.02.93
		Rec. XIV.7	* Bring decisions of IODE-XIV relevant to ASFIS/ASFA to attention of IOC Assembly	Chairman IODE IOC Secretariat	Done. See Res.XVII-7 on ASFIS/ASFA of IOC-XVII & SR IOC-XVIII, para. 333. FAO agreed to continue to act as ASFA Secretariat.
			* Make arrangements for mtg of ASFA co-sponsoring agencies prior to ASFA Board mtg	IOC Secretariat	Done. 17-19.03 in Rome Mission Report is available.
8.3	Marine Information Products	para.231	Investigate possibility of including inventories of data holdings like MEDI on ASFA CD-ROM	Chairman GE-MIM IOC Secretariat, CSA	MEDI inclusion on ASFA CD-ROM no longer considered. Inclusion of MEDI on WWW server will be discussed during GEMIM-V.
		para.232	Negotiate updating of MEDI with relevant oceanographic data centers & publish updates every 2-3 years	IOC Secretariat Chairman GE-MIM NODCs Directors	Updating of MEDI related to carrier of MEDI: discussions will be held at GEMIM-V.
		para.235	Develop Directory of Marine Scientists of Central Eastern Atlantic Region	IOC Secretariat IOCEA Reg. Comm. RECOSCIX-CEA, RDC	Global directory project in progress. Report at IODE-XV. China directory is considered for development by ASFA Board.
		para.238	Develop continuously updated Global Directory of Marine Scientists	IOC Secretariat Chairman GE-MIM Nat. Co-ord's IODE	In progress. Global directory to be loaded on Internet (CEA & WIO directories available on IOC WWW server).
		para.242	Develop full-text searchable CD-ROM of IOC publications	IOC Secretariat WDC-A, MGG, CSA	In progress. CD-ROM will be spin-off of IOC WWW server which is now operational. CD-ROM first issue planned for '96.
		para.243	* Update & publish revised issue of IODE Handbook	IOC Secretariat	CL of 19.08.93 with request for updates; Done, '94.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
8.4	Technology for Document Imaging & Delivery	para.246	Facilitate establishment of & access to on-line marine library databases to disseminate information on data holdings	Chairman GE-MIM	In progress, will be reported to IODE-XV.
		para.247	Implement electronic document delivery within marine sciences community over Internet, through pilot project outlined in Doc. IOC/IODE-XIV/17	Chairman GE-MIM IOC Secretariat	If funds are available, pilot project involving Fiji & Kenya being planned in co-operation with IAMS LIC for '96.
		Rec. XIV.8	* Arrange mtgs of GE on MIM	Chairman GE-MIM IOC Secretariat Chairman IODE	Washington DC, 6-9 Oct.'93. Next session planned for 16-19 Jan.'96 in Athens prior to IODE-XV.
			Implement missions to Africa to expand RECOSCIX projects (RECOSCIX-WIO; RECOSCIX-CEA)	IOC Secretariat, IOC Regional Committees Chairman GE-MIM	To RECOSCIX-WIO, 12-13 Jul.'93. Mission Report is available.
9.	TEMA	para.252	Make update of promotional material: IODE Slide Show in digital form	Nat.Co-ord. Australia IOC Consultant	
			Finalize development of IODE training modules	IOC Consultant, Vice-Chairman IODE	See Doc.IOC/IODE-XV/17.
			* Request developed M. States to make surplus equipment available for countries & centres needing it	Secretary IOC IOC Consultant	Done. CL N° 1368 of 12.01.93.
		para.255	Produce training material for marine data management in form of video cassettes	Nat.Co-ord.Argentina, Vice-Chairman IODE	Argentina will make demonstration at IODE-XV.
		para.256	Use IMS Newsletter & electronic mail bulletin boards for announcements on training activities	IOC Secretariat	Continuously. Regular publications appear in IMS.
		para.258	Assist Gambia & other countries of IOCEA to set up NODCs & obtain training	IOC Secretariat	Training course was arranged in Apr.'95 for IOCEA countries.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
		para.260	Investigate need & possibility to send mission to ROPME area to help in establishment of NODCs & RNODCs	IOC Secretariat IOC Consultant	In Nov.'95 informal consultations were held with Director of UNESCO Reg. Office, Qatar. There is still a need & mission will be arranged in '96.
		Rec. XIV.8	Make arrangements for training courses specified in this Recommendation:		
			* - Training Courses in OceanPC	Project Leader IOC Secretariat	Done. Mombasa '95, Copenhagen '95.
			* - WESTPAC Training Courses	Nat. Co-ord. Japan IOC Secretariat	Done, Tokyo in '93, '94 & '95.
			* - Regional Training Course for S. American countries	Nat.Co-ord.Argentina IOC Consultant	Done, Buenos-Aires, Oct.'94.
			* - Regional Training Course on Marine Geological & Geophysical Data Management for the Black & Caspian Sea countries	WDC-B, MGG IOC Secretariat Vice-Chairman IODE	Done, Gelendzhik, Sep.'95.
			* - Training Course on GF3 & Oceanographic Data Management for Black Sea countries	Nat. Co-ord. Russia Vice-Chairmen IODE IOC Secretariat	Done, Obninsk, Aug.'94.
			- Regional Training Course on Remote Sensing Data, ROPME area	IOC Consultant IOC Secretariat	Postponed until '96.
			- Regional Training Course on Remote Sensing Data for WESTPAC & Indian Ocean countries	Nat. Co-ord. Thailand IOC Secretariat	
			- * Regional Training Course on Marine Data Management for Countries of IOCARIBE	Nat.Co-ord.Colombia IOC Secretariat	Done. 30.XI-11.XII, Cartagena.

