Intergovernmental Oceanographic Commission
Training Course Reports
28

IOC-JODC Training Course on Oceanographic Data Management

Japan Oceanographic Data Centre
Hydrographic Department
Maritime Safety Agency
Tokyo, Japan
26 September - 7 October 1994

UNESCO

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, 165 January - 3 February 1989	English
12.	IOC Advanced Training Course on Continental Shelf Structures Sediments and Mineral Resources Quezon City, Philippines, 2-13 October 1989	English
13.	IOC/IODE Training Course on GF3 Data Formatting System Obninsk, USSR, 14-24 May 1990	English
14.	IOC Training Course on Microcomputers and Management of Marine Data in Oceanographic Data Centres of Spanish-speaking Countries, Bogotá, Colombia, 21-30 October 1991	English Spanish
15.	IOC Advanced Training Course on Nearshore Sedimentation and the Evolution of Coastal Environments, Kuala Lumpur, Malaysia, 17-29 February 1992	English
16.	First IOC Training Course on the Applications of Satellite Remote Sensing to Marine Studies Caracas, Venezuela, 24-28 September 1990	English
17.	IOC-KMFRI-RECOSCIX (WIO) Regional Training Course on Microcomputer-based Marine Library Information Management, Mombasa, Kenya, 10-21 August 1992	English
18.	ROPME-IOC Regional Training Course on Management of Marine Data and Information on Microcomputers for the ROPME Region, Kuwait, 18-28 October 1992	English
19.	IOC-SOA Training Workshop on Environmental Effects on Benthic Communities Xiamen, China, 19-23 October 1992	English
20.	IOC Training Course for the Global Sea Level Observing System (GLOSS) directed to the African and South American Portuguese and Spanish-Speaking Countries São Paulo, Brazil, 1-19 February 1993	English
21.	IOC-SSTC-SOA Training Course on Marine Information Management and ASFA Tianjin, China, 19-30 October 1992	English
22.	First IOC/IOCARIBE-UNEP Training Course on Monitoring and Control of Shoreline Changes in the Caribbean Region Port-of-Spain, Trinidad and Tobago, 21-30 July 1993	English Spanish
23.	IOC/WESTPAC Training Course on Numerical Modelling of the Coastal Ocean Circulation Matsuyama, Japan, 27 September - 1 October 1993	English
24.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 28 September - 9 October 1992	English
25.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 27 September - 8 October 1993	English
26.	IOC Training Course on Ocean Flux Monitoring in the Indian Ocean. Organized with the support of the Government of Germany, Mombasa, Kenya, 15-27 November 1993	English
27.	IOC-UNEP-SPREP Training Course on Coral Reef Monitoring and Assessment, Rarotonga, Cook Islands, 23 February - 13 March 1994	English
28.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 28 September - 9 October 1992	English

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ANNEXES

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 IOC Sub-Commission for the Western Pacific (WESTPAC). The thirteenth training course was organized by JODC under the auspices of IOC from 26 September to 7 October 1994, at 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. 1413 dated 18 May 1994 to all Member States of 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.

Ten applications were received from eight Member States of WESTPAC in response to the IOC Circular Letter. In consultation with the authorities concerned in Japan, three participants from Malaysia, The Philippines, and Vietnam were selected by JODC and IOC (see Annex III).

3. TRAINING COURSE

3.1 OPENING

The training course was officially opened on 26 September 1994 by Dr. Yoshio Kubo, Director of Japan Oceanographic Data Center, Hydrographic Department (JHD), Maritime Safety Agency, Tokyo, Japan. In his opening remarks, Dr. Kubo reminded the participants and the lecturers the importance of oceanographic observation and its data management. He quoted how international joint projects such as WOCE and GOOS emphasized the need to establish an appropriate data management policy. Furthermore, he stressed that only international co-operation could realize sufficient data sets to satisfy data needs in an efficient manner.

Dr. Kubo called the participants' attention to the global climate change and emphasized that environmental research programmes required more and more oceanographic data to improve timely data exchange on a global scale. He noted that further strengthening in international oceanographic data exchange system was crucial for the success of the programmes He states that under these circumstances, all the participants were expected to take an important role to develop oceanographic data mangement activities, not only in their own countries, but also among the international oceanographic community. Finally, Dr. Kubo expressed that mutual friendship and understanding among officials in NODCs in the region were important factors for efficient data and information exchange.

3.2 OUTLINE OF THE COURSE PROGRAMME

The programme covered various subjects such as the establishment of NODCs and their function, as well as the organizational structure of the IODE system, oceanographic data management at JODC, explanation of computer software and study visits (see Annex I). Practical exercises for the use of personal-computers for data management accounted for half of the lecture time. During the course, one

personal computer (IBM PS/V 486DX2-66MHz) was provided to operate software for data management. The course programmes were based on the PC software for data management and the IODE system.

Course material distributed to the participants are as follows:

Guide for Establishing a National Oceanographic Data Centre
IOC Manual part I
IODE Handbook
Guide for Responsible National Oceanographic Data Centres
Activities of Hydrographic Department (brochure)
Activities of JODC (brochure)
WESTPAC Data Management Guide
Oceanographic Data Management Text Book
JODC User's Guide
Documents related to WOCE and GTSPP
OceanPC Manual

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 JODC, the reception of oceanographic data and information from the originator, data processing flow and data files were explained. The role of JODC as the Responsible National Oceanographic Data Centre for WESTPAC (RNODC) was also defined. During the briefing the JODC User's Guide which was prepared for the 1994 training course, was used as a training handbook.

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 initiated by IOC, preceded by outlines of IOC's activities. It included the basic idea of 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 Centres (WDC) through National Oceanographic Data Centres (NODC) and Responsible National Oceanographic Data Centres (RNODC).

Lectures were given on data exchange in the WESTPAC region, explaining the activities of JODC as the RNODC for WESTPAC. It was noted that JODC was also acting as the RNODC for the Integrated Global Ocean Services System programme (IGOSS), the RNODC for IOC Marine Pollution Monitoring programme (MARPOLMON) for the WESTPAC region, and the RNODC for Acoustic Doppler Current Profiler (ADCP). Lectures outlined the tasks of RNODC for WESTPAC, including procedures for forwarding and disseminating oceanographic information, procedures for forwarding data, data announcement, 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 JODC were introduced. The main topic in this session was quality control. Position and speed check of vessel, spike check for temperature

and salinity, limitation check for various parameters, including meteorological parameters, check of hourly height of sea level by interpolation, check of tidal current by harmonic analysis were introduced.

Some software for a PC were provided, but what the participants actually required was to obtain quality control PC software. The data management procedure at JODC was mainly carried out by the main frame computer operated by UNIX, so that some software were not available for PCs.

3.2.4.2 Marine Geophysics

Data management system for the geophysical/geological data were outlined: J-BIRD and MDG77. J-BIRD was a JODC-original integrated digital bathymetric data system, which was used for bathymetric data management at JODC. Formats and data contents of JODC's geological/geophysical master files were then shown.

The 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 (IOC-IHO General Bathymetric Chart of the Oceans) was introduced as an example of the international co-operation in the field of geology/geophysics. GEBCO Digital Atlas (GDA) provided by IHB in 1994 was also demonstrated on a PC. All participants showed a strong interest in GEODAS and GDA.

3.2.4.3 Biology

A lecturer examined the current status of biological data management in the participants' countries and discovered that this activity had not started yet at their NODCs. Taking into account this situation, he introduced a brief background and objectives of biological data management at 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 smapling and analytical methods depending on the aims of observation.

3.2.5 Information Management

The lecturer stressed the importance of information management, especially those managed by Cruise Summary Report (CSR). At first, he introduced the 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 JODC was demonstrated on a PC. It was noted that JODC published and distributed the CSR annually through the WESTPAC Newsletter to IOC Member States. In order to develop a comprehensive record at JODC the participants were requested to submit, upon their return, their country's CSR to JODC which acts as the RNODC of WESTPAC.

3.2.6 Practical Training

3.2.6.1 Personal Computer

Most sessions devoted computer practice for at least half of the time to introduce PC software for oceanographic data management which were currently used in IBM-PC at JODC. The participants were interested in the software for tide and tidal current data processing because their Centre's activities were deeply related to tide and tidal current data management. Those software covered creating files of observation data, quality control, harmonic analysis, prediction, tabulation and other parameters. Copies of all software were provided to the participants. It could be expected that the software would be utilized to manage their own data at each NODC.

Functions of software are:

IGOSS (BATHY/TESAC) Data entry with Q. C.
Display of the station chart with the map on the screen
Display of Station Data in the table or in the chart
Display of BT Data in the table or in the chart
Display of Current Data in the table or in the chart
Tide Data Management Package
Tidal Current Data Management Package
OceanPC.

3.2.6.2 Data Management in Relational Database

In 1994, JODC has developed an oceanographic data management system in relational database named J-DARS (JODC Oceanographic Data Archiving and Retrieving System). The system could be far away from the concept of cruise file or geofile because of its relational structure. Any data could be extracted by retrieving keys in a short time.

The participants were introduced to the concept of J-DARS and practiced its operation. They hoped to obtain a copy of the system with data on CD-ROM, however, JODC is unable to reproduce it at this stage because the system was developed only under UNIX.

3.3 STUDY VISIT

3.3.1 JAMSTEC

On 30 September, the first study visit to the Japan Marine Science and Technology Center (JAMSTEC) was organized to give a chance for the participants to study underwater observation technology. An outline of JAMSTEC was introduced by video to the participants.

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 informed about the development of marine equipment such as Ocean Acoustic Tomography, Offshore Floating Wave Power System named "Mighty Whale" and simulation of a submersible survey vessel. The participants asked a lot of questions.

3.3.2 MSARC

The second study visit to the Maritime Safety Agency Research Center (MSARC) was conducted on 6 October to give the participants the opportunity to study another function of Maritime Safety Agency.

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 manufacturing lens for light houses.

3.4 COUNTRY REPORTS

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

3.4.1 Malaysia

Mr. Z. Aziz introduced the activities of the Royal Malaysian Navy Oceanographic Data Center (RMNODC) which was a Designated National Agency (DNA) for the IODE system of Malaysia. Referring to the Memorandum of Understanding between the Malaysian Navy and the Australian Navy; the relationship of the Australian Oceanographic Data Center (AODC) was explained. He introduced oceanographic data management software named "Hydrocomp" which was able to archive the data in database and to produce maps such as the drawing of contours, plotting of observation stations, display of profiles etc. He also referred to the series of ocean current measurement within the framework of the ASEAN/Australia Regional Ocean Dynamics Project. Finally, he noted that RMNODC would undertake the responsibilities of the NODC in Malaysia and requested technical and financial international assistance further develop its NODC.

