Intergovernmental Oceanographic Commission

ICSU Panel on World Data Centres

Manual and Guides 9

MANUAL ON INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE

REVISED EDITION, 1991

SC-91/WS-51

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1. PURPOSE

The purpose of this manual is to assemble in a convenient form, the procedures, responsibilities and facilities for the international exchange of oceanographic data under the International Oceanographic Data and Information Exchange (IODE) system and under the ICSU WDC System. ICSU oceanographic programmes may be non-governmental, but many, especially for the World Climate Research Programme, are organized and conducted in collaboration with such bodies as IOC and WMO, which then involve governmental oceanographic institutions in Member countries.

Data exchange is primarily concerned with the exchange of measurements of variables related to the ocean, the ocean bottom, or its contents. Information exchange is primarily concerned with the exchange of textual and published information. For additional information on both data and information exchange there is a list of relevant publications in Appendix 1.

The document is intended both as an introduction and source of information for those unfamiliar with international data exchange and as a source of the latest information for data users and those operating the system. The manual has been produced in loose leaf form to facilitate updating. Updates will generally be published after a meeting of the Committee on IODE (C-IODE), which is usually held at intervals of 2 to 3 years; such updates will include, in collaboration with ICSU, relevant updated or new data management plans for ICSU-sponsored scientific programmes.

Updates will cover such topics as exchange of data resulting from technological advances in instrumentation, the development of new processing techniques, additions to the General Format (GF3), the development of additional marine data inventories, information on the development of the network of Responsible National Oceanographic Data Centres, etc.

2. INTRODUCTION

The foundations for the IODE system are laid in the WDC system developed for the International Geophysical Year and its one-year extension, 1957-59. The IGY led to the establishment of World Data Centres A and B for Oceanography, located originally in College Station, Texas, USA and Moscow, USSR, respectively. These centres, now located in Washington, DC and Obninsk of Kaluga District, USSR, are financed by the USA and USSR, respectively. In order to meet the increasing demand for data from WDCs Oceanography by a growing number of users and also to provide complete geographic coverage service by WDCs Oceanography, in 1989 ICSU accepted the proposal by China to establish World Data Centre D, and there is now a third WDC for Oceanography, located in Tianjin and financed by China.

These centres, along with those in other geophysical disciplines, are under the guidance of the Panel on World Data Centres of the International Council of Scientific Unions (ICSU). In guiding the operation of the WDCs for Oceanography, the Panel has depended on the IODE for support and advice on matters related to oceanographic data management and exchange. For example, the Oceanography Section of the previous ICSU Guide to International Exchange of Geophysical data, 1979, was based almost entirely on the IODE guide extant at that time. It has now been decided between IOC and ICSU that only one Manual should provide for the international exchange of oceanographic data, namely the IODE Manual modified as appropriate so as to be acceptable also to ICSU. Consequently, the wording in this version of the IODE Manual reflects this merger and this Manual constitutes the IOC/ICSU Manual to the International Exchange of Oceanographic Data.

2.1 The IODE System

The IODE system has been established to enhance marine research, exploration, and development by facilitating the exchange of oceanographic data and information between participating Member States. IODE is a programme of the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

With the advance of oceanography from a science dealing mostly with local processes to one which is also studying ocean basin and global processes, researchers depend critically on the availability of an international exchange system to provide data and information from all available sources. Additionally, scientists studying local processes benefit substantially from access to data collected by other Member States in their area of interest. The economic benefit of obtaining data by exchange as opposed to collecting it oneself is very large.

The success of the IODE programme depends on the support of participating Member States, and the involvement of many individual institutions and marine scientists, who contribute not only data, but the necessary expertise to maintain and further develop the IODE system. Without this national support funded by the Member States themselves, the system could not exist.

By the early 1970s the technology for the collection of data at sea had advanced to the point that the types and volume of data being collected were becoming overwhelming. Help had to be found to assist the WDCs for Oceanography with problems of both data volumes and data variety. No one centre could hope to collect and maintain the expertise to process all the types of data being collected or deal with the volumes. However, collectively, the IOC system of National Oceanographic Data Centres and Designated National Agencies possessed both the expertise and the capacity. The concept of the Responsible National Oceanographic Data Centre (RNODC) and the second vital element of IODE was born to assist the WDCs for Oceanography with the international exchange of oceanographic data and information.

The third and most vital element of the IODE hierarchy is the National Oceanographic Data Centre (NODC). Without NODCs the system could not exist. NODCs provide the contact with the oceanographic programmes in a Member State and from those programmes compile the data and make it available for exchange. NODCs, in most cases, are the national agencies which assume the responsibilities of an RNODC and without them there could not be an RNODC system.

2.2 The Oceanographic Programmes of ICSU

Since the IGY, oceanographic programmes sponsored by ICSU have been associated with major programmes co-sponsored with the World Meteorological Organization (WMO) and associated with the Global Atmospheric Research Programme (GARP) and the World Climate Research Programme (WCRP). A new oceanographic programme is being organized for the International Geosphere Biosphere Programme (IGBP). Final sets of data and derived information products from the GARP programmes have been submitted for archiving and distribution to the WDCs. Data from WCRP programmes (TOGA and WOCE) are being prepared for submission. The IGBP programme, GOFS, will have a data management plan that will specify the data to be available through the WDCs.

2.3 Global Ocean Observing System

A Global Ocean Observing System (GOOS) is under development during the 1990's and will involve new categories and procedures for exchange of operational oceanographic data. Some of this data will have scientific archival value. IODE and WDCs Oceanography will consult the organizers of OOSDP and GOOS to identify appropriate archiving objectives.

3. GENERAL PRINCIPLES

The following notes on principles of the IODE system have been prepared in compact form for easy reference. The technical terms are explained fully in the main text. There is a list of acronyms in Appendix 10.

The fundamental principle of the system is that Member States, international co-operative programmes, and individual scientists contribute data voluntarily to the RNODCs and WDCs for Oceanography for the benefit of all.

3.1 Access to Data, Data Products and Inventories by Users

Users of the IODE system can approach a WDC for Oceanography, RNODC or NODC for data, data products, or data inventory information.

As a guiding principle, users are encouraged to approach the IODE system through the NODC in their country.

WDCs for Oceanography will generally provide data to NODCs and RNODCs as items of exchange, but may charge a fee to cover costs of providing the service, e.g., cost of copying the data.

RNODCs are required to provide data, data products or inventory information to users as specified in the terms of reference that established the centre.

NODCs are only required to provide services to users in their own Member State according to national procedures. NODCs may if they wish, provide services to others either free of charge or according to national cost recovery procedures.

WDCs for Oceanography, RNODCs and NODCs are encouraged to provide data products to users. In this case charges for data processing and production may be recovered at the discretion of the centre.

3.2 Responsibilities of NODCs for Reporting Data Collection Activities

NODCs are expected to report to the WDCs for Oceanography and to the IOC Secretariat on planned oceanographic data collection programs through the use of NOP announcements.

NODCs are expected to acquire or complete Cruise Summary Report forms for completed data collection programs. The data exchange status box on the Cruise Summary Report is to be used to indicate whether it is the intention of the member state to exchange the data internationally. These forms are to be submitted to the WDCs for Oceanography.

3.3 Responsibilities of NODCs, RNODCs, and WDCs for Oceanography for Data Exchange

NODCs are expected to submit data intended for international exchange, including both standard and non-standard data types, directly to WDCs for Oceanography or via a designated RNODC for the data type with the time periods specified in this Manual.

RNODCs are expected to submit data and reports on their activities to the WDCs for Oceanography on an annual basis or more frequently if stated in their terms of reference.

In general, WDCs for Oceanography are expected to exchange regularly among themselves data and data inventory information without charge to keep the contents of the centres identical, at least for new data. Starting from the date of recognition of each WDC by ICSU, when a new WDC has been added to the system, it may not be feasible that existing collections can be duplicated in full for exchange. It is left to the three WDCs to negotiate what is desireable and feasible, and will be of mutual benefit. If a new international oceanographic programme needs certain kinds of historical data such data should be given a priority for exchange.

3.4 Responsibilities for Establishment of WDCs (Oceanography), RNODCs and NODCs

WDCs for Oceanography are established by the host country under guidelines set forth by the ICSU Panel on World Data Centres so as to provide (i) safeguards against catastrophic loss of data, and (ii) convenient global access to the data collections.

RNODCs are established by the IOC according to the procedures outlined in the "Guide for Responsible National Oceanographic Data Centres" (IOC Manuals and Guides #9, Annex II).

NODCs are established by Member States to serve national interests. NODCs that participate in IODE are expected to fulfill the principles described in this manual.

3.5 Routine and Non-routine Data Exchange in IODE

Exchange of data in IODE takes place according to the principles of this manual when formats, standards, and procedures have been established, agreed and documented in IOC Manuals and Guides. This is considered as routine exchange.

Non-routine or ad-hoc exchanges of data take place in the IODE system to provide access by users to data that cannot be exchanged routinely because formats, standards, and procedures do not yet exist or because the data are too voluminous or expensive to exchange routinely.

The IOC Committee on IODE reviews regularly the requirement to implement routine exchange of previously non-routine, new, or experimental data and takes action to develop the necessary standards and procedures.

4. NATIONAL OCEANOGRAPHIC DATA CENTRES/DESIGNATED NATIONAL AGENCIES

A number of Member States of IOC have officially established centralized facilities for archiving oceanographic data originating from national programmes. These facilities acquire, process, quality control, inventory, archive and disseminate data in accordance with national responsibilities. These centres are referred to in the context of IODE as National Oceanographic Data Centres (NODCs). In addition to disseminating data and data products nationally, these NODCs are normally charged with the responsibility for conducting international exchange.

Some Member States, that have not established an NODC, have instead officially assigned the responsibility of international exchange of oceanographic data and information to some other agency within the Member State. These agencies are referred to as Designated National Agencies (DNAs).

Appendix 2 lists, by country, the names and addresses of the National Oceanographic Data Centres and Designated National Agencies that participate in IODE.

With regard to international exchange the most fundamental responsibility of the NODC/DNA within the IODE is to actively seek and acquire from national sources those data which are exchangeable internationally, and to process and quality control the data and submit them in a timely fashion to the appropriate WDC for Oceanography or RNODC. NODCs should also provide to the WDCs for Oceanography inventory information about their standard and non-standard data holdings available for international data exchange.NODCs should also collect and submit to the IOC Secretariat on a regular basis, information on National Oceanographic Programmes (NOPs). NOPs, and Cruise Summary Reports, are discussed in Section 11.

In return, the NODC can request and receive from the WDCs for Oceanography or RNODCs similar data or inventory information which they need for their own requirements.

5. RESPONSIBLE NATIONAL OCEANOGRAPHIC DATA CENTRES

The RNODC is a national centre which, at national expense, takes on the responsibility of assisting the World Data Centres. This assistance may be provided directly to the WDCs for Oceanography in support of their mission. It may be provided directly to other Member States to assist them with their particular requirements for getting data into or from the exchange system. It may be provided directly to an international scientific programme on behalf of the WDCs for Oceanography. Usually an RNODC will provide services which can be viewed as a combination of two or more of the above.

The RNODC scheme was developed to enable the international exchange system to cope with the increasing variety and volume of oceanographic data being collected. The primary function of the RNODCs is to aid the WDCs for Oceanography. Some RNODCs will provide services for requirements which change little if at all over the years. Other RNODCs will perform a set of services which meet short term needs of the international exchange system and have finite duration. This latter situation reflects a powerful flexibility in the IODE system which enables it to adapt and keep up to the accelerating needs of the oceanographic research community.

In fact, the short time scale associated with the changing needs of the international research community has made it necessary to put in place a mechanism to establish new RNODCs in the intersessional periods between meetings of the IOC Committee on IODE. Details on the establishment and accreditation of an RNODC can be obtained in the "Guide for Responsible National Oceanographic Data Centres" (IOC Manuals and Guides #9, Annex II).

With the advance of technology, the complexity of problems being addressed today, and the increasing need for users to be provided with information and interpretation of data, many data centres find they can not maintain the expertise in the data centre to meet the requirements. As a result, some centres have adopted the practice of entering a joint programme with an oceanographic research establishment to provide RNODC services. This model has also substantially increased the flexibility of the system to provide the necessary services to the international marine community.

When an RNODC is established, it will have an approved terms of reference which describes in detail the functions of that RNODC. Typical functions of an RNOIDC are given in the following paragraph. No RNODC will perform all of these functions. For detailed Terms of Reference for each existing RNODC see Appendix 3.

RNODCs assist with the compilation, processing, quality control, archiving, and submission to the WDCs for Oceanography of various types of data for which they have experience and expertise.

RNODCs assemble and process data as above for submission to the WDCs for Oceanography and for provision of the data to international science programmes or to other international users.

RNODCs assist NODCs and DNAs requesting such assistance with the conversion of data into preferred technical carriers for subsequent submission to the WDCs for Oceanography.

RNODCs compile and make available to WDCs for Oceanography inventories of their data holdings and may also provide directories of data which are not suitable for centralized storage, but which are stored at national or laboratory levels, or at non–oceanographic repositories.

RNODCs may prepare various types of data summaries, graphs, and charts for their area of interest, or projects by arrangement, and upon request.

RNODCs are called upon to assist in the training of staff for emergent NODCs and DNAs in standard data management practices.

Although there is flexibility in negotiating the terms of reference, one of the following rules will apply to an RNODC which collects data.

At the beginning of each calendar year RNODC's are required to forward copies of data collected and processed during the previous year to the WDCs for Oceanography.

RNODCs for special projects will forward data to the WDCs for Oceanography in accordance with the established data management plans.

RNODCs are requested to submit annually, to the WDCs for Oceanography and the IOC Secretariat, reports on their plans and activities.

