**Intergovernmental Oceanographic Commission**
*Reports of Meetings of Experts and Equivalent Bodies*

# IODE Group of Experts on Technical Aspects of Data Exchange

**Fifth Session**
Bidston, United Kingdom, 14-17 July 1992

**UNESCO**

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## 1. OPENING OF AND ARRANGEMENTS FOR THE SESSION

*1* The Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange was opened by the Chairman of the Group, Dr. Meirion Jones, at 10 a.m. on Tuesday 14 July 1992 at Bidston Observatory, UK.

*2* Dr. Jones welcomed the participants on behalf of the Director of the Proudman Oceanographic Laboratory and outlined the objectives of the meeting. In his opening remarks he gave a review of the activities of the British Oceanographic Data Centre (BODC) of which he is the Director. He explained how BODC acted on behalf of the Marine and Atmospheric Sciences Directorate of the UK Natural Environment Research Council and how the work of BODC was organized on a project basis with each project having clear objectives and a well defined programme of work. He stressed the importance that the Directorate placed on oceanographic data management and the strong support it gave to the activities of BODC.

*3* Dr. Jones then noted the major changes that had taken place since the Fourth Session of GETADE in 1988 - over this period there had been a major revolution in computing technology offering a greater range of data carriers, a more distributed computing environment and greatly enhanced hardware and software capabilities. Furthermore, there was a considerably increased diversity in the types of marine data being collected and a greater urgency for these data to be managed in a professional and timely manner. He stressed the need for the Group to review its objectives in the light of these developments and to provide the Scientific Community and other User Groups with clear guidance on the technical aspects of oceanographic data management.

*4* In closing his remarks Dr. Jones wished all participants much success and an enjoyable stay in Bidston.

*5* The List of Participants is given in Annex II.

*6* The Technical Secretary of the Session introduced the List of Documents and the changes. A final list of the working documents is presented in Annex III.

## 2. ADOPTION OF THE AGENDA

*7* The Agenda was adopted as presented in Annex I to the Summary Report. The Group decided not to nominate a Rapporteur for the Session but identified individuals to take responsibility for writing inputs to the draft of the Summary Report keeping the Chairman and the Technical Secretary responsible for the preparation of a final version of the draft to be discussed for adoption under Agenda Item 12.

## 3. ROLE OF THE GROUP IN INTERNATIONAL SCIENCE PROGRAMMES

*8* Dr. N.C. Flemming, Chairman IODE, reported that officers and experts from IODE had, for several years, been involved in working with the data management groups of the global science programmes, TOGA, WOCE and JGOFS. Whilst the science programmes needed to develop their own analysis and modelling centres, there had been growing recognition of the importance of professional data management, the value of formatting systems such as GF3 and the need for archive centres which could accumulate long-term climatic data sets. IODE plays a strategic supporting role in these issues.

*9* Forthcoming science programmes such as LOICZ, GEWEX, GLOBEC and GOEZS, could also be supported by the IODE system. The largest undertaking is the Global Ocean Observing System, which will be developed continuously throughout the 1990s.

*10* The Chairman IODE said that many factors are changing simultaneously and GE-TADE must adapt rapidly and identify those technical issues and decisions which can establish the priorities and critical expertise needed of IODE in the new situation. The Ocean Climate Data Workshop had identified a number of key issues. The report on the Joint IGOSS-IODE Data Monitoring for IODE-XIV (Paris, 30 November - 9 December 1992), had also noted that, if datasets were to be monitored, controlled and managed in a totally effective manner, a special system would be needed for each data type. This problem was exemplified by the success of the GTSPP, where dedicated efforts had greatly advanced the management of a limited range of variables.

*11* The GE-TADE must make strategic decisions: (i) how to manage increased volumes of data, meta-data, model output, quality control information, and text data; (ii) how to provide professional software for data management; (iii) how to provide the essential technical services for the big ocean science programmes without being on the critical path in the projects; and (iv) how to respond in a timely manner to demands for the management of new data types and data from new geographical ocean areas.

*12* The GE-TADE has a technical function to carry out which will always be needed. As the available technology, software and requirements change, GE-TADE must adapt.

*13* In the discussion **the Group agreed** to identify a small number of technical projects which would be the equivalent of the development of GF3 during the 1980s, and which would help to attract new funding.

## 4. STATUS AND FUTURE OF GF3

### 4.1 PREPARATION OF GF3 MANUALS

*14* The Group noted the acceptance of GF3 by many national oceanographic data centres and by some scientific international programmes for international oceanographic data exchange and agreed that efforts should continue for an expanded usage of GF3 and for its further evolution.

*15* The Chairman informed the Group of the status of the six volumes of the IOC Manuals and Guides No. 17 being produced to document the GF3 formatting system. Volumes 2, 4, 5 and 6 which describe the format and the software interface, GF3-PROC, have been published and are available. There remains for publication Volume 1, Introductory Document, and Volume 3, a Compilation of GF3 Standard Subsets.

