Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

IODE Group of Experts on Technical Aspects of Data Exchange

Eighth Session
NASA Goddard Space Flight Centre
Greenbelt, MD, United States of America
13-17 March 2000

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Abstract

During their 8th Session, the IODE Group of Experts on Technical Aspects of Data Exchange reviewed the achievements made during the previous inter-sessional period. The Group also adopted a comprehensive workplan and medium-term objectives for GETADE that include: (i) Develop End-To-End Data Management framework strategy and appropriate projects, products and services, based on user requirements; (ii) Develop IODE Global metadata management system; (iii) Develop marine XML as a mechanism to facilitate format and platform independent information, metadata and data exchange; (iv) Develop the IODE Resource Kit as a marine data and information management reference tool for scientists and data/information managers; (v) Organize integrated national and regional level capacity building projects and programmes, linking equipment, training and operational activities; and (vi) Develop a high-quality IODE web presence and IODE Data/Information Management Portal as a mechanism to promote IODE, to reinforce the 'IODE family' principle, and to guide users to marine information, metadata and data sources. Seventeen participants attended the Session.

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ANNEXES

1. ORGANIZATION OF THE SESSION

1.2   OPENING OF THE SESSION

The IODE Chairman, Mr Ben Searle, welcomed the participants to the Eighth Session of the IODE Group of Experts on Technical Aspects of Data Exchange. He stressed the need for the Group to define concrete actions.

Mr Nickolay Mikhailov, Chairman of the Group welcomed the participants and thanked Ms Lola Olsen, GCMD Project Manager, for hosting this Session.

1.3   ADOPTION OF THE AGENDA

The Technical Secretary, Mr Peter Pissierssens, invited comments on the Provisional Agenda (Document IOC/IODE-TADE-VIII/1 prov.) and Timetable (Document IOC/IODE-TADE-VIII/1 Add prov.). The Group adopted the agenda and timetable.

1.4   WORKING ARRANGEMENTS

The Group then designated Ms Maria Hood as rapporteur for the Session.

1.5   CHAIRMAN'S REPORT

Reference was made to Document IOC/IODE-TADE-VIII/6 (Chairman's Report). The Chairman recalled the work plan of the Seventh Session (Dublin, October 1997) and his succession of Bob Keeley as Chairman of the Group in 1998 during the inter-sessional period. Mr Mikhailov referred to data formats, the MEDI (Marine Environmental Data Information Referral System) pilot project, archiving, the WWW, documentation and OceanPC as the main issues included in the GETADE-VII work plan. He noted that radical changes in technology had taken place since the last Session. As a result some of the actions were no longer relevant and had been cancelled. Implemented actions included (i) analysis of 21 data formats; (ii) MEDI; (iii) IODE Website and IODE data centre standard web page; and (iv) OceanPC. With regard to the WWW he reported that Russia had composed a list of over 1500 URLs entitled 'Travelling on Information Resources on World Ocean'.

2. IODE INTEGRATED INFORMATION TECHNOLOGY

This agenda item was introduced by Mr Mikhailov. Reference was made to Document IOC/IODE-TADE-VIII/7 (The IODE integrated technology for end-to-end data management). Mr Mikhailov identified the requirements for the end-to-end data management system as:

(i)   to develop IODE data management standards on the basis of modern information technologies;
(ii)   to provide support for the full cycle of data processing.

He identified the necessary IODE Data Management modules as:

(i)   metadata management module;
(ii)   data exchange module;
(iii)   data integration module;
(iv)   information products module;
(v)   data archiving module.

He stated that the IODE Data Management modules should be based on a unified integration platform.

Mr Searle commended Mr Mikhailov on the document and called on IODE to act quickly as several other initiatives had been developed or planned that may overlook IODE initiatives. In this regard he referred to the Greenwich project (UK), which is looking at developing innovative marine information technologies. He stressed the need for IODE to become involved in these initiatives. IODE should be a leader in standards and guidelines and be in a position to assist these initiatives. He deplored that most laboratories, institutions and even NODCs and WDCs build their own information systems that cannot easily communicate with each other. A lack of a marine data framework has kept software companies from developing standard marine data management systems.

The Group agreed that a data management framework is necessary. As a result emphasis should be put on developing high level technology specifically, based on the Internet, which is format independent. On the other hand it was recognized that agreements on basic data standards are essential. It was suggested that this could be linked to the XML discussions later on since this was seen as a possible component of a data framework. Reference is also made to Agenda item 7.

3. DATA TRACKING AND INVENTORIES

3.1 NOPs – STATUS OF 'RESEARCH SHIP INFORMATION AND SCHEDULES'

This item was introduced by Mr Ron Wilson. He gave a brief overview of the history of OCEANIC, saying that the OCEANIC system has three components: (i) WOCE datasystems inventory; (ii) Ship schedules; and (iii) GOSIC. The ship scheduling section not only includes information on schedules for coordinating data collection programmes, but also ship specifications such as ship size, equipment, etc. He explained that in addition the database inventory was also used to identify vessels that could assist with the recovery of lost equipment. The system currently contains historical records for about 1,000 cruises from 15 countries, and specifications about 78 ships.

The Group noted that OCEANIC is not exactly equivalent to the IOC National Oceanographic Programmes (NOPs). IOC NOPs are provided in hard copy to the Secretariat and represent an announcement that the data collected will be available for international exchange. The NOPs also contain more information about data collection plans. The IOC NOPs are forwarded to OCEANIC for entry into the database and are thus available on-line.

The Group expressed its appreciation for the NOP information service provided by OCEANIC but recommended upgrading it to make it more interactive and covering more countries. It was also suggested to restate the purpose of the NOPs and to re-identify the target audiences. From a more general point of view **the Group recommended** that the NOP database would become part, together with the ROSCOP and MEDI, of the IODE End-to-end Data Management (E2EDM) framework.

3.2 STATUS OF THE MEDI PILOT PROJECT AND FUTURE ACTIONS

3.2.1 The Global Change Master Directory (GCMD)

This item was introduced by Ms Lola Olsen. The mission of the Global Change Master Directory (GCMD) can be defined as assisting the scientific community in the discovery of, and linkages to, Earth science data, as well as to provide data holders a means to advertise their data to the Earth Science Community. The GCMD offers data set descriptions in the Directory Interchange Format (DIF). Users can register their metadata records on-line through an easy-to-use interface allowing for a step-wise building of the record. Records thus submitted are not appended to the database immediately but are quality-checked and then appended within 24 hours. The database can be queried in several ways including Free-text Search (including spatial search capability), Hierarchical Keyword Search (navigate by a hierarchy of keywords) and Supplementary Information Guided Search (search descriptions of data centres, campaigns or projects, sources (platforms), and sensors

(instruments)). Ms Olsen briefly discussed specific fields of the DIF that could be of significance to IODE. These included the citation, the ocean keywords, the parent-child relationships, the related URL and the node. The GCMD database system is updated continuously and is now in its seventh version, with a new version (MD8) being prepared for release in September 2000. Since its inception in the 1980s the GCMD has gained widespread recognition and is now receiving approximately 20,000 unique visitors per month.

Ms Monica Holland then proceeded to explain that the GCMD covers climate change, the biosphere, hydrosphere & oceans, geology, geography, and human dimensions of global change. The system currently contains over 8,000 records, with 22% pertaining to oceanography (including cryosphere and hydrosphere).

Mr David Kendig provided some technical details of GCMD's new Java-based MD8, highlighting the node structure of the system. The structure will include a central node at GCMD and multiple distributed nodes through cooperating partners. Each partner can enter new records into the system (which are appended to the central database) and the partners can also mirror a subset of the database or the entire database. Using this structure the GCMD can benefit from a decentralized input mechanism and the partners can maintain their identity, yet provide access to a comprehensive database system.

During discussions on GCMD and metadata in general the Group examined the importance of having ocean regions well defined. The International Hydrographic Bureau (IHB) "Limits of Oceans and Seas" was understood to be the only definitive list of ocean regions. However, it was acknowledged that the list is not politically current. The Group was informed of the work done in Australia to digitise components of this list.

The Group recommended to IODE Member States to undertake the digitisation of oceans and sea limits for their area of interest. These efforts would result in a global reference set that would be useful in a number of IODE data management activities.

The Group was informed about the planned cooperation between GCMD and GOSIC whereby GOSIC may become a GCMD node. GOSIC will have a 'window' in GCMD enabling queries of a GOSIC subset of the GCMD database.

The Group expressed its high appreciation and interest in the GCMD system and considered the option to establish an IODE node within the GCMD framework under version 8 (MD8).