For further information on RNODCs see the "Guide for Responsible National Oceanographic Data Centres".

6. THE WORLD DATA CENTRES FOR OCEANOGRAPHY

The World Data Centres for Oceanography receive oceanographic data and inventories from NODCs, RNODCs, marine science organizations, and individual scientists. These data are collected and submitted voluntarily from national programmes, or arise from international co-operative ventures.

In general, the exchange of internationally significant data holdings and data inventory information between WDCs for Oceanography and their counterparts is expected to take place on a regular basis without charge in order to keep the data holdings of the Centres identical.

WDCs for Oceanography accept data in such forms as hard copy and microfilm in addition to computer compatible carriers. It is the policy of IODE to promote the exchange of data on computer compatible carriers but it is not always possible for all Member States to do so. NODCs that obtain data not on computer carriers from these WDCs, and subsequently convert it to computer carriers, are urged to supply the WDCs for Oceanography with a copy. RNODCs are also urged, where possible, to assist Member States and the WDCs for Oceanography with the conversion of marine data to computer carriers.

On request, these WDCs provide copies of data, inventories and publications to NODCs/DNAs, to RNODCs and to international co-operative programmes, as appropriate, in exchange, or with a charge not to exceed the cost of providing the service. As discussed above, some of the data holdings are in hard copy or microfilm form. In this case, the copy of the data will be provided in a mutually agreed convenient form.

Another major responsibility of the WDCs for Oceanography is to monitor the performance of the international data exchange system and report their findings to the IOC Secretariat and the TC-IODE. The TC can use this information to take appropriate action to correct deficiencies in the international exchange system.

The following are the addresses of the World Data Centres for Oceanography and for Marine Geology and Geophysics. The full list of WDCs is in Appendix 4.

World Data Centre A (Oceanography)
National Oceanic and
Atmospheric Administration
Washington, D.C. 20235
U.S.A.
Telephone 202-606-4571
Telex 7401815
Telemail NODC.WDCA

World Data Centre A
Marine Geology and Geophysics
Mail code E/GC 3
325 Broadway
Boulder, Co 80303
USA
Telex 740170 WDCA
Telefax 303-497-6513
Telemail M.LOUGHRIDGE

World Data Centre B (Oceanography)
All-Union Research Institute of
Hydrometeorological Information
6, Korolyov Str.
Obninsk, Kaluga Reg.
249020, USSR
Telex 412633
Telefax 255-66-84

World Data Centre B1
Marine Geology and Geophysics (WDC-B MGG)
18, Krimskaya Str.
Gelendzhik
353470, USSR
Telex 279124 GEO SU

World Data Centre D (Oceanography)
National Marine Data & Information
Service
State Oceanic Administration (SOA)
P.O. Box 74, 93 Liuwei Road
Hedong District, Tianjin 300171
People's Republic of China
Telephone 022 244164
Telex 23138 NODC CN
CHINAPAC 04602-24100104
Fax 022 314408

7. OTHER PERMANENT CENTRES AND INTERNATIONAL PROGRAMME CENTRES

There are in existence a number of data centres belonging to other international organizations that operate ocean related international data exchange or archival programmes. Where such centres exist, IOC develops its programmes to complement their work and co-ordinates its programmes with them. There are some permanent data centres concerned with certain scientific disciplines, and some dealing with a variety of data within a geographical sea area. Additionally there are data centres established to analyse data from international scientific programmes such as WOCE, TOGA, IGBP, and JGOFS.

From the point of view of the IODE system, the key factor is that some non-IODE international data centres transfer their data to the WDCs for Oceanography, whilst others are permanent repositories for ocean related data which are not transferred to the WDCs for Oceanography.

7.1 Centres That Transfer Data to the WDCs for Oceanography

Regional Centres

(a) International Council for the Exploration of the Sea (ICES)
Service Hydrographique
Palaegade 2-4
DK-1261
Copenhagen, K
Denmark

Telephone: (45) 3154225
Telex:22498
Fax: (45) 33934215
E-Mail: ICES.DENMARK

The Service Hydrographique of ICES compiles and analyses project-oriented oceanographic data sets and maintains a regional data set of classical water bottle, or equivalent, data dating from approximately 1900. The area of interest is principally the north-eastern North Atlantic, the North Sea and Baltic. Data sets are supplied by ICES member countries surrounding this region using IODE and other contacts. In the case of two of the member countries ICES is responsible for submitting their data to the World Data Centres.

Programme-Related Analysis Centres

(a) Joint Environmental Data Analysis Center (JEDA)
National Oceanographic Data Center
User Services Branch
NOAA/NESDIS E/OC21
Washington, DC
20235

Telephone 202-606-4549
E-Mail: NODC.WDCA on OMNET/MAIL

The JEDA Center is operated by the US National Oceanographic Data Center and the Scripps Institute of Oceanography to provide data management support for the U.S. Tropical Ocean-Global Atmosphere (TOGA) programme.

(b) TOGA Sub–Surface Thermal Data Centre
IFREMER
BP 70
29263 Plouzane
FRANCE

Telephone: (33) 98 22 45 13
Telex: 940627
E–Mail: ORSTOM.BREST on OMNET/MAIL

The primary function of the TOGA Sub–Surface Thermal Data Centre is to develop a high–quality global tropical sub–surface temperature and salinity data set using IODE and other contacts to acquire the data. Additionally, the Centre will also archive appropriate data products as they are developed and made available either by the Centre itself or by other TOGA related individuals or institutions.

(c) TOGA Sea Level Center
University of Hawaii
1000 Pope Road
Honolulu, Hawaii 96822
USA

Telephone: (808) 948 76 33
Telex: 650 247 86 78
E–Mail: K.WYRTKI on OMNET/MAIL

The task of the Center, established in 1985, is to collect all sea–level data in the TOGA oceanic area between 30 degrees N and 30 degrees S during the ten–year period 1985–1995, of the TOGA programme and make it available for research needed to achieve the scientific objectives of TOGA.

7.2 Discipline Oriented Centres not Transferring Data to WDC's for Oceanography

(a) The Permanent Service for Mean Sea Level (PSMSL)
Proudman Oceanographic Laboratory
Bidston Observatory
Bidston, Birkenhead
Merseyside
L43 7RA
United Kingdom

Telephone: 051 653 86 33 (G. Alcock)
Telex: 628591 OCEAN G
Fax: 051 653 62 69

The PSMSL receives monthly average sea–level data on a regular basis from a large number of countries, archives these data, and disseminates them on request to international users. The PSMSL acts as international sea–level centre for the Global Sea Level Observing System (GLOSS). For more information see the GLOSS Implementation Plan.

(b) International Hydrographic Organization (IHO)
5 avenue Princesse Alice
MC 98011 Monaco Cedex
Principaute de Monaco

Telephone: (33) 93 50.65.87
Telex: 479164 MC - INHORG
Fax: (33) 93 25.20.03

The IHO collects bathymetric information for the worlds oceans. IHO also provides a data banking service for tidal constituents from many locations around the world through the Marine Environmental Data Service in Canada.

(c) Fishery Data Centre
Fishery Information, Data and Statistics Service
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla
00100 Rome, Italy

Telephone: (39) 6 5797 6442
Telex: 610181 FAO I
Fax: (39) 6 5797 6500

The FAO Fishery Data Centre collects information on the production and international trade of fisheries commodities; on fishing vessels, fleets, and fishermen; and on catches and landings. Additionally, various fisheries commissions and councils collect and maintain data for specific regions or groups.

(d) Specialized Oceanographic Center (SOC) for IGOSS Sea Level
Pilot Project in the Pacific (ISLPP)
University of Hawaii
1000 Pope Road
Honolulu, Hawaii 96822
USA

Telephone: (808) 948 76 33
Telex: 650 247 86 78
E-Mail: K.WYRTKI on OMNET/MAIL

This centre was established in 1984. It collects monthly mean sea-level data from sea-level stations located in the Pacific ocean and generates products which are valuable for scientific analysis of climate related ocean processes. Data from this Center are archived in the PSMSL. The activities of this sea-level centre are described in the GLOSS Implementation Plan.

8. THE IOC COMMITTEE ON INTERNATIONAL OCEANOGRAPHIC DATA AND INFORMATION EXCHANGE (C-IODE)*

Within the IOC, guidance on data and information management on the international scale is the responsibility of the C-IODE. This Committee is composed of representatives from each member state of IOC that wishes to participate. Between meetings of the Committee the contact person for IODE in each country is known as the National Co-ordinator. Member States are encouraged to select the head of their NODC and/or the National Co-ordinator as a member of delegation for plenary meetings. The purpose of this policy is to have persons with the technical knowledge and practical data management experience to deal with the questions addressed to the Committee.

The Committee meets approximately every 30 months to review the work carried out in the intersessional period and to set new directions and priorities as appropriate. The intersessional work of the C is carried out by groups of experts, task teams, and rapporteurs, each with quite specific terms of reference.

Using this mechanism, the C further develops the procedures, standards and responsibilities for international exchange to meet the changing requirements of the marine community. As discussed earlier, the time frame for response of the IODE system to new requirements for international data management has become such that IODE often can not wait for the next plenary session to implement new data formats or accredit new RNODCs. For this reason, it has been necessary to establish mechanisms to act within the intersessional period between plenary meetings of the Committee.

The mechanisms referred to above are described in the IOC publications relevant to IODE activities. A list of publications is included as Appendix 1.

Since the consultations between the members of the groups of experts and between the chairmen of the groups and the IOC Secretariat now generally take place using international electronic mail services, these activities can proceed quite rapidly. As a result, IODE has placed itself in a position where it can respond to the rapidly evolving requirements of Member States and international co-operative programmes. Member States who see a requirement for a new data format or a new RNODC before the next regular meeting of the C-IODE can have their problem addressed quickly. In both cases the requirement should be identified to the Secretary IOC at the address below.

Other international agencies or international co-operative science programmes can approach IOC to meet their needs for formats for exchange of data, for RNODCs to support their work, or for other data management services.

For information on the work and structure of the C-IODE, and a list of the currently operating groups of experts, task teams, and rapporteurs see the latest issue of the IODE Handbook.

Requests and questions related to the C-IODE should be addressed to:

Secretary
Intergovernmental Oceanographic Commission
UNESCO
7, Place De Fontenoy
75700 Paris
France

*The former IOC Technical Committee on International Oceanographic Data Exchange. Title has been changed following the discussions at the Twelfth Session of the Committee (Moscow, USSR, December 1987.)

9. DATA WHICH ARE EXCHANGED INTERNATIONALLY

9.1 Data Collected by National Programmes

The international exchange of oceanographic data is strongly supported by Member States of IOC. Marine research programmes looking at regional, ocean basin, and global processes need the most comprehensive data sets available. The assembly of such data sets are only possible through co-operation between the nations collecting the oceanographic data. Thus all participants in the IODE system are strongly urged to process and submit the oceanographic data they collect to their national data centres for onward transmission to the appropriate WDC for Oceanography or RNODC in a timely fashion.

Data that are routinely exchanged are data for which standards and formats have been approved. They are listed in Section 13. These data types cover many of the oceanographic observations now made at sea in national and also in international programmes or in the course of special international projects. As new data types are routinely exchanged, information on them will be added to Section 13. Section 14 contains information on standards for routinely exchanged data.

It is clearly not appropriate that all data collected be routinely exchanged internationally. For example, data which are experimental, data for which volumes are so great as to render routine exchange not feasible, or data for which techniques of data reduction are not agreed, are exchanged on an ad-hoc basis. A case in point is the instantaneous water surface elevation data from wave recorders. These data are so voluminous as to render economically unfeasible the storage of all such data in a single centre. In this case the holders of the data are referenced in the RNODC-Waves and exchanges take place only when required for a specific need. In due course as data collection, data analysis, and computer technologies develop, and as new data standards are agreed, more and more data types will be exchanged routinely. (See Section 15 for a list of currently non-routine data types.)

9.2 International Co-operative Expeditions and Programmes

An important form of international co-operation in marine science is participation in international co-operative oceanographic expeditions or scientific or monitoring programmes. The agreement to conduct such an expedition or programme is invariably associated with an intention on the part of the participating countries to share the results and data. When such an expedition or programme is carried out under the auspices of the IOC and ICSU, the participants are obligated to exchange the resulting data according to the system outlined in this Manual, or in accordance with an agreed data management plan.

If an expedition or programme is organized by other intergovernmental or non-governmental organizations, it is desirable that pertinent marine data should reach the WDCs for Oceanography in accordance with the present scheme of data exchange through national, responsible or disciplinary centres.

9.3 Other Oceanographic Programmes of International Interest

Countries receiving assistance under the United Nations Development Programme or other multi-lateral technical aid programmes, which involve the conduct of oceanographic research, are urged to arrange, in co-operation with the executing agency in each case, for the exchange of all relevant data and data inventories from these activities through the IODE system. Countries not members of the IOC are encouraged to exchange oceanographic data through the IODE system in accordance with the provisions of this Guide.

National or international marine pollution/marine biological sorting centres, as well as centres established in connection with economic development programmes in marine areas, are encouraged to work closely with the World Data Centre system and participate actively in the exchange of data and of information on their holdings.

10. BILATERAL EXCHANGE

NODCs, other national and international programmes, designated national agencies, marine scientific organizations or institutions, and individual scientists may require to exchange data directly on a bilateral basis. Such data exchange programmes could, for example, be carried out in response to specific national or regional requirements. Member States are urged where possible to conduct such international data exchange in the context of the World Data Centre system. All Member States and States who are not members of IOC are urged to support and promote the IODE system where possible by adhering to the precepts outlined in this Guide.