3.4.2 The Philippines

Ms. G. Gascon presented the status of the Philippines NODC and referred to the organization of the National Mapping and Resource Information Authority (NAMRIA) to which the Philippines NODC belonged. She mentioned that one of the NEC PCs was out of order, and tide data processing software for IBM PC were needed instead of NEC. Beside data management, she explained that the Philippines' NODC also had the responsibility to publish the Tide Table and that two short term experts dispatched by JODC through JICA (Japan International Co-operation Agency) in 1988 and 1989, had assisted in the development of the NODC by providing computer equipment and developing software on oceanographic data processing and management.

3.4.3 Vietnam

Ms. T. H. Chu outlined the activities of the Vietnam National Oceanographic Data Center (VNODC) which was founded in 1990 by the joint effort of the Vietnamese Committee for IOC and the National Center for Scientific Research. She emphasized the implementation plan of VNODC in the future, which was divided into three stages, the first stage would be for experimental implementing stage from 1991 to 1993, the second to create national and relational database from 1994 to 1995, and last to create nationally distributed oceanographic database from 1996 onwards.

3.5 CLOSURE

The training course was completed on 7 October 1994. Dr. Yoshio Kubo, Director of JODC, addressed his congratulations to the participants for their fruitful completion of the course. He expressed his wish 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 useful in establishing good human relations among the participants and between the participants and JODC staff, and the participants were welcome to contact JODC for further information and technical assistance.

On behalf of the participants, Mr. Z. Aziz thanked JODC for organizing the course and IOC for providing them with an opportunity to take this training course.

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

4. COURSE EVALUATION

On 7 October 1994, the evaluation for the training course was also carried out with the participants and the lecturers by submission of a questionnaire and discussions. A summary of the evaluation is given below.

4.1 LOCAL ARRANGEMENTS

Accommodation, lecture conditions including facilities and classroom, assistance of JODC staff were evaluated as very good due to the convenient location, advance technology, scientific distribution and enthusiastic attitude.

4.2 PERIOD, MATERIALS

Two of the participants commented that the period of the course was rather short to practice operating a PC and that a three-week course would be more beneficial.

4.3 LECTURES

The participants felt that all the lectures were quite useful for their work and for planning the organization of a new set-up, especially international data exchange mechanism, tide and tidal current data management and geophysical data management were most helpful.

4.4 STUDY VISITS

All the participants mentioned that the study visits to JAMSTEC and MSARC were very informative and interesting, and considered that the visits gave them a good opportunity to understand the activities of other marine related agencies and to establish a relationship between JODC and other agencies.

4.5 SOFTWARE PROVIDED BY JODC

The participants felt that the software provided by JODC was useful, especially for tide and tidal current data processing. However, they hoped to obtain more software for oceanographic data management, including quality control in a PC version.

4.6 EXPECTATION AND SATISFACTION

The participants expected to improve their professional skills, to obtain the necessary knowledge to participate in the IODE system and data management, including quality control, and to become aware of JODC, as well as the RNODC of WESTPAC. They expressed their satisfaction 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 the practical and informative nature of the course. **They recommended** that JODC should establish a closer rapport with the participants; encourage them to communicate to JODC with respect to oceanographic data exchange and to follow-up and further develop the knowledge and techniques they obtained. **The participants also recommended** that JODC, with the assistance of IOC, should consider to organize an advance course on data exchange and management to fulfil the function of RNODC for WESTPAC and to support their Centres for the necessary equipment to make data management as effective as NODC.

5. CONCLUSIONS

In conclusion, 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 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 in the management of 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 at data centers.

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 thirteenth Training Course had the basic knowledge on data management and PC because all of them came from NODCs or similar organizations. Utmost efforts should be made in selecting the candidates to best utilize the limited resources for the training course and to have the most successful results.

(iii) The JODC has been making continual adjustments to the course programme since the beginning of the course in 1982, and it seems to work well for the needs of the participants and for the requirements of the 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) An important remark made during the course was that the support to make each NODC active was really vital. The JODC offered continuous support to the participants after the course.

In conclusion, it is expected that the training course will continue to play an important role in promoting activities of 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

26 September 1994

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

27 September 1994

10:00-12:00	Explanation of International Data Exchange Mechanism IOC/IODE/WESTPAC
13:30-16:00	Explanation of Station Data Management Data Items, Files, Archives, Quality Control, Products Introduction of software Ocean-PC

28 September 1994

10:00-12:00	Explanation of Tidal Data Management Data Items, Files, Archives, Quality Control, Products Exercise on Data Processing in PC
13:30-16:00	Explanation of Tidal Current Data Management Data Items, Files, Archives, Quality Control, Products Exercise on Data Processing in PC

29 September 1994

10:00-11:00	Explanation of Cruise Summary Report (CSR)
11:00-12:00	Explanation of Activity of Marine Information Service Office
13:30-16:00	Country Reports - Introduction of Oceanographic Data Management - Activities of each country of Trainees

30 September 1994

All day	Study Visit Japan Marine Science & Technology Centre (JAMSTEC)

3 October 1994

10:000-12:00	Explanation of IGOSSD/BT Data Management Data Items, Files, Archives, Quality Control, Products Exercise on Data Processing in PC
13:30-16:00	Explanation of Oceanographic Data Management in Relation to Data Base (RDB)

4 October 1994

10:00-12:00	Explanation of Geophysical Data Management Files of MGD77 and J-BIRD, Products.....
13:30-16:00	Explanation of Geophysical Data Management Exercise software GEODAS in PC Exercise on Data Processing in PC

5 October 1994

10:00-12:00	Explanation of E-Mail, Japan Oceanographic Information and Data Exchange System (JOIDES) Exercise of JOIDES Operation
13:30.14:30	Explanation of Biological Data Management
14:30-16:00	Introduction of Current International JODC Involved Projects

6 October 1994

All Day	Study Visit Maritime Safety Agency Research Centre

7 October 1994

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

ANNEX II

COUNTRY REPORTS

ESTABLISHMENT OF THE ROYAL MALAYSIAN NAVY OCEANOGRAPHIC DATA CENTRE (RMNODC) by Zainal Aziz

The Hydrographic Directorate of the Royal Malaysian Navy (RMN) took over 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.

Since then 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. Nevertheless, to be updated with the latest technological advances in oceanographic surveying, a memorandum of understanding (MOU) was established between RMN and the RAN (Royal Australia Navy) under whom the Australian Oceanographic Data Centre (AODC) was formed. One of the activities agreed under the MOU is training of RMN officers in oceanographic data management and establishment of an oceanographic data centre

THE HYDROCOMP SYSTEM

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 to 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.

Hydrocomp is a system based on GIS that operates using Unix. This is a similar 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.

Under the MOU between RMN and RAN the AODC 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. The data inventory is shown at Annex A. With this capability and to ensure that the flow of oceanographic information within RMN and the co-operation level with the civilian maritime community can be further enhanced, the RMN Oceanographic Data Centre (RMNODC) was formed.

DESIGNATED NATIONAL AGENCY

Being a maritime nation and member of Intergovernmental Oceanographic

Commission (IOC), Malaysia does not have its own National Oceanographic Data Centre (NODC). As pointed out by Dr. Youri Iliounine (IOC) to the Malaysian participant at GODAR (Global Ocean Data Archaeology and Rescue) Westpac Workshop held in March 1994 at Tianjin, there is no focal point for IODE and GODAR activities for Malaysia. This will result in data collected by other governmental or non-governmental agencies that are not properly archived will be lost permanently. This is infact a great loss to the country and the scientific community as a whole. Dr. Iliounine further suggested that since RMNODC has the latest technology in oceanographic data management, he proposed that RMNODC should take the initiative to establish a Designated National Agency (DNA) for the IODE system of the Malaysia. Based on this, a request to IOC was made for the RMNODC to be DNA for Malaysia. Vide 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

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 ready for use for scientific analysis.

At departmental level an oceanographic cruise in the Strait of Malacca is planned to take place in November 1994. At national level, planned oceanographic cruises by other

government agencies will be 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 should there be a need.. More trained personnel has been projected to fill up responsible post within the RMNODC including a foreign expert to help set-up the NODC for Malaysia.

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1. OBSERVED DIGITAL DATA SET DESCRIPTIONS

1.1 NODC - US National Oceanographic Data Centre/ World Data Centre - A Data Set

1.1.1 XBT

The NODC XBT file contains approximately **49,602 temperature - depth profiles** obtained using expendable bathythermograph(XBT) instruments, primarily from 1965-1990. The profies are recorded to depths of 1830 meters and stored at non-uniform depth increments corresponding to profile inflection points.
Geographic Coverage : **20 degree S -30 degree N ; 80 degree E - 150 degree E**
Temporal Coverage : **1965-1990**

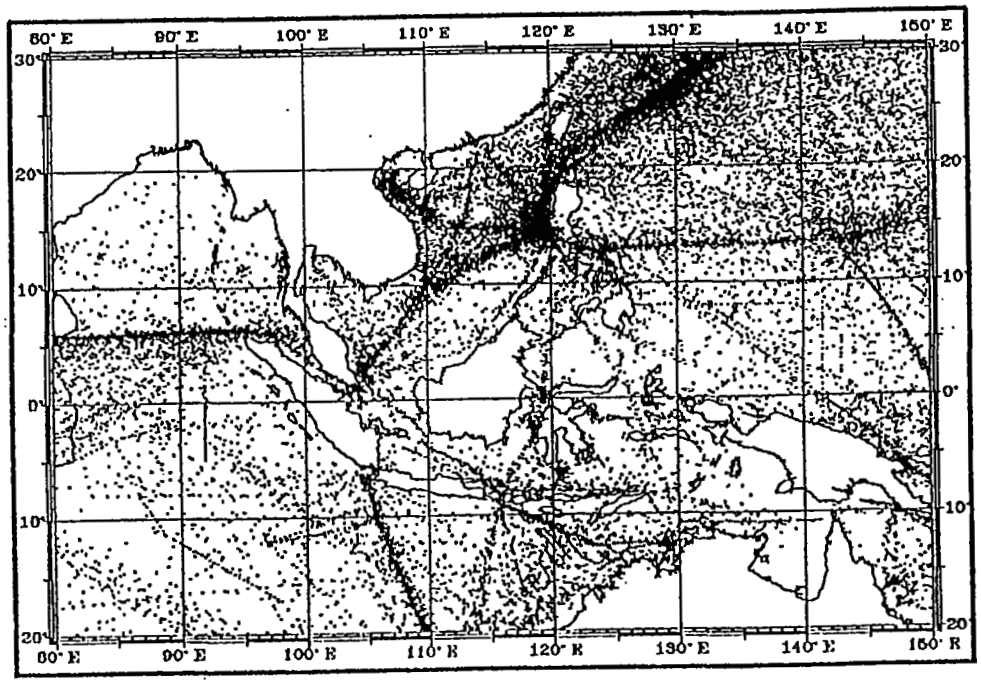


Table 1: NODC XBT - 49602 Observations

1.1.2 MBT

The NODC MBT file contains approximately **75,240 temperature - depth profiles** obtained using mechanical bathythermograph(MBT) instruments, primarily from 1940-1980. The maximum depth of MBT observations is approximately 285 meters and the profile data is stored at 5 m depth intervals.
Geographic Coverage : **20 degree S -30 degree N ; 80 degree E - 150 degree E**
Temporal Coverage : **1940-1980**

