

Intergovernmental Oceanographic Commission
Training Course Reports

37

**IOC-JODC Training Course
on Oceanographic Data Management**

Japan Oceanographic Data Centre
Hydrographic Department
Maritime Safety Agency
Tokyo, Japan
16-27 October 1995

UNESCO

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1. INTRODUCTION

The Training Course on Oceanographic Data Management has been organized every year since 1982 at the Japan Oceanographic Data Center (JODC), in support of the activities of the IOC Sub-Commission for the Western Pacific (WESTPAC). The fourteenth training course was organized by the JODC under the auspices of the IOC from 16 to 27 October 1995 at the JODC, Hydrographic Department, Maritime Safety Agency, Tokyo, Japan.

The objectives of the training course were to provide personnel currently involved in oceanographic data and information management from Member States of the WESTPAC region with basic concepts of the International Oceanographic Data and Information Exchange (IODE) system and its function, especially in the WESTPAC region, and acquisition, procession and compilation of oceanographic data.

2. PARTICIPANTS

The IOC announced the training course through its Circular Letter No. 1457 dated 24 May 1995 to all Member States of the WESTPAC. The application requirements were that candidates should have adequate background knowledge in the field of oceanographic data management, preferably with responsibilities for oceanographic data management at their national oceanographic data centers (NODC), or equivalent organization in their home country and a good command of the English language.

Four applications were received from four Member States of the WESTPAC in response to the IOC Circular Letter. In consultation with the authorities concerned in Japan, three participants from China, Indonesia, and Malaysia were selected by the JODC and the IOC (see Annex III).

3. TRAINING COURSE

3.1 OPENING

The training course was officially opened on 16 October 1995 by Mr. Tadao Tatsuno, Director of Japan Oceanographic Data Center, Hydrographic Department (JHD), Maritime Safety Agency, Tokyo, Japan. In his opening remarks, Mr. Tatsuno reminded the participants and the lecturers the importance of oceanographic observation and its data management. He quoted that on the one hand the oceanographic observation required enormous time and cost, on the other hand scientific, environmental, navigational and fishery community needed more and more oceanographic data. Furthermore, he stressed that since oceanographic data exchange was one of the most efficient and important aspect of the international co-operation, the participants' role, not only in their own country but also in the international oceanographic community would be far more important.

Mr. Tatsuno also quoted Japanese progress since Meiji era, more than 100 years ago, and called the participants' attention to the importance of sharing of knowledge with other people. Finally he expressed that mutual friendship and understanding was one of the important factors for efficient data and information exchange.

3.2 OUTLINE OF THE COURSE PROGRAMME

The programme covered various subjects such as the organizational structure of the JODC, Hydrographic Department, the IOC and the IODE system, oceanographic data management at the JODC, explanation of computer software and study visits (see Annex I). Practical exercises of the usage of personal computers (PC) and work stations in the data management accounted for the half of lecture time. During the course, one personal computer (IBM PS/V 486DX2-66MHZ) was provided to operate software for data management and one work station for on-line database including Internet. The course programmes were based on the explanation of individual oceanographic data management and the PC software for data management.

Course materials distributed to the participants are as follows:

- IOC Manual part 1
- IODE Handbook
- Activities of Hydrographic Department (brochure)
- Activities of JODC (brochure)
- Oceanographic Data Management Text Book
- JODC User's Guide
- Documents related to WOCE and GTSP
- Ocean-PC Manual
- Quality Control Procedure
- CD-ROM for Temperature Profile Data Set produced by JODC in 1995

3.2.1 Activities of the Hydrographic Department

The organization and major activities of the Department were briefly explained with a display panel showing the history of the Department. A film entitled: "Hydrographic Activities of the Department", documented the activities of R.V. SHOYO on the Hydrographic survey/oceanographic observations was screened.

3.2.2 Activities of JODC

The organization of the JODC, the reception of oceanographic data and information from the originator, data processing flow, data files were explained. The role of the JODC as the responsible National Oceanographic Data Center for the WESTPAC (RNODC) was also explained. During the explanation the JODC User's Guide was used, which was prepared for this training in 1994.

3.2.3 International Oceanographic Data and Information Exchange (IODE) System and Data Exchange in the WESTPAC Region

A lecture was given on the history, structure and function of the IODE system of the IOC, proceeded by the outlines of the IOC's activities. It included the basic idea of the international oceanographic data and information exchange, organizational structure and history of the IODE followed by explanations of data flow from observing stations to World Data Centers (WDC) through National Oceanographic Data Centers (NODC) and Responsible National Oceanographic Data Centers (RNODC). Specially the IOC's World Wide Web server (WWW) home page was used for the above briefing through Internet.

Lectures were given on data exchange in the WESTPAC region, explaining the activities of the JODC as the RNODC for the WESTPAC. It was noted that the JODC was also acting as the RNODC for the Integrated Global Ocean Services System programmes (I GOSS), the RNODC for the IOC Marine Pollution Monitoring programme (MARPOLMON) for the WESTPAC region, and the RNODC for Acoustic Doppler Current Profile (ADCP). Lecture outlined the tasks of the RNODC for the WESTPAC including procedures for forwarding and disseminating oceanographic information, procedures for forwarding data and data announcement and retrieval of data and information on the WESTPAC programme.

3.2.4 Data Management

3.2.4.1 Oceanography

Data items and files which have been developed by the JODC were introduced. The main topics in this session was quality control. Position check, speed check of vessel, spike check for temperature and salinity, limitation check for various parameter including meteorological parameters, check of hourly height of sea level, check of tidal current were introduced,

Some of software for PC developed by the JODC and Ocean-PC software were provided, but the data management procedure at the JODC was mainly carried out by the main frame computer operated by UNIX, so that some software were not available for PCs. All participants showed their strong interest in the software for tide and tidal current procedure which included data management,

harmonic analysis and prediction, On the other hand, Ocean-PC software was not attractive for the participants because of its incompleteness.

In conjunction with IGOSS data management, CD-ROM for temperature profile data set produced by the JODC in 1995 was introduced and provided.