3.2.2 Progress of the MEDI Pilot Project

This item was introduced by Mr Greg Reed. Reference was made to Document IOC/IODE-TADE-VIII/9 (MEDI Pilot Project: Status Report, February 2000). Mr Reed recalled that the MEDI system has been operational within the IODE community since 1979, initially as a paper-based product developed by GEMIM. During IODE-XV it was decided to implement a joint GETADE-GEMIM Pilot Project 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"*. A review of existing national and international data directory systems was undertaken in 1997. This included a detailed comparison of the European Directory of Marine Environmental Data (EDMED) and the Marine and Coastal Data Directory of Australia (Blue Pages). The review of these two directories revealed many similarities allowing direct mapping between most fields. Following this a first version of the MEDI Pilot Project software was developed in 1998 using *MS Access* as the database management system, with an additional spatial search tool to provide a user-friendly interface to the database. The software was distributed to a number of institutions in Eastern Africa (ODINEA), Australia, Thailand, Vietnam and Malaysia. Furthermore, the software was reviewed by the GEMIM during their seventh session. Several recommendations were made at that occasion to improve the product. Microsoft's changes in *MS Access 2000* caused some technical

problems with the software, which made AODC decide to migrate to a Java-based product. This migration offers several advantages including platform independence and database independence .

During a demonstration of the new MEDI software, Mr Reed explained that MEDI can be used by small data centres or individual scientists to build a metadata collection (the software includes its own database management system) or in those cases where a permanent Internet connection is not available. The product enables spatial queries (using bounding coordinates or line, polyline, polygon or irregular polygon) or text queries (with pick lists from GCMD keyword list) or SQL queries. It was also considered to include a search option from a subset of the GCMD sensor list.

The Group congratulated AODC with the excellent work done. **The Group considered** that the new MEDI software tool could be used as a client level toolbox to (i) create IODE metadata records for entry into GCMD; (ii) search the GCMD database using an advanced search interface; or (iii) NOP or ROSCOP(CSR) entry tool. Furthermore, it was suggested that the software would be an excellent off-line entry tool.

The Group pointed out that the MEDI software could be advertised to the scientific community as an excellent tool to provide appropriate citation information for data set holders/contributors. It was also suggested that the MEDI software could be pre-loaded with GCMD records for the area of interest of a country, and provided to scientists in that country. This would be a successful mechanism to encourage data entry.

A few suggestions were made to improve the product, such as the possibility to 'customize' the interface. The mechanisms to be used to submit the data entries to GCMD needed to be established in discussions with GCMD.

3.2.3   Global Observing Systems Information Center (GOSIC)

This item was introduced by Mr Ron Wilson. GOSIC has been developed to be a single point of access for information on G3OS (GCOS, GTOS, and GOOS) data. It will be based on a highly distributed system involving many organizations and databases. The web site will include a metadata directory, data flow diagrams for the operational observing systems, and a source of information about the G3OS programmes. The meta data directory will include (i) descriptions of existing databases that are judged relevant to G3OS requirements as identified by the science panels (this has been done by GCOS and GTOS but not yet for GOOS); and (ii) descriptions of databases that hold and provide data being collected by the operational observing systems. It is expected that the metadata system will be hosted by NASA (GCMD). It will provide a 'GOSIC' view by limiting GOSIC queries to G3OS entries. Hyperlinks in the DIF record will provide access to data for browsing, ordering or downloading, and for access to associated products.

3.2.4   European Directory of Marine Environmental Data (EDMED) and EuroGOOS Directory of the Initial Observing System (EDIOS)

This item was introduced by Ms Lesley Rickards. She provided a short overview of the history of EDMED recalling that EDMED had been developed in 1990-1991 with EU funding to find out what data had been collected in EU countries with a view of rescuing important datasets. EDMED, like GCMD, is based on DIF. The first EDMED was tested in Ireland and was then extended to 11 European Union countries + Poland. Currently, EDMED contains 2,300 records from 570 centres. As the scientific community is reluctant to fill out extensive questionnaires, it was decided to keep the field structure as simple as possible. The key fields are Data Set Title and Summary. Recently some modifications were made to the database taking into consideration the Blue Pages/MEDI system. It is planned to make EDMED part of a more comprehensive system including ROSCOP and EDMED, which will be called SeaSearch.

The Group invited EDMED to continue collaborating in the MEDI Pilot Project.

With regard to EDIOS, Ms Rickards reported that a project proposal has been submitted to the European Union for funding. EDIOS will build an inventory of information from all observing stations of EuroGOOS member organizations. The inventory will enable more efficient use of the stations and avoid duplication.

The Group noted the similarity of the EDIOS field structure and GCMD/MEDI and called on EDIOS to consider using GCMD/MEDI. Ms Rickards informed the Group that a decision in this regard had not yet been taken.

3.2.5 Blue Pages

Mr Greg Reed provided some information on the Australian Blue Pages. He recalled that the system had been set up in 1995 with external funding. In order to advertise the project a large number of agencies had been visited. These agencies were subsequently requested to create records. At this time the Blue Pages contain over 4,500 entries from about 12 Federal agencies. The agencies still maintain their own records, but the database is searchable over the Internet. Recently it was decided to use the GCMD search words in the Blue Pages.

3.2.6 ROSCOP

Brief information on this item was provided by Mr Harry Dooley. He drew the attention of the Group to the fact that ROSCOP was an IOC product monitored by the GETADE. ROSCOP now includes approximately 200 parameters. Mr Dooley then proceeded with a short demonstration of the ROSEARCH software.

Taking into consideration the E2EDM framework that would favour a linkage between NOP, ROSCOP and Dataset Descriptions (MEDI), and further taking into consideration that the field structures of these systems were substantially overlapping, **the Group recommended** to include a ROSCOP output form in the MEDI Pilot Project software.

3.2.7 Discussion on convergence of metadata systems and of the role of each of the main players

The Group strongly recommended that IODE's metadata system should be part of GCMD and that the MEDI (Pilot Project) software would be an appropriate offline input tool, additional to GCMD's on-line input interface.

The Group recommended to IODE-XVI that the MEDI Pilot Project software be adopted as the IODE standard metadata input software for creating dataset metadata descriptions. **The Group requested** that the new Java-based software, be distributed as widely as possible to data centres as well as national agencies and possibly scientists. The software should also be included in the IODE website for downloading. NODCs may also consider holding the software on their sites for downloading.

With regard to cooperation with GCMD at the structural level, **the Group recommended** that an IODE node should be created using the new GCMD MD8 system, to be released in September 2000. IODE data centres could then be organized as 'branches' to the node. AODC will investigate the possibility to host the IODE node.

In order to optimise the usefulness and suitability of the MEDI software as a national metadata management system, **the Group recommended** that the data centres should be able to extend the number of fields, to meet local needs but retaining all the existing fields to ensure compatibility with GCMD.

GCMD welcomed the recommendation of the Group to set up an IODE node and looked forward to its establishment, possibly by the end of the year 2000. GCMD also expressed interest in

the MEDI software as an off-line input tool for GCMD (taking into consideration some required modifications in the field structure).

With regard to cooperation between IODE and GOOS/GOSIC **the Group proposed** to undertake a pilot project on the creation of GOOS metadata records for the GOOS Initial Observing System (IOS). The pilot project will use the MEDI software to generate records which could then be included in GCMD and retrieved using the GCMD GOSIC view. The pilot project will be coordinated by Mr Ben Searle and Mr Ron Wilson.

As a second GOOS/GOSIC-IODE joint activity **the Group proposed** to develop a demonstrator for IODE-XVI on the use of XML to enable dynamic graphing and mapping of data on the WWW. This is described in more detail in Agenda item 5.5. A comparable initiative (JCOMM electronic products bulletin), developed at the International Research Institute for Climate Change Studies at Lamont-Doherty Earth Observatory of Columbia University was also mentioned.

4.   DATA FORMATS AND DATA UNIFICATION

4.1   INVENTORY OF DATA FILE FORMATS

This item was introduced by Mr Mikhailov. Reference was made to Document IOC/IODE-TADE-VIII/11 (Status of Data Format and Dictionaries). In his introduction Mr Mikhailov informed the Group that he had analysed 21 data formats. The analysis had been carried out on the basis of (i) data type; (ii) metadata level; (iii) used codes; and (iv) data structure. The formats could be subdivided in three groups: (i) formats with a fixed set of parameters; (ii) formats with a variable set of parameters; and (iii) formats with a variable set of parameters and GF3/GETADE logic with the description of the data structure as part of the record (mostly as headers).

During the discussions **the Group concluded** that formats remain a serious problem. Although IODE can provide guidelines for formats, many different formats will continue to exist and new ones will still be developed. Conversion into standard formats is unrealistic as well.

With regard to code tables the problem was considered as less dramatic but revisions of the code tables would lead to problems with historical data sets using older codes.

4.2   DATA DICTIONARIES

The Group recommended that serious attention should be given to the development of an IODE Data Dictionary. In this regard reference was made to two such initiatives: (i) Data Dictionary developed by Roy Lowry (Bidston, UK). This Dictionary includes over 4000 terms. These are based on existing data holdings of BODC; (ii) Glossary developed by Texas A&M. However, the group called for some caution as Dictionaries will require a continuous management structure. Although the Group considered that the IOC/IODE might be able to play a role in this, it was not clear whether such a long-term commitment would be possible. BODC indicated that, since the Lowry Dictionary was used in all their data activities, they would be continuing the maintenance of the Dictionary.

The Group noted the importance of having a mechanism for interconnecting different dictionaries.

The Group invited the ICES Working Group on data management to provide a copy of the document evaluating existing Data Dictionaries to be distributed among GETADE members in June 2000. A proposal for (an) IODE Data Dictionar(y)(ies) will be prepared by GETADE for adoption during IODE-XVI.