Agenda Item	Major Subject	Paras. Rec/Res	Actions Proposed	Responsibility	Actions Done
			- * Regional Training Course for Mediterranean countries on Oceanographic Data & Information Management	Nat. Co-ord. Malta Vice-Chairman IODE IOC Secretariat	Done. Malta, 10-21 Apr.'95.
			- * Regional Training Course on usage of PCs in Marine Data Management	Nat. Co-ord. Japan Malaysia, IOC Secretariat, ROSTA	Done. 30 Nov-2 Dec.'93 Kuala Lumpur.
12.	IODE-XV	para.286	* Complete negotiation with CEC & Greece on possibility of having IODE-XV in Athens	Nat. Co-ord. Greece IOC Secretariat	Done. Official letter received in Jan.'95.
13.	IODE-XIV Summary Report	para.287	* Make Summary Report ready for publication by end of Dec.'92	Chairman & Vice-Chairman IODE, IOC Secretariat	Done. Published in Feb.'93.
			* Have Summary Report published for 1 st Session of IOC Committee on GOOS & IOC Assembly	IOC Secretariat	Done. SR was an INF Doc. at both mtgs.
		para.288	* Present Summary Report, Resolutions & Recommendations to 17 th Session of IOC Assembly	Chairman IODE	Done. presented & approved. See relevant para. of IOC-XVII SR.

ANNEX VII

GOOS LIST OF VARIABLES

A preliminary list of parameters required by GOOS was proposed to the Committee by the Group of Experts on RNODCs and Global Programmes. Since the report was written, a new list of parameters was prepared by the *ad hoc* working group of the Intergovernmental Committee for GOOS (I-GOOS). We reproduce hereafter, this list from the draft document "*Initial Priorities for the Global Ocean Observing System (GOOS)*" (version 1, February 1996, page 26).

The parameters listed in the attached Table are mainly from the Climate and Health of the Ocean modules planning processes, with other parameters appearing only where they seem to be compelling and robust in terms of justification. Thus, the list of parameters in this Table will undergo some revision as the GOOS planning process takes place over the next few years, it is expected that the changes would occur in terms of additions to the list, not deletions, especially in the most important grouping. Some of the less important parameters may also rise in importance as the planning process proceeds.

Table: Required Parameters for GOOS

Most Important	Important	Least Important or Undetermined Importance
Nutrients (phosphorus, nitrogen) ^{6, 7} Oxygen ^{1,2} Human pathogens (eg, e.coli, cholera) ¹ Bio-effects, impacts (e.g., fish tumors, fisheries collapse) ¹ Biomass (chlorophyll, plankton distribution/abundance) ^{1,2,5} Habitat destruction: ^{1,5} Coral reefs, mangroves, seagrass Algal toxins (e.g., Red tide) ¹ Petroleum (e.g., PAH) ^{1,2} Synthetic organics (e.g., PCB) ¹ Herbicide/Pesticide (chlorinated hydrocarbons) ¹ Sea-surface temperature ^{1,28} Sea-surface salinity ^{1,2,3} Upper-ocean temperature (tropical, high density) ³ Wind (speed/direction) ^{2,3} Wind stress (vector) ³ Sea-level ^{2,3} Surface waves ^{2, 9} Coastal currents ^{2,4} Marine meteorology (air temp. & dew point, precipitation, barometric pressure, clouds, visibility, boundary layer profiles) ^{2,4}	Small pelagic fish (regime shifts) ¹⁰ Sea ice (extent, concentration) ^{3,5} Icing conditions ⁴ Upper-ocean temperature ^{1,3} (Mid-latitude) Surface heat flux ³ Surface water flux (incl. Runoff) ³ Surface CO ₂ flux ³ Upper-ocean salinity ¹ Marine debris ¹ Coastal bathymetry ² Coastal stratification ² Coastal sediment transport ² Coastal sediments ^{1,2} <i>(Note: some of these last 5 parameters may increase in importance as planning for Coastal GOOS advances)</i>	Trace metals ¹ Artificial radionuclides ¹ Pharmaceuticals ¹ Global inventories (heat, salt, carbon) ³ Silicates ² Optical transmissivity ² Sound speed ² Global circulation & transport ³

⁶ **A Strategic Plan for the Assessment and Prediction of the Health of the Ocean in GOOS.** Draft of June 1995.

⁷ **IACMST Survey of UK Requirements for GOOS Data and Products.** Inter-Agency Committee for Marine Science and Technology, IACMST, Southampton Oceanography Centre, Southampton, UK, 66 pages, December 1993.

⁸ **Scientific Design of the Common Module of the Global Ocean Observing System and the Global Climate Observing System: An Ocean Observing System for Climate.** Ocean Observing System Development Panel, Department of Oceanography, Texas A & M University, College Station, Texas 1995.