3.2.4.2 Marine Geophysics

Two participants did not have any knowledge on marine geophysical data management so that preliminary explanation of sounding, chart, basic map of the sea and GEBCO (General Bathymetric Chart of the Ocean) were defined, Then data management system for the geophysical/geological data were outlined, J-BIRD (JODC Bathymetry Integrated Random Data Set) and MDG77 (Marine Geophysical Data Format), Formats and data contents of the JODC's geological / geophysical master files were then shown,

Geophysical Data Management System (GEODAS) which has been developed by U.S. NGDC, was explained. GEODAS was an advanced management system for data which was formatted by MGD77.

In addition, GEBCO was introduced as a picture of example of the international co-operation in the field of geology/geophysics, GEBCO Digital Atlas (G DA) provided by IHB in 1994 was also demonstrated in PC. All participants showed a strong interest in GEODAS and GDA and required a copy of GEODAS and GDA CD-ROM, but the extra copies were not available at the JODC, so a contact point was given.

3.2.4.3 Biology

A lecturer examined the current status of biological data management in the participant's countries and discovered that this activities has not started yet in their countries. Taking into account this situation, he introduced a brief background and objectives of biological data management at the JODC. The difficulty of biological data exchange was explained, The main difficulty to maintain a unique management on marine biological data is the wide variety of sampling and analytical methods depending on the aims of observation,

3.2.5 Information Management

3.2.5.1 Cruise Summary Report (CSR)

The lecturer stressed the importance of information management, especially those managed by CSR. At first, he introduced CSR with its purpose and characteristics. He went ahead and explained the contents, and formats of CSR. The data base management system for CSR at the JODC was shown in PC. It was noted that the JODC published and distributed CSR annually through the WESTPAC News-letter to Member States of the IOC. At the same time, submission of CSR to the JODC was requested to the participants because the JODC was the RNODC of WESTPAC.

3.2.5.2 Marine Information Service

As one of the JODC's main activity, marine information service was briefed. The literature, atlases and maps are collected internally and externally at marine information service office in the JODC. Participants were interested in the maps published by their own countries.

3.2.6 Practical Training

3.2.6.1 Personal Computer

Most of session have computer practice at least half of the session to introduce PC software for oceanographic data management which were currently used in IBM-PC at the JODC. The participants were interested in the software for tide and tidal current data processing because their main data in their offices were deeply related to tide and tidal current. Those software covered creating files

of observation data, applying quality control, making harmonic analysis, prediction, tabulation and so on. Copies of all software were provided to the participants. It could be expected that the software would be utilized to manage their own data easily in their offices.

3.2.6.2 Internal Data Base (J-DARS)

The JODC has developed oceanographic data management system in relational database in 1994. It is so called J-DARS(JODC Oceanographic Data Archiving and Retrieving System). The system could be far a way from the concept of cruise file or geofile because of its relational structure. All data including restricted data are registered in the data base for internal use. Any data could be extracted by retrieving keys such as country code, ship code, institution code, observation date, observation area (latitude, longitude) in a short time through the Hydrographic Department network. The participants were introduced the concept of J-DARS and practiced its operation.

3.2.6.3 External Data Base (J-DOSS)

Beside J-DARS, the JODC has also developed another oceanographic data management system in relational database in 1995. It is so called J-DOSS (JODC Data On-line Service System) to provide users with the JODC's holding data through Internet. The system provides information on new received data, the JODC's holding data as well as other WWW home page. In particular, a lecturer stressed that users could search data inventory and download actual data to their work station through ftp. Any data could be extracted by retrieving keys such as country code, ship code, institution code, observation date, observation area (latitude, longitude) in a short time through Internet. The participants were impressed very much by the JODC's WWW home page because all participants have not seen any home page with data download function,

3.3 STUDY VISIT

3.3.1 JAMSTEC

On 20 October, the first study visit to the Japan Marine Science and Technology Center (JAMSTEC) was organized to give a chance for the participants to see underwater observation technology. Outline of the JAMSTEC was introduced by video to the participants. A study visit was followed to submersible survey vessel "KAIKO" and its mother survey vessel "KAIYOU".

The JAMSTEC was founded in 1971 through the co-operative efforts of government, academia and the private sector. The Center was expected to promote marine sciences and technology in Japan in response to the social needs of the people, and today plays a highly important role in those activities. The participants were introduced about the development of marine equipment such as Ocean Acoustic Topography, Offshore Floating Wave power System named "Mighty Whale" and simulation of submersible survey vessel.

3.3.2 MSARC

The second study visit to Maritime Safety Agency Research Center (MSARC) was conducted on 26 October to give the participants the opportunity to study another function of Maritime Safety Agency,

The MSARC was established in May 1972 to carry out instrument manufacturing and testing, repair of instruments used in Maritime Safety Agency as well as analysis of marine pollution. All of the participants showed great interest in the process of lens manufacturing for light house.

3.4 COUNTRY REPORTS

The Country Reports were presented by three participants to introduce their activities. This session provided useful information to the JODC staff with regard to their oceanographic data management and state-of-the-art in the field of marine in the South East Asia. The Country Reports are in Annex II.

3.5 CLOSING

The training course was completed on 27 October 1995. Mr. Tadao Tatsuno, Director of the JODC, addressed his congratulations to the participants for their fruitful completion of the course. He expressed his wishes that the participants of the training course would utilize the knowledge and experience obtained through the course and continue to contribute to the advancement of the management and international exchange of oceanographic data and information through the IODE system on a world-wide basis. He also pointed out that this training course was most fruitful to establish good human relations among the participants and between the participants and the JODC staff, and the participants were very welcomed to contact the JODC for further information and technical assistance.

On behalf of the participants Lt. Abdul Halim thanked the JODC for organizing the course and the IOC for providing them with an opportunity to take this training course.

Each of three participants was awarded a certificate signed by the IOC Executive Secretary and the Director of the JODC, indicating that they had successfully completed the training course.