The Group invited Mr Edward Vanden Berghe to review the ASFIS/ASFA subject category listing in relation to the ICES document.

4.3 DIGITAL, SPATIAL AND TEXTUAL DATA PRESENTATION UNDER GIS/DBMS

This item was introduced by Mr Mikhailov. Reference was made to Document IOC/IODE-TADE-VIII/12 (Using GIS and DBMS for marine environment data management).

In his presentation Mr Mikhailov demonstrated that his system is based on two subsystems: (i) subsystem of the integrated database (IDB): this stores digital and part of the textual database. The main part of the textual and graphical data are stored in the database as links. This subsystem is the server component; (ii) subsystem of the problem-oriented application (POA). This part is the client part and may be either GIS applications created with ArcView, or applications developed in Delphi.

The Group stressed the importance of links between different types of data presentations i.e. digital, spatial and textual, for the same parameter.

4.4 DEVELOPMENT OF A MARINE XML

This item was introduced by Mr Greg Reed. Reference was made to Document IOC/IODE-TADE-VIII/13 Add. (A Marine XML – Technical Aspects).

In his introduction Mr Reed provided a short overview of XML. He identified the following advantages of using XML: (i) exchange of data: XML makes it easy to send structured data across the WWW; (ii) extensibility: new XML tags can be created by anyone at any time (contrary to HTML, which must follow a pre-set standard); (iii) plain text: XML files are plain (ASCII) text files with the tags being readable to both people and computers; (iv) data identification: the XML standard specifies how to identify data, not how to display them; (v) stylability: style sheets specify how data are displayed; (vi) hierarchical: XML documents are hierarchical in structure.

Before a new XML language can be designed, designers must agree on (i) which tags will be allowed; (ii) how tagged elements may nest within one another; and (iii) how the elements should be processed. (i) and (ii) are coded in a Document Type Definition (DTD) file.

Mr Reed described a project of the AODC that will develop a Java-based quality control application using XML-tagged data and providing a degree of independence from data formats.

The Group expressed its appreciation for the experiment and reiterated the need for a Data Dictionary that would enable definition of the necessary XML tags in a standardized fashion. The Group noted that other XML languages had already been developed that may be of use to the Marine XML: the Geographic Markup Language (GML) would assist in providing geo-spatial tags (longitude, latitude,…). Ms Olsen also reported the planned development of the Earth Science Markup Language (ESML) by the Hydrological Lab in Huntsville, AL (USA). Mr Dooley mentioned the XML initiative of the ICES study group on fish acoustics. **The Group requested** ICES to report on the discussions and recommendations of the ICES Working Group on data management on this topic.

The Group reiterated the need for a review of existing data dictionaries with the objective of identifying the most relevant dictionary as a basis for the Marine XML. It was indicated that due to the power and flexibility of XML it would be possible to use more than one data dictionary to ensure a diversity of user needs were met. **The Group requested** the Australian NODC (AODC), ICES, VLIZ and the Russian NODC to prepare a demonstrator Marine XML application by August 2000 that will enable the exchange of GTSPP data. The application will be demonstrated during IODE-XVI and should possibly lead to an IODE Marine XML Pilot Project.

4.5   APPLYING THE RESOURCE DESCRIPTION FRAMEWORK (RDF) TO MARINE METADATA

This item was introduced by Mr Alexander Besprozvannykh. Reference was made to Document IOC/IODE-TADE-VIII/14 (Applying the Resource Description Framework (RDF) to marine metadata). In his presentation Mr Besprozvannykh provided information about the Resource Description Framework (RDF) model which is an extension of XML.

Mr Besprozvannykh demonstrated the usage of the RDF for accessing metadata (inventories, dictionaries,…). The developed approach and software allows users to describe metadata and supports access to the metadatabase. An online demonstration was provided accessing a Russian NODC metadatabase.

The Group requested the Russian NODC to consider the inclusion of their applications in the XML demonstrator project.

5.   **IODE DATA MANAGEMENT CAPACITY BUILDING - INFORMATION TECHNOLOGIES**

5.1   OceanPC

This item was introduced by Mr Harry Dooley with additional information provided by Mr John Withrow. Reference was made to Document IOC/IODE-TADE-VIII/15 (Status Report on OceanPC). In his introduction Mr Dooley recalled that OceanPC was conceived in the early 1990s with the ambition to complement the very successful CLICOM concept promoted by WMO. OceanPC was therefore seen as providing the vehicle on which marine research and monitoring groups could supply quality-controlled data to the IODE system. OceanPC was also seen as a vehicle to advertise and promote the standards and protocols recommended by IODE. OceanPC also promotes the role of the Cruise Summary Report (ROSCOP) and has attempted to integrate ROSCOP as a key element of international oceanographic data management.

OceanPC was built rapidly, on existing systems, particularly from ICES. OceanPC was developed by a small group composed of Murray Brown, Doug McLain, John Withrow and Harry Dooley. Initially running under the DOS environment, OceanPC has recently been migrated to the Windows environment. Development of OceanPC has been hampered mainly by lack of resources as no specific funding has ever been available.

OceanPC has now been included as a component of the IODE Resource Kit (see agenda item 5.2)

The Group recognized the important role played by OceanPC in the past ten years in advertising and promoting IODE standards and protocols, **and expressed its high appreciation** to the OceanPC developers group.

The Group reiterated the need to continue developing IODE-specific software tools that should henceforth be included in the IODE Resource Kit.

5.2   IODE RESOURCE KIT

This item was introduced by Mr Greg Reed. Reference was made to Document IOC/IODE-TADE-VIII/16 (Status Report on the IODE Resource Kit). In his introduction Mr Reed defined the aim of the IODE Resource Kit to provide an 'NODC in-a-box' development tool for oceanographic data centres. The Kit is designed specifically for countries wanting to set up a data centre. It was based on the ODINEA CD-ROM, a training aid developed for the 'Ocean Data and Information Network for

Eastern Africa' training courses and workshops (1997-1999). Following a presentation during the 1998 IODE Officers Meeting, the IODE Officers meeting recommended "the development of a Pilot Project on the development of a computer-based tool based on the ODINEA CD-ROM, which will be called 'IODE Resource Kit' and will complement and support IODE training activities. The Officers recommended that the Pilot Project beta version CD-ROM should be presented to IODE-XVI with a recommendation to fully implement the 'IODE Resource Kit' as a comprehensive IODE product. An *ad hoc* Working Group was established (composed of Mr B. Searle, KeNODC, Mrs P. Simpson, Mr B. Keeley, GOOS Data and Information Management Service and IOC Secretariat). The *ad hoc* Working Group identified the objectives as the IODE Resource Kit as: (i) to constitute a computer-based tool as a follow-up and complement to IODE data and information management activities; (ii) to contain a number of modules that address marine data and information management requirements in the marine research process, going from programme design to programme support; (iii) to support the development of marine data and information management capabilities. It further decided that the Pilot Project should (i) review and revise the ODINEA course-in-a-box CD-ROM's core document entitled 'A toolkit of Data and Information Management Modules for ICAM and Coastal Oceanography Programmes'; (ii) identify suitable data, metadata and information (including IOC documents) to include in the IODE course-in-a-box CD-ROM; (iii) identify suitable data formats and format translation utilities to include in the IODE Resource Kit CD-ROM; and (iv) produce a beta version of the IODE Resource Kit CD-ROM including insert booklet with necessary installation, acknowledgement and copyright information, for submission to IODE-XVI. It was further agreed that the Pilot Project will concentrate on the IOCINCWIO region.

Following the recommendations and decisions of the Working Group the Resource Kit was revised and is now a set of modules with the following content:

Module 1: Oceanographic Data Centre-in-a-box Handbook: provides information on the IODE programme, on roles and responsibilities of data centres, on development of science and data management programmes. It also describes some of the skills essential for an ocean data manager including database technology, data, metadata and information management, data management guidelines, data management policy, data sources, data QC, data exchange formats, information sources, information exchange, products and services, and data classroom. The latter provides a training curriculum in the use of selected software products to QC and analyze ocean station data, including some of the OceanPC software, the newer Ocean Data View and Java Ocean Atlas. This part of the Kit emphasizes connections between available software and global databases, based on the use of common formats.

Module 2: IODE Reference Centre: provides a comprehensive electronic library of information, data and software resources related to oceanographic data and information management. These include a large number of manuals, guides and reference documents on instrumentation, standard reference materials, data entry spreadsheets and database management tools. At a later stage, a comprehensive list of WWW sites relevant to data and information managers will also be included. To complete this module a large number of freeware, shareware or trialware are included.

Module 3: Data and Information Custom Pack (on separate CD-ROM): contains environmental datasets (including the World Ocean Atlas), ASFA extracts, GLODIR extracts and information and data products for a specific region (currently for the IOCINCWIO region only).

The Kit has been developed jointly by Murray Brown (Phoenix Training Consultants), Greg Reed (AODC) and Peter Pissierssens (IOC). The latest version (Version 3) was demonstrated at, and reviewed by, the 1999 ODINEA workshop (Capetown, November-December 1999) (IOC Workshop Report No. 154).

The Group congratulated the IODE Resource Kit team for the impressive product they developed.