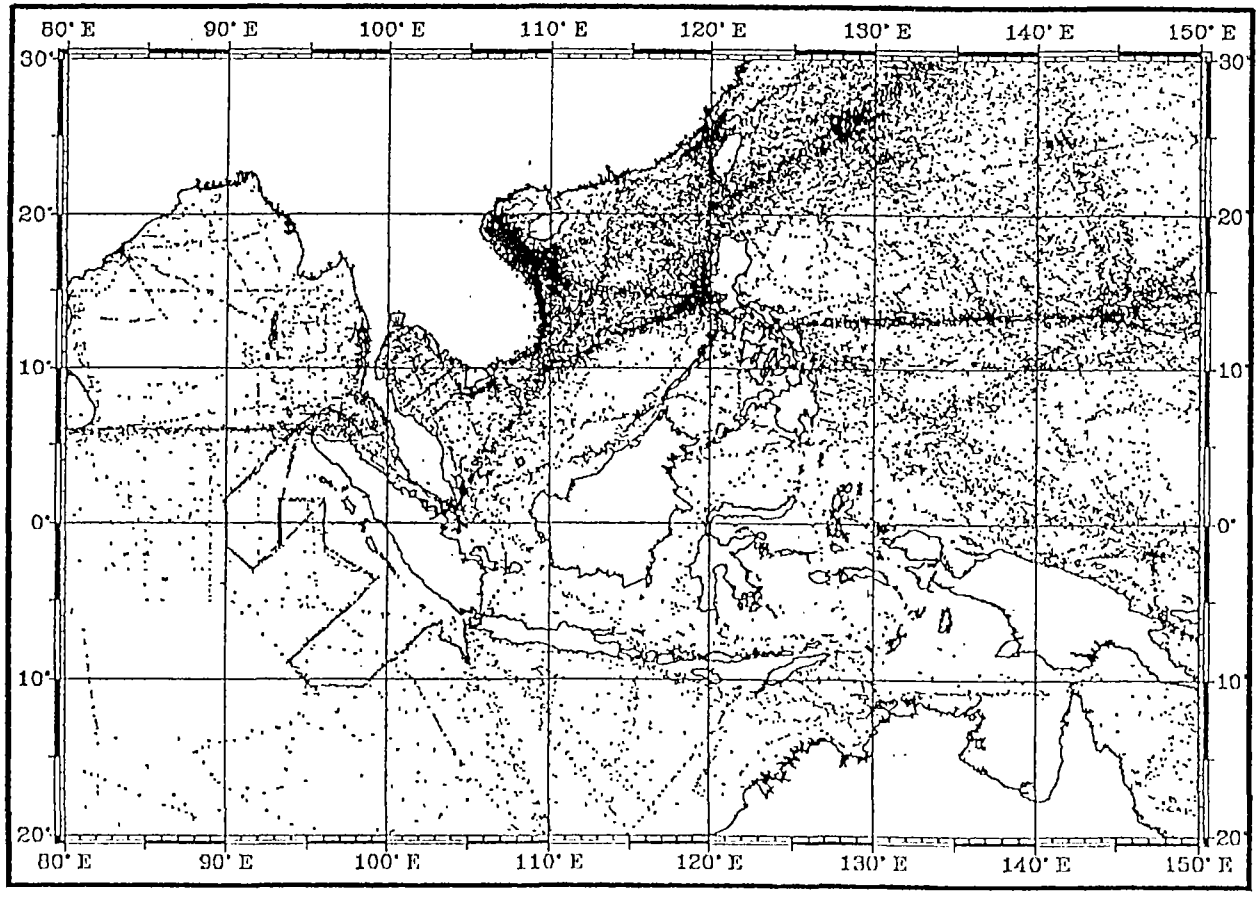


Table 2: NODC MBT - 75,240 Observations

1.1.3 SBT

The NODC SBT file contains approximately **58,513 temperature - depth profiles** obtained using MBT, XBT instruments, primarily from 1940-1990. The profiles are archived at originator interpolated standard depth increments and are unique to the records in the NODC MBT and XBT files.
Geographic Coverage : **20 degree S -30 degree N ; 80 degree E - 150 degree E**
Temporal Coverage : **1940-1980**

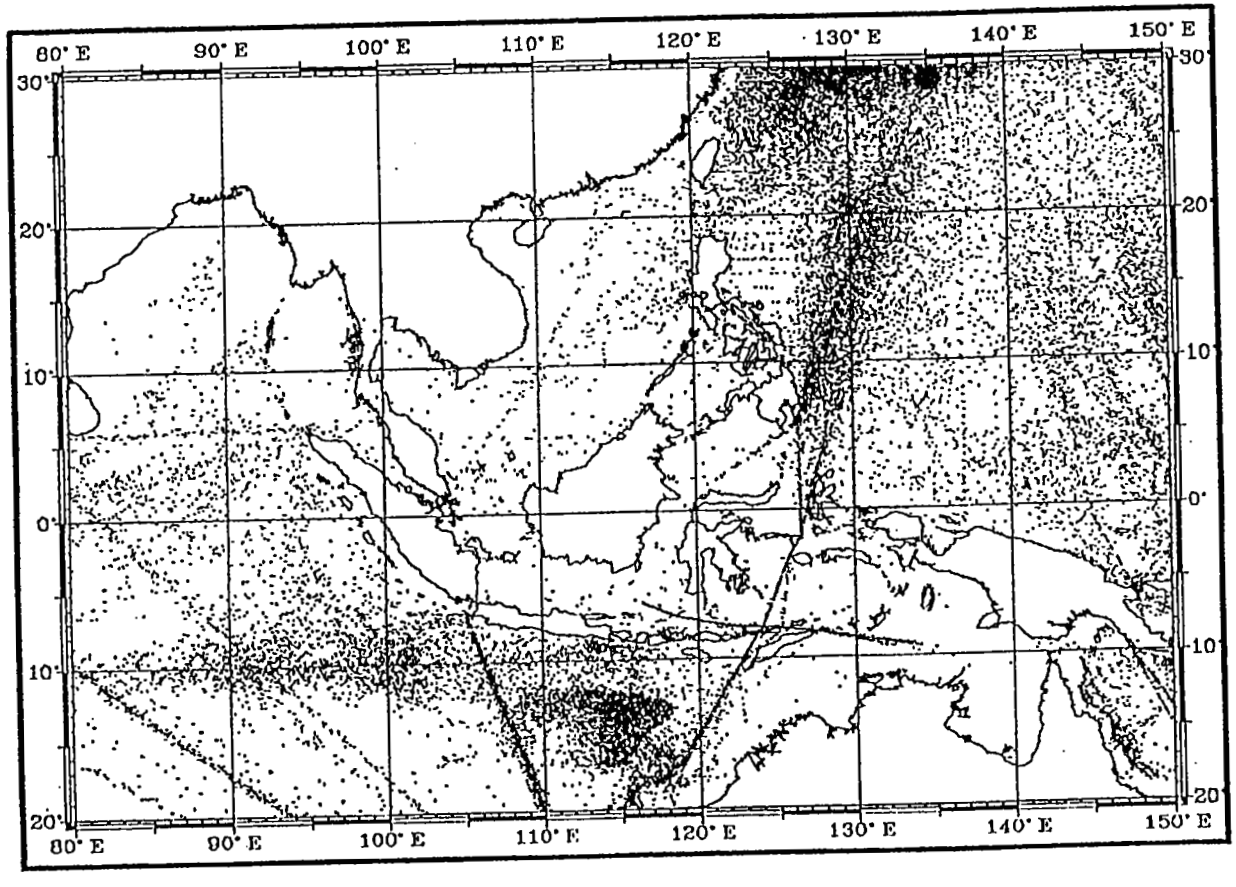


Table 3: NODC SBT - 58513 Observation

1.1.4 SD

The NODC Oceanographic Station Data file contains approximately **41,330** hydrographic watyer sampling casts (Nansen and rosette), primarily from 1900 to 1990. The principal measured parameters are temperature and salinilty measured at discrete depth levels from 0 - 500 m depth. Other physical-chemical parameters such as dissolved oxygen, phosphate, total phosphorous, silicate, nitrite, nitrate and pH as well as meteorological conditions at the time of the cast (ie air temperature and pressure, wind and waves) and auxiliary data such as water colour, water transparency and depth to bottom may also be reported.