4. COURSE EVALUATION

On 27 October 1995, the evaluation for the training course was also carried out with the participants and the lecturers by submission of the questionnaire. A summary of the evaluation was given below.

4.1 LOCAL ARRANGEMENTS

Accommodation, lecture conditions including facilities and classroom, assistance of the JODC staffs were evaluated as very good, excellent due to convenient place, advance technology, scientific distribution and enthusiastic attitude, However, it seemed that the accommodation and living cost were expensive.

4.2 PERIOD, MATERIALS

Two of the participants made comments that the period of the course was a little bit too short to practice on PC and to cover more areas in detail. All participants did not have any problem in language.

4.3 LECTURE

The participants felt that all lecture were quite useful for their office work and for planning the new set-up organization. Especially WWW server home page, PC software package, quality control and explanation of the IOC, IODE were most helpful.

4.4 STUDY VISIT

All participants mentioned that the study visits to the JAMSTEC and the MSARC were very informative, and interesting and considered that the visits gave them a good opportunity to know how the marine science and technology developed in Japan and to understand a relationship between the JODC and other agencies.

4.5 SOFTWARE PROVIDED BY JODC

The participants felt that the software provided by the JODC was useful and easy operation, especially for tide and tidal current data processing. They, however, suggested that the software should be converted into the WINDOWS format.

4.6 EXPECTATION AND SATISFACTION

The participants expected to improve their professional skill, to obtain necessary knowledge to participate in the IODE system and data management including quality control, and to become aware of the JODC, as well as the RNODC of WESTPAC. They expressed their satisfaction more than 90% on these points.

4.7 OPINIONS TO IMPROVE THE COURSE

The participants expressed their hope that this training course would continue as long as possible because of very practical and informative course.

They recommended that the training course should be expanded to do more practice on software including Ocean-PC and to have discussion period for participants and staff on data management and various problems in dealing with various local agencies with regard to data exchange and oceanographic research co-operation. The participants also recommended that the JODC, with assistance of the IOC, should consider to support their activities for the necessary equipment and software to make data management as effective as the NODC,

5. CONCLUSIONS

In conclusions, the training course was considered to have been a successful undertaking which had achieved, to a great extent, its objectives. The course provided the participants with opportunities to deepen their understanding of the importance of international oceanographic data exchange and the mechanism and the function of the IODE system, in particular, in the WESTPAC region. The participants who were responsible for oceanographic data management in their own countries were trained on management of the NODCs and became familiar with algorithms for manipulation of various kinds of data, including data quality control. Furthermore, they had an opportunity to study operational reference service for users as data center.

In order to optimize the benefit of this training course in the future, the following observations may be made:

- (i) The homogeneity of the participants in terms of knowledge, experience and interests in data management and computer is essential for the success of training programmes.
- (ii) The participants for the fourteenth Training Course had the basic knowledge on data management and PC because all of them came from the NODC or university. Utmost efforts should be made in selecting the candidates to best utilize the limited resources for the training course and to have most successful result.
- (iii) The JODC has been making continual adjustments to the course programmes since the beginning of the course in 1982, and it seems to work well for the needs of the participants and for the requirement of oceanographic communities. This exercise should be maintained in the future and further improvement should be considered, including the strengthening of the practical exercises of data management using personal computers. This is now limited by time resources rather than other obstacles.
- (iv) Important remark made during the course was that the support for the participants to make each NODC active was really vital. The JODC offered continuous support to the graduated participants after the course.

In conclusion, it is expected that the training course will continue to play an important role in promoting activities of the NODC, or its equivalent, in each country, and to facilitate data exchange in the region and strengthen, on a global scale, the IODE system.

ANNEX I

TIMETABLE

Monday, 16 October 1995

10:00-12:00	Opening Ceremony and Course Orientation
13:30-16:00	Briefing of Hydrographic Department and JODC

Tuesday, 17 October 1995

10:00-12:00	Explanation of IOC, IODE and WESTPAC
13:30-16:00	Explanation of Serial Station Data Management Files, Archives, Products Introduction of software "Ocean-PC"

Wednesday, 18 October 1995

10:00-12:00	Explanation of Tidal Data Management Files, Archives, Products Exercise of data processing in PC
13:30-16:00	Explanation of Tidal Current Data Management Files, Archives, Products Exercise of data a processing in PC

Thursday, 19 October 1995

10:00-12:00	Explanation of Oceanographic Data Quality Control
13:30-16:00	Country Reports Introduction of Oceanographic Data Management in the Participant Country

Friday, 20 October 1995

All Day	Study Visit Japan Marine Science and Technology Center (JAMSTEC)
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Monday, 23 October 1995

10:00-12:00	Explanation of IGOSS/BT Data Management Files, Archives, Products Exercise of data processing in PC
13:30-16:00	Explanation of Oceanographic Data Management in Internal Oceanographic Data Base (J-DARS)

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Tuesday, 24 October 1995

10:00-12:00	Explanation of Geophysical Data Management J-BIRD, MGD-77 and software of GEODAS
13:30-16:00	Explanation of Oceanographic Data Management in External Oceanographic Data Base (J-DOSS) based on INTERNET

Wednesday, 25 October 1995

10:00-12:00	Explanation of Cruise Summary Report (CSR) Exercise "ROSIN" and "ROSERCH" software in OCEAN-PC
13:30-16:00	Explanation of Biological Data Management Explanation of Activities of Marine Information Service Office

Thursday, 26 October 1995

All Day	Study Visit Maritime Safety Agency Research Center
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Friday, 27 October 1995

10:00-12:00	Course Evaluations and Closing Ceremony
13:30-16:00	Customized Special Study

ANNEX II

COUNTRY REPORTS

PEOPLE'S REPUBLIC OF CHINA NATIONAL OCEANOGRAPHIC DATA CENTER

(by Du Bing)

1. Oceanographic Organization of China

There are four organizations to deal with oceanographic research work and they are State Oceanic Administration (SOA) system, Chinese Academy of Science (CAS) system, State Education Commission (SEC) system and Ministry system. The SOA system consists of three branch administrations, six research institutes, five research centers, one ocean press and one ocean school. CAS system consists of many research institutes of Academia Sinica. SEC system mainly consists of universities and some departments or research institutes which belongs to the university. The Ministry system consists of various institutes which belongs to Fishery, Geology, Meteorology, and Navy, etc. (please see chart 1.)