*16* The Group was informed by the representatives of the RNODC-Formats and of the IOC Secretariat, that the present suite of documents describing standard GF3 subsets were most often requested. It was also noted that the standard subsets serve as useful examples of the capability of GF3 to handle quite diverse datasets. **The Group agreed** that the necessary work to issue Volume 3 should urgently proceed. It requested that this publication take the form of a loose leaf type of binding and be open-ended to allow for additional subsets as they were developed. **The Group appreciated** the efforts of BODC taken for the preparation of GF3 Volumes and **requested** the Chairman of the Group and the Secretary IOC to make the necessary arrangements for the finalization of the text and for this publication to be issued before IODE-XIV. The Group further noted that there may be a need for a limited financial support to speed up the publication and **requested** the Secretary IOC to consider possible ways of support.

*17* The attention of the Group was then focused on Volume 1. Whereas arrangements had been made at the previous meeting of the Group, the draft of this document had not proceeded as quickly as had been hoped. MEDS of Canada consented to proceed with the preparation of the first draft of this Volume, to be presented to IODE-XIV in December 1992 for comments and adoption.

### 4.2 RELATIONSHIP TO BUFR

*18* Mr. R. Keeley summarized the current state of affairs between GF3 and BUFR. BUFR is a binary format developed by WMO and promoted as the one and only future code form for exchanging data on the GTS. This means that, at some point, all IGOSS data will be exchanged in this format. The IGOSS Group of Experts on Operations and Technical Applications recognized that the code table entries in BUFR for oceanographic parameters were not suitable and proposed that GF3 parameter code tables be incorporated into BUFR. This work was begun by MEDS in Canada working with the Chairman of the appropriate WMO technical group which maintains BUFR code tables. Certain differences in how codes are assigned has made this task more complicated than originally thought. However, this work is continuing.

*19* **The Group noted** the advantage of using GF3 parameter codes for IGOSS data as a way to link more closely the handling of real-time and delayed mode data in IODE. For this reason **the Group strongly endorsed** the inclusion of GF3 parameter codes in BUFR tables and **requested** Mr. Keeley to proceed as expeditiously as possible with the implementation of this work.

*20* At the same time, **the Group noted** that the flexibility and capabilities of GF3 were rooted in its parameter code tables. The Chairman remarked that parameter codes were assigned only when the requirement and usage were well understood. **The Group agreed** that there was still a requirement for the creation of new parameter codes and that the assignment of these codes should proceed in as timely a way as possible. **The Group requested** the Chairman of the Group and the RNODC-Formats to work closely together to respond to the requirements for new parameter codes as the need arose.

4.3 BINARY AND PC VERSIONS AND THE FUTURE EVOLUTION OF GF3

*21* The Chairman informed the Group that the initial impetus for the incorporation of binary data into GF3 had come from the oceanographic community collecting multibeam echosounding data. The volumes of these data dictated that a more efficient form, such as binary data would provide, was needed in order for GF3 to be useful. The Chairman began working with the data collectors to remedy this problem and proposals had been made for extending GF3 to accommodate binary data. However, due to lack of resources, these proposals had not been implemented. The Chairman further noted the need for tuning GF3 for use on PCs and stated that the ICES Blueprint 86 and JGOFS formats had been developed as first attempts to address this need. With the rapidly developing computer and data collecting technologies, other needs for further developing GF3 beyond its primary role as a magnetic tape format would undoubtedly arise in future. However, **the Group recognized** the dangers in attempting to evolve GF3 in a "piecemeal" fashion as and when each new requirement arose.

*22* The Group then broadened discussions to other aspects of GF3. The Group was reminded that there is a large community of GF3 users and that it was necessary to consider their requirements in discussion of GF3. This was illustrated by the fact that GF3 is the format endorsed by WOCE for the exchange of data in this programme. **The Group agreed** that it was necessary to maintain GF3 as a stable format. With this in mind, it was noted that certain of the code tables, notably the table of country codes, needed review. The Chairman of IODE informed the Group that he was working with the IMO and ITU to resolve this particular problem. **The Group requested** that this investigation should continue. It recognized that a review of the other code tables in GF3 should be undertaken to ensure that they were all up to date, and requested RNODC-Formats to review these tables and propose appropriate updates to the Chairman and BODC.

