Intergovernmental Oceanographic Commission
Training Course Reports

11

IOC-Unesco Training Course on the Use of Microcomputers for Oceanographic Data Management

Asian Institute of Technology
Bangkok, Thailand, 16 January-3 February 1989

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Unesco

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IOC Training Course Reports

No.	Title	Language versions
1.	IOC Indian Ocean Region Training Course in Petroleum Monitoring, Perth, 18 February-1 March 1980	English
2.	IOC Regional Training Course for Marine Science, Technicians, Cape Ferguson, Queensland, 1-28 June 1980	English
3.	ROPME-IOC-UNEP Training Workshop on Oceanographic Sampling, Analysis, Data Handling and Care of Equipment, Doha, Qatar, 3-15 December 1983	English
4.	Stage COI d'initiation à la gestion et au traitement de l'information scientifique et technique pour l'océanologie, Brest, France, 28 novembre - 9 décembre 1983	French
5.	Curso mixto COI-OMM de formación sobre el Sistema Global Integrado de Servicios Oceánicos (SGISO), Buenos Aires, Argentina, 15 - 26 de octubre de 1984	Spanish
6.	Unesco-IOC-NBO Training Course on Tidal Observations and Data Processing, Tianjin, China, 27 August-22 September 1984	English
7.	Stage COI sur la connaissance et la gestion de la zone côtière et du proche plateau continental Talence, France, 18 septembre - 4 octobre 1984	French
8.	IOC Regional Training Course on Marine Living Resources in the Western Indian Ocean Mombasa, Kenya, 27 August-22 September 1984	English
9.	IOC-Unesco Summer School on Oceanographic Data, Collection and Management Erdemli, Icel, Turkey, 21 September-3 October 1987	English
10.	IOC-Unesco Regional Training Workshop on Ocean Engineering and Its Interface with Ocean Sciences in the Indian Ocean Region Madras, India, 17 March-5 April 1986	English
11.	IOC-Unesco Training Course on the Use of Microcomputers for Oceanographic Data Management Bangkok, Thailand, 16 January-3 February 1989	English

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1. INTRODUCTION

The IOC Regional Committee for the Western Pacific (WESTPAC) at its Fourth Session held in Bangkok, Thailand, 22-26 June 1987, recommended that the Member States of WESTPAC give special attention to the use of micro-computers to handle oceanographic data and acknowledged with thanks the offer of the Government of Thailand to host a training course in this regard at the Asian Institute of Technology (AIT).

The Unesco Regional Workshop on Marine Science Micro-computer Database Development (Jakarta, Indonesia, 17-19 September 1986), also recommended follow-up training activities to facilitate the use of micro-computers in data exchange.

IOC jointly with Unesco, and in co-operation with the National Research Council of Thailand (NRCT) and AIT, therefore, initiated steps first to organize a meeting of experts (Bangkok, 16-19 May 1988) to plan the training course. The training programme thus formulated was announced by IOC Circular Letter No. 1195, dated 25 July 1988, to all IOC Member States in the region.

Financial support for the course was made available under the regular programmes of IOC and Unesco as well as other sources, including the International Centre for Ocean Development of Canada, the Government of Japan and the Japan Hydrographic Association, the Netherlands Marine Science Foundation, the Department of Scientific and Industrial Research of New Zealand, the National Research Council of Thailand and AIT.

The IOC-Unesco Training Course on the Use of Micro-computers for Oceanographic Data Management was thus held at the Regional Computer Centre, AIT, Bangkok, Thailand, from 16 January to 3 February 1989.

The course was aimed at: (i) assisting scientific programmes and activities of the IOC Regional Committee for WESTPAC and Unesco Member States by training specialists to provide quality controlled oceanographic data and necessary data products; (ii) facilitating participation of Member States of the region in the International Oceanogrphic Data and Information Exchange (IODE) System by establishing national oceanographic data centres and increasing the data flow to the RNODC-WESTPAC; (iii) helping data managers understand the wide possibilities for the application of oceanographic data, in order to assist them in their discussions with government officials on the need to create oceanographic data centres.