2. Introduction of NMDIS

The National Marine Data and Information Service (NMDIS) under the State Oceanic Administration (SOA) is a comprehensive sector for research on marine information technologies and service for public benefit, consisting of five operational systems:

- (i) the China National Oceanographic Data Centre (CNODC);
- (ii) the Institute of Marine Scientific and Technological information (IMSTI);
- (iii) the National Marine Archive Centre (NMAC);
- (iv) the World Data Centre-D for Oceanography (WDC-D);
- (v) the International Ocean Institute China Operational Centre IOI-CHINA).

The Service consists of 8 professional divisions with a total of 557 staff members and workers, among them 63 are senior scientists and 184 intermediate professionals, A backbone contingent of scientific workers in various specialities has basically taken shape, who are engaged in marine data processing, marine information research and marine archive management.

The major tasks of the Service are to organize and coordinate the national work on marine data, scientific and technological information and marine archives; take charge of the collection, processing, storage and service of marine information; establish a variety of marine data and data products, tide and tidal current predictions, marine charting, marine literature retrieval, marine information research and reporting, marine patents, marine statistics, computer software designing, marine archives, audio-video recording, and printing and distribution, etc.

3. CNODC Activities

The China National Oceanographic Data Centre (CNODC) is a component of the National Marine Data and Information Service (NMDIS). It is a comprehensive oceanographic data service sector, which takes responsibility for the collection, processing, exchange, management of marine environmental data, and provides services to users. The main activities of CNODC is as follows:

- (i) CNODC periodically receives data collected at 53 coastal observation stations along the coast of China and the islands concerned, These stations are operated under the State Oceanic Administration (SOA), and conduct long-term and continuous observations of sea temperature, sea salinity, sea wave, tide level, sea ice and meteorological elements, etc;

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- (ii) CNODC regularly receives data from oceanographic sections made in the coastal waters of China. These sections are implemented four times a year in the Bohai Sea, the Yellow Sea, the East China Sea and the South China Sea by the three branches of SOA. These observations include data on marine meteorological, hydrological and chemical parameters;
- (iii) CNODC also receives oceanographic data from the ocean investigations carried out under the Chinese Science Research Projects and International Co-operative Oceanographic Research Projects, such as, CTD data, ADCP data, XBT data, buoy data and so on. After the completion of each project, the institutes who participated in the project send the oceanographic data collected in the framework of a project to CNODC.
- (iv) The National Marine Environmental Forecasting Center receives shipreport data from the China Meteorological Administration through GTS. The National Marine Environmental Forecasting Centre uses these data for forecasting services in real-time. This Centre provides CNODC with ship report data on magnetic tapes every year.
- (v) CNODC also obtains oceanographic data from oceanographic institutes of Academia Sinica, Qingdao Ocean University of the State Education Commission, Marine Fishery, Institutes of the Ministry of Geology and Mineral Resources and the Hydrographic Service of the Navy, In turn, CNODC provides them with complete datasets and products on request.
- (vi) CNODC has finished the standardized processing of the major part of historical data held in CNODC and stored them on magnetic tapes. In the 1970s and early 1980s, CNODC has received a big volume of BT profile data and the data from routine observation sections in the coastal waters of China, There are more than 14,300 stations which have not been digitized. These data are in danger of being lost and the necessary measures need to be implemented to rescue them, CNODC will give priority to digitizing section data and BT data sets, These data will be made available for international data exchange.
- (vii) There are many ship report data on paper sheets stored in the three branches of SOA. These data have been received from Chinese Voluntary Observing Ships (VOS). They contain about 400,000 observations, CNODC is now considering the development of a plan to rescue these data. The first step will be to set up a standard data form and digitize these data by using data quality control procedures, and then set up a ship report dataset. Since this is a huge task, it will be a need for significant financial support.
- (viii) After receiving various kinds of oceanographic data, CNODC conducts data processing in the Computer Support Centre of NMDIS by using quality control procedures set up by CNODC and establishes the related data files, CNODC provides both Chinese and abroad users with the data and data products on various requirement.

4. CNODC Data Holdings

The collections of the CNODC include information and data in various carriers, the total quantity of which reaches over 80,000 megabytes, ranking the first in China in terms of the variety and quantity of the marine data, The general information about the data holdings in CNODC is listed in table 1.

Part of the CNODC data holdings are available for International Oceanographic Data Exchange, In order to facilitate the international exchange of these data, two volumes of "Catalogue of Internationally Available Oceanographic Data in the possession of CNODC" have been published previously and the third one of this Catalogue has also been published currently.

5. International Co-operative Activities

- (i) Since its establishment, CNODC, as the Chinese IODE contact point, has actively participated in IODE activities and co-operated closely with other NODCs and RNODCs in the field of oceanographic data exchange which is one of the important data sources for China.
- (ii) CNODC has established close bonds of co-operation in data exchange with WDC-A and WDC-B for Oceanography and WDC-A and WDC-B for Marine Geology and Geophysics through the office of WDC-D for Oceanography.
- (iii) CNODC has experience in the organization of training courses in marine data processing and marine information retrieval techniques for developing countries.
- (iv) CNODC also takes part in some international research activities, such as, TOGA, TOGA-COARE, WOCE and the Joint Sino-Japanese Investigation and Research of Kuroshio projects, setting up database for these special projects and providing many products and publications to marine scientists and researchers.