*23* Discussion of the Group then broadened further. The Group was reminded of its responsibility for technical aspects of data exchange, not just maintenance of GF3. There are requirements to meet challenges for exchange of new data types such as those collected by remote sensing satellites and output from numerical models. At the same time, new technologies such as CD-ROMs, increasing use of telecommunication circuits for data exchange and significant improvements in computer capabilities are broadening the scope of data exchange. The attention of the Group was drawn to the fact that the characteristics of data exchange through a particular medium and format were strongly related to the type of data involved, the purpose of the data and physical characteristics of the medium. This dictated the need to analyze the environment surrounding the exchange in order to proceed in a satisfactory way. **The Group accepted** the basic truth of these statements. The Chairman noted that it was possible for the Group to respond to each demand as the need arose. However, he suggested that it was time to step back from the immediate problems and to examine the underlying logical structures of oceanographic data. The identification of these structures would then be the underpinnings used by the Group to respond in a coherent and consistent way to demands for formats for new data, new observation techniques and improved hardware capabilities. In particular **the Group felt that** the Chairman would have been successful in incorporating binary forms in GF3 had this structure been known. A small group consisting of H. Dooley, R. Lowry (BODC), N. Michailov and led by R. Keeley was formed. They were requested to prepare a paper for consideration at IODE-XIV which will contain a statement of the problem, the goals to meet the problem, terms of reference for the work of the group and a timetable for completion of the work.

## 5. REVIEW OF EXISTING FORMATS

*24* In introducing this item the Techical Secretary explained that its inclusion originated from a discussion at the Ocean Climate Data Workshop (OCDW) Greenbelt, USA, 18-21 February 1992, and an ensuing recommendation from the Second Meeting of the IODE Group of Experts on RNODCs and Climate Data Services (Washington, D.C., USA, 24-26 February 1992). The recommendation requested the Group of Experts on TADE to examine the status, use and utility of existing formats in meeting a need for a common structure to describe global change data and meta-data.

*25* **The Group noted** this request with interest and **considered** that the proposed developments in IODE and elsewhere suggested that there was an urgent need to review the current situation with regard to formats. In response to this request, background information on existing formats was prepared prior to the meeting by the experts of the Group, R. Keeley and N. Michailov.

*26* In introducing Document IOC/GETADE-V/11, R. Keeley drew attention to the necessity to develop a new format for the GTSPP project in order to meet the needs of the real-time data acquisition and quality control requirements of GTSPP. Although these data could be mapped into GF3, a project-specific format had been developed better tuned to the need for data exchange over computer networks. He pointed out, however, that this new format used a truncated version of the GF3 parameter code list, and that it was essential for this list to be maintained and elaborated on. The detailed discussion of the GTSPP format was held under Agenda Item 8.1.

*27* Mr. Michailov explained that the Document IOC/GETADE-V/Inf.2 was not intended to be an exhaustive list of format descriptions, but was formulated as a description of various formatting systems (types) currently in use in oceanography and which are characterized by specific methods and technical specifications. His document provided a brief description of a number of these structures, namely FGGE-III, GF3, BUFR, HDDZ, JGOFS, WHP, Blueprint 86, and the so-called "Perfect" format.

*28* Mr. Michailov noted that the latter format exists only in concept. It is the format that would meet all requirements and demands, and therefore he considered that it would be useful to specify the characteristics of such a format which would comply with various oceanographic data models (geo-referenced, gridded and image). Analysis of the existing formatting systems within the framework of the "Perfect" format concept would also help the creation of a common language environment (parameter tables and language syntax).

*29* Following the discussion **the Group noted** that the formats described in presented documents were in use principally at different data centres and/or project levels. There was, however, a growing lack of control in the area of user-defined formats encouraged in part by the ease with which data could be exported from, for example, databases. Although not wishing to discourage this evolution, it was considered necessary to formulate guidelines for the creation of such datasets.

*30* **The Group concluded** by agreeing to the following actions:

(i) A review of existing formats for oceanographic data should be undertaken (using Documents IOC/GETADE-V/11 and IOC/GETADE-V/Inf.2 as a basis), documenting the main features. Taking into account such details as the name of the format, its origin, documentation of the format, characteristics, features and limitations, status and use of formats, and use of code tables and information on software support, this review will be submitted to IODE-XIV and be led by Mr. D. Hamilton.

(ii) Guidelines for the preparation of user-defined formats, taking into account existing "bad practices" in the preparation of data sets by individuals, should be developed. These Guidelines will be prepared by H. Dooley and R. Lowry (BODC) and submitted to the next session of the Group of Experts.

(iii) An *ad hoc* Group formed as the result of discussions under Agenda Item 4.3 and led by R. Keeley was an appropriate way to approach the evolution of formatting systems for oceanographic data. This *ad hoc* Group should meet for a "brainstorming" session in 1993 with further work by correspondence and report its findings to the next session of the Group of Experts.

*31* **The Group further noted** the ongoing need for the ready availability of documentation on formats, including any associated parameter code tables (e.g., GF3 parameter codes, country and ship codes). This need should be met by the RNODC-Formats. From consideration of the report of this RNODC (Document IOC/GETADE-V/7) it was clear that it was opportune to revise its terms of reference. The present terms of reference had been formulated in 1984, primarily to meet the needs for the management of the GF3 format at that time. **The Group therefore agreed** to the re-formulation of the terms of reference as listed in Annex IV and requested its Chairman to submit the revised terms of reference to IODE-XIV for approval.