The Group restated the aims of the IODE Resource Kit as (i) a resource toolbox for data managers and scientists; (ii) a training aid (supporting IODE training courses and workshops) and (iii) a reference tool, in that order of importance.

The Group recommended that the Kit should become part of the IODE web site and linked to in the IODE Portal. The Group pointed out that the Kit's target audience should include not only data and information managers, but also scientists.

The Group recognized that non-English language versions may be required to ensure wide spread use of the Kit. In this regard it was recommended that a French version be prepared, to be used within the framework of the ODINAFRICA-II proposal. Other language versions should also be considered as required.

In order to ensure the submission of a high-quality product at IODE-XVI**, the Group decided** to establish a Working Group which will (i) finalize the beta version of the IODE Resource Kit for presentation during IODE-XVI; and (ii) prepare a document proposing the future development, management structure (including recommendation for project manager, recommendation for content development and maintenance) and strategy of the IODE Resource Kit. The latter document will be circulated to the GETADE members for comments, prior to IODE-XVI. The Working Group will be composed of Mr Edward Vanden Berghe, Mr Greg Reed, Mr Nickolay Mikhailov, Mr Clive Angwenyi and Mr Peter Pissierssens.

The Group recommended to seek funds for the further development of the IODE Resource Kit.

5.3 REGIONAL CAPACITY BUILDING PROJECTS

This item was introduced by Mr Peter Pissierssens. Reference was made to Document IOC/IODE-TADE-VIII/17 (IODE Data Management Training and Regional Capacity Building). In his introduction Mr Pissierssens gave a brief sketch of the history of the RECOSCIX-WIO and ODINEA projects that had emphasized the need to link equipment, training and operational support to provide an end-to-end capacity building solution. He stressed the need to abandon one-shot training activities without appropriate follow-up or isolated from a more comprehensive and integrated programme. He did issue a word of warning related to the substantial cost of integrated capacity building, which exceeded by far the financial resources of IOC, and could only be implemented with extra-budgetary resources.

The Group strongly endorsed the end-to-end approach to capacity building by the RECOSCIX-WIO and ODINAFRICA projects, and called on the IOC to extend this approach to all IODE capacity building initiatives.

The Group strongly emphasized the need to provide follow-up support to trainees. In this regard it was suggested to use the IODE listserv as a way for trainees to request expert assistance among the IODE data centres. It was also suggested that IODE Regional Coordinators should be given the additional task of coordinating support request follow-up.

The Group recommended that IODE data centre expertise should be included in the GLODIR database, and that this expertise should be advertised on the IODE web site as a resource for IODE trainees. In the IODE web site, as part of the individual NODC page display, thematic expertise listings for that NODC should be included.

5.4 NEW INFORMATION TECHNOLOGIES DEVELOPMENT

This item was introduced by Mr Ben Searle. Reference was made to Document IOC/IODE-TADE-VIII/13 (Technical Developments in Marine Data Management). In his introduction Mr Searle

referred to XML as a major new technology of significant potential benefit to IODE. He pointed out that the technical aspects of a this new technology were relatively simple. The challenge would be to have people accept and use the new technology. In order for the Marine XML to become globally accepted and adopted we must ensure that the development of Marine XML is a coordinated effort.

The Group recommended that a small group be established (like the WWW consortium), possibly composed of a number of interested UN agencies dealing with the Oceans, as well as commercial partners (software developers) and other significant marine data user groups. This group would need to define and endorse the specifications for the Marine XML. IOC could possibly act as Secretariat for this Group. **The Group requested** the IOC Secretariat to investigate options for the establishment of such a Group. Mr Searle offered to prepare a short paper for submission to IODE-XVI on this proposal.

5.5   WEB TECHNOLOGY FOR DATA ACCESS AND EXCHANGE

This item was introduced by Mr Alexander Besprozvannykh. Reference was made to Document IOC/IODE-TADE-VIII/20 (Web-technology for data access and exchange). In his presentation Mr Besprozvannykh gave extensive information on the 'Unified Information Space' as a component of End-to-End Data Management. He explained that the Russian NODC had undertaken an experiment to develop tools based on Internet technology for supporting Unified Information Space in the field of ocean data management. He identified components of UIS to include (i) transport protocol;(ii) unified dictionaries of parameters; (iii) data description language; (iv) metadata description language; and (v) addressing and identification. He gave a demonstration of the system showing selection of data and mapping of the data using scaleable vector graphics (svg).

The Group congratulated the Russian NODC with this highly sophisticated system that demonstrated the advanced possibilities with Internet technology and XML.

The Group decided to prepare a demonstrator for IODE-XVI, in cooperation with the XML demonstrator team, and which would focus on 3 different formats of T-S data using GTSPP, Russian format and ICES formats and show-how, with the use of XML; this data could be easily integrated and viewed as a 'single' data set, without the need for converting the data to a single format.

6.   **DATA PRODUCTS AND SERVICES**

6.1   IODE DATA PORTAL

This item was introduced by Mr Ben Searle. Reference was made to Document IOC/IODE-TADE-VIII/18 (The IODE Internet Data Portal). In his introduction Mr Searle defined a Portal as a gateway, usually a web site, that is a major starting site for users to find information or data on specific topics. An IODE Portal would form a niche entry point for users with an interest in a variety of marine data and information services. The IODE Portal should not be a single, but multiple-entry point system.

Reference was made to GOSIC, which provides a portal to G3OS data sources on the WWW. Mr Searle suggested to build the IODE Portal on the existing IODE web site that includes information on the IODE system, links to the NODCs, RNODCs and WDCs, information on marine professionals (GLODIR), marine science related sites (OceanPilot), list of acronyms, marine science libraries, etc. He noted that we currently lack a marine-specific search engine. He also mentioned the possibility of the portal providing a 'bureau service', which would allow data collectors to submit raw data to the system that would subsequently be quality controlled, metadata would be extracted and the data would be archived in the system.

The Group discussed the issue of centralized *vs.* decentralized systems. Ms Olsen remarked that GCMD's policy was to make use of the currently available technology but closely monitor

development of future technologies so as to ensure that users always received the best possible services through the most advanced technologies. She also noted that international metadata providers prefer to have full versions of the GCMD holdings in-house, making GCMD a multi-site mirrored database service. The input system was also based on a multi-site approach.

The Group considered the question of how the data centres would face the development of institutional and project-based data and information management systems that might develop independent of the IODE system. **The Group considered** that IODE should assist such initiatives by providing the necessary data and information management know-how to ensure that products and services developed by such projects and institutions would conform with IODE standards. **The Group also recommended** that IODE gives attention to the varied data and information needs of multi-disciplinary projects that are becoming increasingly important.

The Group discussed various ways to increase the visibility of IODE on the Internet to better reach the target audiences, i.e. marine scientists, marine data managers, and other users of marine data. **The Group agreed** that an IODE Portal would dramatically increase the visibility of IODE.

The Group agreed that the structure of the IODE web site should better reflect the IODE services and products, rather than the organizational structure of the IODE Programme. As the products and services are developed at the data centre level, the Group discussed at length ways how this information could be made visible within the IODE web site. These could include (i) data centres informing the IOC Secretariat about their new services and products by email, after which this information could be advertised in the IODE site; (ii) data centres to post information on their (new) services and products on a standardized web page on their own web site. The IOC could then create an 'include' link to this page in the IODE web site. **The Group agreed** that both options should be used.

The Group also recommended to IODE data centres to include a clearly visible link to the IODE web site in their web sites (possibly using the words 'A member of the IODE network of oceanographic data centres'). **The Group also requested** IOC to increase the visibility of the IODE site on the IOC web site homepage. **The Group requested** the IOC Secretariat to prepare a draft template for the standard IODE page, to be used by the IODE data centres on their web site. It was agreed that content and functionality should take priority over artistic quality.

The Group requested the IOC Secretariat, in consultation with the Group and the IODE Chair, to develop an IODE corporate branding for use on all IODE information and data products.

The Russian NODC offered to the IODE web site its list of over 1500 URLs entitled 'Travelling on Information Resources on World Ocean'. The IOC OceanPilot database could be used as a model from a technical point of view, enabling on-line registration and editing of sites.

As a major tool of the IODE Portal **the Group proposed** the development of a 'Search tool for integrated access to multimedia databases'. This tool should search all Internet resources using the Z39.50 protocol or a subset thereof, using the EU UNIVERSE project as an example. It should retrieve publications, metadata, etc. **The Group decided** to establish a working group to prepare a project proposal that could possibly submitted to the EU within Framework 5. The group will be composed of Ms Pauline Simpson, Mr Edward Vanden Berghe, Mr Ben Searle, Mr Greg Reed and Ms Lesley Rickards.

The Group requested Ms Pauline Simpson and the IOC Secretariat to contact FAO to gather information on their OneFish portal for dissemination to the Group.

7.   END-TO-END DATA MANAGEMENT FRAMEWORK

This item was introduced by Mr Nickolay Mikhailov. Reference was made to Document IOC/IODE-TADE-VIII/7 (IODE Integrated Information Technology). He identified the overall principles and architecture for an E2EDM system.