To achieve these aims the course had the following objectives:

(i) to provide participants with an understanding of the techniques and methodologies that can be used in managing oceanographic data on micro-computers;

(ii) to allow trainees to manage data practically and to develop a working operational data base for their material. These data base structures would be taken back to their organizations.

The course was intended to complement the Training Course on Oceanographic Data Management held annually since 1982 at the Japan Oceanographic Data Centre (JODC).

2. PARTICIPANTS

The application requirements announced for the course included, inter alia, that the candidates should (i) be working in the field of oceanography/marine sciences; (ii) have experience in oceanographic data management; (iii) be familiar with the utilization of micro-computers using the MS-DOS operating system; and (iv) have a good command of English.

In all twenty-four applications were received from Member States of the WESTPAC region. Following consultations with IOC and Unesco, fifteen participants were selected from nine countries: People's Republic of China (2), Cook Islands, Indonesia (2), Malaysia, New Zealand, Philippines (2), Republic of Korea (2), Thailand (3) and Viet Nam. In addition, four Thai observers were present (see Annex II). They included personnel involved in oceanographic data and information management at the NODC or its equivalent in their home country, or engaged in research in institutions in such fields as marine environment, marine fisheries, marine meteorology and oceanography.

All the participants were well qualified in their respective fields of marine sciences; the majority of them had practical experience in the utilization of micro-computers and were fluent in English.

3. INSTRUCTORS

In addition to lecturers from AIT, four lecturers from outside Thailand collaborated in conduct of the training course: two from ROSTSEA, one from the Netherlands NODC and one from JODC. One staff member of IOC acted as the technical secretary for the course (see Annex III).

Facilities provided by AIT at its Regional Centre included a micro-computer laboratory equipped with the Local Area Network (LAN) using IBM PS/2 equipment. Twelve terminals of the network and stand-alone computers were at the disposal of the participants. A file-server and some high-resolution displays were also available.

4. COURSE PROGRAMME

4.1 OPENING

The training course was formally opened at the Auditorium of the Regional Computer Centre, AIT, on 16 January 1989 at 9.00 a.m.

Miss Prapasri Thanasukarn, Research Project and Co-ordination Division of NRCT, made the opening address on behalf of Dr. Choomporn Swasdiyakorn, Secretary-General of the National Research Council of Thailand and the Chairman of Thailand National Committee for Marine Science.

Referring to the IOC mission to Thailand for IODE which took place in June 1987, and to the expert meeting in May 1988, she reminded the participants that good co-operation between IOC and institutions concerned had been maintained in the preparation of the course. Miss Thanasukarn stated that the Secretary-General of NRCT attached great importance to this course in providing a unique opportunity for the participants to be exposed to micro-computer oriented oceanographic data management techniques. This activity, she said, would no doubt complement the training programmes that were being implemented by IOC jointly with JODC in Tokyo over the past few years in support of IODE programme and activities in the region. She expressed the hope that this training course would benefit all the participants not only in strengthening oceanographic data exchange activities in the region, but also in facilitating each participants' current work at home.

On behalf of the Secretary IOC, Mr. Yukio Kiuchi, IOC Associate Expert, welcomed the participants and stressed the regional importance of this training course within the framework of the IOC activities under the Training, Education and Mutual Assistance (TEMA). He reminded the participants that it was at the Fourth Session of the Regional Committee for Western Pacific that the Government of Thailand offered to host this training activity. On behalf of the IOC, he expressed appreciation to the Government of Thailand for hosting this important course and expressed satisfaction that this course was being held at no other institution than AIT which, as all the participants know, is a well known regional centre in the field of technology with excellent facilities for the conduct of the course.