*32* It was agreed that RNODC-Formats would continue to work closely with BODC (UK) on responding to requests on technical issues relating to GF3. In this context, Dr. Jones reported that BODC had serviced requests for 82 installations of the GF3-Proc software, 29 of which were related to the implementation of the software on VAX/VMS systems, 15 installations on IBM mainframes, 17 installations on IBM PCs, 5 on SUNS under Unix and other installations on Burroughs, CDC, GEC, Data General, HP, NORD, NEC and UNIVAC machines.

## 6. OCEAN-PC

*33* The Technical Secretary Dr. I. Oliounine presented the Summary Report of the Expert Consultation on OCEAN-PC, a standard software package for Oceanographic Data Processing and Exchange (Paris, 7-9 November 1990). Experts have met and agreed on an approach to the development of a user-friendly, flexible and modular PC software package. The goal of the Project was to promote the effective use of ocean data by providing easy to use and standardized data management tools at the level of individual scientists. The consultation meeting agreed that the Project should aim to meet the needs of a wide variety of user groups from marine scientists to data managers in developing and developed countries.

*34* He then provided the Group with the latest information on OCEAN-PC developments:

(i) a listing of available software for marine data handling was prepared and published by IOC in the first quarter of 1992. This inventory of PC programmes contains information on tools, time and productivity packages, format conversion and exchange routines with particular focus on analytical capabilities, quality control and data visualization for marine science;

(ii) an initial software package was prepared in June 1992 partly based on ICES ocean data processing programmes;

(iii) the first draft of the OCEAN-PC intermediate term development plan was finalized and a limited distribution for comments will be arranged before the end of July in order to get comments and prepare a final draft for the adoption at IODE-XIV.

*35* The attention of the Group was focused on the Inventory of Software and Products for the Display and Analysis of Marine Data - "The Shoebox" (IOC/INF-878). **The Group welcomed** the publication of the Inventory by the IOC as the first attempt in providing the users with information on available software for processing of oceanographic data and expressed interest in its further development. However, **the Group expressed concern** that the content of the Inventory is very sketchy and many software packages and products freely and commercially available have not been mentioned.

*36* **The Group recognized** that the way in which the inventory was compiled will not meet fully the needs of users as much of the software does not come with user manuals and instruction. Future issues of the inventory should include information on how to use the software presented in the inventory. No distinction was given to the usage

of the software on slow and quick PCs in spite of the fact that in many developing countries there are only slow PC/XT class computers with 5.25" floppy disk for 370 KB format only. Software which depends on a math-coprocessor and for UGA display is not applicable for these systems. Although the use of MS-WINDOWS 3.0 greatly improves user interface, it was emphasized that WINDOWS 3.0 needs preferably 80386 or higher CPU plus 8 MB of memory to be comfortably used, which may not be readily available at small data centres. **The Group emphasized** that OCEAN-PC should develop a data structure which should go easily and clearly into the IODE system.

*37* **The Group requested** its Chairman to establish a close contact with the OCEAN-PC project leader, in order to bring to his attention concerns expressed by the Group (e.g., better identification of aims and tasks, description of functions, hardware and software specifications for database, means of management and processing, etc), to advise on the ways in which OCEAN-PC can correspond to IODE practices and provide assistance to the publication of a revised version if the need arises.

*38* Dr. Dooley reported on progress made in the implementation of OCEAN-PC during a working session held in ICES Headquarters in June 1992. Dr. D. McLain convened this Workshop which was closely steered by the Document "Intermediate Term Development Plan for OCEAN-PC", a draft of which was presented to the Group. This Plan, based on the Inventory (IOC/INF-878), was developed initially by Dr. McLain and modified during the course of the Working Session following the testing of some of its suggestions.

*39* The outcome of the Working Session was the production of an OCEAN-PC diskette of software packaged in such a way to provide for an easy flow of ocean profile data from key entry and format converters to the production of products. The diskette, which will be accompanied by appropriate documentation, is to be distributed soon to a selected group of reviewers, including some members of GETADE and potential users in developing countries. This review will form the basis of an up-graded version of OCEAN-PC software.

*40* **The Group recognized** the potential of the system being developed primarily on the basis of the ICES software and concurred that the next step should be an evaluation of the package by potential users. The feedback from this evaluation would provide essential information for the further development of the package.

## 7. OCEAN CLIMATE DATA WORKSHOP - TADE RESPONSE TO ISSUES RAISED

*41* **The Group was informed** of discussions between scientists and data managers that took place at the Ocean Climate Data Workshop (OCDW) held in Washington, USA, 18-21 February 1992. Results of that Workshop were further discussed at the Second Session of the Group of Experts on RNODCs and Climate Data Services, which formulated recommendations to the IOC and particularly to the GETADE (Annex VI).