⁹ **Opportunities to Improve Marine Forecasting.** Marine Board, National Research Council, National Academy Press, Washington, DC, 1989.

¹⁰ **Report of the First Session of the *ad hoc* Panel for the Monitoring and Assessment of Living Marine Resources Module.** San José, Costa Rica, 7-10 December 1993.

ANNEX VIII

ODINEA

INTRODUCTION

It has been observed that the participation of IOCINCWIO Member States in IODE programme activities is minimal: no NODCs or RNODCs have been established in this region; only one DNA is registered in Tanzania. At the Third Session of IOCINCWIO, held in Mauritius in December 1992, it was noted that regional capabilities to interpret and use the results from large-scale experiments like TOGA and WOCE, are very limited. The Regional Committee identified a need to enhance this capability and train human resources to use both the data and interpret the results so as to provide advice on actions to the governments. RECOSCIX-WIO was identified as a centre through which such data could be delivered.

It is stated that, in order to ensure increased participation of IOCINCWIO Member States in the IODE programme, two major activities have to be undertaken: (i) *strengthen national capabilities and assist in the development of NODCs*; (ii) *develop a regional data and information network for the IOCINCWIO region*. It is noted that a regional information exchange network is already operational through the RECOSCIX-WD (Regional Co-operation in Scientific Information Exchange in the Western Indian Ocean region) project. The existing network can be adapted to include data exchange.

In response to the request formulated by IOCINCWIO-III, a project proposal was presented to the IODE Committee.

DEVELOPMENT OF A REGIONAL OCEAN DATA AND INFORMATION NETWORK IN THE IOCINCWIO REGION

1. PURPOSE OF THE NETWORK

Within the framework of IODE, the network shall:

- Provide a regional co-operative structure linking national oceanographic data centres (NODC). This linkage will ensure access of all scientists in the region to the data collected by national stations.
- Ensure active involvement of national institutions in the IODE programme.
- Adhere to the IODE data management procedures and ensure the use of standard methods for data collection and storage in the region.
- Ensure access of scientists in the region to datasets not located in the region including satellite datasets.
- Develop and disseminate data products for the benefit of scientists and policy makers in the region.
- Establish exchange of data and information with the WDCs Oceanography.

2. NETWORK COMPONENTS

The rationale behind the development of a regional network of NODCs is the need for co-ordinated capacity building. During IOCINCWIO-III, as well as the mission, it was stressed that, in order to achieve sustainable operational data management activities at the national and other levels, substantial efforts need to be made to build infrastructural, as well as human capacity. A regional network is considered as a suitable mechanism to achieve these objectives.

2.1 NATIONAL OCEANOGRAPHIC DATA CENTRES (NODC)

Each participating Member State should strive towards the development of a National Oceanographic Data Centre (NODC). Its Terms of Reference are defined within IODE. It will be one of the major objectives of the

project to assist Member States in the setting up of the NODC, training its staff, and developing the operational activities of the NODC.

2.2 REGIONAL DISPATCH CENTRE (RDC)

In order to provide an appropriate co-ordinating structure for the Network project, it is suggested to develop a 'Regional Dispatch Centre'. The **Draft Terms of Reference for the Regional Dispatch Centre** are defined as follows. The regional dispatch centre's role will be:

- (i) to provide support to the Member States in their setting up of NODCs. This support will include the organization of consultative expert missions to Member States, distribution of guidelines in NODC setup procedures, etc;
- (ii) to promote the IODE programme and its activities amongst marine scientists in the IOCINCWIO region and ensure their participation in the programme;
- (iii) to collect and disseminate in the region, information on the IODE programme, its components and programme activities;
- (iv) to organize regional training courses for NODC's staff;
- (v) to organize relevant training activities in data and information management for scientists, data and information managers;
- (vi) to develop a regional data holdings catalogue (MEDI-WIO);
- (vii) to co-ordinate the data flow NODCs-WDCs;
- (viii) to promote data management activities.

During IOCINCWIO-III, it was agreed to implant this centre, on an experimental basis, at the Regional Dispatch Centre of RECOSCIX-WIO, based at the **Kenya Marine and Fisheries Research Institute** (Mombasa, Kenya). By virtue of its 6 years experience, hosting the regional dispatch centre of RECOSCIX-WIO and the substantial training undertaken by the RDC staff, this institution is considered as a suitable location for the Network RDC.