Dr. R. J. E. Harger, Programme Specialist for Marine Sciences, ROSTSEA, welcomed the participants on behalf of the Director-General of Unesco. He reminded them of the development of micro-computers in recent years, stating that micro-computers of tomorrow will cover the various functions of today's main frame computers. He raised further questions of the future interface between micro-computers and main frame computers. In this regard, Dr. Harger expressed the hope that this programme would provide participants not only with opportunities for training but also with a sort of workshop where they could look together for improved ways to use of micro-computers.

Mr. Prida Thimakorn, Director of Regional Research and Development Centre of AIT, welcoming the participants, expressed that AIT had always been keenly interested in promoting co-operation with international organizations such as Unesco and IOC. He attached great importance to the course as it was being held at a time when the region as a whole was undergoing rapid changes with marine science and technology in response to its growing development needs. The strengthening of oceanographic data exchange through the course, he hoped, would pave the way for closer co-operation amongst the countries in the field of marine sciences and ocean services. He said AIT would do all that was possible to provide necessary facilities for the conduct of the course. He wished the participants a great success.

4.2 OUTLINE OF COURSE PROGRAMME

The course programme covered the following subjects: 1. concepts of relational data management systems; 2. principles of file conversion and file manipulation; 3. use of relational data base management system; 4. use of graphics and statistics software; 5. principles of data dictionaries; 6. report generation; 7. mechanism and functions of the IODE system; 8. IODE in the WESTPAC region and activities of RNODC-WESTPAC; 9. oceanographic data management in WESTPAC region; 10. establishment of NODCs and DNAs; 11. remote sensing; 12. principles of the general format used by IODE and its application to micro-computers; and, 13. data quality control. A complete time schedule of the training course is as shown in Annex I.

Although the normal course hours were from 8.30 a.m. to 4.30 p.m. many participants eagerly continued to study even until very late at night, availing themselves of AIT's permission to use the computers till 10.30 p.m.

The course materials as listed in Annex IV were distributed to the participants.

Although the training course covered a wide range of subjects, they could be divided into three main parts, each consisting of several topics assigned to the lecturers concerned. In the first part the introduction of the basic concepts and use of micro-computers were dealt mainly by lecturers from AIT. In the second part the application and practical use of micro-computers for management of actual oceanographic data with the aid of various software packages were described and discussed by the lecturers from ROSTSEA. In the third part, the introduction of the IODE System and its component in the WESTPAC region were discussed, including demonstrations and practical exercises on data management in the framework of IODE System. The lecturers from the Netherlands and the Japanese NODC were mainly responsible for this part of the training course.

4.2.1 Concepts of Relational Data Base Management and Principles of File Conversion and File Manipulation

The first part had covered the following topics: introduction on the basic concepts and use of micro-computers; the principles of micro-computer operating systems, particularly on the differences between Local Area Network (LAN) and stand-alone systems; demonstration of the network and a stand-alone system; concepts of data base, including relational data bases and, in particular, data bases based on dBASE-III file structure. Between lectures participants were assigned practical exercises on the operation of micro-computers, with particular emphasis on the creation and manipulation of data using dBASE-III file structures.

4.2.2 Use of Relational Data Base Management System, Graphics and Statistics Software Packages for Oceanographic Data

The second stage of the training programme covered lectures and practical exercises on the actual handling of oceanographic data brought by participants from their country. The exercises included manipulation of various data types such as salinity, conductivity, temperature, depth, tide,

tidal currents, as well as biological data on the distribution of coral reefs in Java Bay, provided by the lecturers from ROSTSEA for exercise purposes. The participants were trained in data management using dBASE-III.

FILEBASE, a flexibie and easy-to-use software package for file handling, developed by ROSTSEA using clipper, a dBASE compatible programming language, was then introduced to the participants, who used it to process their own oceanographic data, including input from and output to other packages.