*42* The recommendation regarding IOC and WMO sponsored workshops was fully supported by the Group. **The Group noted** its standing recommendation for a workshop (IOC/GETADE-IV/3) on applications of new computer technology and telecommunications to oceanographic data management. It was agreed that these issues were, to some extent, discussed in the Ocean Climate Data Workshop.

*43* A list of issues resulting from the OCDW presented to the Group stimulated considerable discussion in which it was noted that though these items are of a general nature they are all important technical issues in the management of oceanographic data. **The Group agreed** that specific recommendations regarding each issue would be of little value unless set in the context of specific problems. For example, recommendations regarding the storage and retrieval of large datasets depend on the nature of the data, of retrieval requirements and of the computing environment.

*44* **The Group also agreed** that it has made progress in, or is aware of, technical solutions to some issues. For example, it is known that standard data compression algorithms have already been worked out and are routinely available in Unix, DOS and other environments, but these implementations are system specific. In addition, the GF3 format for many years has presented the ability to hold meta-data in Plain Language Records, appropriately mixed with data records. **The Group noted with thanks** the readiness of Mr. D. Hamilton to review how ADCP data are handled and to produce a report for IODE.

*45* As for the recommendations of the Second Session of GERCDS, **the Group noted** that the recommendation to report on the status, use and utility of GF3 and other formats was considered as well as the recommendation to examine the need for an RNODC-Formats under Agenda Item 5. The recommendation to reconsider the terms of reference of the Group was discussed under Agenda Item 11.

*46* **The Group requested** the Chairman to report that it stands ready to respond to technical issues of the sort outlined in Annex VI. Furthermore, it was agreed that requirements placed on IODE have in fact increased from "data exchange" to the much broader area of "data management" in support of regional and global science programmes.

## 8. RELATIONSHIP TO IGOSS

### 8.1 REVIEW OF DEVELOPMENTS

*47* Mr. R. Keeley informed the Group on the progress in implementation of the GTSPP (Document IOC/INF-863). Routine handling of BATHY and TESAC data within the Project has been underway for 1.5 years. The data are received by MEDS, passed through quality control procedures and forwarded to the US NODC three times each week. The US NODC issues these data on a monthly basis to the WOCE regional science centres in Miami, San Diego, and Hobart, Australia. These centres subject the data to scientific quality control. As yet, data have returned to the US NODC from only one centre, but when fully operational, all centres will return the data on a regular schedule.

*48* The most recent meeting of participants of the GTSPP focused on handling of delayed mode data. They were informed of progress in accumulating historical data by the participants. For these data, the Group was asked to note that while the GTSPP focused on temperature and salinity profile data, if other profiles, such as nutrients, had been collected at the same time, they would need to be kept all together.

*49* The Group was interested in the achievements of the GTSPP. Of particular interest was the experience gained in automated quality control procedures, electronic data exchange and data monitoring. **The Group noted** that wider international use of the quality control software was impeded because it was VAX dependent, and that it would be desirable to have UNIX and PC based versions. Mr. Keeley informed the Group that the participants of the GTSPP were considering how this could be accomplished.

*50* The last meeting of the GTSPP endorsed using GF3 as the format for exchanging delayed mode data between participants. N. Michailov presented a draft subset (Document IOC/GETADE-V/Inf.5) for this purpose. He informed the Group that he had encountered some difficulties due to the variable length and contents of data structures used in the GTSPP format. In trying to meet this problem considerable inefficiencies in formatting the data resulted. **The Group expressed** appreciation for his efforts since these began to highlight some of the underlying data structures that were also appearing in newer formats. **The Group noted** that the small group formed as a result of the discussions of Agenda Item 4.3 would find his work of value. At the same time, **the Group requested** M. Jones to work with N. Michailov to develop the GF3 form needed by the GTSPP, taking in mind that whatever the solution, it must be in accord with present capabilities of GF3 and GF3-PROC.

### 8.2 DATA TRACKING

*51* **The Group reviewed** the paper on this topic prepared by R. Wilson and D. Kohnke for presentation at IODE-XIV (Document IOC/IODE-XIV/7). **The Group fully supported** the goals and activities set out in the paper, **and agreed** that monitoring of data was an important issue for IODE. **The Group also agreed** that NOPs and Cruise Summary Reports (CSRs) were of vital importance to any successful monitoring scheme.

*52* **The Group took particular note** that the document suggested that electronic management of CSRs within the proposed activities should consider the system developed by ICES for usage. H. Dooley informed the Group that the ICES system presently contained information from 12,000 CSRs, that he was co-operating with WDC-A, Oceanography, to load all of their holdings and that, when this was completed by the end of 1993, roughly 25,000

CSRs would be represented. This file would then be passed back to WDC-A for continued maintenance. He also informed the Group that all of the information contained in a CSR was transferrable to the ICES system except if track charts were also supplied. **The Group endorsed** the use of the ICES system for managing CSR information. M. Jones informed the Group that BODC would shortly conduct an experiment in optically scanning track charts and linking these to the information obtained from the associated CSR. **The Group expressed interest** in this event because it provided a way to explore how to build on the capabilities of the ICES system. **The Group requested** Dr. Jones to keep it informed on his progress.