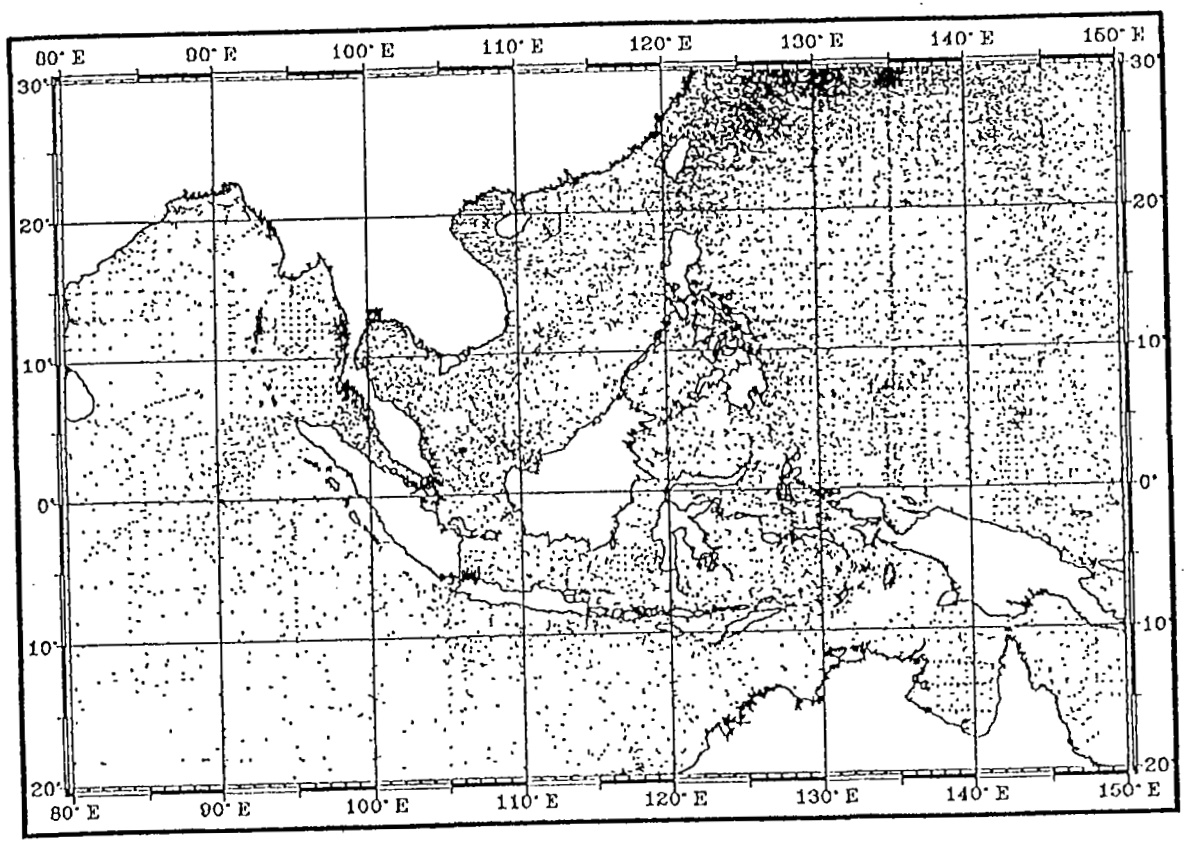


Table 4: NODC SD 41330 Observations

1.2 AODC - Australian Oceanographic Data Centre.

1.2.1 XBT

The AODC XBT file contains approximately **1759 temperature - depth profiles** obtained using expendable bathythermograph(XBT) instruments.
Geographic Coverage : **20 degree S -30 degree N ; 80 degree E - 150 degree E**

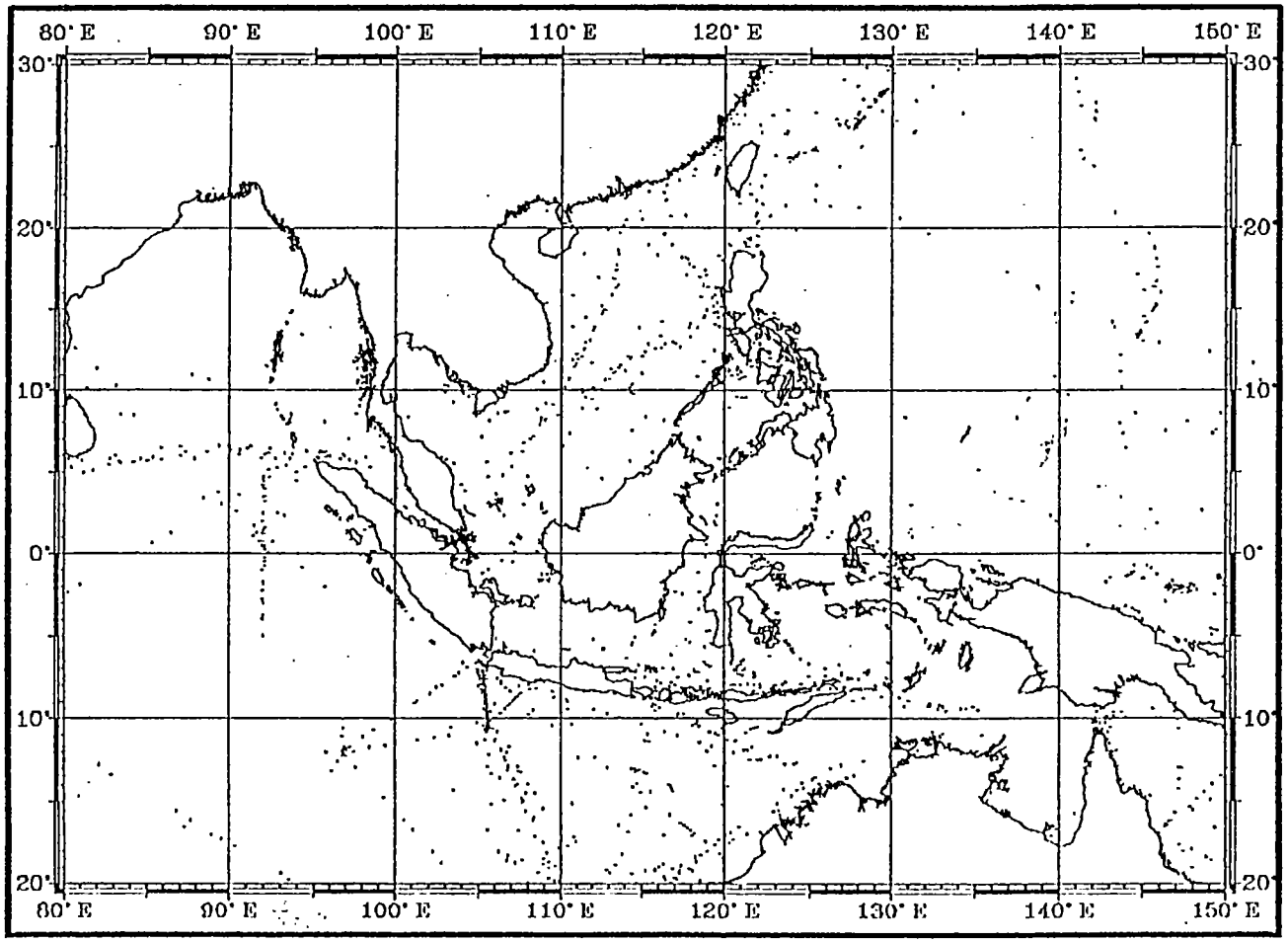


Table 5: AODC XBT - 1759 Observations

PHILIPPINES NATIONAL OCEANOGRAPHIC DATA CENTRE by G. Gascon

HISTORICAL BACKGROUND

After the Philippines became a member of the IOC, the National Committee on Marine Sciences (NCMS) was created to serve as a focal point and coordinating body of the IOC on marine researches undertaken by various national agencies, institutions and laboratories of the government. The Philippines became a participating member of the IODE system of the IOC with the implementation of the "Cooperative Study of the Kuroshio Current and the Adjacent Seas" (CSK). The NCMS designated the then Bureau of Coast & Geodetic Survey (now the CGSD of NAMRIA) to serve as the National Oceanographic Data Center (NODC).

THE NODC AND THE OCEANOGRAPHIC INFORMATION SYSTEM IN THE PHILIPPINES

Organization

The Philippine NODC (Figure 1), a unit within the Coast and Geodetic Survey Department (CGSD) of the National Mapping and Resource Information Authority (NAMRIA) was established to acquire, process, store, archive and disseminate oceanographic data. Four of its personnel have trained at the JODC in oceanographic data management and two of them have attended training at Flinders University of South Australia to acquire a wide range of topics involving collections, processing and archiving of tidal and sea level data. At present it has four (4) working computer equipment.

Data Processing and Management

Two (2) short-term experts dispatched by the JODC in 1988 and 1989 had assisted in the development of the NODC by providing computer equipment and developing softwares on oceanographic data processing and management. Other softwares on oceanographic data also provided by the ASEAN-Australia Cooperative Programme on Marine Science Projects Tides and Tidal Phenomena (TTP) and Regional Ocean Dynamics (ROD). Further development of softwares are being undertaken by the NODC personnel.

Figure 2: Shows the data/information flow of the Philippine Oceanographic Data Center.

Figure 1:
Oceanographic Division
Coast & Geodetic Survey Department
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY

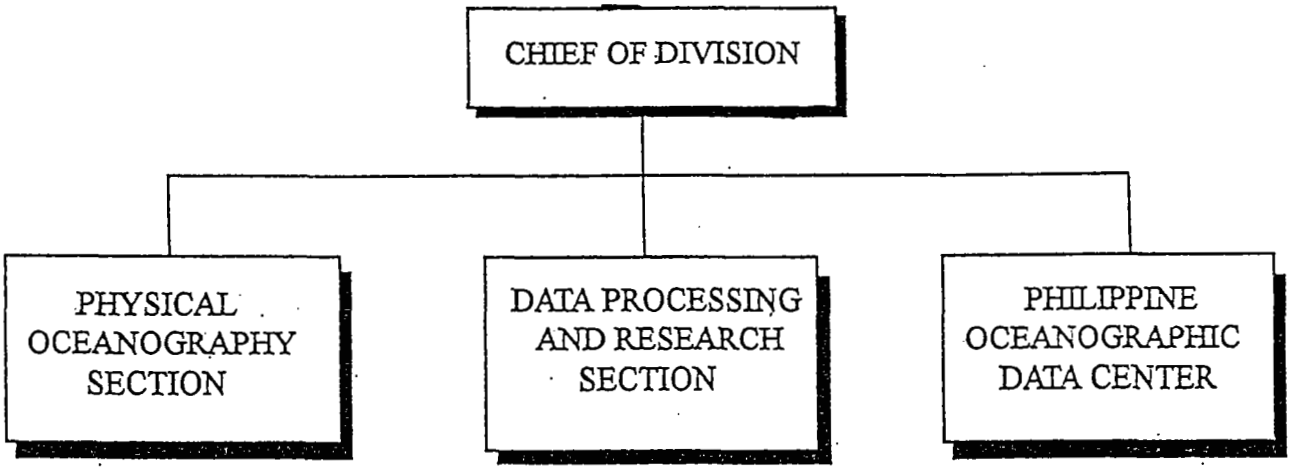
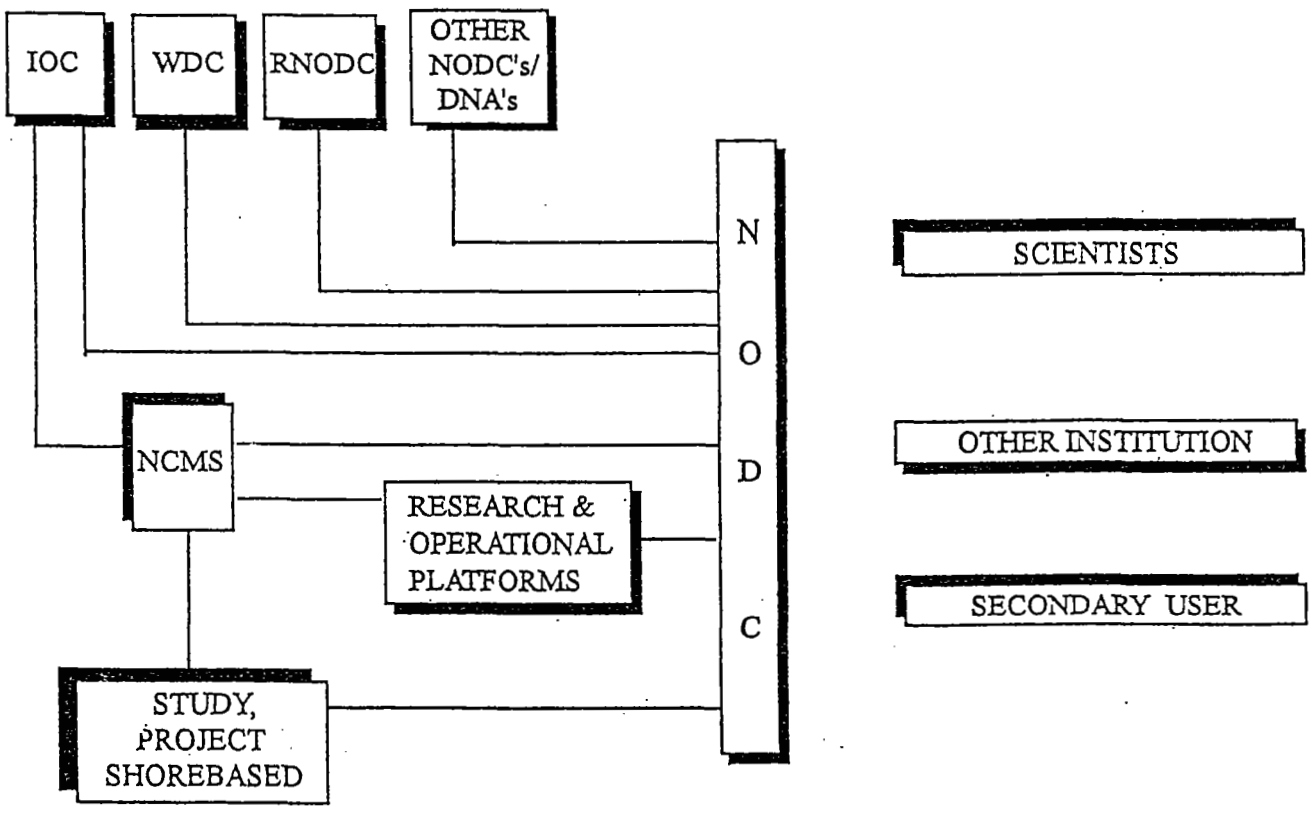


Figure 2: NODC Data/Information Flow



FUNCTIONAL CHART

OCEANOGRAPHIC DIVISION

Initiates, plans and conducts oceanographic investigations on sea water properties; undertake direct and indirect current measurements and other phenomena on coastal waters and continental margins within the Exclusive Economic Zone; maintains and operates Primary tide stations and Tsunami stations at major ports of the country; continuously observes and gathers oceanographic data from government agencies, private entities, as well as foreign institutions for data banking and exchange for the maintenance and development of a National Oceanographic Data Centre. In-charge-of the annual publication of the Predicted Tide and Current Tables to serve as a guide to mariners on safety to navigation.

PHYSICAL OCEANOGRAPHY

Maintains and operates the automatic tide gauges at Primary Tide stations. Takes daily tide staff reading, corrects time of observation, temperature and density of sea water and notifies the Central Office of an impending Tsunami threat through marigrams of Tide Stations. Participates in annual tidal releveling and inspection of coast pilot works at the Primary Tide Stations. Undertakes direct current measurements on natural waterways for safety to navigation. Participates in indirect current measurements using Nansen casts, CTD profiler, plankton nets and water sampling for salinity determination for dissolve oxygen content, nutrients, pH, etc.

DATA PROCESSING AND RESEARCH

Inspects and tabulates marigrams from Primary and Secondary Tide Stations. Computes the various mean tidal datum planes, tide reducer for reduction of soundings, the speed and direction of currents from direct current measurement. Analyze tidal and current data for determination of Tidal Constants of constituents for prepares manuscripts for the publication of Annual Tide and Current Tables. Determines the temperature, salinity and other physical oceanographic parameters from serial casts observation and prepares manuscripts of Oceanographic Atlas. Makes researches on ocean circulation and sea-level variations, direct current measurements on inland waterways and primary tide stations.

NATIONAL OCEANOGRAPHIC DATA CENTRE

Gathers oceanographic data from various related government marine agencies, as well as from foreign institutions and encodes processed data from our tidal and current observations for data banking. Develops software on oceanographic data processing. Collates, archives, and issues/exchanges oceanographic data to public, private entities and foreign sectors.

Table 1: NODC DATA HOLDINGS

Data Item	Data Attribute
1. Tidal Current	Latitude, Longitude, direction at rising tide and direction at falling tide
2. Tide	Latitude, Longitude, Tide Station name, datum below BM of zero of tide staff, number of tidal components, delay angle of each tidal component and amplitude
3. Ocean Meteorology	Latitude, Longitude, data observed, with direction, wind force, atmospheric pressure, atmospheric temperature and wave height
4. Water Temperature	Latitude, Longitude, depth, date observed, number of layers observed, depth and temperature of each layer
5. Surface Water Temperature	Latitude, Longitude, date observed water temperature
6. Ocean Current	Latitude, Longitude, date observed, observation instruments, current direction, current velocity, northward and eastward components of velocity.
7. Salinity	Latitude, Longitude, depth, date observed, number of layers observed, number of standard layers, depth and salinity of each layer.
8. Water Analysis	Latitude, Longitude, depth, date observed, number of layers observed, DO, PO_4, total P, NO_2, NO_3, N, Si and PH of the layer observed, depth, T, thermostatic anomaly, specific volume anomaly, dynamic depth anomaly, and speed of sound of the standard layer.

NODC Oceanographic Data Holdings

NODC data holdings are sets in three (3) categories:

1. Data collected as a result of observations from regional cooperative projects. Such data are only in typewritten available for international exchange as the "Study of the Kuroshio Current and the Adjacent Region".

2. Data requested from WDC and through IODE System for oceanography by the NODC which are in continuous forms and are data resulting from observations covering almost any part of the country.

3. Data acquired by BCGS as a result of observations in the performance of its function as a hydrographic office of the government. Such data are available in forms, reports, publications, floppy disk and tapes coming from ten (10) Primary Tide Stations and twenty eight (28) Secondary Stations located at different parts of the country.

NODC data holding include (Table 1): measurements of water temperature, salinity, water analysis, ocean meteorology, bathymetry, tides, tidal and ocean currents, BT data, etc.

Information and Referral Services

Due to the limited budget and personnel the mandatory requirement of all government and private agencies, universities and institutions involved in marine science to submit oceanographic data was held in abeyance until such time that the then BCGS was capable of taking full responsibility of the NODC. For types of data and information that it cannot provide NODC referred them to other agencies and organizations with proper coordinations.

NCMS member agencies which hold/observe marine information are as follows:

	Agencies	Nature of Data
1.	Philippine Council for Aquatic and Marine Research and Development (PCAMRD)	Biology, Fisheries, and Chemical Oceanography
2.	Bureau of Fisheries and Aquatic Resources (BFAR)	Biolgoy, Fisheries, and Chemical Oceanography
3.	Mines and Geo-Sciences Burea (MGB)	Marine Geology and Geophysics
4.	Marine Science Institute (MSI) University of the Philippines	Biology, Fisheries and Physical Oceanography
5.	National Mapping and Resource Information Authority (NAMRIA)	Physical Oceanography Geology, Geophysics and Meteorology.
6.	Philippine Coast Guard (PCG)	Contamination/Pollution
7.	Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA)	Meteorology, Geology, Geophysics and Physical Oceanography
8.	Institute of Marine Fisheries and Oceanography, College of Fisheries (UPV-CF), University of the Philippines in Visayas	Chemical Oceanography, Biology and Fisheries
9.	Tawi-Tawi College of Technology and Oceanography (TCTO) Mindanao State University	Chemical Oceanography, Biology and Fisheries
10.	National Museum (NM)	Marine Archaelogical Properties/Resources

International Cooperation and Exchange

Aside from being a participating member of the IODE System since its establishment the NODC have been involved on the following ocean research programs.

1. Cooperative Study of Kuroshio Current and Adjacent Regions 1968 Summer and 1969 Winter Cruises (CSK).

2. ASEAN-Australia Cooperative Program on Marine Sciences:

   2.1 Tides and Tidal Phenomena (TTP) Project.

   2.2 Regional Ocean Dynamics (ROD) Project
   Current Metering Experiment

3. Global Sea Level Observing System (GLOSS)/PSMSL.

4. Integrated Global Ocean Services System (IGOSS)/IGOSS Sea Level Project in the Pacific (ISLPP).

5. Tropical Ocean Global Atmosphere (TOGA)

6. World Ocean Circulation Experiment (WOCE)

7. Pacific Tsunami Warning System (PTWS)

OCEANOGRAPHIC INVESTIGATIONS AND DATA HOLDING PROBLEM IN VIETNAM by Chu Thi Hin

I. Introduction

Vietnam is situated in the South-east Asian tropical mosoon zone prossessing a shore line more than 3200 km and there are 21/40 with about 1/6 of total country population located immediately close to the shore line. Therefore the sea plays an very important role in the life of Vietnamese people and it's natural for Vietnam to give considerable attention and efforts to understand its seas.