Two other software packages that enable the analysis and visualization of the participants' data sets were also introduced. The object was to teach the methods of data manipulation using different software products with both the initial and final data storage structures in the form of dBASE-III files. REFLEX, a graphical, hand-on package was utilized as the product for data analysis and visualization. The statistical manipulation of data was covered through the use of the MINITAB statistical software package. The first step of instruction gave an in-depth introduction to the different software packages and an overview of their characteristics and features. The second step was based on the creation, in the classroom, of small dBASE-III files and their subsequent export towards and import from the other software products. This entailed teaching different methods both for the creation of exportable files (usually ASCII, with different delimiters) from within each software product and the translation of the "text" files to be imported. The dBASE files were then analyzed as to the structure and content. Data structures for each package were thus well explored along with the primary functions that each of them could undertake. The final step of instruction was based on the manipulation and analysis of the participants' individual marine data-sets utilizing the software introduced. Emphasis was placed on the fact that although both the original and processed data storage structures were in the form of dBASE-III files, the transport of data to the other software packages could be performed routinely to utilize the unique features that each package possessed. The concept of relational database construction using dBASE-III files was explored and the participants designed systems of first normal files for use in their own institutions.

With the aim of keeping records and references, a software package BETABASE, developed by ROSTSEA, was presented. The main function of BETABASE, which could be considered as a virtual data base, or as a data base for data bases, is to create dBASE data dictionaries completely describing structures of the primary data base files. The primary data base files may contain thousands of records, but the BETABASE file contains as its records the fields of primary database. It can be referred to as a data dictionary when each data base is viewed individually, or as a dictionary-compendium, when joined together. When micro-computers were used on an individual basis it is quite likely that file structures for the data will differ from user to user, or in each file. In such cases BETABASE would be useful in summarizing various data bases and in exchanging information on data bases among individual scientists and institutions. After having been introduced to it, the participants did exercises on the use of this software package.

Furthermore, lectures and practical work during the evenings covered additional ground in programming, data base system design, complex file translations and a comparison between the initial IODE microcomputer file definition and the micro-computer dBASE-III dictionary approach.

4.2.3 **IODE System and Use of Micro-Computers**

The third stage of the course programme, which dealt specifically with IODE activities, started with the presentation of the IODE slide set with inserted comments by the lecturer, and questions and answers on it. This was followed by the presentation as outlined below.

(i) System and Function of IODE in Global Aspects

The presentation on global aspects of the system and function of IODE encompassed the basic background on the need for proper data and information management. Following a briefing of the history of IOC and IODE, the components of the IODE system were explained. The position of data and information management in relation to marine research projects was described. In the presentation, it was stressed that not only main frame computers but also micro-computers have become extremely useful for data management and exchange under the IODE system. As an example of the use of micro-computers for IODE procedures, the participants did exercises on generating reports in such IODE formats as the National Oceanographic Programmes (NOP), the Reports of Observations/Samples Collected by Oceanographic Programmes (ROSCOP), and the Marine Environmental Data Information Referral System (MEDI).

(ii) IODE System in WESTPAC Region

Lectures were given on the IODE system with particular reference to its component in the WESTPAC region. They included procedures for forwarding and disseminating oceanographic information, procedures for data and data announcement and retrieval of data and information in the region. Briefings were also given on the functions of JODC, which is acting as the RNODC for WESTPAC in IODE system, as the RNODC for the Integrated Global Ocean Services System (IGOSS) and as the RNODC for IOC Marine Pollution Monitoring Programme (MARPOLMON) for the region.

(iii) Establishment and Management of an NODC

Lectures were given on the key functions of a National Oceanographic Data Centre (NODC), or Designated National Agency (DNA), in both national and international domains, with emphasis on their function in the context of the IODE network.

The relations between an NODC, academic circles and administration in a country were illustrated in a role game. A case, related to plans for a power plant on a island offshore a hypothetical country, was submitted to the participants. Local conditions were specified. The participants were subdivided in three groups representing government, scientific community and a data centre, and asked to consider the situation from the different viewpoints and present their ideas. This was an interesting exercise for all concerned.