## 9. TECHNICAL ISSUES OF COMMUNICATIONS

*53* Mr. S. Tani presented Document IOC/GETADE-V/9 which provided a brief summary of some of these issues. He noted that the choice of communications medium was related to the type of information to be sent, the volumes of data and the capabilities of the partners in the exchange. He remarked that there were certain activities, such as GTSPP and undertakings by a number of individual countries, where electronic interchange of data or meta-data was already happening. He went on to review the capabilities of some of the major international networks. He cautioned that there were still many countries in the world where there was no access to computer networks due to technical or financial reasons. Electronic mail services are still the lowest common denominator in this domain.

*54* Mr. Tani spoke briefly about the increasing use of media such as magnetic optical floppy disks. He noted their increasing use in the Japan Oceanographic Data Center (JODC) but cautioned that a standard format had not yet emerged. **The Group noted** that capabilities in the domain of communications are changing constantly and that solutions to a particular problem are dependent on the situation. Various members of the Group have experience in one or another area of this topic and the Group felt it would be helpful if others could be informed. Mr. Tani agreed to compile information from members relating to this topic and to prepare an information paper for IODE-XIV.

## 10. ELECTION OF THE CHAIRMAN

*55* **The Group unanimously elected** Dr. R. Keeley (Canada) as its new Chairman to hold office until the end of its Seventh Session.

*56* **The Group expressed** its thanks to Dr. M. Jones who led the Group during the past two intersessional periods so effectively.

## 11. REVISION OF TERMS OF REFERENCE

*57* **The Group reviewed** its terms of reference and proposed revisions as presented in Annex IV, in order to reflect fully its responsibilities in technical aspects of ocean data exchange vis-a-vis the IOC Committee on IODE.

*58* The proposed revision will be submitted to IODE-XIV for adoption.

*59* Under this Agenda Item **the Group reviewed** its membership and recommended the Chairman of the Group to provide guidance to the Secretary IOC on a new membership, so as to respond more efficiently to the demands from IODE community for technical advice on new technological developments in oceanographic data exchange.

## 12. ADOPTION OF THE RECOMMENDATIONS AND SUMMARY REPORT

*60* **The Group adopted** the Draft Summary Report of the Session and all recommendations contained herewith **and requested** the Technical Secretary and the Chairman to make editorial changes they feel necessary.

*61* **The Group requested** the Secretary IOC and its Chairman to arrange the next session not later than 1994.

## 13. CLOSURE

*62* The Session was closed by 1700 on 17 July 1992. In his closing remarks, Dr. Jones thanked all participants for their co-operation and the spirit of friendship which helped him so much in the successful implementation of his duties.

# ANNEX I

# AGENDA

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# ANNEX II

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# ANNEX III

## LIST OF DOCUMENTS [1]

| Document Code | Title |
|---|---|
| **WORKING DOCUMENTS** | |
| IOC/GETADE-V/1 | Agenda |
| IOC/GETADE-V/2 | Annotated Provisional Agenda |
| IOC/GETADE-V/3 | Summary Report |
| IOC/GETADE-V/4 | List of Documents |
| IOC/GETADE-V/5 | List of Participants |
| IOC/GETADE-V/6 | GF3 Procedures in Binary Forms and on PCs |
| IOC/GETADE-V/7 | Report of the RNODC Formats on Intersessional Activities |
| IOC/GETADE-V/8 | Summary of Decisions of OCDW and Recommendations of the Second Session of the Group of Experts on RCDS relevant to GETADE responsibilities |
| IOC/GETADE-V/9 | Technical Issues of Communications |
| IOC/GETADE-V/10 | IODE Contributions to International Science Programmes with Special Emphasis on Technical Aspects of Data Exchange |
| IOC/GETADE-V/11 | Review of Formats which Exist and are Used for an International Oceanographic Data Exchange |
| **INFORMATION AND OTHER REFERENCE DOCUMENTS** | |
| IOC/GETADE-V/Inf.1 | Local Arrangements |
| IOC/GETADE-V/Inf.2 | Review of Ocean Data Exchange Formats |
| IOC/GETADE-V/Inf.3 | Time Schedule |
| IOC/GETADE-V/Inf.4 | OCEAN-PC Intermediate Term Development Plan |
| IOC/GETADE-V/Inf.5 | GTSPP Data Exchange Format - GF3 Subset |

# ANNEX IV

## PROPOSED TERMS OF REFERENCE OF RNODC-FORMATS

1. Act as a Referral Centre for international/project oriented oceanographic data formats, maintaining a full set of documentation on all such formats and on supporting software.

2. Act as a Referral Centre for parameter and other code tables used in oceanographic data formats.

3. Assist (in co-operation with BODC, UK) in the management and administration of GF3 format, in particular, the servicing of requests for GF3 supporting documentation and software.