The Group agreed that a combination of the previous "IGOSS/IODE Data Management Strategy in Support of GOOS – The benefits of an end-to-end marine data management capability" and the revised "Integrated Information Technology" paper (Document IOC/IODE-TADE-VIII/7) provided both a vision for the future of IODE as well as a framework under which IODE development can take place. This framework will be developed through the creation of a series of building blocks. A number of existing or proposed projects will form the initial building blocks.

The Group fully endorsed the need for an IODE End-To-End Data Management strategy but recognized that the development of an E2EDM requires detailed planning meetings. As a first approach **the Group agreed** to revise Mr Mikhailov's document in preparation for IODE-XVI.

The Group recognized that the E2EDM needs to target users and products to meet their needs. Too often in the past the database was the end product for data centres. It is therefore essential to cooperate with scientists to identify products required by all users. It was pointed out that scientists can provide additional metadata that relate to accuracy, resolution, quality indicators among others, which are important for the product development but are not traditionally handled by data centres.

Reference was made to the EuroGOOS data requirement survey that could be useful to identify general marine data product requirements.

The Group decided that the revised IODE E2EDM document should be submitted to the relevant GOOS group as the IODE view and seek their comments and input as to meeting the GOOS user needs.

The Group recalled the decision at IODE-XV to establish a Steering Group on E2EDM. This would design GTSPP-like systems for other variables. When JCOMM was established it was recommended that the E2EDM Steering Group would be a joint IODE-JCOMM initiative. The Group stressed the need to ensure that IODE plays an active role in JCOMM.

8.   COOPERATION WITH OTHER PROGRAMMES

With regard to cooperation with GOOS, reference was made to the IODE Chair's participation in JCOMM.

With regard to cooperation with LOICZ (reference was made to the recommendation made by IODE-XV in this regard), the IODE Chair reported that he was in the process of drafting a Memorandum of Understanding with LOICZ on assisting them in marine data management. It was recalled that IODE-XV had proposed the development of a Directory of ocean datasets. **The Group agreed** that AODC will send a copy of the MEDI (Pilot Project) software and some additional descriptive information to LOICZ through the IOC Secretariat.

Reference was made to Agenda Item 5.4 where it had been proposed to establish a small group including UN agencies and other interested partners, on the development of a marine XML. **The Group requested** the IODE Chair to draft terms of reference of the XML Group and to prepare a list of possible initial partners.

9. GETADE PROGRAMME AND ACTION PLAN FOR THE NEXT INTER-SESSIONAL PERIOD

The Group discussed at length the direction in which it felt GETADE should develop in the next years. The Group defined the main mission of the GETADE work plan as:

"The development of an End-to-End Marine Data Management Framework"

The creation of a marine data and information management and exchange framework is essential when considering national, regional and global monitoring and research programmes. Such a framework cannot be developed overnight but must be based on a series of building blocks that address specific technological and policy issues. The GETADE action plan is aimed at providing the technology blocks within which a framework can be developed. The objectives given below form some of these and are inter-related, rather than 'one-off' projects.

Objective 1: **Develop IODE Integrated Global Metadata Management System**
- Task 1: Work with GCMD, building on GCMD technologies, to create an 'end-to-end' IODE metadata system, providing mechanisms for collection and dissemination of metadata.
    - Sub-task 1: Establish the IODE/GCMD node and NODC-level branch structures;
    - Sub-task 2: Develop IODE marine metadata views within GCMD;
    - Sub-task 3: Develop joint GCMD/IODE added functionality marine-oriented query tools/interfaces.
- Task 2: Develop and distribute the MEDI software, as the NODC or national agency level offline input tool for IODE metadata.
    - Sub-task 1: expand MEDI to provide an integrated 'end-to-end' metadata system by including NOP and ROSCOP.
- Task 3: Establish cooperative agreements with other marine programmes to promote IODE/MEDI/GCMD and provide services/tools to these programmes.
    - Sub-task 1: Establish cooperative agreement with GOOS to create GOOS metadata records for GOOS-IOS.

Objective 2: **Develop marine XML as a mechanism to facilitate format and platform independent data exchange, data management and metadata processes.**
- Task 1: Develop technical specifications for marine XML
    - Sub-task 1: Establish a marine XML working group (consortium) involving UN agencies involved in ocean environment, and other interested partners to oversee the development of a marine XML specification;
    - Sub-task 2: Identify Data Dictionar(y)(ies).
- Task 2: Prepare XML demonstrators and implementations;
- Task 3: Promote the marine XML at the data centre and national agency level;
- Task 4: Develop XML based applications, to support data tag creation, data processing and exchange.

Objective 3: **Develop the IODE Resource Kit as a marine data and information management reference tool for scientists and data/information managers.**
- Task 1: Establish Working Group to plan and guide development of the Kit and to coordinate its content development and maintenance;
- Task 2: Apply the Resource Kit in capacity building projects and programmes as a training aid, and provide feedback on quality/requirements to the Working Group;
- Task 3: Develop non-English versions as required;
- Task 4: Promote the Resource Kit.

Objective 4: **Organize integrated national and regional level capacity building projects and programmes, linking equipment, training and operational activities.**

- Task 1: Assist in the implementation of the ODINAFRICA project implementation by providing technical expertise and training, as required;
- Task 2:Assist in the drafting of, and seeking funding for, national/regional IODE integrated capacity building projects.

Objective 5: **Develop a high-quality IODE web presence and IODE Data/Information Management Portal, as a mechanism to better support the IODE user community with improved abilities to locate marine information, metadata and data sources as well as promoting IODE and to reinforce the 'IODE family' principle.**
- Task 1: Develop a services and products-oriented IODE web site, focussing on data, data products and information dissemination;
- Task 2: Increase and ensure distributed authorship of IODE web site, stressing 'IODE family' principle;
- Task 3: Develop the IODE data/information management Portal, providing powerful search tools to IODE and other marine data/information tools and services, including metadata and data;
- Task 4: Develop distributed capabilities for the IODE Data Portal.

10.   ELECTION OF THE GETADE CHAIR

The Group elected Mr Greg Reed as Chair of the Group for the next inter-sessional period. The Group thanked the outgoing Chair, Mr Nickolay Mikhailov for his hard work, especially taking into consideration the fact that he had taken over from the previous Chair Bob Keeley in the middle of the inter-sessional period. **The Group expressed its appreciation** to Mr Mikhailov especially for his vision in launching GETADE's movement towards integrated information technology through the End-to-End Data Management framework. **The Group called on** Mr Mikhailov to continue his and his centre's involvement in the Group's activities.

11.   DATE AND PLACE OF THE NEXT SESSION

In view of the substantive number of recommended action items that will require endorsement by the IODE Committee, and the need to respond quickly to the Committee's decisions, **the Group strongly recommended** to organize the ninth Session of the Group in the year 2001, preferably in March or April 2001. It was felt that this would best ensure effective implementation of the highly technological and time-sensitive medium-term work plan, recommended by the Group.

The new Chair, Mr Greg Reed, and the IODE Chair, Mr Ben Searle tentatively proposed to host the next session of the Group in Sydney, Australia. They will investigate this matter further and inform the IOC Secretariat as soon as possible.

12.   OTHER BUSINESS

The Group recommended that an item on the RNODC formats should be included in the Agenda of the next session.

13.   ADOPTION OF THE SUMMARY REPORT

The Group adopted the draft summary report of its eighth Session. **The Group instructed** the Technical Secretary and the Group's Chair to carry out the necessary editing and corrections when processing the final version.

14.   CLOSURE OF THE SESSION

The outgoing Chair, Mr Nickolay Mikhailov referred to himself and Mr Harry Dooley as the longest standing members of the Group. He said that this session had been a key meeting for the GETADE because the Group was now going through a complex and fascinating time with the increasing role of Internet-based information technology. Nevertheless he called on the Group not to forget the past successes and achievements of the Group and see these as a foundation on which the Group can now build. He closed by ensuring the Group of his and his centre's commitment to GETADE's objectives.

The IODE Chair thanked everybody for contributing to this exciting meeting. He especially thanked this session's host, Ms Lola Olsen, for the excellent arrangements, made at very short notice.

He expressed his and the Group's hope that the hosting by NASA/GCMD of this session would be symbolic for the future close collaboration between the GCMD and IODE in metadata management. He further thanked the Group members for the many outstanding working documents which had been prepared for this session. He pointed out that the Group had defined a number of new goals, mechanisms and framework for the future of IODE, and he expressed his hope that the IODE Committee would adopt these.

The Chair closed the session on Thursday 17 March at 15:30 hrs.