Examples were given of specific services and products to be provided by an NODC. The role of an NODC as the historical archive of valuable environmental data was emphasized. In this context, the participants were advised to consider optical discs for long-term archival of data, as the performance of magnetic media, especially in tropical regions, is not impressive and in the long-run much time may be needed for rerecording of data.

Lectures were followed by discussions among participants on the establishment of NODCs. Some participants mentioned that in some cases the establishment of a national network for oceanographic data and information might be appropriate in preference to one national centre. This concept was based on the growing capabilities and reliability of computer networks and the effective distribution of expertise within the country.

(iv) Oceanographic Data Management through RNODC-WESTPAC

As part of lectures on oceanographic data management through RNODC-WESTPAC, various software packages developed by JODC for the use of micro-computers were introduced, including the following. The package IGOSS.BAS displays the bathymetric temperature, salinity and conductivity data on the screen in graphics, thus allowing visual data checking at the time of keying. Input data are also automatically stored in the prescribed BT or SD format of JODC. The package KERSD.BAS displays data from Kuroshio Exploitation and Utilization Research (KER), on either the screen or printer. It is useful for reading and analyzing KER data issued by JODC in the form of diskettes. The package ANAYEA.BAS and its variation are for tidal data management. The functions of these packages include tabulation of hourly height, harmonic analyses for one month or one year, tabulation of high and low water, display of frequency distribution of height, as well as prediction of tidal height on any future date using harmonic constants computed through the harmonic analyses. Similarly, the package STDATA.C was introduced which deals with harmonic analysis, harmonic constants and prediction of tide and tidal current.

(v) Principles of GF3 and GF3-PROC for Oceanographic Data Exchange

A lecture was given on the basic structure of IOC General Format 3 (GF3), which is a system for formatting geo-referenced data series into sequential files on digital storage devices and is used as the international exchange format for oceanographic data. The functions of GF3-PROC, a Fortran-based software package for the GF3 system, were also illustrated. A briefing was given on GF3-PC, a data storage format, which is compatible with the GF3 magnetic tape format, but oriented towards the PC environment. A first version of GF3-PC as developed for the pilot programme of the Joint Global Ocean Flux Studies (JGOFS) was presented for experimentation. It was emphasized that the GF3 concept including GF3-PC, would be a useful complement of the data-dictionary approach, although GF3 demands more in terms of obligatory data documentation which is a necessary safeguard for historical data archives. The participants did exercises to produce subsets of their own data sets in GF3-PC format. Some products of these exercises were collected on a diskette, along with parallel results obtained using the dBASE-III based data-dictionary approach, represented by the BETABASE application, and sent to the Chairman of the Group of Expert on Technical Aspects of Data Exchange (TADE) of IODE to support further development of the format.

(vi) Remote Sensing

A lecture was given on remote sensing with a view to giving the participants a wider perspective of data acquisition technique. General aspects and the main techniques of remote sensing were presented. Particular attention was given to the relation between the data acquired by remote sensing and those obtained by conventional methods, and their complementary roles. The lecture included a description of the role of the IODE Task Team on Remote Sensing Data.

(vii) Data Quality Control

Lectures were given on the concepts of quality control and quality control procedures for oceanographic data, covering the importance of quality control, sources of errors, and procedures and techniques to eliminate, to flag and to reduce errors. Presentation included the quality control procedures adopted by JODC to check duplication of reference numbers, uniformity of reports, data formats, upper and lower parameter limits, positions of observations, density in relation to depth and the comparison between temperature-salinity diagrams and standardized historical data. Algorithms for spike tests for temperature, salinity, tidal hourly height and tidal current were also introduced, followed by the demonstrations and practical exercises of quality control using various software packages developed by JODC.

4.3 CLOSURE

The training course came to an end on 3 February 1989. A farewell dinner party was hosted by the local organizers on the eve of closure of the training course in Bangkok. In her closing address, Miss Prapasri Thanasukarn on behalf of the Director-General of NRCT congratulated the participants for successfully completing the course and expressed thanks to the lectures, the IOC, Unesco and AIT for their co-operation. Mr Prida Thimakorn hoped that the participants would utilize the knowledge and experience they had gained and continue to work together for international oceanographic data exchange in the WESTPAC region. Dr. Harger, on behalf of the IOC and Unesco, thanked the participants for their hard work and enthusiasm.