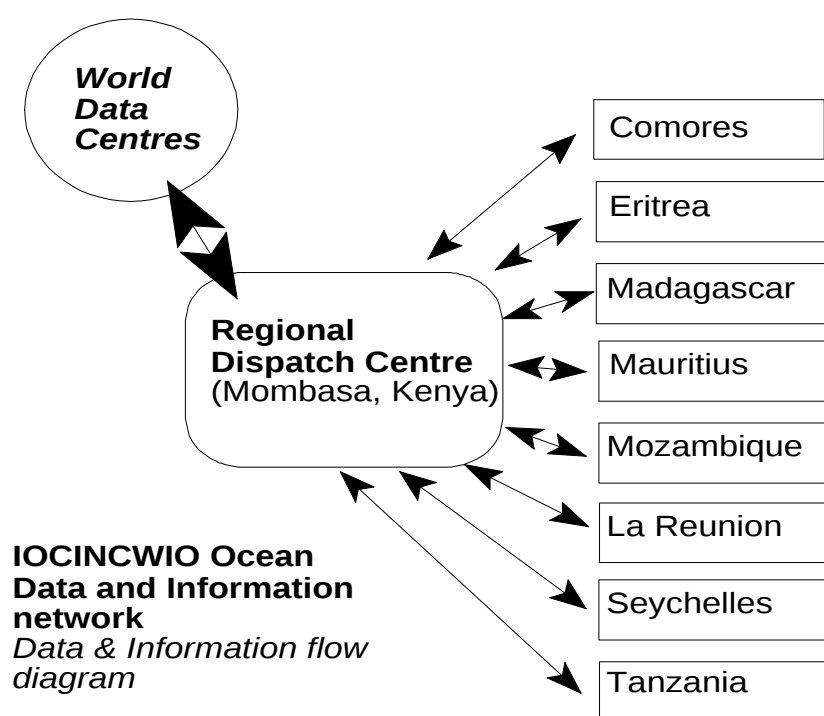


Figure 1

NETWORK SERVICES AND ACTIVITIES

The project will carry out a **development phase** and an **operational phase**. The development phase will include activities related to the building of the network and its components, the latter including NODCs and the RDC. During the development phase, all project services will be developed including substantial capacity building, both in terms of infrastructure, as well as training. The operational phase will include the provision of all services and continuous development and updating of data and information products.

The project will focus on **both data and information**, integrating both in all products. The term 'database' should be interpreted as numerical, as well as information 'database'.

1. DEVELOPMENT PHASE

This includes:

- (i) Setting up of the Regional Dispatch Centre.
 - (a) This will include the modification of the current RECOSCIX-WIO Regional Dispatch Centre to include the Network Terms of Reference. In consultation and co-operation with KMFRI, (additional) staff will be identified for the RDC operations.
- (ii) Analysis of national requirements for the NODCs and identification of NODCs by the Member States.
 - (a) Member States will be requested to identify national institutions to host the NODC. Upon request advisory missions can be undertaken to assist the Member States. Guidelines to identify suitable institutions (and minimum requirements) for NODC will be developed;
 - (b) Member States will identify infrastructure, as well as training requirements for the NODCs.
- (iii) Setting up of the NODCs (infrastructure and staff training).
 - (a) Member States will be assisted, if required, with some infrastructure (equipment) to enable their participation in the project;
 - (b) A regional training course for NODC managers will be organized.
- (iv) Development of **capacity catalogues**.
 - (a) **National Data Holdings Catalogue:** MEDI-WIO. This catalogue will provide information on national data holdings in MEDI format;
 - (b) **National Marine Science Programme Activities Catalogue:** NOPS-WIO, MSCP;
 - (c) **National Marine Science Human and Infrastructure Capacity:** WIODIR (Directory of Marine Science Institutions and Scientists).
- (v) Development of **national databases**.
 - (a) distribution of standard data management procedures and software;
 - (b) organization of regional data and information management courses.
- (vi) Development of a **regional data query service**.
 - (a) This service will assist national scientists in locating and obtaining datasets either from within or outside the region.

The development phase is estimated to take 3 years.

2. OPERATIONAL PHASE

The operational phase, following the successful implementation of the development phase will concentrate on the sustained provision of services and development of products. In terms of products, it is essential to highlight that scientists must be able to benefit fully from the network by having access to **data products** as well as data. The project will therefore need to make special efforts to develop such products.

ESTIMATED BUDGET

DEVELOPMENT PHASE (3 years)

Item	Cost
- setting up of the Regional Dispatch Centre = supplementary equipment	\$20,000.00
- identification of NODCs by the Member States = advisory missions (maximum 10 countries)	\$30,000.00
- setting up of the NODCs by the Member States = NODC equipment support (10 countries)	\$50,000.00
= Regional Training Course for NODC Managers	\$30,000.00
- communication costs (10 countries incl. RDC) (3 years)	\$40,000.00
- regional training course on data management	\$30,000.00
- regional training course on information management	\$30,000.00
- data products development and distribution	\$20,000.00
TOTAL	\$250,000.00

OPERATIONAL PHASE (4 years)

Item	Cost
- Communication costs	\$40,000.00
- regional training course data management	\$40,000.00
- regional training course information management	\$40,000.00
- data product development and distribution	\$40,000.00
TOTAL	\$160,000.00

TOTAL BUDGET: US\$ 410,000

ANNEX IX

SOFTWARE DEMONSTRATIONS

Indian Data Center Data Management Software - Dr. J.S. Sarupria

A user-friendly, menu-driven system is being developed for easy accessing oceanographic/marine information contained in the Northern Indian Ocean (NIO) CD-ROM. The system supports station data, time-series data and underway datasets. Users can select the desired dataset by defining area, season, parameters, etc. Selected data can be plotted along with bathymetric and underwater features. Also data export utilities is included in the S/W.

This S/W system is developed using TURBO C programming language under DOS environment.