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Chart 1

THE STRUCTURE MAP OF THE NATIONAL MARINE DATA AND INFORMATION SERVICE

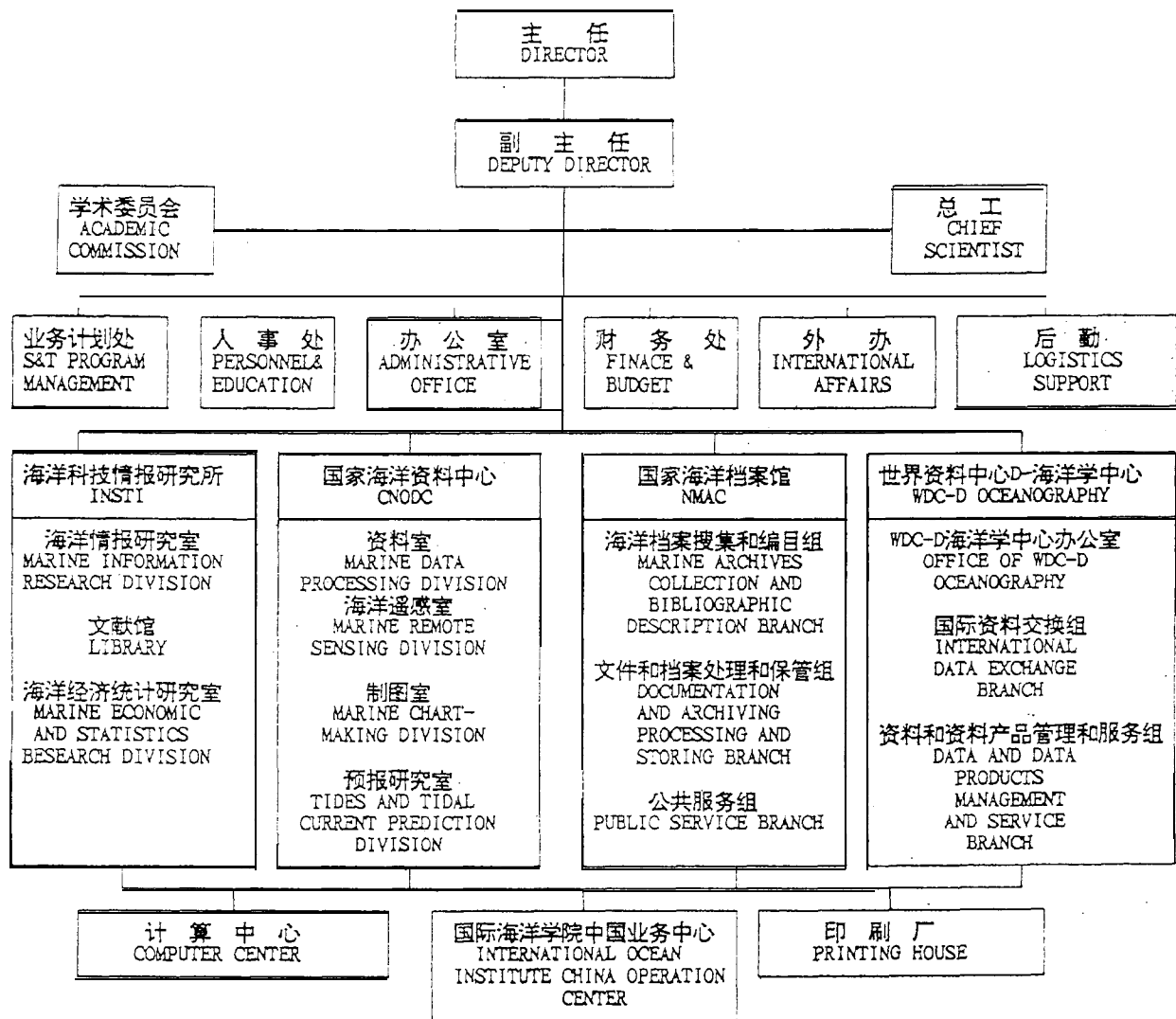


Table 1

**DATA HOLDINGS IN THE CHINA NATIONAL
OCEANOGRAPHIC DATA CENTRE**

海洋调查资料馆藏情况

资 料 种 类	Name of data	单位unit	数量quantity
海洋站观测资料	Coastal station data	站年station/Year	3 527
海流资料	Tidal current data	站次station	350 968
国内外连续站资料	Time-serial station data	站次station	5 540
国内大面站资料	Oceanographic station data	站次station	4 382
国外GEK资料	GEK data	站次station	341 046
南森站资料	Nansen station data	站次station	250 834
地球物理资料	Geophysics data	站次station	1 800 000
地球化学资料	Geochemistry data	站次station	3 000
潮汐资料	Tides data	站年station/Year	2 114
COADS 资料	COADS data	站次station	79 000 000
中美海气调查资料	PRC-US TOGA data	站次station	4 416
NBT, XBT	NBT XBT data	站次station	364 000
船舶报	Ship reports	站次station	3 740 000
CTD 资料	CTD data	条record	1 937 000
海平面资料	Sea level data	条record	375 000
降水资料	Rainfall data	条record	185 000
锰结核资料	Manganese nodule data	站次station	10 055
信风资料	Trade wind data	条record	625 000
沉积物粒径资料	Sediment size data	站次station	5 000
中日黑潮调查资料	Cruise data of China-Japan Joint Research on kuroshio	站次station	2580
总计	Total	站次station	76 537 294

INDONESIA FISHERY FACULTY PATTIMURA UNIVERSITY
(by Khouw Abraham Seumel)

1. INTRODUCTION

Indonesia which is located on 95°36'48" - 142°53'16" E and 6°30'13" N - 12°23'24" S, between the Pacific and Indian Oceans and between the Asian and Australian Continents is probably one of the most complex structures on earth, consists of more than 17.000 islands and it is covered about 70 % of the sea. By virtue of its long coastal stretches is essentially a maritime nation and the government has expressed its intention of increasing the nation's role in marine science activities for deriving the maximum benefits from its areas and the resources therein. Indonesia Seas are strongly influenced by monsoonal climate pattern. It is the only form of tropical inter-ocean link between a reservoir of warm surface water of the Western Pacific with the Eastern Indian Ocean. The watermass and heat flux exchange between the two oceans through this link is estimated to be considerable and has a large, perhaps even global scale, impact on the climate (Wyrski, 1961).