11. PROCEDURES FOR THE INTERNATIONAL EXCHANGE OF OCEANOGRAPHIC DATA

Earlier sections of this manual have described the roles of the NODCs, RNODCs, and WDCs for Oceanography in the international exchange of oceanographic data. This section explains in more detail the reporting procedures upon which the international exchange system is based. These procedures result in inventories which are used to monitor the flow of data within the IODE system and to provide a referral service to data sources for users.

11.1 National Oceanographic Programmes

IOC Member States are urged to announce their planned research cruises as "National Oceanographic Programmes" (NOPs). An example of an NOP announcement is given in Appendix 5. NOPs serve the purpose of informing other IOC Member States of the intention to conduct research cruises or research programmes. In particular, NOPs are intended to provide an opportunity for the development of co-operative programmes. For example, NOPs can be used to announce that berths are available should a scientist from another member state wish to join a cruise investigating a process or area of interest to him. When submitted well in advance, NOPs have proved extremely useful for this kind of co-ordination of oceanographic research activities among Member States and for planning the training of specialists.

If a research cruise or programme is announced as a NOP, this does not carry with it the obligation to exchange the data through the IODE system. If the Member State wishes also to announce at this stage that the data will be exchanged internationally, this can be done with a plain language statement on the NOP form. This will serve as an early notice to the IODE system that the data can be expected. This notice will assist in the monitoring of international data exchange and may also assist scientists planning other national or international programmes. These other programmes could benefit by knowing in advance about intentions to collect and exchange data.

Member States of IOC are encouraged to distribute their NOP announcements in consultation with the IOC Secretariat, and in accordance with the distribution list provided by the Secretariat.

11.2 Cruise Summary Report (ROSCOP3)

Cruise Summary Report stands for "Report of Observations/Samples Collected by Oceanographic Programmes". By completing and submitting the Cruise Summary Report form to the World Data Centres, a Member State of IOC informs the IODE system that data have been collected. The timely completion and submission of the Cruise Summary Report form in this manner is fundamental to the success of the international exchange system. Cruise Summary Report applies to ship-borne cruise data, and also to data gathered from other platform types as described on the Cruise Summary Report form.

IOC is collaborating with the University of Deleware, USA, in developing an electronic bulletin board for the purpose of announcing NOPs and disseminating the information rapidly. Member States will be able to read the contents of the bulletin board frequently to keep up to date on the planned programmes of other Member States. Member States will input their planned research cruises or programmes to the bulletin board in a timely manner.

Instructions on using the electronic bulletin board for both inserting planned programme information and reading out these announcements are in preparation and will be included in future updates to this manual.

The Cruise Summary Report form describes the types and amounts of data which have been collected, the time frame in which it was collected and the area in which it was collected. When completing the form the data originator has the option to indicate that the data will be made available for international exchange. This can be done by checking the data exchange status box on the form. Cruise Summary Report forms should be completed and forwarded rapidly to NODCs, which will forward copies of the forms to the WDCs for Oceanography.

Cruise Summary Report forms should be completed and used for reporting collection of all data types listed in Sections 13 and 15.

National Oceanographic Data Centres and Designated National Agencies are expected to actively monitor the research programmes in their country and see that Cruise Summary Report forms are submitted rapidly to the WDCs for Oceanography. Programme chief scientists are expected to complete the form, but in some Member States assistance can be provided by the NODC, or the NODC can complete the forms from cruise or project information provided by the chief scientist for national purposes. In the absence of an NODC or DNA the chief scientist should send the Cruise Summary Report directly to a WDC for Oceanography.

The WDCs for Oceanography, and some RNODCs compile the information on the Cruise Summary Report forms into inventories and use them to monitor the flow of data in the international exchange system. Conclusions can be drawn on the timeliness and completeness of international data banks and bottlenecks in the system are identified and addressed. WDCs for Oceanography make copies of ROSCOPs available to NODCs, RNODCs, organizations and individual scientists on request in accordance with normal exchange guidelines. The C-IODE reviews the performance of the international exchange system at each meeting and takes appropriate action to address any problems that have been identified.

The Cruise Summary Report (ROSCOP3) has been issued as a revision of ROSCOP2. The Cruise Summary Report is included as Appendix 6.

11.3 Submission of Data to RNODCs and WDCs for Oceanography

Data which have been designated as internationally exchangeable or are part of an international co-operative investigation should be submitted to the WDCs for Oceanography and/or appropriate RNODC in accordance with the provisions of this Manual. Data originators are encouraged to submit these data to a WDC for Oceanography via an NODC or RNODC in accordance with national procedures. These arrangements do not preclude an NODC or principal scientist at any time from voluntarily contributing data to the international exchange system.

Appendix 3 gives the terms of reference and data types handled by each RNODC. Chief scientists or NODCs should check this list to ensure that data are sent to the correct RNODC. If the data type is not handled by an RNODC, the data should be sent directly to a WDC for Oceanography. Data should preferably be submitted in GF3 unless other arrangements have been made. The data should be quality controlled and appropriate data quality flags should be included to describe the results of the quality control. Standard GF3 units, which are usually SI units, should be adhered to as much as possible.

Preferably all data should be made available in the WDCs for Oceanography within one year of collection. Chemical, biological and geological data may require longer intervals which should not, however, exceed two years.

It is preferable that data (including inventories) be sent to the three WDCs for Oceanography (A, B, and D). When data are sent to only one of these centres a copy of the transmittal letter should be forwarded to the other centre. Data sent to only one WDC for Oceanography in standard format and in readily reproducable media will be copied and transmitted to the other WDC within six (6) months after their submission.

Data submitted to only one WDC and on unreproducible (or hard to replace) media, (e.g., manuscripts, maps, CD-ROMS, etc.) should be submitted in sufficient copies for all WDCs Oceanography.

The following data types should be sent to the specified centres identified below and not to the WDCs for Oceanography. Addresses for these centres are given in Section 7.

Mean sea-level data should be sent to the Permanent Service for Mean Sea Level.

Soundings which are in the form of either plotting sheets or tabulations should be sent to the International Hydrographic Organization (IHO) or to a qualified hydrographic office in the Member State.

Copies of meteorological observations, recorded on the appropriate meteorological forms, should be sent to meteorological centres in accordance with procedures of the World Meteorological Organization. However, copies of all meteorological data taken in connection with oceanographic observations should also be sent to one of the World Data Centres for Oceanography.

Fishery statistical data which would not normally be sent to World Data Centres for Oceanography, should be sent to the FAO Fishery Data Centre.

11.4 The GF3 Formatting System

For the purpose of exchange of data between IODE centres, and also between these centres and their users, IODE has developed the GF3 formatting system. GF3 is a fully operational, sophisticated formatting system which has incorporated in it a number of highly desirable features. The format makes use of plain language comment records at all levels in the hierarchy so that the magnetic tapes, floppy disks, or whatever carriers are used, contain the documentation for the data. Consequently data carried in GF3 are better documented and are more useful to secondary users.

The second major feature of GF3 is that it is amenable to automatic processing. This is of significant benefit to data centres and users alike in that it reduces software development and simplifies dealing with data from new sources.

The third major feature of GF3 is the concept of standard subsets. For most data which are routinely exchanged within the IODE system standard subsets have already been created, making it much easier for centres and users with little or no GF3 experience to use the system.

The fourth and, perhaps, the most significant feature of GF3, is that it has available a powerful and growing supporting software system written in the Fortran language. Versions of this software system are available for most of the commonly used mainframe computers including IBM, Control Data, Honeywell, and Digital Equipment Corporation products. The basis of this system is GF3 Proc a set of Fortran sub-routines.

The GF3 formatting system and its supporting software system, GF3 Proc, are described in IOC Manuals and Guides No. 17 entitled "GF3 - A General Formatting System for Geo-Referenced Data". This is a six volume series that describes all aspects of GF3.

The RNODC-Formats will have on hand at any time the latest and most complete information on GF3, its standard subsets, and the available supporting software. Users are encouraged to contact RNODC-Formats on a regular basis to keep their records up to date. The address for the RNODC-Formats is given in Appendix 3.

In submitting data to the IODE system, and in exchanging data internationally, data centres and scientists alike are strongly encouraged to use GF3. Although it may take additional effort initially as compared to reading or writing data in a simpler ad-hoc format, the acquisition of a capability in this formatting system will pay large dividends to data originators and to data managers in the medium and long term.

12. REAL TIME DATA AND IGOSS

The Integrated Global Ocean Services System (IGOSS) was established for the purpose of making oceanographic data available to users in an operational time frame. IGOSS is a joint IOC/World Meteorological Organization (WMO) programme. The IGOSS programme is guided by the Joint IOC/WMO Working Committee for IGOSS. This Committee operates in a somewhat similar fashion to the C-IODE.

IGOSS guides the development of programmes to acquire and exchange oceanographic and some marine meteorological data via telecommunications methods within a few hours to one month of its collection. IGOSS also promotes and assists with the development of various oceanographic analyses and forecasts. These data, analyses and forecasts are used by a variety of clients from those operating ships and offshore marine facilities, to those operating international co-operative scientific programmes.

In order to exchange data and the resulting analyses and forecasts in these time frames, IGOSS uses the Global Telecommunications System (GTS) of the World Weather Watch of WMO. Input and output facilities for the GTS are usually located in the facilities of National Weather Services in Member States of IOC and WMO. Oceanographic data for the GTS are obtained from ships of opportunity, from research vessels and from moored and drifting buoys.

The role of IODE vis-a-vis IGOSS is to archive the marine data collected within the IGOSS programme and to make it available within the IODE system either as separate data sets or integrated with all other available data of the same type.

The management of IGOSS data within IODE requires a different approach than the more traditional data types. The data are available within the IGOSS system for approximately two months after they are collected. At the end of the two months the data should begin to be available within the IODE system. To accomplish this IODE has established three RNODCs-IGOSS. These RNODCs receive data on a weekly or monthly basis from their counterpart Specialized Oceanographic Centres (SOCs) in the IGOSS system and process the data into their archives. The terms of reference of the RNODCs-IGOSS can be found in Appendix 3 of this manual.

More information on the topic of IGOSS data is available in IOC Manuals and Guides No. 1, "Guide to IGOSS Data Archives and Exchange (BATHY and TESAC)", and in the IOC/WMO publication Manuals and Guides No. 3, "Guide to Operational Procedures for the Collection and Exchange of Oceanographic Data (BATHY and TESAC)". A diagram of IGOSS/IODE data flow is presented in Appendix 7.

From 1 January 1991 a new project has been launched built on existing oceanographic data management system, IGOSS and IODE, which is known as the Global Temperature Salinity Pilot Project (GTSPP). Its immediate task is to crease a complete data and information base of ocean temperature and salinity data captured both in real-time and submitted in fully processed form weeks to months later. The description of project objectives, project elements and management are presented in the GTSPP Project Plan.

The processing of real time data can be seen as the beginning of the future for IODE. With the availability of instrumentation with digital processing and communications capabilities, some IODE centres are even now receiving some of their data in real or near real time. Additionally, some IODE NODCs have obtained connections to the GTS to receive real time BATHY/TESAC, wave, and drifting buoy data. With the advent of satellites routinely transmitting oceanographic data in the 1990 time frame, more and more data will become available to national data centres in this manner.

NODCs are also providing support to IGOSS by preparing and inserting on the GTS, BATHY/TESAC messages from the temperature and salinity data they receive from national sources where these data are received in an appropriate time frame. Other NODCs insert real time wave data on the GTS for transmission to international users.

This early access by IODE centres to marine data has permitted a substantial improvement in service to national and international users. IODE can provide data management services to these users while a programme is in progress, rather than just archiving the data at the end of the programme. Users will benefit additionally because IODE can supply integrated data sets, including data from other sources that would not otherwise have been available to their programme. The rapid creation of large spatial data sets in near real time permits users to obtain data in synoptic form or as time series and provides useful input to models or data for model verification.

13. TYPES OF DATA TO BE ROUTINELY EXCHANGED WITHIN THE IODE SYSTEM

This section describes the data which should be routinely exchanged within the IODE system.

In general, these data should have been processed for all instrumental corrections and calibrations, and should have received a generally acceptable level of quality control. National standards of quality control exist for some data types and the C-IODE is working on an international set of standards. The data should then be exchanged through the World Data Centre system or to other permanent centres according to the principles specified in this manual.

The following list covers many of the major kinds of standard oceanographic and marine meteorological data recorded in connection with oceanographic observations:

13.1 Values of air temperature, ocean surface temperature, atmospheric pressure, humidity, speed and direction of wind, precipitation, visual observations of cloud cover and weather, visibility, other atmospheric phenomena and sea ice.

13.2 Visual and instrumented in-situ observations of waves, sea and swell, including calculated parameters and spectra.

13.3 Colour and transparency using standard Secchi discs, and standard colour scales. The methods used in obtaining these data should be described in detail.

13.4 Values of temperature, salinity (or conductivity) and chemical properties from water bottle samples at surface and at depth, and data from continuous records of physical properties from instruments such as bathy-thermographs (BT and XBT) and salinity-conductivity-temperature depth (STD & CTD) records, also values of other physical-chemical observations from research vessels, shore and fixed stations, drifting or moored buoys.

13.5 Surface and sub-surface current velocities from moored instruments, and surface and sub-surface Lagrangian drifters.

13.6 Sea-levels from recording gauges or tide-staffs. Reduced data from offshore oceanic tide gauges.

13.7 Values of primary production, plant pigments, zooplankton biomass and micro-nekton biomass. The methods used in obtaining these biological data exchanged should be described in detail. (Phytoplankton and benthos biomass are temporarily omitted from the list of standard data pending the development of better standardized methods.)

13.8 Description of geological bottom samples: Data from cores, grab and dredge samples of sediment and bedrock; geological period and rock type. For cores, length and short qualitative description. Where possible, estimates of the probable age of top and bottom parts are especially desirable. For other samples; short qualitative description and method of collection.