4. Report on its activities to the IOC Committee on IODE and its Groups of Experts on RNODCs and Climate Data Services and on the Technical Aspects of Data Exchange.

# ANNEX V

## PROPOSED TERMS OF REFERENCE FOR THE GROUP OF EXPERTS ON TADE

1. Evaluate and support the demands on IODE for new technical solutions, particularly with reference to the requirements expressed by the Ocean Climate Data Workshop.

2. Collaborate with IGOSS GE/OTA and the data management groups of other international bodies and scientific programmes in the development of technical solutions to support the management and exchange of oceanographic data.

3. Keep under review the formatting systems being used in the exchange of oceanographic data, and ensure the proper development of such systems in support of the needs of IODE and of scientific programmes.

4. Provide advice and guidance on the use of GF3 formatting system, and maintain and develop the system including its code tables, documentation and supporting software.

5. Continually review the impacts of new computing technologies on the exchange and management of oceanographic data, and identify opportunities (and propose solutions) for the evolution of the IODE systems in the light of these developments.

# ANNEX VI

## DECISIONS OF THE OCEAN CLIMATE DATA WORKSHOP & RECOMMENDATIONS OF THE SECOND SESSION OF THE GROUP OF EXPERTS ON RNODCs & CLIMATE DATA SERVICES RELEVANT TO GETADE RESPONSIBILITIES

### OCEAN CLIMATE DATA WORKSHOP (OCDW)

A full range of technical matters associated with the collection and dissemination of data and meta-data were discussed. It was recognized that many of these items will require assembling, relatively small, expert groups who would make specific recommendations aimed at solving a particular problem. Issues under this subject include:

(i) Problems associated with the increasing size of datasets:

- Techniques for storage and retrieval of these data.
- Study of compression techniques and of data products associated with these datasets.
- Training of data managers in handling of large datasets.

(ii) Increasing complexity of data:

- New data types especially in Chemistry and Biology.
- Growing importance of meta-data and problems associated with the cost, formatting, storage and retrieval of this information.

(iii) Need for correlation of datasets across disciplinary lines:

- Techniques for format interchange.
- Flexibility of data (and meta-data) recording.
- Development of a common geo-reference system.

(iv) Although oceanography was of prime concern to workshop participants, it was recognized that ocean data is only part of the total system and that multi-disciplinary datasets will need to be considered.

(v) Technical problems associated with the storage and retrieval of satellite derived observations.

(vi) Development of an overall IOC strategy focussed on the orderly development of data systems required for an operational ocean observing system. This development must be done jointly with experts in technology development, in co-operation with the WMO as well as other international bodies and might be the subject of another follow-on workshop.

Concern was expressed over the adequacy of communication networks as required by both present research programmes and potential monitoring activities. Workshop attendees suggested a study of the following items:

(i) Interactive transfers of data collections.

(ii) International data networks which could link data centres.

(iii) Rapid data dissemination to users worldwide.

(iv) Investigate regulatory policies that may hinder the use of the wider band widths needed to carry out current and planned programmes.

(v) All participants agreed that the electronic mail used widely by the oceanographic community has been, and will continue to be, an essential part of the international communication system.

**GROUP OF EXPERTS ON RNODCs & CLIMATE DATA SERVICES (GERCDS-II)**

Recommended

... the IOC & WMO Secretariats will assume responsibility for organizing workshops (each of 2-3 days length) to formulate and standardize the international reporting (real-time and delayed-mode) of several new instrument types. ADCP and towed-CTD data may be the subject of the first of these workshops; expendable instruments including XCTD, XPC & XSV - of the second one. Participants of these workshops should include scientists, manufacturers and data managers.

... taking into account that GF3 is currently recommended by WOCE as its delivery format to the WDCs; noting that it is not recommended by JGOFS although GETADE has worked with JGOFS to develop a free format GF3 which is an extension of GF3; noting also that GF3 is not apparently suitable to describe the GTSPP files, the Group of Experts on TADE to examine urgently and report to IODE-XIV on the status, use and utility of GF3 and other format systems with similar objectives (CDF, GTSPP) in meeting a need for a common structure to describe global change data and meta-data.

... the Group of Experts on TADE to consider the possibility of changing its Terms of Reference by inclusion issues relevant to software development for managing oceanographic data in order to avoid duplication and assist developing countries in the field; as well as issues relevant to communication development in order to facilitate data exchange between national, regional and global oceanographic data collection and processing infrastructures.

... the Group of Experts on TADE in consultation with ICES to examine a need to a present requirement for an RNODC-Formats.