Ambon Island is one of the beautiful and famous part of Indonesian Archipelago located on 128°00'00" - 128°14'25" E and 03°37'55" - 03°47'35" S (Figure on Ambon). Nearly all type of bottom topographical features such as shallow water continental slope, volcanic and corals islands and its distribution of water and land divide the area into different seas connected by many channels, passages, and straits. This complexity of the region especially the Banda Sea has interested and drawn many major international oceanographic expeditions, such as the CHALLENGER (1882-1885), the GAZELLE (1875), the VALDIVIA (1899), the SIBOGA (1900), the PLANET (1906-1907), the SNELLIUS (1929-1930), the SPENCER F. BAIRD (1947-1950), and the GALATHEA (1951). In recent years, a few oceanographic cruises have been organized, locally or as part of some cooperative regional studies, such as the Intergovernmental Oceanographic Commission (IOC), the International Indian Ocean Expedition (IIOE), the SNELLIUS II Expedition (1984-1985), and Cooperative Study of Kuroshio which covers also the South China Sea.

In the last decade, there have been rapid progresses in the development and utilization of marine resources corresponding to the outstanding progress of scientific technology for helping student at Pattimura University Fishery Faculty to do their final field research as the implementation of Marine Sciences Education Project (MSEP). This progress resulted the increasing in oceanographic data management activities such as Physical Oceanographic, Chemical Oceanographic and Biological Oceanographic data management. An enormous amount of money and time for the research have been spent as consequence of these activities not only for the student but also for the lecturer, and even for the faculty. In order to make the data and information easily and speedy to access, there is a need to develop a Oceanographic Data Management Center or a kind of National Oceanographic Data Center (NODC) which provides such as oceanographic data and information for research purposes and an aid for student to do their final field research for graduation.

2. STATUS AND DEVELOPMENT

Marine Sciences Education Project (MSEP) is a part of the Marine Sciences and Technology Department at Fishery Faculty Pattimura University. This education project was funded by the World Bank and is focused on the implementation of marine scientific research. Since it was established on 1985, this department has just 2 divisions (Marine Biology and Oceanography Division) in which all of the marine research activities were conducted to provide a system that would encourage better understanding and collaboration of marine resources for the student at Fishery Faculty, perhaps in the form of oceanographic activities.

Nowadays, it is developed and has 6 divisions including oceanographic department which has drawn at least 12 staffs. There are also many oceanographic equipment available which is supplied by Aanderaa (Norway) in cooperation with World Bank. One computer room consists of a set of 12 computer system (two of them are specified for oceanographic software program) in order to record and store all of the oceanographic data.

Institutional Cooperation

MSEP strongly develops an institutional cooperation with Research and Development Center for Oceanography - LIPI AMBON in which the student from Pattimura University do their field research under supervised of LIPI staff. In the form of cooperation itself, some of Fishery Faculty staffs are included in LIPI oceanographic cruises or LIPI field research. Marine research cooperation activities in MSEP involved several agencies where type of data collected depend on institutional mission. Type of data collected by each agencies can be described as follow:

Agencies	Type of data
Research and Development Center for Oceanographic LIPI (RDCO)	Physical, Chemical Biological
National Hydrographic Office (DISHIDROS)	Tide
Marine Fisheries Research Institute (BL)	Fisheries including Acoustic data
Assessment and Application Agency for Technology (BPPT)	Oceanography
National Co-ordination Agency for Survey and Mapping (BAKOSURTANAL)	Tide and Remote Sensing
National Institute of Aeronautics and Space (LAPAN)	Oceanography (using satellite)
Meteorological and Geographical Agency (BMG)	Meteorology
Marine Geological Institute (MGI)	Marine Geology and Geophysics

Oceanographic cruise data

The oceanographic data managed by MSEP can be divide into three major components i.e.: Physical Oceanographic Data, Chemical Oceanographic Data, Biological Oceanographic Data. Since 1985 around 20 cruises have been carried out in order to collect oceanographic data in the area around Ambon Island, which is focused on the Banda Sea areas, The number of stations taken from that cruises were about 156. To manage these data, MSEP developed a PC-based information system. The system used is the wordtyper software (Microsoft Word or Word Perfect) for archiving data, but no software package available for data analysis. The data were analysed using manual package such as calculator or the experience of the analyser.

The recent oceanographic cruises data is collected by R.V. Ina Lau, a new oceanographic research vessel launched in 1994, A total of 2 cruises have been drawn now at the areas around Piru Bay with total number of stations estimated about 27. Meanwhile, the data collected from January 1995 is still in quality control process.

3. PROBLEMS

From the above description, it is clear that some actual problem can be taken as the consequence of the role of MSEP as one of marine scientific institute, The major problem can be derived that no one institution could carry out her own research indecently, On the other hand our government has still difficulty to control the institution research activities because of the burocraticacy system, It is essential that any policy or plan for oceanographic research should take into the consideration to safeguard their interests as well as to exploit their expertise to the maximum. Oceanographic data which has been collected by MSEP has traditionally been trained within their

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respective facilities or, in some cases, destroyed or lost for lack of archiving capabilities, Most data are analysed by using PC with conventional software package and stored in the floppy disc; limited number of technicians and computer system would lead to the limitation of developing data.

4. SOLUTION

After having studied situation and having discussion, it was found that the best possible approach would be recommended to develop our belove MSEP :

- To establish an oceanographic data and information center;
- To activate a form of oceanography research group;
- To develop the need of equipment and computer system for running oceanographic software.