13.9 Underway records of gravity, magnetics, and bathymetry, provided in recognized formats.

13.10 Oil pollution observations reported in the MARPOLMON standard as presented in IOC Manual No. 13 for Monitoring Oil and Dissolved/Dispersed Petroleum Hydrocarbons in Marine Waters and on Beaches.

14. STANDARDS AND PROCEDURES FOR ROUTINELY EXCHANGED DATA

The following paragraphs provide additional information on standards and procedures for use with some of the above types of data.

14.1 Mechanical and Expendable Bathy-Thermograms

Mechanical BT records should be accompanied by sea-surface reference temperatures only if the method or precision of observing the reference temperatures is identified. If digitized, mechanical BTs should be presented at 5-metre depth increments to a precision of + 0.2_C.

XBTs should be digitized to at least the same standards as the mechanical BT. To take advantage of the greater accuracy and resolution of present XBT probes, the ICES Working Group on Marine Data Management (Brest, 1983) offered the following optimum standards for digitizing XBTs:

1. XBTs should be critically evaluated before exchange;

2. Accepted observations should be digitized at inflection points to an accuracy of 0.1_C and 2m in depth;

3. Observations digitized at fixed intervals may also be exchanged if linear interpolation between digitized points falls within 0.2_C of the original profile.

Data digitized to standards other than the above should be clearly identified as special data sets that may not be suitable in regenerating vertical structures.

14.2 CTD/STD Data

The ICES Working Group on Marine Data Management have recommended Guidelines for International Exchange of CTD/STD Data (May 1982). These guidelines were adopted by the IOC Working Committee on International Oceanographic Data Exchange (January 1984). The guidelines are given in Appendix 8.

Telecommunicated data collected by XBTs and CTDs are digitized to a standard agreed by the Joint IOC/WMO Working Committee for IGOSS.

14.3 Moored Current Meter Data

Standards for exchange of moored current meter data have been developed by the ICES Working Group on Marine Data Management (May 1982). These standards were adopted by the IOC Working Committee on International Oceanographic Data Exchange (January 1984). The guidelines are included as Appendix 9.

14.4 Sea Level Data

Information on mean sea-level from all GLOSS stations as well as other sea-level centres should be sent to the Permanent Service for Mean Sea Level (PSMSL) in accordance with the procedures described in the IOC Manual on Sea Level Measurements and Interpretation, and the GLOSS Implementation Plan.

14.5 Marine Geological and Geophysical Data

Institutions and scientists exchanging marine geological and geophysical data are encouraged to utilize the GF3 format (preferred) or the Marine Geophysical Data Exchange Format – "MGD77".

The following principle concerning geological and geophysical data was accepted by the ninth session of the C-IODE. "Member States should ask their respective national centres to participate voluntarily in the experimental use of the available acceptable exchange formats, particularly the GF3, for analytical geological data. The IOC requests the respective national data centres to encourage the use of either GF3 format (preferably) or the MGD77 format, for marine geophysical data in international exchange. Any future amendments to MGD77 or other formats, or in arrangements for the exchange of other marine geophysical data in the context of international exchanges should take into account the need for continued compatibility with the GF3 format and attempt to shape such amendments within the framework of GF3."

15. DATA TYPES WHICH ARE NOT YET ROUTINELY EXCHANGED

Observations and measurements of a unique nature made by experimental instruments or for specific research projects, and special observations that are very voluminous or require further elaborate analysis for use or exchange are not routinely exchanged in the IODE system. Data resulting from these observations or measurements are generally to be retained by originating countries.

However, since some of these data are of broad general interest, data originators are strongly encouraged to make these data available internationally. To do so, data originators are encouraged to submit the Cruise Summary Report form to the World Data Centres for Oceanography in order to advertise the availability of new data internationally. Users can then establish contact with data originators through the WDCs for Oceanography to request copies of the data.

The following list provides examples of some of these types of data:

15.1 Specialized meteorological data recorded in connection with oceanographic observations, such as solar radiation, gradient values of wind velocity, etc.

15.2 Experimental measurements of waves, swell and orbital velocity, wave slope and techniques using radar, laser, and satellite remote sensing, etc. Significant wave height based on satellite remote sensing is likely to become standard soon.

15.3 Instrumented optical measurements of water properties other than those given in Section 13.3.

15.4 Bottom photographs, topographic profiles, interim bathymetric charts, side scan sonar records, multibeam bathymetric sonar, and sonar from deep-towed vehicle or submersibles. Digitized bathymetric data will soon be standard, and a GF3 standard subset has been approved.

15.5 Results of chemical analysis of trace elements, biochemical analyses, results of pollution studies, underway continuous chemical records, vertical continuous profiles, and data from undulating recorders.

15.6 Unreduced continuous recordings of current measurements and those using experimental methods such as doppler, sonar scattering methods and continuous profiling techniques.

15.7 Satellite observations (other than significant wave height data), images and digitized images, remote sensed altimetry and sea-level data, sea surface temperature, optical properties, and wind stress. In accordance with decisions at IODE-XII, the IODE system plans to accept remotely sensed data for some data types at level-2 for exchange and creation of higher level data products. The priority data types are altimetry, sea-level, sea surface temperature and wind stress.

15.8 Biological data such as measures of abundance of marine organisms, collections for taxonomic and ecological studies, surface observations of marine life, biological echo traces, underwater sounds and bioluminescence.

15.9 Measurements of geophysical refraction and reflection observations, well log and drill hole.

15.10 Tracers, Freon-11 and -12, Tritium, He-3, Krypton-85, Argon-39, Carbon-14, Radium- 226, and Radium-228. Development of standards for exchange of these data types is being carried out.

15.11 Hourly, daily and monthly mean sea-level data from GLOSS stations as well as other stations needed for research and operational applications within the TOGA, WOCE and IGOSS programmes. Procedures and formats for submission of these data to specialized international data analysis centres are described in the GLOSS Implementation Plan.

With the rapid introduction of new instrumentation sensors, remote sensing, and high data rate instruments with on–board processors it may be necessary to designate an RNODC for a data type which has not yet become standard. This permits the IODE system to respond to the needs of large oceanographic projects and global experiments involving new data types, and to maintain such data sets in preparation for transfer to the WDCs Oceanography. Data documentation and quality control will be monitored by the RNODC, until the standards have been developed.

It is impractical to provide specifications for all such kinds of observations and resulting data. When standards for such data are prepared by international groups, they will be appended to or included as future revisions to this Manual.

16. PUBLICATIONS, CATALOGUES, DATA PRODUCTS, AND INFORMATION REFERRAL

The primary source of information on the holdings of the World Data Centres are the catalogues which they update and publish annually. The RNODCs have a responsibility to supply users of their services and the WDCs for Oceanography with information on their holdings. Information on RNODC holdings are included in the annual WDC catalogues.

NODCs are requested to also supply the WDCs for Oceanography with inventory information on their data holdings, especially those data that are not routinely exchanged within the IODE system.

Most NODCs already produce a range of data products, maps, statistical summaries, and other standard or specialized data presentations on request to meet national requirements. It is the objective of the IODE system to combine data sets and use the expertise in data product generation to develop supra-national or basin scale data products in support of basin scale or global oceanographic experiments.

WDCs for Oceanography may provide copies of material received from NODCs and RNODCs upon request. A fee may be charged to recover costs of providing the service.

In addition to this service, IOC offers an additional service to Member States through the Marine Environmental Data and Information Referral System (MEDI). MEDI provides a multidisciplinary source guide to the availability and location of marine environmental data. Participants in the MEDI referral system prepare simple free text entries to record information pertinent to the system and send them to IOC.

Material compiled from the submitted MEDI entries is available to NODCs in electronic form and other interested agencies on diskette and through NOSIE, the on-line system of WDC-A. Instructions on preparing and submitting a MEDI Entry are included in Appendix 11.

Reference can also be made to the INFOCLIMA inventory produced by WMO.

Contributors to the World Data Centres and the RNODCs are also urged to provide scientific literature, charts and graphs which would serve to augment or enhance the usefulness of the data holdings of Centres.

17. REQUESTS AND DATA DISSEMINATION

The World Data Centres for Oceanography are responsible for the provision of data and information to any qualified requester in the scientific community either in exchange, or at a cost not to exceed the cost of processing and shipping. In general, reasonably sized requests from activities or individuals affiliated with national or regional contributors to the World Data Centre system will be considered as an exchange service and thus fulfilled without charge. Small requests from non–contributors may be handled in a similar manner.

The WDCs for Oceanography and NODCs, when requested to supply data to developing countries, should seek to maintain charges, if any, at a minimum level. In case advice is needed, the situation may be referred to the IOC Secretariat.

Unless a requester specifies otherwise, the Centre will use the method which most satisfactorily reproduces the data or information item with the least expense. For certain types of requests, limitations in funding, personnel and facilities may preclude direct or no–cost provision of data or information by the World Data Centre.

Unusually voluminous requests, or requests for special data services or products not readily available at a World Data Centre, may be serviced by an RNODC, national, or disciplinary centre at the request of the World Data Centre. The requester may be charged an amount not to exceed the cost of processing and shipping.

World Data Centres, Oceanography may serve as an intermediary or co–ordinator for requests for unique types of data, or data in other disciplines, by placing the originator of the request in contact with the appropriate institute or disciplinary centre.

Data and information may be ordered directly from the World Data Centres for Oceanography through National Oceanographic Data Centres or Designated National Agencies or through any other organization officially designated by national initiative as responsible for communication with the World Data Centres. This may include the ordering of data products of a specialized nature (i.e. statistical data summaries, data displays, etc.), through Responsible National Oceanographic Data Centres (RNODCs). In the absence of such designated organizations, any scientist or investigator may at any time order data, information, or publications directly from a WDC for Oceanography.

Where a data centre has acquired a data set from the WDC system, other NODCs, or RNODCs, on behalf of an inquirer, the data centre may wish to retain the data as a provision against future inquiries, or because they have a continuing interest in a specific sea area. In such cases, the data centre should be aware that the original data set may be up–dated from time to time, or errors may have been deleted, by the originating data centre. Where duplicate data sets are deliberately held in this way, the holder should make regular contact with the originating centre to check whether the old data set is still valid, whether it should be deleted, or whether new data are available. Care should be given to the avoidance of false data entries arising from duplication of original and revised data values, appearing as separate data values.

Data centres in receipt of up–dated or corrected data sets may wish to inform their earlier users of the availability of revised data and advise them to correct their holdings, but this cannot be regarded as obligatory.

18. UPDATING THIS MANUAL

The Manual is designed to be updated by sections. When parts of it are updated, the sections being amended are republished. The new sections are sent to the Manual owner with instructions on which pages to exchange.

Every page of the Manual has a block in the upper right corner labelled "SECTION", "PAGE", and "DATE". Each section of the manual is numbered, and the number is written in the "SECTION" block of each page in the section. Page numbering begins anew in each section of the manual, the number being recorded in the "PAGE" block. Each page is uniquely identified by combined section number and page number. Since each section of the manual can be exchanged, the date the section pages were published is recorded in the "DATE" block.

For example, this section of the Manual, "18 – Updating this Manual", describes how the manual can be kept up to date. It has three pages. Each page has "18" in its "SECTION" block. The first page in the section has "1" in its "PAGE" block and the second page a "2". The "DATE" block has "03/91", showing that these pages were published in March 1991.

Note that the second and third pages of Section 18 is a list of all the 18 sections and the 11 appendices comprising "Manuals and Guides #9", with a date beside each section. This is the "SECTION DATE" list. Its purpose is to show the manual owner whether any sections of his manual are now outdated. The dates shown are the date the section was last published. The latest version of the "SECTION DATE" list is sent with every update. By comparing the publication date recorded for each section in the manual against those shown in the latest section date list, any sections still held that are outdated can be found. The latest version of the outdated sections can be requested, and the whole manual kept fully up to date.

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APPENDIX 1
LIST OF THE IOC PUBLICATIONS RELEVANT TO THE IODE ACTIVITIES

1. **The Guide to IGOSS Data Archives and Exchange (BATHY and TESAC), Revised Edition. Manuals and Guides No. 1, UNESCO, 1985.**

   The Guide contains information on the flow of data through the IGOSS system to the archives in the national and international IODE centres, the formats, quality assessment and characteristics of the data, and its availability to national and international users of the real and near-real time data.

2. **The International Catalogue of Ocean Data Stations.**
   IOC Manuals and Guides No. 2, UNESCO, 1975 Amendment 1, February 1976.

   The Catalogue contains information arranged by ocean area, on the location, year of beginning of record, parameters observed, and characteristics of the data for coastal stations, inland stations, nearshore and offshore manned stations, automatic buoys, offshore reference stations visited regularly, and repetitive drifting stations.

3. **The Guide to Operational Procedures for the Collection and Exchange of Oceanographic Data (BATHY and TESAC), Revised Edition.**
   IOC Manuals and Guides No. 3, UNESCO, 1984.

   The Guide contains information which describes the procedures for collecting, encoding and transmitting BATHY, TESAC, and TRACKOB data collected at sea and for completion of the logs to accompany the data when the original traces are submitted to research laboratories after the cruise is completed.

4. **The Guide for Establishing a National Oceanographic Data Centre.**
   IOC Manuals and Guides No. 5, UNESCO, 1975.

   The Guide contains a broad variety of information on matters which should be considered when a Member State is deciding to establish a national oceanographic data centre.

5. **The Guide for Responsible National Oceanographic Data Centres.**
   IOC Manuals and Guides No. 9, Annex II, UNESCO, 1982.

   The Guide describes the roles and responsibilities of the RNODCs in the IODE system; and the procedures to be followed in having the RNODC accredited and established.