The fifteen participants were awarded certificates signed by the Secretary IOC and the Director of Marine Science Division of Unesco, indicating successful completion of the course (Annex V).

5. COURSE EVALUATION

5.1 ASSESSMENT BY PARTICIPANTS

At the end of the training course the participants replied anonymously to a questionnaire, designed to obtain their opinions regarding the various aspects of the course (Annex VI). Below is an assessment based on this survey.

Local arrangements, covering accommodations and teaching conditions including computer facilities and classrooms were considered 'excellent' by most of the participants. Technical back-up by AIT staff for the operation of facilities was also very helpful. Many appreciated the transportation provided during weekend to and from the town as well as the farewell party prepared by the local organizers at the end of the course. There was however a suggestion that more information should have been given on means of transportation between the airport, the course venue and the town, given the distance between them.

Participants considered that the course objectives were well specified and the lectures, demonstrations and practical exercises had successfully met them. The level of course programme was appropriate to all the participants except one, who considered it 'too advanced'. Some participants noted that the course covered a wide range of topics, which they found useful. However, they thought that they would need to study them further in order to make use of the knowledge effectively in their work at their home institutions.

Regarding the contents of the course programme, all the participants agreed that the course was very useful and they had learnt new things. Many found the first part of the course highly informative, where the presentation was given in a systematic manner with reference to the series of appropriate text and exercise books. In respect of the second part of the course, participants were able to understand how to generate data bases for subsequent processing to cater for various users and purposes. In particular they found FILEBASE and REFLEX quite useful for data manipulation and graphics, respectively. The results of three ballots given to each participant to vote on the most useful software packages used in the course were as follows: FILEBASE 13 votes, REFLEX 12, dBASE-III 7 and MINITAB and BETABASE 5 each.

The majority of the participants apparently had no previous knowledge of the procedures and guidelines of the IODE system. They confirmed the significant role to be played by IODE in furthering marine science and services for the benefit of the marine scientific community. Some stated that the training course would be particularly useful to them in the establishment of national oceanographic data centres in their own country or institution. Others found the JODC software packages for tidal and other data management quite useful and convenient, and requested more detailed information on them.

The duration of the course was considered adequate by the most of the participants, while two of them regarded it as 'too short'.

The majority of the participants suggested possible further improvements in the course programme. Some proposed inclusion of other subjects, such as the use of the dBASE-III language for writing programmes, more comprehensive treatment of data base management concepts, and system analysis. Others proposed that, considering the duration of the course, the programme should be adjusted to cover a narrower range of topics including software packages so as to provide more detailed treatment of them. Some participants were of the view that further improvement of the ways of presentation of subjects and course materials could be made and, in this regard, referred to the structural approach demonstrated by AIT teaching staff as a good example to follow.

The participants suggested that the software packages with the following functions would be useful for their work at home, in addition to those presented during the course:

- automatic contouring of a set of geo-referenced data values
- plotting of positions on a map of region of interest
- input to own map of areas of interest (on 10km x 10km scale, 100m detail)
- processing of CTD data
- coding of temperature observations into GTS message in accordance with WMO rules

In summarizing their assessment, almost all the participants expressed their view that the course provided an excellent opportunity to learn the use of micro-computers for data management and IODE. It was suggested that such a training course would definitely be useful for other regions. Regarding the need for follow-up activities to be planned by IOC and Unesco, some participants suggested organizing a follow-up meeting in the future, where the participants of this course could exchange information and discuss their achievements and the difficulties experienced in making progress in data management.

5.2 ASSESSMENT BY LECTURERS

Major points of the assessment of course by lecturers were as follows:

Local arrangements, including the accommodations and teaching conditions were considered excellent. The AIT lectures suggested that in the future course materials and software packages should be sent to AIT well in advance so that they could be readily reproduced for distribution by the time the course programme starts.