ANNEX I

AGENDA

1. **OPENING OF THE SESSION**

    1.1   OPENING OF THE SESSION
    1.2   ADOPTION OF THE AGENDA
    1.3   WORKING ARRANGEMENTS
    1.4   CHAIRMAN'S REPORT

2. **IODE INTEGRATED INFORMATION TECHNOLOGY**

3. **DATA TRACKING AND INVENTORIES**

    3.1   NOPS - STATUS OF ' RESEARCH SHIP INFORMATION AND SCHEDULES'
    3.2   STATUS OF THE MEDI PILOT PROJECT AND FUTURE ACTIONS
    3.2.1 The Global Change Master Directory (GCMD)
    3.2.2 Progress of the MEDI Pilot Project
    3.2.3 Global Observing Systems Information Center (GOSIC)
    3.2.4 European Directory of Marine Environmental Data (EDMED) and EuroGOOS Directory of the Initial Observing System (EDIOS)
    3.2.5 Blue Pages
    3.2.6 ROSCOP
    3.2.7 Discussion on convergence of metadata systems and of the role of each of the main players

4. **DATA FORMATS AND DATA UNIFICATION**

    4.1   INVENTORY OF DATA FILES FORMATS
    4.2   DATA DICTIONARIES
    4.3   DIGITAL, SPATIAL AND TEXTUAL DATA PRESENTATION UNDER GIS/DBMS
    4.4   DEVELOPMENT OF A MARINE XML
    4.5   APPLYING THE RESOURCE DESCRIPTION FRAMEWORK (RDF) TO MARINE METADATA

5. **IODE DATA MANAGEMENT CAPACITY BUILDING – INFORMATION TECHNOLOGIES**

    5.1   OCEANPC
    5.2   IODE RESOURCE KIT
    5.3   REGIONAL CAPACITY BUILDING PROJECTS
    5.4   NEW INFORMATION TECHNOLOGIES DEVELOPMENT
    5.5   WEB-TECHNOLOGY FOR DATA ACCESS AND EXCHANGE

6. **DATA PRODUCTS AND SERVICES**

    6.1   IODE DATA PORTAL

7. **END-TO-END DATA MANAGEMENT FRAMEWORK**

8. **COOPERATION WITH OTHER PROGRAMMES**

9. **GETADE PROGRAMME AND ACTION PLAN FOR THE NEXT INTER SESSIONAL PERIOD**

10. **ELECTION OF THE GETADE CHAIR**

11. **DATE AND PLACE OF THE NEXT SESSION**

12. **OTHER BUSINESS**

13. **ADOPTION OF THE SUMMARY REPORT**

14. **CLOSURE OF THE SESSION**

ANNEX II

RECOMMENDATIONS

Recommendation TADE-VIII.1

The IODE Group of Experts on Technical Aspects of Data Exchange,

Having reviewed its completed and ongoing activities,

Taking into consideration the needs of its user communities,

Considering the opportunities provided by new information technologies,

Identifies the following medium-term objectives for GETADE:

Objective 1: Develop End-To-End Data Management framework strategy and appropriate projects, products and services, based on user requirements.

Objective 2: Develop IODE Global metadata management system.

Objective 3: Develop marine XML as a mechanism to facilitate format and platform independent information, metadata and data exchange.

Objective 4: Develop the IODE Resource Kit as a marine data and information management reference tool for scientists and data/information managers.

Objective 5: Organize integrated national and regional level capacity building projects and programmes, linking equipment, training and operational activities.

Objective 6: Develop a high-quality IODE web presence and IODE Data/Information Management Portal, as a mechanism to promote IODE, to reinforce the 'IODE family' principle, and to guide users to marine information, metadata and data sources.

Recommendation TADE-VIII.2

ACTION PLAN FOR THE GROUP 2000-2001

The IODE Group of Experts on Technical Aspects of Data Exchange,

Having reviewed its completed and ongoing activities,

Highlighting the need for IODE to provide data services and products to its target audiences,

Taking into account the opportunities provided by new technologies,

Being aware of the resource constraints under which IOC is operating,

Adopts a plan of action for the inter-sessional period 2000-2001 as given in the Annex to this Recommendation.

Annex to Recommendation TADE-VIII.2

Action Item	Agenda Item	Task	Who	When	Cost
1	3.2.4	Invite EDMED to continue participation in MEDI pilot project	IODE Chair	4/2000	-
2	3.2.6	Include a ROSCOP output form in the MEDI pilot project and investigate NOP inclusion	Greg Reed	4/2000	$5000 (from AODC)
3	3.2.7	Limited distribution of Java-based MEDI Pilot Project software	AODC	6/2000	-
4	3.2.7	Distribution of MEDI software (version 1), 500-1000 copies on CD	AODC	End 2000	$5000
5	3.2.7	Send to IOC generic agreement on cooperation with GCMD (node establishment agreement)	GCMD	6/2000	-
6	3.2.7	IODE creation on GCMD MD8 system	AODC	End of 2000	$10,000/yr
7	3.2.7	Pilot project on creation of GOOS metadata records for GOOS IOS with MEDI Pilot Project software	B. Searle/ R.Wilson	End 4/2000	-
8	8	Inform LOICZ about MEDI status incl. MEDI pilot project software	AODC/ IOC Secretariat	6/2000	-
9	4.2	Distribute document evaluating existing data dictionaries, prepared by ICES WG on Marine Data Management to GETADE	ICES	6/2000	-
10	4.2	Prepare a proposal for IODE-16 to adopt an IODE Data Dictionary	Chair/ GETADE/ GCMD	7/2000	-
11	4.4	Distribute document on ICES consideration of marine XML prepared by ICES WG on Marine Data Management to GETADE	ICES	6/2000	-
12	4.4/4.5/ 5.5	Prepare a demonstrator to present during IODE-16 of Marine XML based on the Russian NODC XML/RDF tools for the exchange and visualization of multi-format ocean temperature and salinity data	Russian NODC (lead)/AODC/ ICES/VLIZ	August 2000	$20000 (from centres), $2000 from IOC for demo
13	5.4	Investigate establishment of a small group (like WWW consortium) to define and endorse specifications of marine XML	IOC Secretariat/ Chair IODE	Prior to IODE-16	-
14	5.4	Prepare a short paper for submission to IODE-16 about marine XML on this proposal	Chair IODE	7/2000	-
15	5.1	Seek funding to support continued development of IODE Resource Kit	E.Vanden Berghe/ N. Mikhailov/ G. Reed/ C. Angwenyi/ P.Pissierssens	Cont.	To be identified
16	5.2	French translation of Resource Kit; others to be considered.	E.Vanden Berghe/ N. Mikhailov/ G. Reed/ C. Angwenyi/ P.Pissierssens	2000/ 2001	To be identified
17	5.2	Establish a working group to finalise the beta version of the	E.Vanden Berghe/ N.	8/2000	To be identified

		Resource Kit for IODE-16; prepare document on future development, management structure (including content development and maintenance), and strategy. Circulate to GETADE prior to IODE-16	Mikhailov/ G. Reed/ C. Angwenyi/ P.Pissierssens		
18		Investigate possibility to develop computer-based Data and Information Management training system with special attention to partnerships with relevant expert partners	E. Vanden Berghe/ IOC Secretariat	2001-…	To be identified
19		Develop corporate branding for IODE	IOC Secretariat/ GETADE/ IODE Chair	4/2000	-
20	6.1	Provide list of over 1500 data and information source URLs to IOC Secretariat for inclusion in IODE web site/ IODE portal	Russian NODC	3/2000	-
21	6.1	Adding clearly visible link in DC web site to IODE web site with words 'A member of the IODE network of oceanographic data centres'	All data centres/ IOC Secretariat	2000	-
22	6.1	Establish working group to prepare project proposal 'Search tool for integrated access to multimedia databases'	P. Simpson/ B. Searle/ G. Reed/ L. Rickards/ E. Vanden Berghe	8/2000	-
23	6.1	Updating of IODE web site to reflect IODE Services and Products	IOC Secretariat	Prior to IODE-16	-
24	6.1	Prepare a draft template for the standard IODE web page to be used by data centres	IOC Secretariat	Prior to IODE-16	-
25	6.1	Contact FAO to gather information on OneFish portal	IOC Secretariat/ P. Simpson	Prior to IODE-16	-
26	6.1	Data centres to inform the Secretariat about their new services and products to be advertised on IODE site; data centres to post information on their new services and products on a standardized web page on their own sites	Data Centres	Cont.	-
27	5.3	Entering Data Centre expertise into GLODIR database and development of thematic expertise list for IODE web site	All data centres/ IOC Secretariat	Prior to IODE-16	-
28	7	Revise IODE E2EDM document for submission to IODE-16 and GOOS	Chair IODE/ N.Mikhailov	7/2000	-
29	8	Advertise IODE activities through appropriate listservs and journals	IOC Secretariat/ IODE Chair/ GETADE Chair	Cont.	-