6. **The Marine Environmental Data Information Referral Catalogue.**

   The Catalogue is a free text formatted compilation of information on multi-disciplinary marine environmental data sets that is available from the IOC Secretariat in electronic form on diskette.

7. **The Description of GF3, A General Formatting System for Geo-Referenced Data.**
   IOC Manuals and Guides No. 17.

   Volume 1, Introductory Guide to the GF3 Formatting System (planned for 1991).

   This Volume is intended to familiarize the new user with the purpose and scope of the GF3 system without overburdening him with technical details. An introduction is provided, illustrated by examples, both to the GF3 format and to its supporting software package GF3-Proc.

Volume 2, Technical Description of the GF3 Format and Codes Tables, UNESCO, 1987 (E,F,S,R).

This Volume contains a detailed technical specification of the GF3 format and its associated code tables.

Volume 3, Standard Subsets of the GF3 Format, UNESCO, 1991.

This Volume contains a description of standard subsets of the GF3 format tailored to a range of different types of data. It also serves as a set of worked-up examples illustrating how the GF3 format may be used.

Volume 4, USSR's Guide to the GF3-Proc Software, UNESCO, 1990 (E,F,S,R).

This Volume provides an overview of GF3-Proc explaining what it does, how it works and how it is used. It also provides an introduction to the subroutine calls in the user interface to the package.

Volume 5, Reference Manual for the GF3-Proc Software (planned for 1991).

This Volume contains a detailed specification of each GF3-Proc subroutine available from the user's programme and provides detailed instructions on how and when these routines may be used.

Volume 6, Quick Reference Sheets for GF3 and GF3-Proc, UNESCO, 1990 (E,F,S,R).

This Volume contains quick and easy reference sheets to the GF3 format (see Part A) and the GF3-Proc software (see Part B).

8. **The User Guide for the Exchange of Measured Wave Data.**
IOC Manuals and Guides No. 18, UNESCO, 1987.

The Guide contains a description of the standards, GF3 standard subset formats and procedures to be used in exchanging measured wave data between IODE centres or in providing the data to scientific and engineering users.

9. **The ICSU Guide to WDCs.**

The Guide contains information on the location, data holdings and services of the World Data Centres of the ICSU system, including the WDCs for Oceanography (*Part I and Part Ia*).

10. **The IODE Handbook.**

The Handbook is prepared after each meeting of the TC-IODE and contains information on the IODE Officers, the NODC, DNAs and national co-ordinators participating in IODE; the Terms of Reference of Task Teams and Groups of Experts working in the intersessional period and the meetings planned in the intersessional period.

11. **Global Sea-Level Observing System (GLOSS) Implementation Plan, IOC Technical Series, UNESCO, 1990. 90 pp (English only).**

The GLOSS Implementation Plan includes information on GLOSS objectives and basic elements, detailed description of the GLOSS network, mechanisms of sea-level data collection, processing and exchange. Special attention is given to the operation of GLOSS as an international system. The GLOSS Implementation Plan, published in 1990, is expected to be updated every 2 years.

12. **The IODE Slide Show.**

The Slide Show consists of a series of 35 mm slides and a suggested narrative that can be used to introduce the IODE system to an audience that is not familiar with IODE.

13. **The Guide to Drifting Buoys.**
IOC Manuals and Guides No. 20.

The Guide provides the meteorological and oceanographic communities of the world with up-to-date information regarding the hardware, operations and data telemetry, data processing, data archival and data distribution for drifting buoys.

14. **The IODE Brochure – Ocean Data for Science, Industry, Education.**

The Brochure provides a brief description of the IODE system which can be used to alert potential national and international users to IODE and IODE services.

15. **The Brochure on the Global Sea-Level Observing System (GLOSS), 1990 (E,F,S,R).**

The coloured GLOSS Brochure provides intelligible and remindful information on the Global Sea-Level Observing System. It includes a very short but impressive and well illustrated description of the GLOSS Objectives, basic elements and network. The Brochure describes GLOSS as a co-ordinated system for the monitoring of sea-level rise in anticipation of global climate warming.

16. **Toward a Global Ocean Observing System (GOOS) – A Strategy. IOC-XVI/8 Annex 3, Paris, 15 November 1990 (English only).**

This document gives some idea on the IOC position towards the GOOS development, which will be built on the present capabilities and the incorporation of new scientific results, technologies and methodologies. It contains the description of coverage and elements of a system, rationale and benefits, and proposes steps to be taken for the achievement of the ultimate goal – the establishment of GOOS to be able to supply enough data for forecasts of long range weather and climate, as well as for regional predictions of ocean conditions for fisheries, coastal zone management, shipping, etc.

17. **IOC-WMO Status Report on Existing Ocean Elements and Related Systems of the Global Ocean Observing Systems (GOOS). IOC/INF-833, Paris, December 1990 (English only).**

The Status Report includes a collation of requirements from existing and planned large-scale climate research programmes (TOGA, WOCE, JGOFS, GEWEX and polar programmes) and a description and analysis of existing ocean observing and data management systems of the IOC and WMO (IGOSS, GLOSS, DBCP, IODE, WWW) which are considered as a basis for the development of Global Ocean Observing System. It is envisioned that such reports will be prepared annually.

18. **The Global Temperature-Salinity Pilot Project (GTSPP) Project Plan. SC-90/WS-71, IOC, 1990, 18 pp (English).**

The Plan provides an overview of the GTSPP and the actions required to implement and operate the Project. The Projects' elements, priorities and critical implementation problems are discussed as well as the interaction with existing data management programmes. The benefits for Member States and how they can participate in the project are also represented.

19. **GTSPP Real-Time Quality Control Manual. IOC Manuals and Guides No. 22, UNESCO, 1990, 121 pp (English only).**

The Manual describes the means by which data quality is assessed and the actions taken as a result of the procedures. The Manual sets standards for quality control of real-time data and describes exactly the screening process that is employed and the quality control tests.

20. **Integrated Global Ocean Services System (IGOSS) Plan and Implementation Programme 1989-1995. WMO. No. 725, 1989, 52 pp (E,F,S,R).**

The IGOSS Plan and Implementation Programme is the basic document for IGOSS development. The Plan describes what is IGOSS, what are the purposes and benefits of the System and how it is structured. The Implementation Programme provides Member States particularly on the System with quantitative objectives to be reached during the period if the requirements set out in the Plan are to be met. This document is prepared periodically, as needed, adopted by the Joint IOC-WMO Committee for IGOSS and endorsed by the IOC and WMO governing bodies.

21. **Guide to Operational Procedures for the Collection and Exchange of IGOSS Data. Second Revised Edition. 1988, 68 pp (E,F,S,R).**

The Guide to Operational Procedures for the Collection and Exchange of IGOSS Data provides the National Representatives for IGOSS and the National Co-ordinators for the IGOSS BATHY/TESAC Operational Programme with guidelines regarding the way IGOSS data have to be gathered, encoded, transmitted and quality-controlled. The Guide is under constant revision by the IGOSS Group of Experts on Operations and Technical Applications.

22. **Guide to IGOSS Specialized Oceanographic Centres (SOCs), 1988, 17 pp (E,F,S,R).**

The Guide to IGOSS Specialized Oceanographic Centres explains the role and duties of these centres which are the backbone of the IGOSS Data Processing and Services System (IDPSS). In particular, it differentiates between "data type" and "specific programme/process" SOCs. In addition, it provides the procedures to be applied for becoming a SOC and to establish a SOC.

APPENDIX 2
NATIONAL CO-ORDINATORS FOR INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE AND OCEANOGRAPHIC DATA CENTRES

	NODC or DNA	Date when Centre was Founded	Special Responsi-bilities
Adolfo J. Gil Villanueva Director, Centro Argentino de Datos Oceanograficos (CEADO) Avenida Montes de Oca 2124 1271 Buenos Aires ARGENTINA Tel: <54> (1) 21 00 61/67 Ext. 59 Fax: <54> (1) 21 77 97 Tlx: 21338 RACEL AR Attn. SIHN Tlm: HIDRO.ARGENTINA	NODC	1974	RNODC-SOC
The Director Australian Oceanographic Data Centre (AODC) Hydrographic Office, R.A.N. P.O. Box 1332 161, Walker Street North Sydney, N.S.W. 2090 AUSTRALIA Tel: <61> (2) 925 48 70 Fax: <61> (2) 925 48 35 Tlm: B.SEARLE	NODC	1964	
Departamento de Geofisica Directoria De Hidrografia e Navegacao Rua Barao de Jacequai, s/no. 24040 Ponta da Armacao Niteroi, RJ BRAZIL Tel: <55> (21) 713 40 43 Fax: <55> (21) 718 79 41	NODC	1971	
Prof. Dr. Christo I. Christov Head of Department of Informatics Institute of Meteorology & Hydrology 66, boulevard Lenin Sofia 1184 BULGARIA	NODC	1985	
Marine Environmental Data Service Department of Fisheries and Oceans 200 Kent Street, Ottawa Ontario K1A 0E6 CANADA Tel: <1> (613) 990 02 64 Fax: <1> (613) 996 90 55 Tlm: R.WILSON.MEDS	NODC		RNODC for Drifting Buoy Data

Mr. R.E. Montaner Chief, Centro Nacional de Datos Oceanograficos de Chile Instituto Hidrografico de la Armada Casilla 324 Valparaiso CHILE Tel: <56> (32) 25 10 56 Fax: <56> (32) 25 32 83 Tlx: 230362 HIDRO CL Tlm: TOGA.CHILE	NODC	1968
Mr. Hou Wenfeng National Marine Data & Information Service State Oceanic Administration (SOA) 93, Liuwei road, Hedong district Tianjin 300171 PEOPLE'S REPUBLIC OF CHINA Tel: <86> (22) 24 41 62 Tlx: 23138 NODC CN	NODC	1979
The Director Centro Colombiano de Datos Oceanograficos (CECOLDO) Mindefensa–Can–Oficina, 113 Apartado Aereo 28466 Bogota COLOMBIA	NODC	
The Royal Danish Hydrographic Office Esplanaden 19 1263 Copenhagen K DENMARK		
Captain R. Toledo Echeverria Instituto Oceanografico de la Armada P.O. Box 5940 Guayaquil ECUADOR	NODC	1972
Institute of Oceanography and Fisheries 101, Kasr 21 – Ainy Street Cairo ARAB REPUBLIC OF EGYPT	NODC	1971
Mr. P. Malkki Institute of Marine Research Asiakkaankatu 3 P.O. Box 33 SF 00931 Helsinki 93 FINLAND Tel: <358> (0) 33 10 44	DNA	1960
National Co–ordinator IODE IFREMER, Technopolis 40 155, rue Jean–Jacques Rousseau 92138 – Issy les Moulineaux Cedex FRANCE Tel: <33> (1) 47 23 55 28 Tlx: 610775 Tlm: G.STANISLAS	NODC	1971

Mr. C. Brockmann — NODC — 1967
Deutsches Ozeanographisches Datenzentrum
Bundesamt fur Seeschiffahrt und Hydrographie
Bernhard-Nocht-Strasse 78
Postfach 301220
D-2000 Hamburg 36
GERMANY
Tel: <49> (40) 31 90 52 02
Fax: <49> (40) 31 90 51 50
Tlx: 211138 BSH HHD
Tlm: C.BROCKMANN

Mr. M.A. Mensah — DNA
Fishery Research Unit
United Nations Development Programme, FAO
P.O. Box B 62, Community 2
Tema
GHANA

Dr. E. Balopoulos — NODC — 1986
Head, Greek National Oceanographic Data Centre
National Centre for Marine Research
GR - 16604 Hellenikon
GREECE
Tel: <30> (1) 981 57 03
Fax: <30> (1) 983 30 95
Tlx: 224135 NCMR GR

Chief, Section of Hydrography — NODC — 1949
Institute of National Geography
Guatemala
GUATEMALA

Dr. Sekou Cisse — NODC — 1990
Chef de la Division Gestion de l'Information
B.P. 561, CERESCOR
Conakry
REPUBLIC OF GUINEA
Tel: <224> 46 59 51/46 36 50
Tlx: MDEC 22331 GE

Dr. J. Jonsson — NODC
Marine Research Institute
Skulagata 4
Reykjavik
ICELAND
Tel: <354> (1) 12 02 40
Fax: <354> (1) 62 37 90
Tlm: MRI.ICELAND.LIBRARY

Mr. J.S. Sarupria — NODC — 1964
National Institute of Oceanography
Dona Paula
Goa 403004
INDIA
Tel: <91> (62) 53 56/59 88
Fax: <91> (62) 08 32/46 12
Tlx: 194216 NIO IN, 194 316 MGG IN
Cbl: OCEANOLOGY, PANAJI

Dr. Mohmood M. Abdul-Hussein
Basrah University
Marine Science Centre
Basrah
IRAQ
Tlx: 7025 UNEVRSTY IK

Dr. A. Hecht
Oceanographic and Limnological Research Company
P.O. Box 1793
Haifa
ISRAEL

Centro Nazionale per la Raccolta di Dati Oceanografici — NODC — 1965
Consiglio Nazionale delle Ricerche
7, Piazzale delle Scienze
Rome
ITALY

Mr. Osamu Yamada — NODC — 1965 — IGOSS, RNODC, RNODC for MARPOLMON (for WESTPAC region), RNODC WESTPAC
Director, Japan Oceanographic Data Centre (JODC)
Hydrographic Department, Maritime Safety Agency
5-3-1 Tsukiji Chuo-ku
Tokyo 104
JAPAN
Tel: <81> (3) 35 41 38 11
Fax: <81> (3) 35 45 28 85
Tlx: 2522452 HD JODC J
Tlm: T.MORI/OMNET

Dr. E. Okemwa
Director, Kenya Marine & Fisheries Institute
P.O. Box 81651
Mombasa
KENYA