GEBCO CD-ROM - Dr. M.T. Jones

Dr. M.T. Jones gave a demonstration of the GEBCO Digital Atlas (GDA) published by the British Oceanographic Data Centre in the spring of 1994. The CD-ROM is accompanied by a floppy disk containing the GDA Software Interface (designed to run under MSDOS 3.0 or later) and an extensive Supporting Volume describing the activities of GEBCO and providing a User Guide to the software. Dr. Jones explained how the work had been carried out under the joint auspices of the IOC and the IHO, with funding provided by the UK's National Environment Research Council. The GDA was being developed as an authoritative digital bathymetric chart of the world's oceans and, in future, would be used as the basis for the updating of GEBCO.

Dr. Jones described how the CD-ROM contained a full set of digitized bathymetric contours and tracklines from the Fifth Edition of the GEBCO printed charts published by the Canadian Hydrographic Service in the early 1980's. It also included a copy of the US Defense Mapping Agency's World Vector Shoreline and the IOC's International Bathymetric Chart of the Mediterranean. He demonstrated how the GDA Software Interface provided a powerful and user friendly interface to the CD-ROM including facilities for selecting, interrogating, visualizing, overlaying and exporting data from the GDA. It had a very low learning overhead enabling the user to zoom into any geographic area of interest at will. Contours, coastlines and tracklines could be displayed at a choice of 5 projections and could be exported in vector form into the user's own files as labelled streams of geographic co-ordinates in a simple flat ASCII format. Dr. Jones concluded by informing the Meeting that a second edition of the GDA would be published in late 1996 and would include revised bathymetry of the Northeast Atlantic and the Indian Ocean south of 50° S and down to the Antarctica.

A coloured brochure on the GEBCO Digital Atlas is available from BODC - it can also be viewed on the World Wide Web at URL = <http://www.nbi.ac.uk/bodc/gebco.html>

SeaStation Mariner Software - Dr. D. McLain

Dr. McLain demonstrated a commercial system for downloading real-time satellite images on a PC laptop (or desktop) computer. The system, called "SeaStation Mariner", uses 2 PCMCIA cards to receive VHF signals from NOAA TIROS-N satellites, and display SST images in real-time. A variety of options are available to overlay the images on other data, such as weather data, GPS position data, and climatological data from CD-ROMs. Information is available on INTERNET at: <http://www.oceans.com>.

OceanPC-OPCPLOT Software - Dr. M. Brown

Earth Science Mapping and Charting Software for Personal Computers (Version 6.0) OPCPlot is a PC/DOS-based programme to draw charts (in simple geographic projection) of any part of the Earth between 85 S and 85 N latitudes. OPCPlot includes a global database of shorelines, rivers, lakes, countries and US states extracted from the Micro World Data Bank II. A method to use instead the vast libraries of DMA vector product format (VPF) data (e.g., the Digital Chart of the World, or the World Vector Shoreline Plus [Spring 1996 release]) is described in the accompanying 60-page Manual. [Using VPF data requires a 2-step conversion through the DMA MUSE software.]

OPCPlot was begun in 1989 as a stand-alone charting programme, but it has been incorporated into the Intergovernmental Oceanographic Commission's "OceanPCProject" where it is the principal charting module. The programme can plot (or contour) the following environmental data formats over the base charts:

- OPCPlot vector format (comma delimited ascii fields);
- Gridded data with OPCPlot header;
- Gridded data with no header;
- Gridded data with SURFER header;
- ICES Standard Profile hydrographic data.

A companion programme, X2OPC, converts over 30 "external" formats (including the 1985-1990 TOGA CD-ROM files) to OPCPlot's vector format, so many more types of data can be plotted on the charts.

GTSPD CD-ROM - Mr. J.R. Keeley

MEDS is assembling a CD-ROM documenting the data and information of the Global Temperature-Salinity Pilot Project. The CD is nearly completed and this prototype version was demonstrated by Mr. J.R. Keeley. The CD contains all of the data assembled by the project from the start of 1990 to the end of 1995. All data have passed through GTSPD quality control and duplicates analysis software. There are roughly 400,000 stations with profiles of temperature, salinity and some oxygen. In addition, the CD contains all of the reports of GTSPD meetings and documentation of the quality control procedures applied by data and science centres participating in the project. Commercial software is used to tie all of the documentation and data into a single package that resembles how information is presented on the World Wide Web. In addition, the latest version of OceanPC and CDS/ISIS are provided as tools to view information and data. Translation software is provided to convert the format of the data on the CD into the format required by OceanPC. The final version of the CD is expected to be issued by the Summer of 1996.

Marine and Coastal Data Directory of Australia - Mr. B.J. Searle

A brief demonstration was held on the software developed by the Australian Oceanographic Data Centre (AODC) used to capture meta data as part of a broader project to develop an Inventory or Directory of marine and coastal data holdings. The software is based on Microsoft ACCESS database and includes a series of windows with data entry forms. There are a number of pull down lists to choose from in order to provide a more consistent data entry mechanism.

This software provides data entry, modification and output capabilities as well as some 'house keeping' or maintenance capabilities. The database can be queried according to specified criteria.

The software is available free of charge for those people that have a license for Microsoft ACCESS via the AODC's Home Pages under the 'Blue Pages' heading. Full documentation is also available at this site. The URL is: <http://www.aodc.gov.au/AODC.html>

US NODC Data Management System - Mr. R. Fauquet

The US National Oceanographic Data Center provided a live interactive software demonstration of systems being used to process and manage ocean data. The systems are based on a SYBASE relational database and on legacy data file look-up tables that previously ran on DEC microvax and UNISYS mainframe computers. The graphical user interface was adopted from the world wide web.