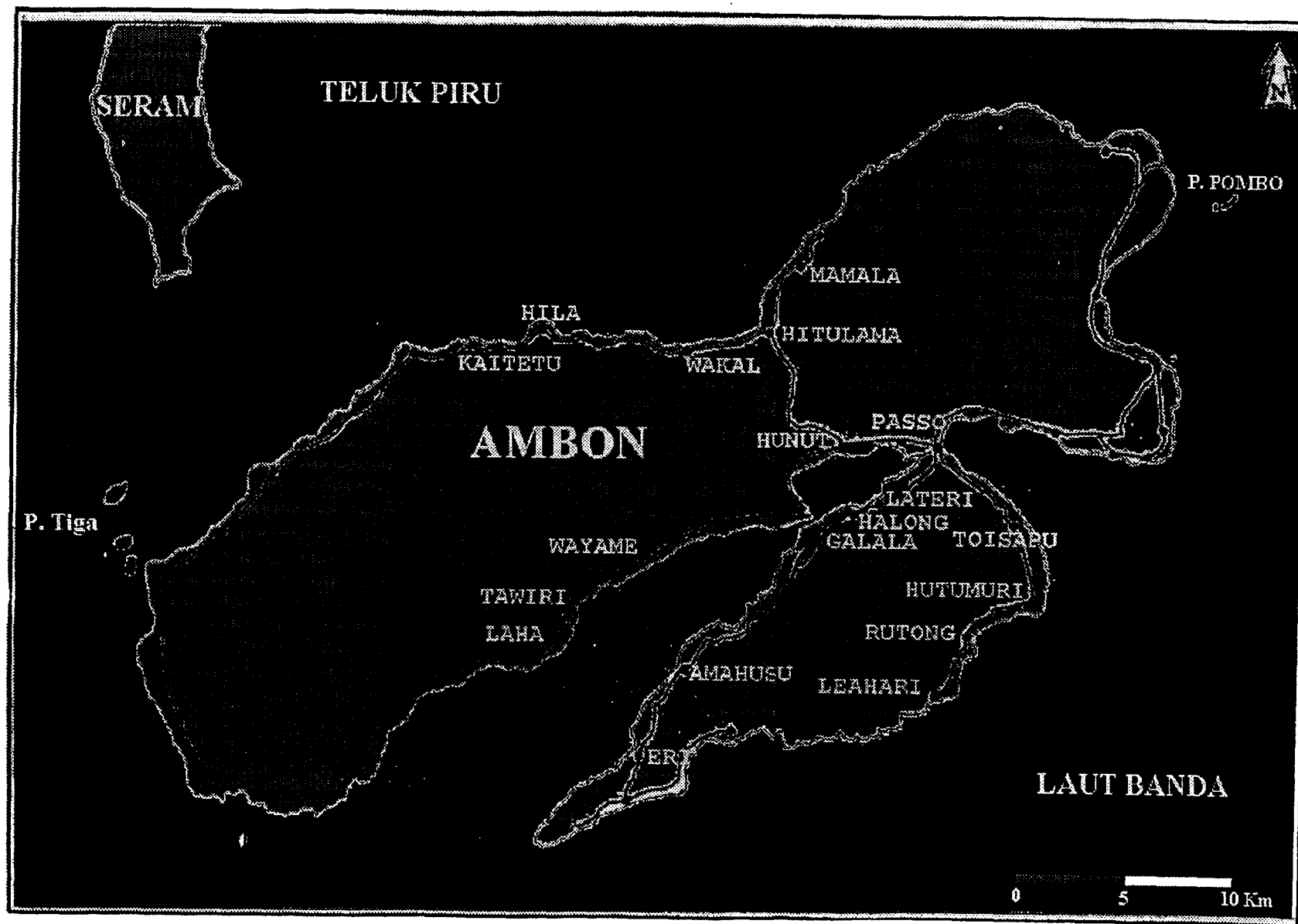


Figure on m

ROYAL MALAYSIAN NAVY OCEANOGRAPHIC DATA CENTRE
(by Abdul Halim Mohd Ashaari)

INTRODUCTION

1. The Hydrographic Directorate of the Royal Malaysian Navy (RMN) took over the prediction of tides for Malaysia from the British Navy in 1987, Realising the importance of oceanography in naval maritime warfare and the economic development of Malaysia, the Oceanographic Section of the Hydrographic Directorate was established on 20th June 1990.

2. The need for an oceanographic data centre and a system to manage ocean data has been a subject of many discussions within RMN and also in other government agencies, Under a co-operation program with the Australian government, RMN officers were sent to the Australian Oceanographic Data Centre (AODC) to train in oceanographic data management and establishment of an oceanographic data centre.

THE HYDROCOMP SYSTEM

3. The management of oceanographic data is particularly complex due to the temporal and spatial complexity and size of the marine environment; the difficulties and expense of collecting data; the frailty of instruments and the need to comply with the international standards. To overcome these difficulties, the Hydrographic Directorate was given financial approval to procure computer hardware and software so that management of oceanographic data can be undertaken efficiently particularly to support defence requirement, As a result, the RMN decided to buy the HydroComp Geovision from Australia, a system similar to the one currently used by the AODC for its oceanographic data management. Delivery and installation of the system were completed in January 1994.

4. Hydrocomp is a system based on GIS that operates using Unix. This is similar to the system used at the AODC for managing, analysis and display of oceanographic data. The system contains a wide range of analysis tools and display capabilities that can be further expanded. Hydrocomp has been developed to manage data in a variety of formats and structures and is particularly suited to manage environmental data that is frequently varied in structure and format. The AODC also provides data for the RMN Hydrocomp System. These data cover Malaysian area of interest that is crucial for defence as well as scientific research purposes. In order to enhance the flow of oceanographic information within RMN and the co-operation level with the civilian maritime community, the RMN Oceanographic Data Centre (RMNODC) was formed.

DESIGNATED NATIONAL AGENCY

5. As a maritime nation and member of the Intergovernmental Oceanographic Commission (IOC), Malaysia does not have its own National Oceanographic Data Centre (NODC). As pointed out by Dr. Youri Oliounine (IOC) to the Malaysian participant at GODAR (Global Ocean Data Archaeology and Rescue) Westpac Workshop held in March 1994 in Tianjin, there is no focal point for IODE and GODAR activities in Malaysia, This will result in permanent lost of data collected by other governmental or non-governmental agencies that are not properly archived. This is a great loss to the country and the scientific community as a whole. Dr. Oliounine further suggested that RMN take the initiative to establish a Designated National Agency (DNA) for the IODE system for Malaysia since the RMNODC has the latest technology in oceanographic data management. Based on this, a request was made to IOC for the RMNODC to be DNA for Malaysia. By IOC Circular Letter No.1414 dated 25 May 94 the RMNODC is now DNA of the IODE system in Malaysia.