Dr. Sangbok D. Hahn — NODC — 1974
Head, Korea Oceanographic Data Centre
National Fisheries Research & Development Agency
Shirang-Ri, Kijang-Up, Yangsan-Gun
Kyungsangnam-Do 626-900
KOREA, REPUBLIC OF
Tel: <82> (51) 465 00 91
<82> (523) 361 38 61
Fax: <82> (523) 361 80 76
Tlx: 52647 K

Dr. S. Lakkis
National Council for Scientific Research
P.O. Box 8281
Beirut
LEBANON

Centre National de la Recherche Oceanographique
B.P. 68
Nosy Bè
MADAGASCAR

Dr. L. Saliba
Department of Agriculture and Fisheries
The Royal University of Malta
Msida
MALTA

Mr. Geog. Jose Luis Frias Salazar — NODC
Jefe del Departamento de Oceanografia INEGI-SPP
Insurgentes Sur 795 - 4°. Piso
Col. Napoles, C.P. 03810
Mexico D.F.
MEXICO

Institut des Peches Maritimes
Office National des Peches
Rue du Chevalier Bayard
Casablanca
MOROCCO

NODC

Dr. J.H. Stel
Netherlands Marine Research Foundation
Laan van N.O. Indie 131
P.O. Box 93120
2509 AB Den Haag
NETHERLANDS
Tel: <31> (70) 344 07 80
Fax: <31> (70) 383 21 73

NODC 1972

Mr. J.G. Tobor
Director, Nigerian Institute of Oceanography & Marine Research
P.M.B. 12729
Victoria Island
Lagos
NIGERIA
Tel: <234> (1) 61 73 85
Cbl: OCEANOGRAF

NODC 1990

Mr. R. Leinebo
Norsk Oseanografisk Datasenter
Institute of Marine Research
Nordnesparken 2,
P.O. Box 1870/72
5024 Bergen
NORWAY
Tel: <47> (5) 32 71 69
Fax: <47> (5) 32 13 59
Tlx: 42297 OCEAN N
Tlm: NODS.NORWAY
Cbl: METEOCEAN

NODC 1972

National Oceanographic Data Centre
National Institute of Oceanography
37-K, Block 6, PECHS
Karachi 29
PAKISTAN
Tel: <92> (21) 43 43 08
Tlx: 24681 NIO PK

NODC 1962

Dr. Ruth Calienes
Instituto del Mar del Peru
SN Gamarra y General Valle
Apartado 3734
Lima
PERU
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NODC 1984

Mr. Conrado Santos, Chief Geophysicist
Philippine Oceanographic Data Centre
c/o Bureau of Coast and Geodetic Survey
Barraca Street, Binondo
Manila
PHILIPPINES

NODC

Dr. K. Rozdzynski — NODC
Institute of Meteorology and Water Economy
Maritime Branch
ul. Waszyngtona 42
81-342 Gdynia
POLAND

Director, Instituto Hidrografico — DNA — 1986
Rua das Trinas, 49
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Tlx: 65990 HIDROG P

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KOREA, PEOPLE'S DEMOCRATIC
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Ing. G. Serpoianu — DNA — 1970
Institutul Roman de Cercetari Marine
Bulevardul Lenin No 300
Constantza
ROMANIA

Dr. F.M. Fernandez — NODC — 1968
Director del Centro Espanol de Datos Oceanograficos
Instituto Espanol de Oceanografia
Avenida de Brazil, 31
28020 Madrid
SPAIN

Mr. J. Szaron — DNA — 1971
Swedish Meteorological and Hydrological Institute
Oceanography Laboratory
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S-403 14 Goteborg
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Fax: <46> (31) 13 04 47
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Dr. C.L. Hottinger
Geologisches Institut
Universitat Basel
Bernoullistr, 32
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SWITZERLAND

Marine Science Department
Faculty of Science
Chulalongkorn University
Bangkok 5
THAILAND

Mr. A. Duncan, Chief Information Officer Institute of Marine Affairs Hilltop Lane, Chaguaramas P.O. Box 3160 Carenage Post Office TRINIDAD AND TOBAGO, W.I. Tel: <1809> 634 42 92/429 42 94 Tlm: IMA.TRINIDAD.LIBRARY	DNA		
Mr. H. Yuce Department of Navigation, Hydrography & Oceanography Seyir ve Hidrografi Daire Baskanligi 81647 Cubuklu Istanbul TURKEY Tel: <90> (1) 322 25 80 Tlx: 29474 DKSH TR	DNA	1982	
Dr. V.I. Smirnov, Deputy-Director All-Union Research Institute of Hydrometeorological Information (VNIIGMI) 6. Koroleva Street, Kaluga District Obninsk 249020 USSR Tel: <7> (095) 546 39 10 Fax: <7> (095) 255 22 25 Tlx: 412633 INFOR SU	NODC	1962	IGOSS RNODC RNODC-MEDALPEX RNODC for World Data Centre MARPOLMON (for North Atlantic & Mediterranean)
Dr. M.T. Jones, Head British Oceanographic Data Centre Proudman Oceanographic Laboratory Bidston Observatory, Birkenhead Merseyside L43 7RA UNITED KINGDOM Tel: <44> (51) 653 86 33 Fax: <44> (51) 653 62 69 Tlx: 628591 OCEANSB G Tlm: BODC.UK	NODC	1968	RNODC for instrumented & Remote Sensed wave data RNODC-JASIN
The Principal Secretary Ministry of Natural Resources and Tourism P.O. Box 9372 Dar-es-Salem UNITED REPUBLIC OF TANZANIA	DNA	1971	
Mr. Gregory Withee, Director National Oceanographic Data Centre National Oceanic and Atmospheric Administration/NESDIS 1825 Connecticut Avenue, NW Washington DC, 20235 USA Tel: <1> (202) 606 45 94 Fax: <1> (202) 606 45 86 Tlx: 7401815 Tlm: NODC.WDCA	NODC	1961	RNODC/IGOSS RNODC/CARIPOL
Sr. Jorge Cigliutti, Director Centro Nacional de Datos Oceanograficos (CENDO) Capurro 980 Casilla de Correo 1381 Montevideo URUGUAY	NODC	1986	

Director — NODC — 1985
Direccion de Hidrografia y Navegacion de la Armada
Observatorio Naval Cajigal
23 de Enero, la Planicie
Apartado Postale 6745, Carmelitas
Caracas
VENEZUELA
Tlx: 21168 DCOTE ATT. DIHN

Dr. Pham Van Ninh, Director — NODC — 1990
Vietnam National Oceanographic Data Centre
Vien Khoa Hoc Viet Nam, Nghiado, Tuliem
Hanoi
VIETNAM
Tel: <84> 58333/515
Tlx: 411525 NCSR VT

Mr. Vlado Dadic
Institute of Oceanography and Fisheries
P.O. Box 114
58000 Split
YUGOSLAVIA

WDC-A (Oceanography)
National Oceanic and Atmospheric Administration
1825, Connecticut Avenue, NW
Washington DC, 20235
USA
Tel: <1> (202) 606 45 71
Tlm: NODC.WDCA

WDC-B1 (Oceanography)
Dr. V.I. Smirnov
Deputy-Director
All-Union Research Institute of Hydrometeorological
Information (VNIIGMI)
6, Koroleva Street, Kaluga District
Obninsk 249020
USSR
Tel: <7> (095) 546 39 10
Fax: <7> (095) 255 22 25
Tlx: 412633 INFOR SU

World Data Centre D (Oceanography)
National Marine Data & Information Service
State Oceanic Administration (SOA)
P.O. Box 74
93, Liu Wei Road, Hedong District
Tianjin 300171
PEOPLE'S REPUBLIC OF CHINA
Tel: <86> (22) 24 41 64
Fax: <86> (22) 31 44 08
Tlx: 23138 NODC CN
CHINAPAC: 04602-24100104

International Council for the Exploration of the Sea — RNODC-Formats
Regional Oceanographic Data Centre
Palaegade 2-4
1261 Copenhagen K
DENMARK
Tel: <45> (1) 15 42 25
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Tlx: 22498 ICES DK
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Permanent Service of Mean Sea Level (PSMSL)
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Tel: <44> (51) 653 86 33
Tlx: 628591 OCEANB G
Tlm: D.PUGH

APPENDIX 3
EXISTING RNODCs AND THEIR TERMS OF REFERENCE

RNODC – SOC: Operated by NODC of Argentina (28 August 1987)

- Receive, control the quality and store in standard format the physical and chemical data obtained by the international scientific community from cruises and research programmes carried out in the Southern Oceans, and distribute on request the information contained in such files;

- Co-operate closely with WDCs-Oceanography, sending regular shipments (at least once a year) free of charge of complete sets of physical and chemical data stored on magnetic tape and in GF3, inventories, data summaries and other data products related to the physical and chemical data from the Southern Oceans;

- Assist the World Data Centres by sending copies to them of any ROSCOP forms submitted to the RNODC-SOC;

- Co-operate with the BIOMASS Data Center, regarding exchange of data and inventories, as well as other data products.

At present, the responsibility of the Center is not limited to a particular geographical area or data types within the Southern Oceans. However, if new offers are submitted to the Committee by other appropriate National Oceanographic Data Centres willing to act as RNODC-SOC for specific geographical areas or data types, the Committee may examine such offers to determine whether they would be compatible with responsibilities of the RNODC-SOC in Argentina.

RNODC for Drifting Buoys Data: Operated by MEDS, Canada (1 January 1986)

- Data from the GTS are accumulated for one week when they are processed, quality controlled and updated in the archival database;

- As soon as an agreement is reached with Service Argos, data from Service Argos will be acquired on a regular basis and archived in its original form;

- Data received from Service Argos will be available from MEDS archives within 30 days of reception. The archive base will be a 2000-database with special MEDS-written software for data input and output products;

- Data inventories and format information, as well as information on processing algorithms and quality control will be shipped within 7 days of receipt of request, free of charge;

- Data will be shipped, on IBM standard magnetic tape in GF3 subset format, within 30 days of receipt of a request. Every data shipment will be accompanied by sufficient documentation to enable the user to read the tape. The requestor will be asked to acknowledge receipt within 15 days of receiving the data;

- Accumulated data will be submitted each year to a World Data Centre within 3 calendar months of the end of the year. The data will be forwarded in GF3 format, on magnetic tape. All other aspects of data forwarding to the WDCs will be in accordance with IOC Manuals and Guides No. 9;

- Capability to produce data products from the data in the archive will be gradually developed. As these products are developed, they will be made available to users on request;

- Report regularly on its activities to the Group of Experts on RNODCs and to the WC/IODE.

RNODCs for IGOSS (BATHY and TESAC): Operated by NODCs of Japan, the USA and the USSR

(a) acquire BATHY, TESAC datasets and sub-surface temperature data from drifting and moored buoys from IGOSS Specialized Oceanographic Centre (SOC) for area of responsibility;

(b) apply supplementary quality control to acquired data and provide services to users after 30 days from receipt of that data;

(c) archive, and make available to users, selected data products from SOCs and analysis centres;

(d) acquire non-operational BATHY, TESAC and sub-surface temperature data from drifting and moored buoys and/or datasets for area of responsibility;

(e) apply quality control to non-operational data, prepare integrated datasets and provide services to users;

(f) provide for exchange of IGOSS data in GF3 format with other RNODCs or to other users as requested;

(g) maintain a database and inventories for areas of responsibility;

(h) prepare products based on operational and non-operational IGOSS data, as appropriate;

(i) transmit to the WDCs annually, datasets in GF3 format, inventories and selected data products;

(j) prepare summary and BATHY, TESAC and sub-surface temperature from drifting and moored buoys database plots and transmit to the IOC Secretariat every 15 August and 15 February for data received during the previous 6 months;

(k) participate in efforts to monitor data flow;

(l) participate as feasible in IOC training programmes;

(m) provide for exchange of documentation and software regarding quality control and processing procedures, with other RNODCs, as possible.

RNODCs for MARPOLMON: Operated by NODCs of Japan, the USA and the USSR (3 May 1987)

A. Referral

The RNODC-MARPOLMON will:

- Provide a referral capacity to worldwide holdings of marine pollution data.

B. Access

The RNODC-MARPOLMON will be expected to demonstrate:

- a capability and willingness to perform automated data processing functions for marine pollution data;
- a willingness to accept marine pollution data which may not be received in automated form, and to convert them to such a form;
- a capability for performing quality control (format checks and/or environmental);
- a capability to work with discipline-oriented codes (biological and chemical);
- a capability for converting marine pollution data to GF3 format or other internationally recognized format.

C. **Products**

The RNODC-MARPOLMON will:

- provide copies of processed data to World Data Centres A and B (Oceanography);
- provide machine listings and simple statistics of marine pollution data;
- produce graphics of marine pollution data, for the use of concerned Member States.

D. **Training**

The RNODC-MARPOLMON will conduct formal or informal training sessions for data centre personnel involved in the programme and who actively submit marine pollution data. Expenses of trainees will not, however, be borne by the RNODC concerned. Selection of trainees will be jointly arranged by IOC and the RNODC.

Bearing in mind the Recommendations of the IOC Scientific Committee for the Global Investigation of Pollution in the Marine Environment, at its Sixth Session (Paris, 25 September - 1 October 1986), on the regional relevance to marine pollution management activities, RNODCs-MARPOLMON have been established in Japan, for the WESTPAC region, in the USA for the Caribbean region and in the USSR for the Atlantic, Mediterranean and Baltic Seas.