Using the forms page available for use on the world wide web, a very simple set of PERL scripts are executed from the entries on the forms page. The PERL scripts then create jobs to run queries to both the relational databases AND to the older file look-up tables. A single combined return is provided to the user. Thus, filling in the blocks on a single computer monitor screen replaces what used to require the creation, submission and execution of up to 10 individual computer programmes, which then had to be integrated by an oceanographer to determine the status of the processing of the dataset.

This system is used to track progress of received datasets through the processing stream because the catalogue and inventory information is actually generated when the query is run. Thus an inventory query for a newly acquired

dataset will be able to determine if the set has been added to the archive, added to the final working database, if the set has passed quality control routines, and if the appropriate documentation has been keyed to the data itself.

An added benefit of this development effort is to provide on-network access to look-up tables for ocean research ships, institutions, observing and monitoring projects, and data format descriptions. With this ability on-network access to user defined custom sub-sets of working databases is possible.

WWW Demonstration at IODE - H.D. Dooley (ICES) & J.R. Keeley (MEDS)

Since the last IODE Meeting, capabilities in communication by means of inter-linked computers has made incredible progress. One notable part of this increased communication capability is due to the World Wide Web. Most of the oceanographic community, including those concerned with oceanographic data management have taken advantage of the facilities of the Web. These facilities allow for the presentation, in a user-friendly way, of a hypertext-linked description of the work of an organization, and provide for the on-line accessibility of data and products. Some of these products take full advantage of present-day multimedia standards.

The demonstration was prepared using the Netscape WWW Browser which is normally connected to the Web via a computer that has a modem connection either directly to the Internet or via an Internet provider. A sequence of hypertext format files were downloaded from a number of IOC relevant sites which allowed for a rapid overview of WWW capabilities at the IODE.

The demonstration consisted of 5 parts, namely:

- (a) Use of local HTML files: This provides a quick overview of most of the demonstration without actually entering the Internet;
- (b) General Links: Points to two good starting points for those concerned with ocean research and data management;
- (c) Data Centres: Points to a number of (IODE) Oceanographic Data Centres;
- (d) Oceanographic Projects: A number of projects and programmes have dedicated Web pages. Here is a selection of them;
- (e) Databases, etc: WWW provides access to a number of fundamental databases of relevance to oceanographers. Here are examples;
- (f) Use of Searches: This demonstrates the use of the LYCOS search engine in helping you to answer your questions on oceanography and data management. Several examples of IODE relevant parameters are provided.

Irish Data Centre Software - Mr. J. Wallace

Extended EDMED for Ireland V. 1.0

The Extended EDMED for Ireland is a electronic directory of marine environmental data in Ireland. The directory aims to identify and describe the various types of marine data available in Ireland, the form in which these data are held and how they may be sourced. Sources of data include harbour and port authorities, local and national government and the academic, commercial and private sectors.

A user-friendly MS Windows software interface enables the contents of the directory to be searched, browsed and selected at the user's own desktop. At present, there are over 300 datasets described in version 1.0 of the extended directory. Each dataset description gives information on:

- Scientist and organization holding the data;
- Date(s) of survey;
- Geographic location on map;
- Description of the work carried out (including equipment and methods employed);
- Parameters sampled;

- Availability and relevant notes;
- Storage media;
- Publications;
- National/International Projects.

Geographic information can be added directly to a gridded map or entered as individual lat/long co-ordinates. Parameters sampled can be easily specified using tick boxes with a text entry for unlisted parameters.

There are several export file formats available such as text files, tab separated text and comma separated text. The output prints in either of two report formats, long or short form depending on the user's requirements. Dataset descriptions (records) compiled from a search routine, or individual tagged records can be extracted in either of these two ways.

In addition to identifying existing data holdings, the directory can also be used to log new datasets. This will serve a dual purpose of updating the directory held by the Irish Marine Data Centre and documenting the user's own work.

The EROS 2000 Database V1.0

The EROS 2000 Database holds data submitted from 8 cruises carried out in the NW Mediterranean as part of the European Rivers and Ocean System 2000 project. The EROS 2000 Database has 3 modules:

- The PUBLICATIONS module is a bibliography of the papers that have appeared in the EROS 2000 Water Pollution Research Reports. It includes the full abstract from each paper and allows advanced searching and selective printing.
- The SCIENTISTS module is a mailing list of all the people who are involved in the EROS 2000 project. It provides contact information as well as individual's scientific interest and also allows advanced searching and selective printing.
- The DATASET INFORMATION module represents the core of the management system. It contains both cruise details and their associated datasets. Each dataset is sourced to the relevant cruise and contributing scientist(s).

In addition to the cruise details, participating scientists and parameters measured, a notes field has been included to allow for storage of information on methodology used in collecting/analyzing the data, as well as information regarding the quality of the data and any quality assurance procedures (as established by the scientist) that have been carried out on the data.

Features of EROS 2000 Database Data Visualization

Data visualization is achieved by activating various data windows via the STATIONS option. Geographical location plots of the cruise tracks and stations including quasi-GIS facilities are available. X-Y plots are also available. The graphing facility allows profiles from several stations to be overlaid on the same graph.