The lecturers generally considered that the participants had adequate background knowledge and experience on the subjects which enabled them to follow presentations. No serious language barriers were encountered. When some participants had difficulties in understanding instructions, special individual teaching was provided. The participants were to a great extent able to absorb what they were taught.

The course objectives and contents of the course programme were in general considered highly satisfactory. Some lecturers however stressed the importance of teaching the fundamental definitions and concepts of computers, while others attached more importance to practical experience in

manipulation of data which were of direct relevance to the participants' work at home. It was suggested that participant should be strongly urged to bring their own data, even on paper, so that a direct application can be made of the methods taught in the classroom. There was an opinion that the relations between individual laboratory work on the one hand and data exchange through the IODE system on the other should be elaborated in a more extensive way in future training courses.

6. GENERAL CONCLUSIONS

The training course was successfully completed through the concerted action of the host institution, the participants, the lecturers, IOC and Unesco. The course was run smoothly and according to schedule. The success may be attributed to the enthusiasm and interest shown by the lecturers and trainees. Replies to the questionnaires proved that the aims and objectives of the course have been achieved to a great extent.

However, in order to optimize the benefit that participants and the marine community could gain from such courses, continued improvement of the course programmes should be encouraged, taking into account some of the suggestions made by the participants. Due consideration should be given to careful selection of subject matters, including the choice of software packages to be presented, in keeping with the interest, background knowledge, experience and needs of the participants. A reasonable homogeneity of interest and knowledge among participants would be desirable. Systematic, structured presentation of lectures followed by step-by-step exercises would facilitate effective conduct of the training course. Likewise, provision of complete manuals including books of exercises would be very useful to the participants for checking their knowledge during the course as well as for further study when they return home.

It is recommended that similar training courses, refined as discussed above, should be organized in other regions in the future, which would not only promote management of oceanographic data and information in laboratories, institutions and countries, but also strengthen regional and global exchange of data and information through the IODE system.

NOTE:

dBASE and dBASE-III are trademarks of Ashton Tate Inc. MINITAB is a trademark of Minitab Inc. REFLEX is a trademark of Borland Analytica Inc. Clipper is a trademark of Nantucket Corporation.

ANNEX I

COURSE PROGRAMME

16 January	a.m.	Opening Course Introduction
	p.m.	Concepts of Relational Data Base Management
17 January	a.m.	" " " "
	p.m.	Principles of File Conversion and File Manipulation
18 January	a.m./p.m.	" " " "
19 January	a.m./p.m.	Using Relational Date Base Management System
20 January	a.m./p.m.	" " " "
21 & 22 January		(free)
23 January	a.m./p.m.	" " " "
24 January	a.m.	" " " "
	p.m.	Use of Graphics and Statistics Software Packages
25 January	a.m./p.m.	" " " "
26 January	a.m.	Principles of Data Dictionaries
	p.m.	Report Generation: Tabular Reports
27 January	a.m./p.m.	JODC Software for Oceanographic Data Exchange
28 & 29 January		(free)
30 January	a.m.	System and Function of IODE in Global Aspects
	p.m.	IODE System in the WESTPAC Region
31 January	a.m.	Establishment and Management of an NODC
	p.m.	Oceanographic Data Management through RNODC-WESTPAC
1 February	a.m.	" " " "
	p.m.	Principles of GF3 and GF3-Proc
2 February	a.m.	Remote Sensing
	p.m.	Data Quality Control
3 February	a.m.	" " " "
	p.m.	Course Evaluation Closing