RNODC - WESTPAC: Operated by NODC of Japan (24 February 1979)

1. Producing a work plan to define: i) the procedures of JODC in acquiring, processing, reformatting and archiving, distribution of data and inventory of research cruises in the WESTPAC region with reference to the WDC system, and ii) the implementation of this work plan;
2. Providing a mechanism for registration of WESTPAC cruises with RNODC-WESTPAC;
3. Working closely with National Co-ordinators for IODE and any other national contact points for data management within WESTPAC who might be appointed by Member States;
4. Publishing a guide for WESTPAC data management for distribution to Member States through national contact points.

RNODC - Waves: Operated by BODC, UK

1. Compile comprehensive inventories of instrumented wave data, using a standard reporting form and a worldwide community of national co-ordinators for wave data.
2. Bank wave data values for remote-sensed satellite altimeter wave data and produce data products at level-2 and above.
3. Assist the WDCs, Oceanography through production of a world catalogue of instrumental wave data and forward data to the WDCs where these are held.
4. Provide services to users which include advice on wave data management, on wave data products, and on specialized data products derived from Remote Sensed data; sales of the world data catalogue.
5. Prepare a report and work closely with the Technical Committee on IODE, through its Group of Experts on RNODCs and Climate Data Services highlighting new developments and ensuring the provision of expert knowledge on instrumented and Remote Sensed satellite wave data to the data centres, PIANC, subsidiary bodies and other international organizations.

RNODC – JASIN: Operated by BODC, UK (17 October 1985)

The JASIN project was an intensive study, conducted during 2 months in 1978 in the North Rockall Trough, of the atmospheric and ocean boundary layer to observe the structure of the layer and its interaction with the large scale motions of the sea and air. More than 50 teams of investigators from 9 countries participated, using 14 ships and 3 aircraft, and deploying 35 mooring systems. Approximately 20 different types of oceanographic and meteorological data make up the 44 datasets planned for inclusion in the project archive. These include wave spectra, moored and drifting current meter data, vertical current profiles, temperature data (atmosphere and sea surface), thermistor chain data, data from conductivity/temperature/depth type instruments (for example CTDs, XBTs, water bottles, towed thermistors), meteorological data from surface ship/buoys, tethered balloons, aircraft and radio sondes and heat and moisture flux data.

The importance now attached to a more complete scientific understanding of the large scale processes controlling the global circulations of the oceans and atmosphere systems gives a particular value to detailed observations of air–sea interaction processes such as those in the JASIN project. The intensive observation period of the project also lay within the brief active observing life of the pioneering SEASAT microwave ocean observation satellite. The use of the 2 datasets in combination has proved extremely fruitful.

In order to establish the JASIN project archive, the RNODC is established to acquire copies of the datasets, to screen them for corruption or major errors, collating the necessary data documentation, and to convert them into the IOC GF3 format for international oceanographic data exchange. Once the preparation of the archive is complete, an inventory will be produced describing its contents.

The RNODC will provide copies of project datasets in GF3 format in response to inquiries received through the IODE system. A number of the datasets are already available; others will be made available as and when their archival is completed.

RNODC – Formats: Operated by the Service Hydrographique of ICES

1. Act as an archive centre for international marine environmental data formats, maintaining a full set of documentation on all such formats.

2. Act as an archive centre for code tables for GF3 and code tables for all other international archival formats, and for external code tables (e.g., taxonomic codes, chemical substance codes, etc.). The RNODC would maintain references to all such code tables.

3. Manage the expansion of the existing GF3 parameter code table as necessary under the guidance of the Committee on IODE (through its Group of Experts on Format Development or its successor) and to provide a focal point to which user requirements for new parameter codes may be directed.

4. Maintain user aids for GF3, including a programme library for processing of GF3, guidance notes and user guides, documentation of standard and experimental subsets of GF3, and sample data tapes of GF3 subsets.

5. Function as a centre for services to other centres in IOC and ICES Member States in such GF3 matters as responses to requests for information about, or copies of, items mentioned above.

6. Prepare a report to the Working Committee, through its Group of Experts on RNODCs, together with an annual newsletter for distribution to National Co-ordinators for IODE, National Oceanographic Data Centres, and other interested parties, such as WMO, ECOR and SCOR, highlighting new developments in GF3 and including an updated inventory of the documents, programmes, tapes, formats and code tables available.

7. Work closely with the Group of Experts on Format Development or its successor to ensure the provision of expert knowledge on formats to other centres, including WDCs–A and –B (all disciplines) and subsidiary bodies of WMO, IOC and other international organizations and in the promotion of GF3 as an exchange format. The provision of expert knowledge will be assured in fields covering:

   (a) guidance in the uses of GF3;

   (b) assistance to developing countries with the development of national formats compatible with GF3; and

   (c) assistance to developing data centres and countries, in collaboration with other RNODCs, in converting data into GF3.

RNODC – ADCP: Operated by JODC, Japan (27 June 1991)

1. To compile and evaluate information on existing datasets held by Member States already active in ADCP measurements and produce a catalogue of ADCP users with referral capacity;

2. Produce a detailed catalogue of ADCP users that includes information about their ADCP instrumentation, related instrumentation (GPS, LORAN, measurement of ship motion, etc.), procedures, averaging/ sampling (temporal and spatial vertical and horizontal), quality assurance methods, formats, products and uses of data;

3. In consultation with other NODCs and SCOR, to establish provisional standards and procedures for the reduction, quality control, archiving and exchange of ADCP data;

4. To assemble a pilot ADCP data archive of samples of ADCP data from other Member States so as to assess the effectiveness of the proposed standards and procedures;

5. To prepare guidelines concerning the different performance characteristics and data documentation relevant to each instrument type, in order to formulate adequate data documentation and quality control;

6. To report on the progress of RNODC–ADCP to the Group of Experts on RNODCs and Climate Data, and to IODE–XIV.

APPENDIX 4
LIST OF WORLD DATA CENTRES (JANUARY 1989)

WDC–A (USA)

USA NATIONAL ACADEMY OF SCIENCES

COMMITTEE ON GEOPHYSICAL DATA

WDC-S CO–ORDINATION OFFICE

Meteorology
National Climatic Data Centre, Asheville, NC

Glaciology
Co-operative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO

Oceanography
National Oceanographic Data Centre, NOAA, Washington, DC

Marine Geology and Geophysics, Seismology, Solar–Terrestrial Physics, Solid Earth Geophysics
National Geophysical Data Center, NOAA, Boulder, CO

Rockets and Satellites
National Space Science Data Center, NASA, Greenbelt, MD

Seismology
National Earthquake Information Center, U.S. Geological Survey, Denver, CO

Rotation of the Earth
U.S. Naval Observatory, Washington, DC

WDC–B (USSR)

USSR ACADEMIA NAUK, SOVIET GEOPHYSICAL COMMITTEE

STATE COMMITTEE FOR HYDROMETEOROLOGY

Meteorology, Oceanography, Marine Geology & Geophysics, Glaciology, Rockets & Satellites, Rotation of the Earth, Tsunami, Mean Sea–Level, Tides

All–Union Research Institute of Hydrometeorological Information, Obninsk, Kaluga Region

Solar–Terrestrial Physics: Solar, Interplanetary, Geomagnetic Variations, Ionosphere, Cosmic Rays

Solid Earth Geophysics: Seismology, Gravity, Crustal Movements, Geomagnetism, Heat Flow, Marine Geology, Geophysics

USSR Academy of Sciences, Soviet Geophysical Committee, Moscow

WDC–C1 (Europe)

Representative: E. Friis–Christensen, Copenhagen

Earth Tides
Observatoire Royale, Brussels, Belgium

Recent Crustal Movements
International Centre for Recent Crustal Movements, Zdiby, Czechoslovakia

Geomagnetism
Danish Meteorological Institute, Copenhagen, Denmark

British Geological Survey, Edinburgh, U.K.

Solar Activity
Observatoire de Paris, Meudon, France

Sunspot Index
Observatoire Royale, Brussels, Belgium

Glaciology
Scott Polar Research Institute, Cambridge, UK

Solar–Terrestrial Physics
Rutherford Appleton Laboratory, Chilton, UK

Soil Geography and Classification
International Soil Reference & Information Centre, Wageningen, Netherlands

WDC–C2 (Japan)

Representative: M. Sugiura, Kyoto

Airglow
Tokyo Astronomical Observatory

Ionosphere
Radio Research Laboratories, Tokyo

Aurora
National Institute for Polar Research, Tokyo

Nuclear Radiation
Japan Meteorological Agency, Tokyo

Cosmic Rays
Institute of Physics & Chemistry Research, Saitama–Ken

Solar Radio Emission
Nagoya University, Toyokawa

Geomagnetism
Kyoto University, Kyoto

Solar–Terrestrial Activity
Institute for Space & Astronomical Science, Tokyo

WDC-D (China)

CHINESE ACADEMY OF SCIENCES

CHINESE NATIONAL COMMITTEE FOR WDC

Oceanography, Marine Meteorology, Marine Geology & Geophysics, Sediments, Marine Biology & Pollution

Institute of Marine Scientific & Technological Information, Tianjin, Hedong District

Meteorology

State Meteorological Administration, Beijing

Seismology

State Seismological Bureau, Dept. of Science Programming & Earthquake Monitoring, Beijing

Geology

Chinese Academy of Geological Sciences, Beijing

Renewable Resources & Environment

Chinese Academy of Sciences, Commission for Integrated Survey of Natural Resources, Beijing

Astronomy

Chinese Academy of Sciences, Astronomical Observatory, Beijing

Glaciology & Geocryology

Institute of Glaciology & Geocryology, Hanzhou

Geophysics

Chinese Academy of Sciences, Institute of Geophysics, Beijing

Space Sciences

Chinese Academy of Sciences, Beijing

APPENDIX 5
NATIONAL OCEANOGRAPHIC PROGRAMME (NOP) ANNOUNCEMENT

The NOP announcement is prepared in a relatively free form format. The announcement should include the following information about a planned oceanographic cruise.

Ship Name
Area (by common geographic area name and/or Marsden Square)
Date span for the cruise
Name of the programme (if there is one)
Operating agency (the organization that can be contacted about participation in the cruise)
Comments (any comments that would provide additional useful information to a potential particpant)

This information is often prepared in a tabular format with codes that are described at the end of the table. An example prepared from a NOP announcement submitted by Japan follows.

SAMPLE NOP ANNOUNCEMENT

Ship	Area (Marsden Square)	Date	Programme	Operating Agency	Comments
Takuyo	West Pacific Ocean (022, 023, 058, 060, 095, 096, 130, 131, 132)	Feb.–Mar. 1988	H,P,G,D	HD, MSA	WESTPAC, KER
Shoyo	NW Pacific Ocean & Philippine Sea (130,131)	Apr.–May, 1987	H,P,D	HD, MSA	MARPOLMON
Shoyo	Philippine Sea & East China Sea (095, 096, 130, 131, 132)	May 1987	H,P,D	HD, MSA	

(1) Acronyms of Operating Agencies

HD, MSA :Hydrographic Department, Maritime Safety Agency

(2) Acronyms of Expeditions

KER :Kuroshio Exploitation and Utilization Research
WESTPAC :Western Pacific Programme of Oceanographic Observations
MARPOLMON :Marine Pollution Monitoring Programme

(3) Programme Code

M :Meteorology
H :Hydrography
P :Pollution
G :Geophysics
D :Dynamics
B :Biology

NOP announcements should be sent to the IOC Secretariat for further distribution to Member States and other interested users in accordance with the provision described in Chapter 11 of the Manual. The address of the Secretariat is:

IOC Secretariat
UNESCO
7, Place de Fontenoy
75700 Paris
France
Tel: <33> (1) 45 68 39 80
Fax: <33> (1) 40 56 93 16
Tlx: 204461
Cbl: Unesco Paris
Tlm: IOC.SECRETARIAT

In addition to using the existing NOP format, it is intended to distribute NOPs to Member States using output from the University of Delaware's on-line database OCEANIC. An example of the output for 2 cruises is shown below, together with a key to the fields.

For those who have pre-paid accounts on their national packet switching networks on-line access to OCEANIC is through telenet address 311030200612. For those on Internet the address is DELOCN.UDEL.EDU and no password is required. There is no charge apart from telephone connection costs. Postal address is K. Bouton, College of Marine Studies, University of Delaware, Lewes, DE 19958, USA, from where a primer on OCEANIC can be obtained.

FORMAT

Shipname	depart data	depart port	general area	discipline
Country update	arrive date	arrive port	specific area	experiment
				PI (inst)
Example:				
Meteor	02-Sep-1991	Reykjavik	N E Atlantic	Phys oc
(D) E1	26-Sep-1991	Hamburg	Norwegian Sea	WOCE Section AR7
				Meincke
Tyro				
(NL) D4	16-Oct-1991	P Den Helder	Crete	geo
	06-Nov-1991		Med	MAST
				De Lange

Notes: Update code is a letter for year (D is 1990, E is 1991) and 1-4 for the quarter of the year when latest information received.

APPENDIX 6
CRUISE SUMMARY REPORT (ROSCOP3)

CRUISE SUMMARY REPORT

The Cruise Summary Report is a general purpose form for reporting on measurements and samples collected at sea. It is used to support a global, first level, inventory of data collected at sea and to provide ready access for scientists, programme managers and data managers alike to timely information on who has collected what, when and where. The resulting global summaries of measurements made will be available to scientists and planners through World and National Data Centres and to the Programme Offices of international programmes.

The Cruise Summary Report replaces the ROSCOP (2nd edition), and should be used for cruises ending after January 1st, 1991, although its use prior to that date is strongly encouraged.