**ANNEX VII**

**ACTION PLAN OF THE GROUP OF EXPERTS ON GETADE FOR 1992 - 1994**

| Agenda Item | Action | Responsibility | Deadline |
|---|---|---|---|
| 4.1 | Finalize Volume 3 of GF3 Manual N° 17 describing Standard GF3 Subsets | BODC, UK (M. Jones) | 09/92 |
| | Submit Volume 3 to IOC Secretariat for Publication | BODC, UK (M. Jones) | 10/92 |
| | Publication of GF3 Volume 3 | IOC Secretariat | 11/92 |
| | Prepare draft of Volume 1, Introductory Document & submit to IOC | MEDS, Canada (R. Keeley) | Fall 92 |
| | Distribute draft of Volume 1 with third despatch of IODE-XIV documents | IOC Secretariat | 09/92 |
| | Submit to IODE-XIV for comments | IOC Secretariat | 12/92 |
| | Finalize text of Volume 1 taking into account IODE-XIV comments & submit to IOC Secretariat for publication | MEDS, Canada (R. Keeley) | 03/93 |
| | Publication of GF3 Volume 1 | IOC Secretariat | 05/93 |
| 4.2 | Ensure inclusion of GF3 parameter codes in BUFR | Chairman GETADE (R. Keeley) | Continuing |
| | Create new parameter codes when required | Chairman GETADE RNODC-Formats (H. Dooley) | Continuing |
| 4.3 | Finalize discussions with IMO & ITU to changes in country codes | Chairman IODE (N. Flemming) | 10/92 |
| | Review tables of country codes & bring revised version to attention of IODE-XIV | RNODC-Formats (H. Dooley) | 12/92 |
| | Review other tables in GF3 & bring appropriate updates to IODE-XIV | RNODC-Formats (H. Dooley) Chairman GETADE (R. Keeley) BODC (M. Jones) | 12/92 |

| Agenda Item | Action | Responsibility | Deadline |
|---|---|---|---|
| | Prepare a proposal for IODE-XIV on the setting up of an *ad hoc* Task Team to study the underlying structures of oceanographic data & to recommend a method for evolution of formatting systems for oceanographic data | Chairman GETADE<br>*Ad hoc* Task Team<br>(R. Keeley) | 12/92 |
| | Prepare Terms of Reference of an *ad hoc* Group & its timetable | Chairman GETADE *Ad hoc* Task Team<br>(R. Keeley) | 12/92 |
| | "Brainstorming" session of *Ad hoc* Task Team (4 days, 4 participants) | R. Keeley | mid-1993 |
| | Finalize the study & submit to next meeting of the Group for consideration | Chairman GETADE<br>*Ad hoc* Task Team<br>(R. Keeley) | 1994 |
| 5. | Draft review of existing formats | US NODC<br>(D. Hamilton) | 12/92 |
| | Guidelines for preparation of user-defined formats | H. Dooley<br>R. Lowry | mid-1993 |
| | Make the ready availability of documentation on formats, including any associated parameter code tables | RNODC-Formats<br>(H. Dooley) | Continuing |
| | Submit new Terms of Reference of RNODC-Formats to IODE-XIV for approval | Chairman GETADE<br>(R. Keeley) | 12/92 |
| 6. | Co-operate closely & actively with project leader of OCEAN-PC development | Chairman GETADE<br>(R. Keeley) | Continuing |
| | Participate in evaluation of First OCEAN-PC software package | Chairman GETADE<br>(R. Keeley)<br>Russian NODC<br>(N. Michailov) | 8-11/92 |
| 7. | Inform Chairman of GERCDS on readiness of GETADE to respond to technical issues of data management as they have been mentioned in recommendations of GERCDS & OCDW | Chairman GETADE (R. Keeley) | 8-9/92 |
| | Review on handling of ADCP data & report to IODE-XIV | US NODC<br>(D. Hamilton) | 12/92 |
| 8.1 | Development of GF3 form needed by GTSPP. Report to next Session of GTSPP on development | Russian NODC<br>(N. Michailov)<br>BODC (M. Jones) | 4/93 |

| Agenda Item | Action | Responsibility | Deadline |
|---|---|---|---|
| 8.2 | Study of usage of optical scanning technology for information obtained from ROSCOP forms. Report on progress to next Session of GETADE | BODC (M. Jones)<br>RNODC-Formats<br>(H. Dooley) | 1994 |
| 9. | Compile information on technical issues of communications & data exchange media from Members of the Group | Japan NODC<br>(S. Tani) | 8-10/92 |
| | Prepare an information paper on the issue for IODE-XIV | Japan NODC<br>(S. Tani) | 12/92 |
| 11. | Submit revised Terms of Reference of GETADE for adoption at IODE-XIV | Chairman GETADE<br>(R. Keeley) | 12/92 |
| | Provide guidance to Secretary IOC on Membership of the Group | Chairman GETADE<br>(R. Keeley) | Continuing |
| 12. | Submit Summary Report of GETADE-V to IODE-XIV for adoption | Chairman GETADE<br>(R. Keeley) | 12/92 |
| | Arrange next Session GETADE-V in 1994 | Chairman GETADE<br>(R. Keeley)<br>IOC Secretariat | 1994 |

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