ANNEX III

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ANNEX IV

LIST OF DOCUMENTS

Document Code	Title	Agenda item
IOC/IODE-TADE-VIII/1	Provisional Agenda	1.2
IOC/IODE-TADE-VIII/1 add.prov.	Provisional Timetable	1.2
IOC/IODE-TADE-VIII/3	Summary Report	
IOC/IODE-TADE-VIII/4 prov.	Provisional List of Documents	1.2
IOC/IODE-TADE-VIII/5	List of participants	1.2
IOC/IODE-TADE-VIII/6	Chairman's Report on Inter-sessional activities	1.4
IOC/IODE-TADE-VIII/7	IODE integrated information technology	2
IOC/IODE-TADE-VIII/9	Status of MEDI Pilot Project	3.2
IOC/IODE-TADE-VIII/10	Description of the Global Change Master Directory (GCMD)	3.2.2
IOC/IODE-TADE-VIII/11	Status Report on Data Formats & Dictionaries	4.1/4.2
IOC/IODE-TADE-VIII/12	Using GIS and DBMS for Marine Environment Data Management (Part 1)	4.3
IOC/IODE-TADE-VIII/12 add	Using GIS and DBMS for Marine Environment Data Management (Part 2)	4.3
IOC/IODE-TADE-VIII/13	Development of a marine XML	4.4
IOC/IODE-TADE-VIII/13 add	Marine XML Technical Aspects	4.4
IOC/IODE-TADE-VIII/14	Applying the Resource Description Framework (RDF) Model to marine metadata	4.5
IOC/IODE-TADE-VIII/15	Status Report on OceanPC	5.1
IOC/IODE-TADE-VIII/16	Status Report on IODE Resource Kit	5.2
IOC/IODE-TADE-VIII/17	IODE Data Management Training and Regional Capacity Building	5.3/5.6
IOC/IODE-TADE-VIII/18	IODE Data Portal	6.1
IOC/IODE-TADE-VIII/20	Web-technology for data access and exchange	4
INF-1102	IODE Officers Meeting 10-13 February 1998, Goa, India Summary Report	1.4.2
IOC/IODE-XV/3	IODE-XV Athens, Greece, 23-31 January 1996	1.4.2

ANNEX V

Minutes of the IODE-GOOS-GOSIC-GCMD Collaboration Discussions
Goddard Space Flight Center, Greenbelt, Maryland
20 March 2000

AGENDA

   I. Background information from GETADE 8 Meeting (Mr Peter Pissierssens)
- Marine XML development (Mr Ben Searle)
- IODE-GCMD integration (Mr Peter Pissierssens and Lola Olsen)
- Demonstration of MEDI Pilot Project (Mr Greg Reed)

  II. GOSIC
- Collaborations with GCMD (Mr Ron Wilson)
- Possible role in / collaborations with IODE-MEDI-GCMD (Mr Ron Wilson and Ms Katherine Bouton)

 III. Action Plan from items I and II
 IV. Action Plan for full integration of MEDI-GCMD

DISCUSSIONS

Ms Maria Hood welcomed the participants and presented the objectives of the meeting, which were to discuss and plan the collaborations between IODE, GOOS, GOSIC, and GCMD to meet the metadata needs of the marine community and the GOOS programme.

Mr Peter Pissierssens presented a brief overview of the results from the GETADE-VIII meeting, highlighting the 5 main objectives of the GETADE programme: Development of the IODE Integrated Global Metadata Management System; Development of a Marine XML as a mechanism to facilitate format and platform-independent data exchange, management, and metadata processes; Development of the IODE Resource Kit; Organization of integrated national and regional level capacity building projects and programmes; and Development of a high-quality IODE web presence and IODE Data / Information management portal.

Mr Ron Wilson suggested that in any future IODE document we should better illustrate the different components of the end-to-end data management components and their usefulness for users.

Mr Ben Searle presented an overview of plans for development of a Marine XML, and described how marine XLM will enable format-independent information exchange, search and query, and display. These discussions are presented in full detail in the GETADE-VIII meeting report.

Mr Peter Pissierssens summarised the planned collaborations between IODE (MEDI Pilot Project) and GCMD, describing how efforts would be made to ensure compatibility between the MEDI field structure and the GCMD DIF, and discussing the development of an IODE node in the GCMD system. It was pointed out that the IODE community might have a need for some additional fields, currently not available in the GCMD DIF. This was not seen as a major obstacle. Further concrete tasks and action plans were left for later discussion. It was also noted that the offer to host the IODE node, made by AODC, would need to be approved by the IODE Committee during its 16th Session.

Mr Greg Reed gave a demonstration of the MEDI Pilot Project software for the participants from GOSIC who were not present during the GETADE-VIII demonstrations.

Mr Ron Wilson provided information on the existing and planned collaborations between GOSIC and GCMD, describing the development of a GOSIC 'view' in the GCMD system, where the G3OS metadata form a subset of the larger GCMD system and are searched through the GOSIC view using the GCMD system functionality.

In discussing possible collaborations of GOSIC with the IODE-MEDI system and the IODE-GCMD collaboration, Mr Wilson stated that GOSIC was interested in using the MEDI system as an offline data entry tool for the GOSIC system. Mr Wilson pointed out that GOSIC was developed to handle G3OS metadata at the directory level and that the inventory level metadata management services offered by the MEDI system could be used by the individual contributing G3OS data centres as both a metadata management tool and data entry into GOSIC.

Action plans from agenda items I and II include providing the MEDI Pilot Project software to GOSIC, and GOSIC will use the MEDI system to create metadata records for the GOOS Initial Observing System. GOSIC also wishes to explore the MEDI software capability for the metadata needs of GTOS and GCOS. After this initial pilot project is completed, GOSIC will discuss further details of collaboration and usage of the MEDI system to meet G3OS inventory level metadata needs.

GOSIC will present a demonstration of the GOSIC 'view' in the GCMD system to the GOOS Steering Committee meeting in May 2000, and MEDI will also present a demonstration of the inventory level management tools available for contributing data centres and programmes.

The remainder of the meeting was spent discussing the practical aspects of the MEDI-GCMD collaboration and assigning individual responsibility as follows:

- Comparison of GCMD and MEDI Fields (Greg Reed and Monica Holland)
- Modification of MEDI fields to be compatible with GCMD fields (Greg Reed)
- GCMD to expand geographic query possibilities to include polygons and polylines as in MEDI (Jeanine Pollack)
- Marine DTD (Greg Reed and GCMD staff)
- Issues of submitting information offline using MEDI to GCMD or node in GCMD (Lola Olsen)
- Technical specifications, requirements, and sample agreement statement for node development within GCMD (Lola Olsen)
- Data dictionary adoption by IODE and collaboration with GCMD keyword list (IODE and Monica Holland)
- Set up working group (joint GCMD / IODE-GETADE) for maintenance of data dictionary (IODE-GETADE and GCMD staff)

PARTICIPANT LIST

GCMD: Lola Olsen; David Kendig; Gene Major; Janine Pollack; Monica Holland;
AODC: Greg Reed (also GETADE Chair); Ben Searle (also IODE Chair)
GOSIC: Katherine Bouton; Ron Wilson
IOC Secretariat: Peter Pissierssens; Maria Hood

ANNEX VI

LIST OF ACRONYMS

AODC	Australian Oceanographic Data Centre (Australia)
ASFIS/ASFA	Aquatic Sciences Information System/ Aquatic Sciences and Fisheries Abstracts (FAO-IOC-UN/DOALOS)
BODC	British Oceanographic Data Centre (UK)
CLICOM	Climate Computing
CSR	Cruise Summary Report (also called ROSCOP) (IOC/IODE)
DIF	Directory Interchange Format
DOS	Disk Operating System
DTD	Document Type Definition
E2EDM	End-to-end Data Management
EDIOS	EuroGOOS Directory of the Initial Observing System
EDMED	European Directory of Marine Environmental Data (UK)
ESML	Earth Sciences Markup Language
EU	European Union
G3OS	Sponsors Group for the Global Observing Systems
GCMD	Global Change Master Directory (NASA, USA)
GCOS	Global Climate Observing System (WMO-ICSU-IOC-UNEP)
GEMIM	IODE Group of Experts on Marine Information Management (IOC/IODE)
GF/3	General Format No 3 (A General Oceanographic Data Exchange Format) (IODE)
GETADE	IODE Group of Experts on Technical Aspects of Data Exchange (IOC/IODE)
GLODIR	Global Directory of Marine (and Freshwater) Professionals (IOC/IODE)
GML	Geographic Markup Language
GOOS	Global Ocean Observing System (IOC-WMO-UNEP-ICSU)
GOSIC	Global Observing Systems Information Center (USA)
GTOS	Global Terrestrial Observing System
GTSPP	Global Temperature Salinity Profile Programme (IGOSS-IODE)
HTML	HyperText Markup Language
ICES	International Council for the Exploration of the Sea
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
IHB	International Hydrographic Bureau
IODE	International Oceanographic Data and Information Exchange (IOC)
IOS	Initial Observing System (GOOS)
JCOMM	Joint IOC-WMO Technical Commission for Oceanography and Marine Meteorology (IOC-WMO)
KeNODC	Kenya National Oceanographic Data Centre (Kenya)
LOICZ	Land-Ocean Interaction in the Coastal Zone (IGBP)
MEDI	Marine Environmental Data Information Referral System (IOC/IODE)
NASA	National Aeronautics and Space Administration (USA)
NODC	National Oceanographic Data Centre (IOC/IODE)
NOP	National Oceanographic Programme (IOC/IODE)
OCEANIC	Ocean Information Center (USA)
ODINAFRICA	Ocean Data and Information Network for Africa (IOC/IODE)
ODINEA	Ocean Data and Information Network for Eastern Africa (IOC/IODE)
RDF	Resource Description Framework
RECOSCIX-WIO	Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean region (IOC/IODE)
RNODC	Responsible National Oceanographic Data Centre (IOC/IODE)
ROSCOP	Report of Observations/Samples Collected by Oceanographic Programmes (IOC/IODE)
SQL	Structured Query Language
UIS	Unified Information Space