Searching

All modules of the application support advanced querying of the database based on logical criteria including geographical searches.

Data Reporting and Output

Report generation is also supported and reports may be displayed on the screen, written to an ASCII file or sent to a printer. Graphs may be placed in the clipboard and pasted into a word processing package where they can be further edited.

System Requirements

- Microsoft Windows v. 3.1;

- Intel 80386 IBM compatible PC or better;
- VGA (super VGA rec.);
- Minimum 8MB RAM.

Cruiseman V1.1 - A Research Cruise Data Management System

With the recent upgrading of the Lough Beltra and its Data Acquisition System (DAS), the ability of scientists to collect large volumes of data has increased dramatically. CRUISEMAN (short for CRUISE MANager) provides an interface between the numbers and the scientists and allows easy visualization of underway data logged to the Lough Beltra DAS during the course of a cruise. Scientists on board the Lough Beltra record a brief description of their cruise survey details (sampling strategy, location and parameters) prior to launching the DAS. Following the cruise, underway data is transferred to the Irish Marine Data Centre where it is formatted and visually quality assessed (for noise or spikes). CRUISEMAN links each cruise database dynamically to the original cruise survey details recorded by the Chief Scientist.

Individual cruise datasets (information and data) are distributed to the relevant cruise participants on CRUISEMAN, while a database of all cruises is managed at the Irish Marine Data Centre.

Features

In CRUISEMAN, 4 interactive modules maintain each dataset - Cruise Information, Parameters, Tracks and Cruise Track Player. The Cruise Information module contains pertinent survey details such as:

- participating scientists and organizations;
- research project name;
- survey location and description;
- date(s) of survey;
- notes on equipment used and methodology;
- important post-cruise information.

In association with the Cruise Information module, the Parameters module maintains the survey objective by recording the measured parameters.

The Tracks module allows the user to plot or export data, or maintain their own data tables. It allows the user to perform the following:

- Select cruise tracks and parameters to plot;
- Filter data frequency;
- Create and export user-parsed data tables.

The Cruise Track Player module is the main feature of CRUISEMAN. This is where data visualization is achieved and time-series plots are linked interactively to data tables. It offers the following features:

- A time-series graph of parameters;
- A map of the survey location with a plot of the cruise track and stations;
- A graph and map printing facility;
- A data table viewer and data point selection facility;
- Y-axis scale customisation facility;
- Parameter gridding facility;
- Colour coding by parameter.

Scientists can use CRUISEMAN to suit their own needs. These could include:

- An immediate recollection of the history of a survey;
- A visual tool to give a picture of the features of a survey;
- A visual tool to view background conditions;
- A data processing tool which reveals spikes/anomalies;
- A data processing tool for creating user-parsed data tables.

System Requirements

- Microsoft Windows v. 3.1;
- Intel 80386 IBM compatible PC or better;
- VGA (super VGA rec.);
- Minimum 8MB RAM.

ANNEX X

LIST OF ACRONYMS

ADCP	Acoustic Doppler Current Profiler
AMAP	Arctic Monitoring & Assessment Programme
AODC	Australian Oceanographic Data Centre
ASFA	Aquatic Sciences & Fisheries Abstracts
ASFIS	Aquatic Sciences & Fisheries Information System
AVHRR	Advanced Very High Resolution Radiometer
BATHY	Bathymograph
BODC	British Oceanographic Data Centre
BSH	Bundesamt für Seeschifffahrt und Hydrographie (Germany)
BUFR	Binary Universal Form for Representation
CDS	Computerized Documentation System
CEADO	Argentinian Oceanographic Data Centre
CEC	Commission of the European Communities
CENDOC	Centro Nacional de Datos Oceanográficos (Chile)
CEO	Centre for Earth Observation
CEOS	Committee on Earth Observation Satellites
CERESCOR	Centre de Recherche Scientifique de Conakry (Guinée)
CMD	Continuously Managed Database
CMM	Commission for Marine Meteorology
CNROP	Centre National de la Recherche Océanographique et des Pêches (Mauritania)
COADS	Comprehensive Ocean Atmosphere Data Set
CODATA	Commission on Data for Science & Technology (ICSU)
COMSBLACK	Co-operative Marine Science Programme for the Black Sea
CSR	Cruise Summary Report
CTD	Conductivity, Temperature, Depth
DNA	Designated National Agency
DODS	Distributed Oceanographic Data System
EC	Executive Council (IOC)
EDMED	European Directory of Marine Environmental Data
EEZ	Exclusive Economic Zone
ESA	European Space Agency
ETEDM	End-To-End Data Management
EU	European Union
EURASLIC	European Aquatic Sciences & Libraries & Information Centres
EUROGOOS	European Global Ocean Observing System
FAO	Food & Agriculture Organization of the United Nations