In the last decade, there has been rapid progress in the development and utilization of marine resources, that is one of the most important policy of some latest Governmental 5-years Plans Development country.

II. Oceanographic investigations in Vietnam- features and achievements

The Oceanographic investigations in Vietnam has a long and complicated history. The most ancient coastal stations are Hon Dau, Vung Tau and Mui Nai that began their functional activies in the first three decades of our country. The first institute of oceanography was founded in Nhatrang during 20th years and this institute spent attention for the investigation sea bottom topography and collection sea organisms (fishes, plankton, corals) and the study water's hydrological regim. After that somde foreign ships carried out observations in the Biendong Sea but without participating of the vietnamese side.

In the 60th years, there were 3 oceanographic campaigns that played the most important role for the development ocean science in our country:

- Complex investigation of Bac- Bo gulf (1959-1962) by joint efforts of China and North Vietnam.

- Investigation of pelagic and demersal fishes (1960-1961) with the cooperation of TINRO (Soviet Union).

- NAGA expedition (1951-1961) by joint efforts of USA, South Vietnam and Thailan, sponsored by FAO.

The most inmportant research vessels of the country were R/V Biendong Sea of Marire Products Institute (MPI), Marine Research N°3 of Institute Oceanography (IO) and Naval Hydrographic Vessel. Other side, there were different marine research

projects in cooperation with the foreign compaigns, which provide us many perspective results.

Expedition works at the sea consisted mainly of multipurpose seasonal cruises that covered large ares of the sea. The research fields have been rather wide including marine hydro-meteorology, geology- geophisic, marine biology, marine chemistry and bottom topography. *Fig.1* and *Fig.2* present typical seasonal expeditions by R/V Biendong Sea of MPI and the Russian R/Vs in cooperation with Marine Hydrometeorologial Centre (MHC)

Since the 90th years commercial project survey submarine optic cable system, oil and gas exploitation has had tendency to be concentrated in the coastal zone.

Talking about oceanographic research process it's necessary to talk about National Marine Investigation Program (NMIP). Since 1977, NMIP has been established and develops corresponding to every State Five Years Plan of socio-economic Development of our country. Almost of maritime institutions and experts take part in this Program as well as : Institute Oceanography (Nhatrang), MPI, Hydrometeorologial Centre (MHC), Laboratory of Tropical Meteorology, VNODC, Sub-IO in Hanoi, Sub- IO in Haiphong, Hanoi University etc.

Talking about the most important achievements on oceanographic research of two latest Five-years Plans, Prof. Dr. Dang Ngoc Thanh- the General Director of the Programme made underline on followings problems:

1. Determination Geologo-geophysical characterics of the coastal shelf and prediction natural resources, especially oil and gas potential.

2. Topography-geomorphology and sedimentary of the sea bottoms, concerning to the problem investigation and exploitation oil and-gas.

3. Geological-geotectonical characteristics and Earthquake zoning of the coastal zone and Biendong Sea.

4. Hydrometeorology, meteorology, dynamic of the shelf, concerning to the problem forecasting and exploitation oil and gas, especially some process as: typhoon, water's temperatura, tidal, waves, water currents etc.

5. Regime characterics tic of typhoon surges and water currents in the coastal zones and islands in Biendong Sea.

6. Effect of the Vietnam ocean conditions for the building oil exploitation structures

7.Oil pollution on the water sea and numerical model for calculation diffusion-adnection process.

8. Effect of oil pollution for the ecological environment in Vietnam conditions.

Below we present some concrete examples from above-mentioned conclutions:

Fig.3 showed the distribution of the wind speed of typhoon N°4 (1969) in the South China Sea and the wind field calculating by numerical model (*Dr.Pham Van Ninh, River and Sea dynamic Center*)

Fig.4. Prediction schema of hydrocarbon potential in the Red River Basin , according to the geotectonical characterics (*Le Trong can et al, Institute of Oil and Gas*).

Fig. 5. Schema of Earth crust on the coastal zone and Biendong Sea region (*Dr. Bui Cong Que, Applied Geophysical Center*).

II. Data holding in Vietnam at present and future

Marine Products Institute is the first our institutions that started in 1989 computerized oceanographic data management. That was only the beginning because Vietnamese marine research institutions were still isolated from the whole data management community of the world.

Besides the states of isolation and a well-know situation of many developing countries, the establishment of Data management System and well function NODC in Vietnam is a difficulty undertaken task. The main reason are :

- Lacking policy from government throughout, so that, every institution wants to establish their own data management staff.

- Lacking of workmanship and necessary technical and technological capabilities.

- Limited buget of government on oceanographic data service.

During 1991, the Decentralized Vietnam National Oceanographic Data Center was established by join efforts of the IOC of Vietnam. The implementation of the VNODC has been divided on 3 stages : 1. Experimental implementing; 2- Creating the relational topical data bases and C- Creating the national distributed data base.

1- Experimental implementing stage (1991-1993): The activities and purposes of this stage are:

- To establish VONDC and 3 operative branches OB1, OB2, OB3 and to provide them with necessary informatic technology;

- To make contact with the world NODC's network;

- To make the Vietnames oceanographic community to take interest on computerized data management and data products of the world community.

2. Creating the relational topical data bases (1994-1995): In this stage our purpose are as follow :

- To establish the national standard data formats, storage and transfer medium;

- To create the relational topical data bases on marine meteorology, oceanography and marine biology;

- To establish the experimental computer network as well as to improve significantly data processing capacity in order to increase the social demands on oceanographic data service.

3. Creating national distributed oceanographic data bases (from1996): This stage contains :

- To implement appropriated distributed computer network

- To create the national distributed oceanographic data bases;

- To link VNODC to GTS and to GTS and to establish effective oceanographic data service.

At present the stage 1 and part of stage 2 are successfully completed.

It is very important that since 1993 VNODC has maintained relation with JODC, NODC (NOAA), BODC, WDC-A, WDC-B, RNODC WESTPAC and some other special data centers.

Since the end of the stage 1, the technological capability ha allowed VNODC to handle effectively CD-ROMs products and some another kind of data products in delayed mode of IODE, IGOSS, GOSS and TOGA etc.

3. Conclution

From above presented status of oceanographic research activities and data management in Vietnam (added the materials provided Ms. Nguyen Hong Chau on IOC-IODC Training Course 27.9 - 8.10/1993); it is clearly that, the Vietnamese oceanographic activities have their own achievements and new concept development and Oceanographic Community of Vietnam (among them is VNODC) has been already to joint to the World Oceanographic Community. VNODC also hope that, the World Oceanographic Community would spend more attention and support for the marine investigations and Data Oceanographic Service in Vietnam.

4. Acknowledgments

I am acknowledged the IOC Secretariat and JODC for providing me with final support to this training course. I especially acknowledge the staff of JODC for giving me all possible conditions for my study and life in Tokyo. I strongly hope that, the knowledge, provided me this training course would be very useful for my job in future

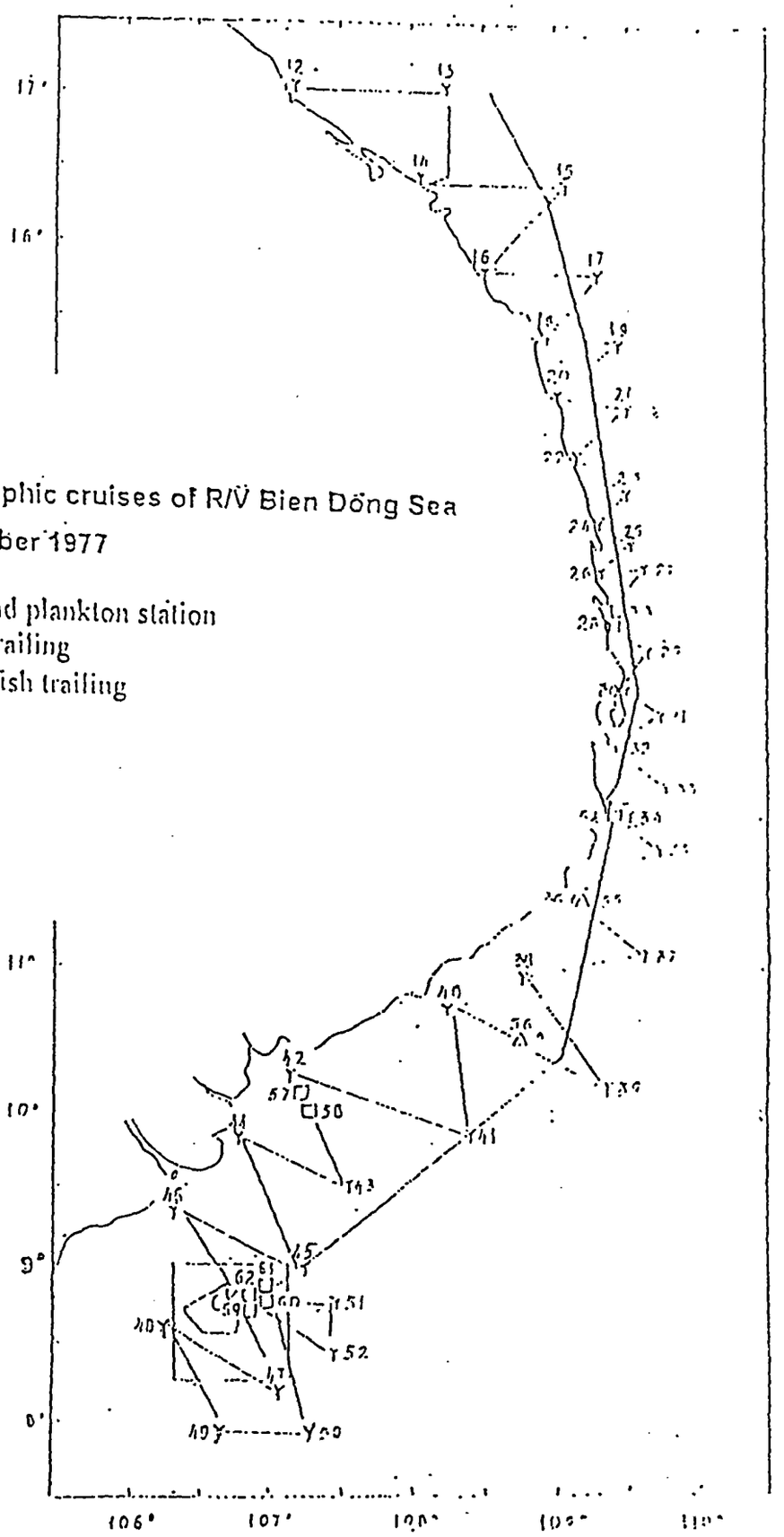


Fig.2.1 Oceanographic cruises of R/V Bien Dông Sea In September 1977

Y-Nansen cast and plankton station
□- Bottom fish trailing
Δ- Middle layer fish trailing