STATUS OF OCEANOGRAPHIC DATA MANAGEMENT

6. RMN was involved in the current metering experiment of the ASEAN/Australia Regional Ocean Dynamics Project which ended recently. Under this program an oceanographic cruise was carried out in the Sulawesi Sea, Makassar Strait and the South China Sea, Oceanographic parameters such as

temperature, salinity and current were observed. These data are now archived in the Hydrocomp database and available for scientific analysis, Other data sets kept in the database are:

- a. Bathymetry
- b. CTD
- c. XBT
- d. STD
- e. IGOSS (Bathy/Tesac)
- f. Geophysical Data
- g. Wave
- h. Marine Biology

7. Another system is used to keep a database on Sea Level, Tidal Current and Tides

8. At departmental level 4 oceanographic cruises in the Strait of Malacca were carried out by the RMN and the CSR was sent to Japan Oceanographic Data Center. At national level, action has been taken to ensure that the planned oceanographic cruises by other government agencies are monitored so that data collected can be archived at the RMNODC. With its present capability the RMNODC is set to undertake the responsibilities of the NODC. More trained personnel has been projected to fill up responsible post within the RMNODC to help the set-up the NODC for Malaysia.

ACTIVITIES

9. The Hydrographic Directorate is responsible for the production of the Malaysia, Singapore and Brunei Tide Tables. The demand for the Tide Tables has also increased at a steady rate. This was reflected in the increased of sales annually. The predictions for Singapore were received from Port of Singapore Authority. The Oceanographic Section continues to maintain its tide stations and the data obtained was satisfactory.

10. Under the Malaysia/Australia Co-operation Program an officer from the Hydrographic Directorate was attached to the Australia Oceanographic Data Centre for two weeks in December 93 and another officer in March 95. The purpose of the attachment was to understudy the HydroComp System which was installed in 1994. An officer from AODC was also sent to the RMNODC to help train the staff in HydroComp. In July 95, an officer from the Hydrographic Directorate was attached to the RV Franklin to understudy the system and equipment used in oceanographic cruise.

11. The ASEAN/Australia Regional Ocean Dynamics (ROD) Project was a project where additional tide stations were established in the ASEAN region. The maintenance of the stations and management of the data was carried out by the Oceanographic Section, Under the Current Metering Element (CME), an ADCP was laid in the Strait of Malacca in June for a one year duration. However the manufacturer detected some technical defect in the system and the ADCP was recovered in early November for repair, Redeployment of the ADCP in expected to take place when the defect is rectified.

12. The Oceanographic Section is also involved in the following activities :

- a. IOC-WESTPAC (Sub-committee for West Pacific)
- b. IGOSS (integrated Global Ocean Services System)
- c. TOGA (Tropical Ocean and Global Atmosphere Program)
- d. GLOSS (Global Sea Level Observing System)
- e. GODAR (Global Ocean Data Rescue and Archaeology)

DEVELOPMENT

13. The RMNODC has recently initiated the first step for GODAR activities in Malaysia by an agreement reached between the various local agencies during an oceanographic research co-ordination meeting called by the Hydrographic Directorate. It was decided in the meeting that the RMNODC be elected as the responsible body for co-ordinating oceanographic research cruises and data management.

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14. It is also planned for a National Hydrographic Centre to be established and with it, a National Oceanographic Data Centre. In preparation, the RMNODC has started a move towards carrying out the duties of NODC as required by the IOC. Oceanographic cruises were carried out successfully and are planned to cover the whole of Malaysian waters, Procurement of research equipment are on the way and more personnel are being trained to meet the demand.

15. An agreement is being reached with the various agencies involved in oceanographic activities to ensure the flow of data to the RMNODC. Oceanographic programs of the various agencies will also be made known to the RMNODC so that the National Oceanographic Program can be published and submitted to the Responsible National Oceanographic Data Centre. In short, every effort is being made to meet the objective of a National Oceanographic Data Centre.

CONCLUSION

16, The RMNODC of the Hydrographic Directorate is capable of being the NODC for Malaysia and has won the trust and confidence of the various agencies by its past performance. It is now just a matter of time before it will be fully capable of performing as such, The success of RMNODC is largely due to the assistance contributed by agencies such as JODC, AODC and Navoceano in term of training and equipment. The local agencies will also need to play a major role as a data contribute. Without the support of these agencies, the establishment of a NODC will not be achieved.

ANNEX III

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ANNEX IV

List of Participating Countries in Training Courses from 1982 to 1995

1st	29 Mar. - 9 Apr.	1982	Republic of Korea, Philippines, Thailand
2nd	16 - 28 May	1983	China, Indonesia, Malaysia
3rd	4 - 16 June	1984	China, Republic of Korea, Vietnam
4th	2 - 14 Sep.	1985	Philippines , China, Vietnam
5th	8 - 20 Sep.	1986	China, Republic of Korea, DPR of Korea Malaysia (2), Thailand
6th	7 - 19 Sep.	1987	China, Philippines, Thailand
7th	26 Sep. - 8 Oct.	1988	Republic of Korea, Thailand , Vietnam
8th	25 Sep. - 7 Oct.	1989	China, Indonesia , Malaysia, Thailand Republic of Korea
9th	15 - 26 Oct.	1990	Indonesia , Republic of Korea, Vietnam
10th	24 Sep. - 9 Oct.	1991	Indonesia , Malaysia, Philippines Thailand (2)
11th	28 Sep. - 9 Oct.	1992	Indonesia , Philippines, Thailand
12th	27 Sep. - 8 Oct.	1993	Indonesia , Thailand , Vietnam
13th	26 Sep. - 7 Oct.	1994	Malaysia, Philippines, Vietnam
14th	16 Oct. - 27 Oct.	1995	China, Indonesia, Malaysia

ANNEX V

List of Instructors

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