GCOS	Global Climate Observing System
GDA	GEBCO Digital Atlas
GEBCO	General Bathymetric Chart of the Oceans (IOC-IHO)
GEMIM	Group of Experts on Marine Information Management
GEODAS	Geophysical Data System
GETADE	Group of Experts on Technical Aspects of Data Exchange
GF3	General Format 3 (IOC)
GIPME	Global Investigation of Pollution in the Marine Environment (IOC)
GLOBEC	Global Ocean Ecosystem Dynamics
GODAR	Global Oceanographic Data Archaeology & Rescue Project
GOOS	Global Ocean Observing System
GOVPP	Global Ocean Velocity Pilot Project
GTOS	Global Terrestrial Observing System
GTS	Global Telecommunication System (WMO)
GTSP	Global Temperature-Salinity Pilot Project
HELCOM	Helsinki Commission
HOTO	Health of the Oceans
IAMSLIC	International Association of Aquatic & Marine Science Libraries & Information Centers
ICLARM	International Centre for Living Aquatic Resources Management
ICSEM	International Council for the Scientific Exploration of the Mediterranean Sea
ICSPRO	Inter-Secretariat Committee on Scientific Programmes Relating to Oceanography
ICSU	International Council of Scientific Unions
IFLA	International Federation of Library Associations
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
IGBP	International Geosphere-Biosphere Programme
IGOSS	Integrated Global Ocean Services System
IHO	International Hydrographic Organization
INCO	Iranian National Centre for Oceanography
IOC	Intergovernmental Oceanographic Commission
IOCARIBE	IOC Sub-Commission for the Caribbean & Adjacent Regions
IOCEA	IOC Regional Committee for the Central Eastern Atlantic
IOCINCWIO	IOC Regional Committee of the Co-operative Investigation in the North & Central
IOCINDIO	IOC Regional Committee for the Central Indian Ocean
IODE	International Oceanographic Data & Information Exchange (IOC)
ISMARE	Irish Marine & Research Data Centre
IUCN	International Union for the Conservation of Nature
JGOFS	Joint Global Ocean Flux Study (SCOR-IOC)
JODC	Japan Oceanographic Data Centre
JPO	Joint Planning Office
JRC	Joint Research Centre

JSTC	Joint Scientific & Technical Committee (GCOS)
KMFRI	Kenya Marine & Fisheries Research Institute
KORDI	Korean Ocean Research & Development Institute
LOICZ	Land Ocean Interactions in the Coastal Zone
MAP	Mediterranean Action Plan
MARPOLMON	Marine Pollution Monitoring System (IOC)
MAST	Marine Science & Technology (CEC)
MBT	Mechanical BathyThermograph
MCSS	Marine Climatological Summaries Scheme
MEDATLAS	Mediterranean Atlas
MEDGLOSS	Mediterranean Global Sea-Level Observing System
MEDI	Marine Environmental Data Information & Referral System
MEDS	Marine Environmental Data Service (Canada)
MEDU	Mediterranean Action Plan Co-ordinating Unit
MGG	Marine Geology & Geophysics
MMS	Marine Meteorological Services
MSCP	Marine Science Country Profile
NCDC	National Climatic Data Centre
NGDC	National Geophysical Data Centre (USA)
NIO	National Institute of Oceanography (India)
NMC	National Meteorological Centre
NOAA	National Oceanic & Atmospheric Administration (USA)
NOAMI	National Oceanography & Maritime Institute (Bangladesh)
NODC	National Oceanographic Data Centre (IODE)
NOP	National Oceanographic Programme (IODE)
OCEANPC	Ocean Personal Computer Project
ODIC	Oceanographic Data & Information Centre
ODINEA	Ocean Data & Information Network for Eastern Africa
OOSDP	CCCO-JSC Ocean Observing System Development Panel
ORSTOM	Institut Français de Recherche Scientifique pour le Développement et Co-operation
OSRS	Subgroup on Ocean Satellites & Remote Sensing
PC	Personal Computer
PERSGA	Red Sea & Gulf of Aden Environment Programme
PIPICO	Panel for International Programmes & International Co-operation in Ocean Affairs (USA)
QC	Quality Control
RECOSCIX-CEA	Regional Co-operation in Scientific Information Exchange in the Central Eastern Atlantic Region
RECOSCIX-WIO	Regional Co-operation in Scientific Information Exchange in the Western Indian Ocean Region
RMNODC	Royal Malaysian National Oceanographic Data Centre

RNIIGMI	All Russia Research Institute of Hydrometeorological Information
RNODC	Responsible National Oceanographic Data Centre (IODE)
ROPME	Regional Organization for the Preservation of the Marine Environment
ROSCOP	Report on Observations/Samples Collected by Oceanographic Programmes
RTH	Regional Telecommunication Hub
SAR	Synthetic Aperture Radar
SHOA	Servicio Hidrografico y Oceanografico de la Armada (Chile)
SISMER	Systèmes d'Information Scientifiques pour la Mer (France)
SOA	State Ocean Administration (China)
SOC	Specialized Oceanographic Centre
TEMA	Training, Education & Mutual Assistance in the Marine Sciences (IOC)
TESAC	Temperature, Salinity, Currents
UNCED	United Nations Conference on Environment & Development
UNCLOS	United National Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNESCO	United National Educational, Scientific & Cultural Organization
UOT	Upper Ocean Thermal
URL	Uniform Resource Locator
VCP	Voluntary Co-operation Programme
VOS	Volunteer Observation Ship
WCRP	World Climate Research Programme
WDC	World Data Centre (IODE)
WESTPAC	IOC Sub-Commission for the Western Pacific Region
WIODIR	Western Indian Ocean Directory of Marine Scientists
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WWW	World Wide Web
XBT	Expendable BathyThermograph Instrument

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

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