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ANNEX III

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ANNEX IV

LIST OF COURSE MATERIALS AND INFORMATION DOCUMENTS

1. RCC-AIT, Introduction to Computers, pp.43.
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8. J.R.E. Harger, FILEBASE: An Enhanced dB-III + Compatible File and Text Management System, Jakarta, pp.20.
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21. IOC, Technical Description of the GF3 Format and Cote Tables, pp.116, IOC Manuals and Guides, No.17, Vol.2, 1987.
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23. JODC, WESTPAC Data Management Guide, Tokyo 1982, pp.26.
24. JODC, Oceanographic Data Management in the Personal Computer, Tokyo, pp.17.
25. JODC, Quality Control Procedures applied to Oceanographic Data in JODC, Tokyo, pp.12.
26. European Space Agency (ESA), Looking Down, Looking Forward, pp.53.
27. Natural Environment Research Council/Institute of Oceanographic Sciences (NERC/IOS), Remote Sensing of the Oceans, pp.10.

28. British National Space Centre (BNSC), Ocean Colour, the potential for commercial applications, pp. 24.
29. University Rhode Island, Remote Sensing, a Tool for Managing the Marine Environment: eight case studies, pp.43.
30. Marine Information and Advisory Service (MIAS), Demonstration of the use of GF3 for the exchange of CTD data.
31. MIAS, Demonstration of the use of GF3 for the exchange of drifting buoy data.
32. MIAS, Standard GF3 subset for digitized contour maps.
33. MIAS, User Guide for GF3-Proc.

ANNEX V

Intergovernmental Oceanographic Commission

CERTIFICATE

United Nations Educational, Scientific and Cultural Organization

This is to certify that

attended and successfully completed the IOC-Unesco Training Course on the Use of Micro-computers for Oceanographic Data Management organized at the Asian Institute of Technology, Bangkok, Thailand, from 16th January to 3rd February 1989.

Gunnar Kullenberg
Secretary IOC

Dale C. Krause
Director, Division of
Marine Science, Unesco

3 February 1989

ANNEX VI

QUESTIONNAIRE FOR ASSESSMENT BY TRAINEES

Note: The purpose of this questionnaire is to collect information for overall assessment of the training course and to improve future training and related activities. Please check as appropriate and write your comments and suggestions.

1. How were the local arrangements?

	poor				excellent
(1) accommodation	1	2	3	4	5
(2) teaching conditions including facilities and classroom	1	2	3	4	5
(3) transportation, etc.	1	2	3	4	5

comments:

2. Are the objectives of the course well specified? Have they been successfully met?

1	2	3	4	5

comments:

3. Were the lectures given by instructors, and practical exercises adequeate to meet the objective?

1	2	3	4	5

comments:

4. Do you think that the course programme was too advanced, just adequate or too low?

- too advanced ☐ adequate ☐ too low ☐

comments: (Did the activity meet your expectations as far as standard is concerned?)

5. Was the course useful to you? Did you learn anything that is new and useful for you?

1	2	3	4	5

comments: (If so, what?)

6. Was the duration of course adequate?

- too long ☐ adequate ☐ too short ☐

comments:

7. Do you feel a need for modification of the course programme?

- yes ☐ no ☐

comments: (If so, please specify the need. What additional areas should be covered?)

8. Have you attended a Unesco- or IOC short-term course before?

- yes ☐ no ☐

If yes, please specify:

9. In what way do you plan to apply the knowledge and experience gained during the training course when you go back home?

10. In your workplace, do you have adequate facilities in terms of equipment, trained personnel, publications, etc? If not, what are the needs of your institution/country?

11. What do you think of the equipment that was provided?
    (1) Hardware:

    (2) Software:

12. Any other comments and suggestions regarding the course including the following: (use additional paper, if needed.)
    (1) Were all subject of specific interest to you covered?
    (2) Did you have adequate opportunity to work in specific areas or obtain specialized help?
    (3) What do you think IOC/Unesco should do as a follow-up in this region?
    (4) Do you think other regions could benefit by training course such as this?
    (5) other comments.

13. How do you rate this activity?

- unacceptable ☐
  poor ☐
  adequate ☐
  good ☐
  very good ☐
  outstanding ☐

Name of participant_____ (optional)

Bangkok, 3 Feb 1989