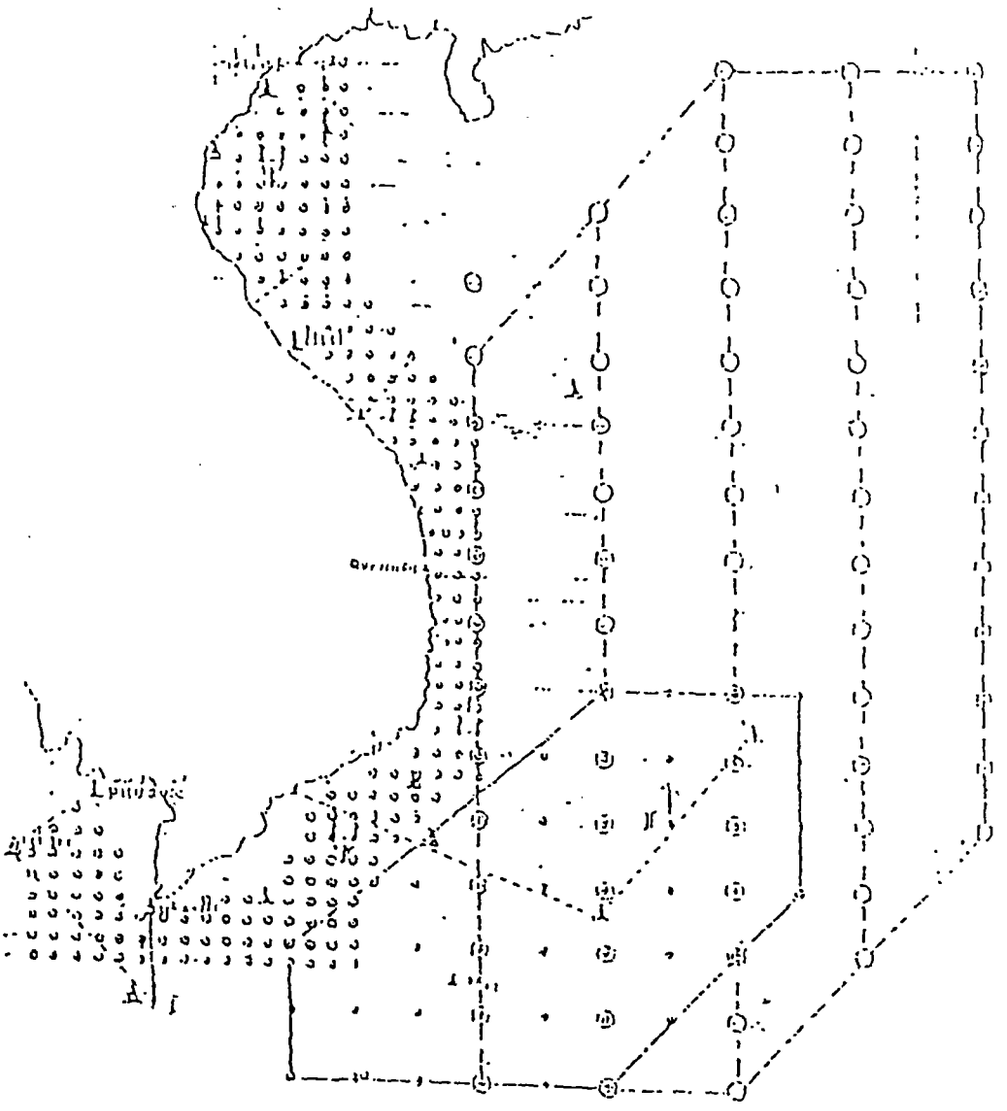


Fig.2.2 Station scheme of the Vietnamese-Russian Project for investigation of typhoon and oceanography (DVNIGMI, MHC and LTM).
Δ-Regular coastal and island station, Δ- planned island stations. O-Typhoon observation network by chips and air-plans. • -Nansen and CTD cast
δ- Sea current measurement polygons.

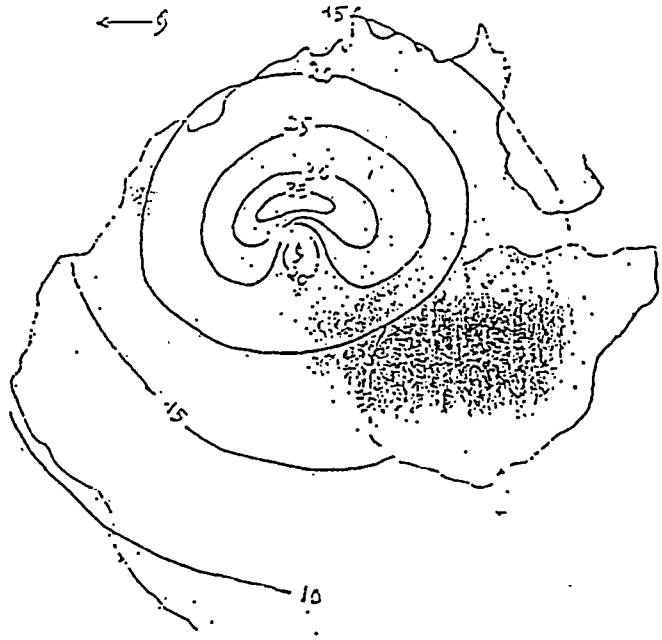


Fig.3.1 Distribution of the wind speed (m/s) of typhoon N°4/1969 in the South China Sea

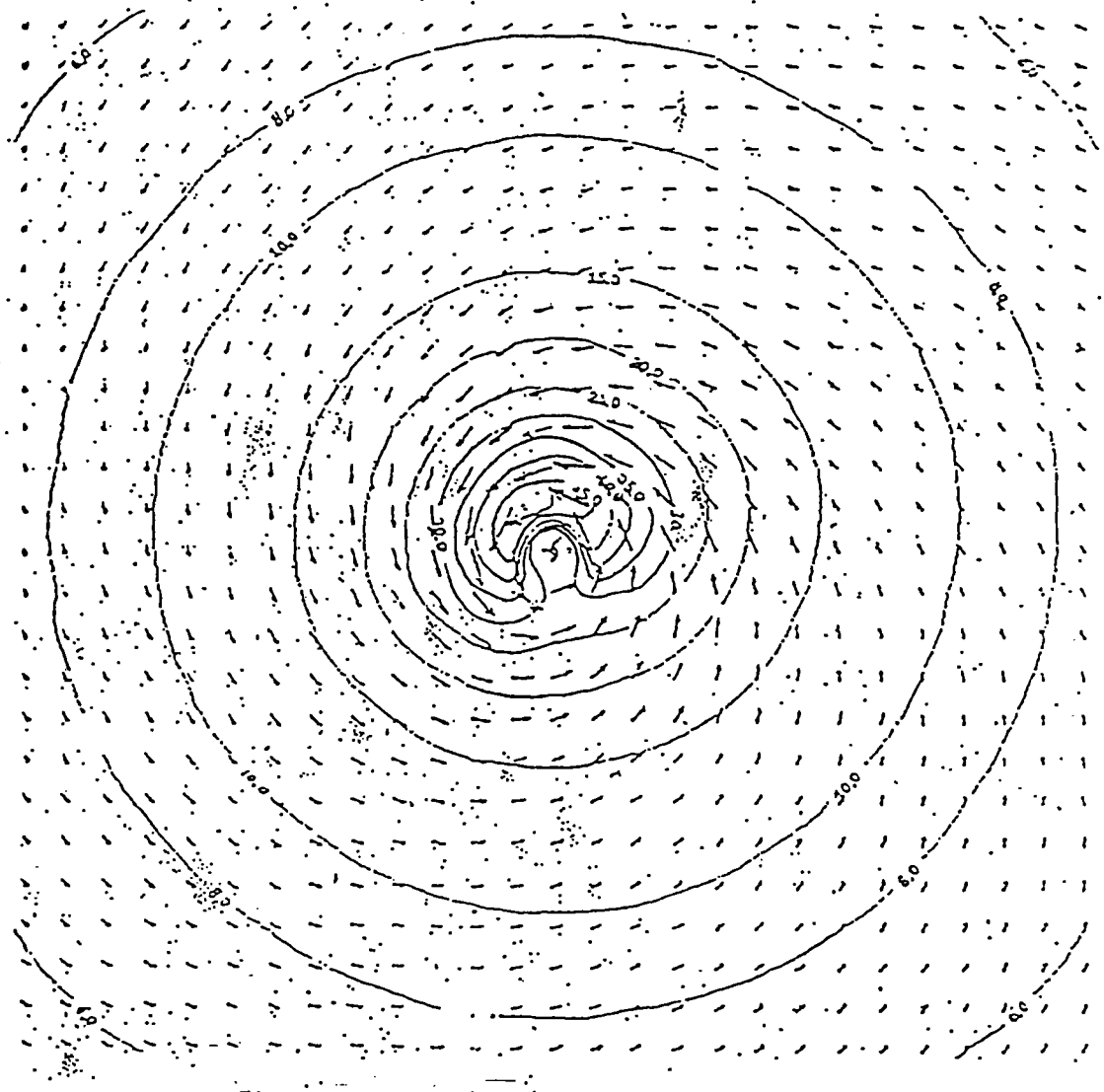


Fig.3.2 Wind field calculating by numerical model
(Dr.Pham Van Ninh, River and Sea dynamic Center)