VLIZ	Vlaams Instituut voor de Zee (Belgium)
WDC	World Data Centre (IOC/IODE)
WWW	World Wide Web
XML	Extensible Markup Language

In this Series, entitled

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

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans S. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' *(Also printed in Spanish)*
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping *(Also printed in French and Spanish)*
12. Joint 100-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
13. Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
18. Second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica *(Spanish only)*
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. Second Session of the IODE Group of Experts on Marine Information Management
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources *(Also printed in French and Spanish)*
25. Third Session of the IOC Group of Experts on Effects of Pollutants
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans *(Also printed in French)*
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
30. First Session of the IOCARIBE Group of Experts on Recruitment in Tropical Coastal Demersal Communities *(Also printed in Spanish)*
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources
33. Second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
36. First Consultative Meeting on RNODCs and Climate Data Services
37. Second Joint IOC-WMO Meeting of Experts on IGOSS-IODE Data Flow
38. Fourth Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
39. Fourth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
40. Fourteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
41. Third Session of the IOC Consultative Group on Ocean Mapping
42. Sixth Session of the Joint IOC-WMO-CCPS Working Group on the Investigations of 'El Niño' (*Also printed in Spanish)*
43. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
44. Third Session of the IOC-UN(OALOS) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
45. Ninth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
46. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
47. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
50. Third Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System
52. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean
53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic *(Also printed in French)*
54. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico *(Also printed in Spanish)*
55. Fifth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
56. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
57. First Meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area
58. Fourth Session of the IOC Consultative Group on Ocean Mapping

59. Second Session of the IOC-WMO/IGOSS Group of Experts on Operations and Technical Applications

60. Second Session of the IOC Group of Experts on the Global Sea-Level Observing System

61. UNEP-IOC-WMO Meeting of Experts on Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change

62. Third Session of the IOC-FAO Group of Experts on the Programme of Ocean Science in Relation to Living Resources

63. Second Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials

64. Joint Meeting of the Group of Experts on Pollutants and the Group of Experts on Methods, Standards and Intercalibration

65. First Meeting of the Working Group on Oceanographic Co-operation in the ROPME Sea Area

66. Fifth Session of the Editorial Board for the International Bathymetric and its Geological/Geophysical Series

67. Thirteenth Session of the IOC-IHO Joint Guiding Committee for the General Bathymetric Chart of the Oceans *(Also printed in French)*

68. International Meeting of Scientific and Technical Experts on Climate Change and Oceans

69. UNEP-IOC-WMO-IUCN Meeting of Experts on a Long-Term Global Monitoring System

70. Fourth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes

71. ROPME-IOC Meeting of the Steering Committee on Oceanographic Co-operation in the ROPME Sea Area

72. Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' *(Spanish only)*

73. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico *(Also printed in Spanish)*

74. UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs

75. Third Session of the IODE Group of Experts on Marine Information Management

76. Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange

77. ROPME-IOC Meeting of the Steering Committee for the Integrated Project Plan for the Coastal and Marine Environment of the ROPME Sea Area

78. Third Session of the IOC Group of Experts on the Global Sea-level Observing System

79. Third Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials

80. Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans

81. Fifth Joint IOG-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes

82. Second Meeting of the UNEP-IOC-ASPEI Global Task Team on the Implications of climate Change on Coral Reefs

83. Seventh Session of the JSC Ocean Observing System Development Panel

84. Fourth Session of the IODE Group of Experts on Marine Information Management

85. Sixth Session of the IOC Editorial Board for the International Bathymetric chart of the Mediterranean and its Geological/Geophysical Series

86. Fourth Session of the Joint IOC-JGOFS Panel on Carbon Dioxide

87. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Pacific

88. Eighth Session of the JSC Ocean Observing System Development Panel

89. Ninth Session of the JSC Ocean Observing System Development Panel

90. Sixth Session of the IODE Group of Experts on Technical Aspects of Data Exchange

91. First Session of the IOC-FAO Group of Experts on OSLR for the IOCINCWIO Region

92. Fifth Session of the Joint IOC-JGOFS CO, Advisory Panel Meeting

93. Tenth Session of the JSC Ocean Observing System Development Panel

94. First Session of the Joint CMM-IGOSS-IODE Sub-group on Ocean Satellites and Remote Sensing

95. Third Session of the IOC Editorial Board for the International Chart of the Western Indian Ocean

96. Fourth Session of the IOC Group of Experts on the Global Sea Level Observing System

97. Joint Meeting of GEMSI and GEEP Core Groups

98. First Session of the Joint Scientific and Technical Committee for Global Ocean Observing System

99. Second International Meeting of Scientific and Technical Experts on Climate Change and the Oceans

100. First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific

101. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico

102. Second Session of the Joint Scientific and Technical Committee for Global Ocean Observing System

103. Fifteenth Session of the Joint IOC-IHO Committee for the General Bathymetric Chart of the Oceans

104. Fifth Session of the IOC Consultative Group on Ocean Mapping

105. Fifth Session of the IODE Group of Experts on Marine Information Management

106. IOC-NOAA *Ad hoc* Consultation on Marine Biodiversity

107. Sixth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes

108. Third Session of the Health of the Oceans (HOTO) Panel of the Joint Scientific and Technical Committee for GLOSS

109. Second Session of the Strategy Subcommittee (SSC) of the IOC-WMO-UNEP Intergovernmental Committee for the Global Ocean Observing System

110. Third Session of the Joint Scientific and Technical Committee for Global Ocean Observing System

111. First Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate

112. Sixth Session of the Joint IOC-JGOFS C02 Advisory Panel Meeting

113. First Meeting of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS)

114. Eighth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of "El Niño" *(Spanish only)*

116. Second Session of the IOC Editorial Board of the International Bathymetric Chart of the Central Eastern Atlantic *(Also printed in French)*

116. Tenth Session of the Off ices Committee for the Joint IOC-IHO General Bathymetric Chart of the Oceans (GEBCO), USA, 1996

117. IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Fifth Session, USA, 1997

118. Joint Scientific Technical Committee for Global Ocean Observing System (J-GOOS), Fourth Session, USA, 1997

199 First Session of the Joint 100-WMO IGOSS Ship-of-Opportunity Programme Implementation Panel, South Africa, 1997

120. Report of Ocean Climate Time-Series Workshop, Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate, USA, 1997

121. IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS), Second Session, Thailand, 1997
122. First Session of the IOC-IUCN-NOAA *Ad hoc* Consultative Meeting on Large Marine Ecosystems (LME), France, 1997
123. Second Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), South Africa, 1997
124. Sixth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico, Colombia, 1996 *(also printed in Spanish)*
125. Seventh Session of the IODE Group of Experts on Technical Aspects of Data Exchange, Ireland, 1997
126. IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), First Session, France, 1997
127. Second Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 1998
128. Sixth Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1997
129. Sixth Session of the Tropical Atmosphere - Ocean Array (TAO) Implementation Panel, United Kingdom, 1997
130. First Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 1998
131. Fourth Session of the Health of the Oceans (HOTO) Panel of the Global Ocean Observing System (GOOS), Singapore, 1997
132. Sixteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), United Kingdom, 1997
133. First Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1998
134. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IOC/EB-IBCWIO-IW3), South Africa, 1997
135. Third Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), France, 1998
136. Seventh Session of the Joint IOC-JGOFS C02 Advisory Panel Meeting, Germany, 1997
137. Implementation of Global Ocean Observations for GOOS/GCOS, First Session, Australia, 1998
138. Implementation of Global Ocean Observations for GOOS/GCOS, Second Session, France, 1998
139. Second Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Brazil, 1998
140. Third Session of IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), China, 1998
141. Ninth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Ecuador, 1998 *(Spanish only)*
142. Seventh Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Croatia, 1998
143. Seventh Session of the Tropical Atmosphere-Ocean Array (TAO) Implementation Panel, Abidjan, Côte d'Ivoire, 1998
144. Sixth Session of the IODE Group of Experts on Marine Information Management (GEMIM), USA, 1999
145. Second Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), China, 1999
146. Third Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Ghana, 1999
147. Fourth Session of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC); Fourth Session of the WCRP CLIVAR   Upper Ocean Panel (UOP); Special Joint Session of OOPC and UOP, USA, 1999
148. Second Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1999
149. Eighth Session of the Joint IOC-JGOFS CO2 Advisory Panel Meeting, Japan, 1999
150. Fourth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), Japan, 1999
151. Seventh Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1999
152. Sixth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 1999
153. Seventeenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), Canada, 1999
154. Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y el Golfo de Mexico (IBCCA), Septima Reunión, Mexico, 1998
     IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA), Seventh Session, Mexico, 1998
155. Initial Global Ocean Observing System (GOOS) Commitments Meeting, IOC-WMO-UNEP-ICSU/Impl-III/3, France, 1999
156. First Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, Venezuela, 1999 *(also printed in Spanish)*
157. Fourth Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), China, 1999
158. Eighth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Russian Federation, 1999
159. Third Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), Chile, 1999
160. Fourth Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS). Hawaii, 2000
161. Eighth Session of the IODE Group of Experts on Technical Aspects of Data Exchange, USA, 2000