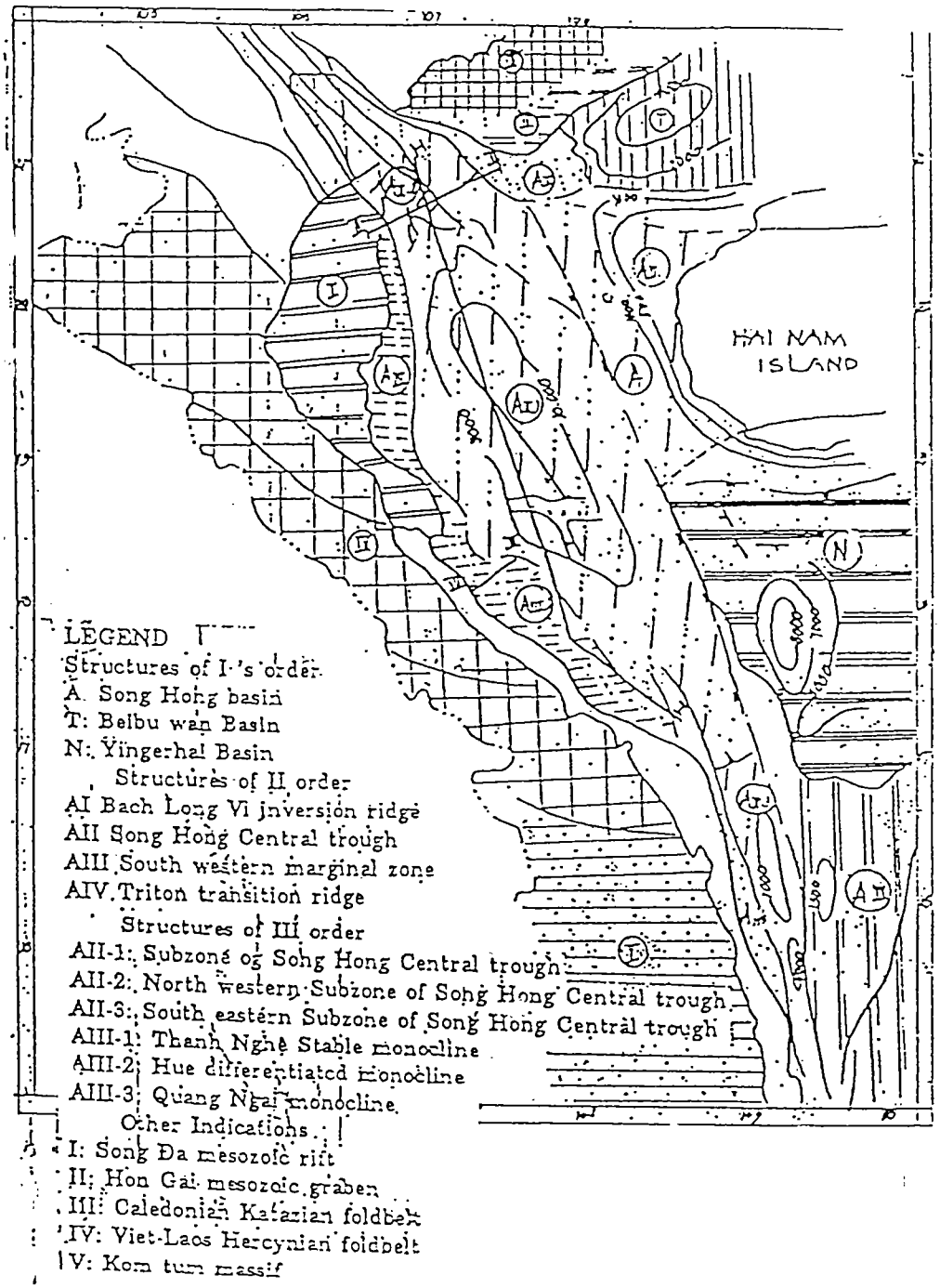


Fig.4 Prediction schema of hydrocarbon potential in the Red river basin according to the geotectonical characteristics

(Le Trong Can et al, Institute of Oil and Gas)

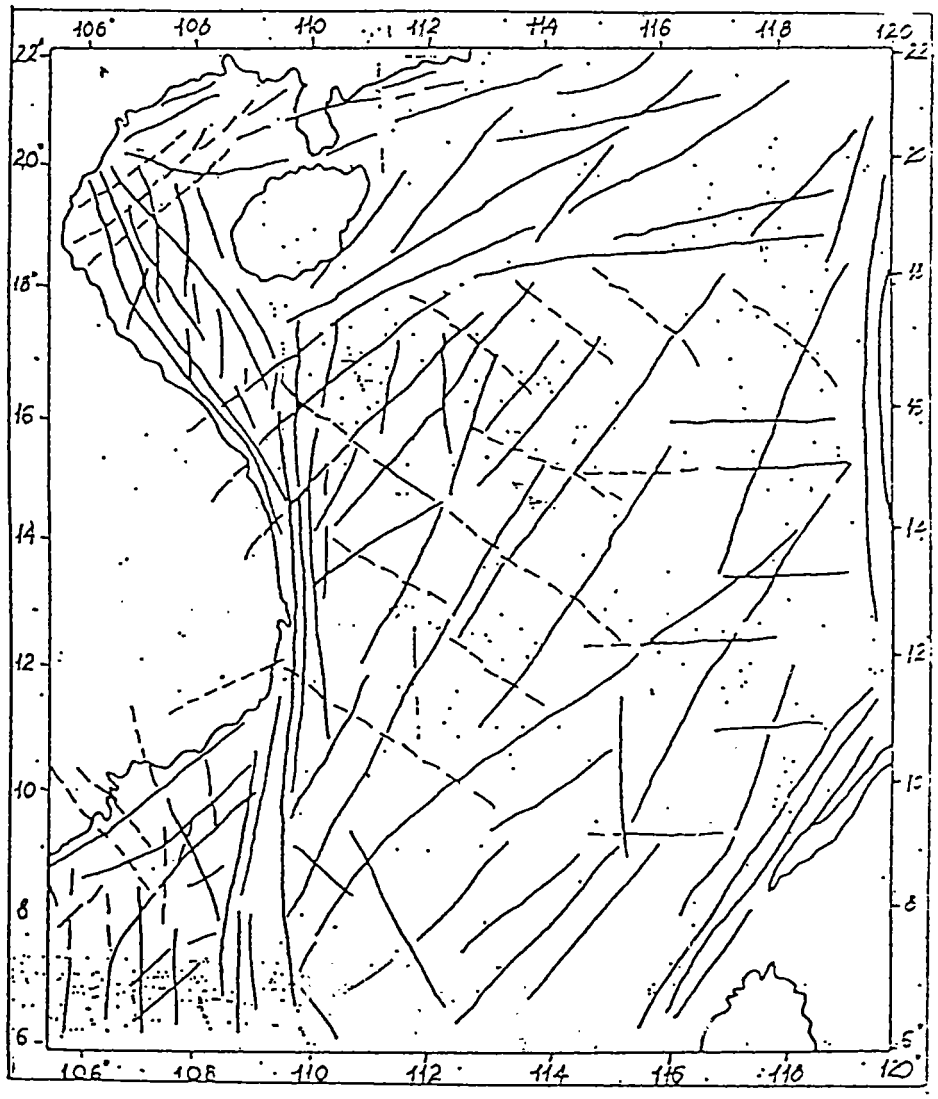


Fig. 5. Schema of Earth crust on the coastal zone and Blendong Sea region
(Dr. Bui Cong Que, Applied Geophysical Center).

ANNEX III

LIST OF PARTICIPANTS

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ANNEX IV

LIST OF PARTICIPATING COUNTRIES IN TRAINING COURSES FROM 1982 to 1993

1st:	29 March-9 April 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 September 1985	Philippines, China, Vietnam
5th:	8-20 September 1986	China, Republic of Korea, DPR of Korea Malaysia (2), Thailand
6th:	7-19 September 1987	China, Philippines, Thailand
7th:	26 Sept.-8 Oct. 1988	Republic of Korea, Thailand, Vietnam
8th:	25 Sept.-7 Oct. 1989	China, Indonesia, Malaysia, Thailand Republic of Korea
9th:	15-26 Oct. 1990	Indonesia, Republic of Korea, Vietnam
10th:	24 Sept.-9 Oct. 1991	Indonesia, Malaysia, Philippines Thailand (2)
11th:	28 Sept.-9 Oct. 1992	Indonesia, Philippines, Thailand
12th:	27 Sept.-8 Oct. 1993	Indonesia, Thailand, Vietnam
13th	26 Sept.-7 Oct. 1994	Malaysia, Philippines, Vietnam

SUMMARY

China	6
DPR Korea	1
Indonesia	6
Malaysia	6
Rep. Korea	6
Philippines	6
Thailand	9
Vietnam	6
Total	46

ANNEX V

LIST OF ACRONYMS

ADCP	Acoustic Doppler Current Profiler
AODC	Australian Oceanographic Data Centre
ASEAN	Association of South-East Asian Nations
BATHY	Bathythermograph Report (of IGOSS)
BT	Bathythermograph
CD-ROM	Compact Disk used as Read Only Memory
DNA	Designated National Agency
GEBCO	IOC/IHO General Bathymetric Chart of the Oceans
GF3	General Format 3 (promoted by IODE)
CSR	Cruise Summary REport
J-DARS	JODC Oceanographic Data Archiving and Retrieving System
GDA	GEBCO Digital Atlas
GEODAS	Geophysical Data Management System
GOOS	Global Ocean Observing System
GTSPP	Global Temperature Salinity Pilot Program
IGOSS	Integrated Global Ocean Service System
IHB	International Hydrographic Bureau
IHO	International Hydrographic Organization
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
J-BIRD	JODC's Bathymetry Integrated Random Datasets
JAMSTEC	Japan Marine Science and Technology Center
JHD	Japan Hydrographic Department
JICA	Japan International Co-operation Agency
JODC	Japan Oceanographic Data Center
MARPOLMON	Marine Pollution Monitoring Programme
MSARC	Maritime Safety Agency Research Centre
MGD-77	Marine Geophysical Data Format
MS-DOS	Disk Operating System of Microsoft
NAMRIA	National Mapping and Resource Information Authority (of The Philippines)

NGDC	National Geophysical Data Center (of USA)
NODC	National Oceanographic Data Center
PC	Personal Computer
RMNODC	Royal Malaysian Navy Oceanographic Data Center
RNODC	Responsible National Oceanographic Data Center
TESAC	Temperature, Salinity, Currents (of IGOSS)
VNODC	Vietnam National Oceanographic Data Center
WDC	World Data Centre
WESTPAC	IOC Sub-Commission for the Western Pacific
WOCE	World Ocean Circulation Experiment