For research cruises and voyages of ships of opportunity, it is generally expected that one report will be completed for each port to port operation. It is intended that the report should be completed by the chief scientist(s), or appropriate ship's officer, just before returning to port and that it should be sent as soon as practicable after completion of the cruise or observational programme to:

Please affix the name and address of the collating centre to which the completed report should be submitted

If no address is provided in the above box, then please send to one of the following (as arranged):

- Your National Oceanographic Data Centre or designated agency.

or
- World Data Centre A, Oceanography, NOAA, Washington DC 20235, USA.

or
- World Data Centre B, Oceanography, 6, Koroleva Street, Obninsk 249020, USSR.

or
- World Data Centre D, Oceanography, 77 Qi Wei Road, Hedong District, Tianjin, China

or
- ICES Service Hydrographique, Palaegade 2-4, 1261 Copenhagen K, Denmark.

Further copies of these forms may be obtained from any of the above centres.

CODE LIST OF DATA TYPES

In order to assist computer-based retrieval of information on the data reported on Cruise Summary Reports, you are requested to assign against each of the entries made on Page 2 ("Moorings, bottom mounted gear and drifting systems") and Page 3 ("Summary of measurements and samples taken") one or more data type codes from the following list.

Please note that the list is restricted to the more common types of oceanographic data. For those data types not included on the list you are requested to use codes D90, H90, P90, B90, M90, and G90 (for other types of physical oceanography, chemical oceanography, contamination, biology & fisheries, meteorology, and geology & geophysics data respectively).

For some entries you will find that only one code is required (e.g. for BTs, only H13 is needed), while for others a string of codes may be appropriate (e.g. for water bottle stations with measurements of temperature, salinity, oxygen, nitrate and phosphate, the codes H09, H21, H24 and H22 would be assigned to the entry).

PHYSICAL OCEANOGRAPHY

- H71 Surface measurements underway (T, S)
- H13 Bathythermograph drops
- H09 Water bottle stations
- H10 CTD stations
- H11 Subsurface measurements underway (T, S)
- H72 Thermistor chain
- H16 Transparency (e.g. transmissometer)
- H17 Optics (e.g. underwater light levels)
- H73 Geochemical tracers (e.g. freons)
- D01 Current meters
- D71 Current profiler (e.g. ADCP)
- D03 Currents measured from ship drift
- D04 GEK
- D05 Surface drifters / drifting buoys
- D06 Neutrally buoyant floats
- D09 Sea level measurements (including bottom pressure recorders and inverted echo-sounders)
- D72 Instrumented wave measurements
- D90 Other physical oceanographic measurements

CHEMICAL OCEANOGRAPHY

- H21 Oxygen
- H74 Carbon dioxide
- H33 Other dissolved gases
- H22 Phosphates
- H23 Total-P
- H24 Nitrates
- H25 Nitrites
- H75 Total-N
- H76 Ammonia
- H26 Silicates
- H27 Alkalinity
- H28 pH
- H30 Trace elements
- H31 Radioactivity
- H32 Isotopes
- H90 Other chemical oceanographic measurements

CONTAMINATION

- P01 Suspended matter
- P02 Trace metals
- P03 Petroleum residues
- P04 Chlorinated hydrocarbons
- P05 Other dissolved substances
- P12 Bottom deposits
- P13 Contaminants in organisms
- P90 Other contaminant measurements

BIOLOGY & FISHERIES

- B01 Primary productivity
- B02 Phytoplankton pigments (e.g. chlorophyll, fluorescence)
- B71 Particulate organic matter (e.g. POC, PON)
- B06 Dissolved organic matter (e.g. DOC)
- B72 Biochemical measurements (e.g. lipids, aminoacids)
- B73 Sediment traps
- B08 Phytoplankton
- B09 Zooplankton
- B03 Seston
- B10 Neuston
- B11 Nekton
- B13 Eggs / larvae
- B07 Pelagic bacteria / micro-organisms
- B16 Benthic bacteria / micro-organisms
- B17 Phytobenthos
- B18 Zoobenthos
- B25 Birds
- B26 Mammals & reptiles
- B14 Pelagic fish
- B19 Demersal fish
- B20 Molluscs
- B21 Crustaceans
- B28 Acoustic reflection on marine organisms
- B37 Taggings
- B64 Gear research
- B65 Exploratory fishing
- B90 Other biological / fishery measurements

METEOROLOGY

- M01 Upper air observations
- M02 Incident radiation
- M05 Occasional standard measurements
- M06 Routine standard measurements
- M71 Atmospheric chemistry
- M90 Other meteorological measurements

GEOLOGY & GEOPHYSICS

- G01 Dredge
- G02 Grab
- G03 Core - rock
- G04 Core - soft bottom
- G08 Bottom photography
- G71 In-situ seafloor measurements
- G72 Geophysical measurements made at depth (below near surface and above seafloor)
- G73 Single-beam echosounding
- G74 Multi-beam echosounding
- G24 Long/short range side scan sonar
- G75 Single channel seismic reflection
- G76 Multichannel seismic reflection
- G26 Seismic refraction
- G27 Gravity measurements
- G28 Magnetic measurements
- G90 Other geological or geophysical measurements

CRUISE SUMMARY REPORT
(ILLUSTRATIVE EXAMPLE)

FOR COLLATING CENTRE USE
Centre: BODC Ref. No: 3400
Is data exchange restricted? ☐ Yes ☐ In part ☑ No

SHIP enter the full name and international radio call sign of the ship from which the data were collected, and indicate the type of ship, for example, research ship, ship of opportunity, naval survey vessel; etc.

Name: R.R.S. DISCOVERY Call Sign: GLNE

Type of ship: RESEARCH SHIP

CRUISE NO./NAME DISCOVERY 174 — enter the unique number, name or acronym assigned to the cruise (or cruise leg, if appropriate).

CRUISE PERIOD start (not sail) 19 05 1988 (day month year) to 12 06 1988 (day month year) end (return to port)

PORT OF DEPARTURE (enter name and country) BARRY, U.K.

PORT OF RETURN (enter name and country) BARRY, U.K.

RESPONSIBLE LABORATORY enter name and address of the laboratory responsible for coordinating the scientific planning of the cruise.

Name: IOS DEACON LABORATORY

Address: BROOK ROAD, WORMLEY, GODALMING, SURREY GU8 5UB

Country: U.K.

CHIEF SCIENTIST(S) enter name and laboratory of the person(s) in charge of the scientific work (chief of mission) during the cruise.

DR. P.M. SAUNDERS, IOS DEACON LABORATORY

OBJECTIVES AND BRIEF NARRATIVE OF CRUISE enter sufficient information about the purpose and nature of the cruise so as to provide the context in which the reported data were collected.

ONE OF A SERIES OF PHYSICAL OCEANOGRAPHY CRUISES TO STUDY:
A) THE OVERFLOW OF NORWEGIAN SEA WATER ACROSS THE ICELAND FAEROES RIDGE AND THROUGH THE FAEROE BANK CHANNEL
B) THE FORMATION OF NORTH ATLANTIC DEEP WATER IN THE ICELAND BASIN AND OBSERVE ITS PASSAGE THROUGH THE CHARLIE-GIBBS FRACTURE ZONE INTO THE WESTERN ATLANTIC

MAIN TASKS
1: RECOVER MOORINGS LAID IN THE FAEROE BANK CHANNEL ON CHALLENGER CRUISE 15/87
2: LAY 1-YEAR CURRENT METER MOORINGS IN THE CHARLIE-GIBBS FRACTURE ZONE (35°W)
3: HYDROGRAPHIC MEASUREMENTS IN THE ABOVE AREAS AND ON AN ICELAND BASIN SECTION NEAR 57°N

PROJECT (IF APPLICABLE) if the cruise is designated as part of a larger scale cooperative project (or expedition or programme), then enter the name of the project, and of the organisation responsible for coordinating the project.

Project name: _____

Coordinating body: _____

PRINCIPAL INVESTIGATORS: Enter the name and address of the Principal Investigators responsible for the data collected on the cruise, and who may be contacted for further information about the data. (The letter assigned below against each Principal Investigator is used on pages 2 and 3, under the column heading 'PI', to identify the data sets for which he/she is responsible)

A. DR. P.M. SAUNDERS, IOS DEACON LAB., WORMLEY, GODALMING, SURREY

B. DR. D. SMYTHE-WRIGHT, IOS DEACON LAB., WORMLEY, GODALMING, SURREY

C. HYDROGRAPHER OF THE NAVY, HYDROGRAPHIC DEPT., TAUNTON, SOMERSET

D. DR. I.M. VASSIE, POL, BIDSTON OBSERVATORY, BIRKENHEAD, MERSEYSIDE

E.

F.

MOORINGS, BOTTOM MOUNTED GEAR AND DRIFTING SYSTEMS

This section should be used for reporting moorings, bottom mounted gear and drifting systems (both surface and deep) deployed and/or recovered during the cruise. Separate entries should be made for each location (only deployment positions need be given for drifting systems). This section may also be used to report data collected at fixed locations which are returned to routinely in order to construct 'long time series'.

PI (see top of page)	APPROXIMATE POSITION LATITUDE deg	min N/S	LONGITUDE deg	min E/W	DATA TYPE (enter code(s) from list on cover page)	DESCRIPTION (identify, as appropriate, the nature of the instrumentation, the parameters (to be) measured, the number of instruments and their depths, whether deployed and/or recovered, dates of deployment and/or recovery, and any identifiers given to the site)
D	61	35 N	009	46 W	D09	RECOVERED INVERTED ECHO SOUNDER AND BOTTOM PRESSURE RECORDER (LAID MAY 1987)
A	61	19 N	008	15 W	D01	RECOVERED MOORING 435 (LAID MAY 1987) WITH 2 CURRENT METERS
A	61	20 N	008	12 W	D01,H72	RECOVERED MOORING 438 (LAID MAY 1987) WITH THERMISTOR CHAIN AND 4 CURRENT METERS
A	52	48 N	035	07 W	D01	LAID ONE-YEAR MOORING 473 WITH 1 CURRENT METER
A	52	45 N	035	03 W	D01	LAID ONE-YEAR MOORING 474 WITH 2 CURRENT METERS
A	52	41 N	035	04 W	D01	LAID ONE-YEAR MOORING 466 WITH 3 CURRENT METERS
A	52	37 N	035	05 W	D01	LAID ONE-YEAR MOORING 467 WITH 2 CURRENT METERS
A	52	26 N	035	02 W	D01	LAID ONE-YEAR MOORING 469 WITH 2 CURRENT METERS
A	52	19 N	035	10 W	D01	LAID ONE-YEAR MOORING 468 WITH 3 CURRENT METERS
A	52	07 N	035	08 W	D01	LAID ONE-YEAR MOORING 471 WITH 2 CURRENT METERS
A	51	48 N	035	07 W	D01	LAID ONE-YEAR MOORING 472 WITH 1 CURRENT METER

Please continue on separate sheet if necessary.

SUMMARY OF MEASUREMENTS AND SAMPLES TAKEN

Except for the data already described on page 2 under 'Moorings, Bottom Mounted Gear and Drifting Systems', this section should include a summary of all data collected on the cruise, whether it be measurements (e.g. temperature, salinity values) or samples (e.g. cores, net hauls).

Separate entries should be made for each distinct and coherent set of measurements or samples. Different modes of data collection (e.g. vertical profiles as opposed to underway measurements) should be clearly distinguished, as should measurement/sampling techniques that imply distinctly different accuracies or spatial/temporal resolutions. Thus, for example, separate entries would be created for i) BT drops, ii) water bottle stations, iii) CTD casts, iv) towed CTD, v) towed undulating CTD profiler, vi) surface water intake measurements, etc.

Each data set entry should start on a new line - it's description may extend over several lines if necessary.

NO. UNITS : for each data set, enter the estimated amount of data collected expressed in terms of the number of, 'stations', 'miles' of track, 'days' of recording; 'cores' taken; net 'hauls'; balloon 'ascents'; or whatever unit is most appropriate to the data. The amount should be entered under 'NO' and the counting unit should be identified in plain text under 'UNITS'.

PI	NO	UNITS	DATA TYPE	DESCRIPTION
see page 2	see above	see above	enter code(s) from list on cover page.	Identify, as appropriate, the nature of the data and of the instrumentation/sampling gear and list the parameters measured. Include any supplementary information that may be appropriate, e.g. vertical or horizontal profiles, depth horizons, continuous recording or discrete samples, etc. For samples taken for later analysis on shore, an indication should be given of the type of analysis planned, i.e. the purpose for which the samples were taken.
A	23	DAYS	M06	SYNOPTIC MET. REPORTS - VOLUNTARY OBSERVING SHIP
A	4000	N.MILES	G73	WIDE BEAM BATHYMETRY - 10kHz P.E.S.
A	4000	N.MILES	D71	UNDERWAY CURRENT PROFILING IN UPPER 400M. USING RDI ADCP
C	48	DROPS	H13	XBT DROPS WITH T4 AND T7 PROBES - SOME TRACES CODED AND TRANSMITTED OVER GTS
A	50	STATIONS	H10, H21, H16	DEEP CASTS USING NBIS CTD WITH OXYGEN SENSOR AND SEA TECH TRANSMISSOMETER (DATA COLLECTED ON DOWNCASTS)
B	50	STATIONS	H09, H24, H26, H73, H30	GENERAL OCEANICS MULTISAMPLER (12 x 1.7 LITRE BOTTLES) EMPLOYED ON UP-CASTS AT EACH CTD STATION WITH CALIBRATION SAMPLES TAKEN FOR SALINITY AND OXYGEN PLUS: NITRATES AT 16 STATIONS SILICATES AT 26 STATIONS FREON 11 & 12 AT 24 STATIONS PLUS SAMPLES TAKEN AT SELECTED STATIONS TO ANALYSE LATER FOR ALUMINIUM

Please continue on separate sheet if necessary

TRACK CHART: You are strongly encouraged to submit, with the completed report, an annotated track chart illustrating the route followed and the points where measurements were taken.

Insert a tick (✓) in this box if a track chart is supplied. ☑

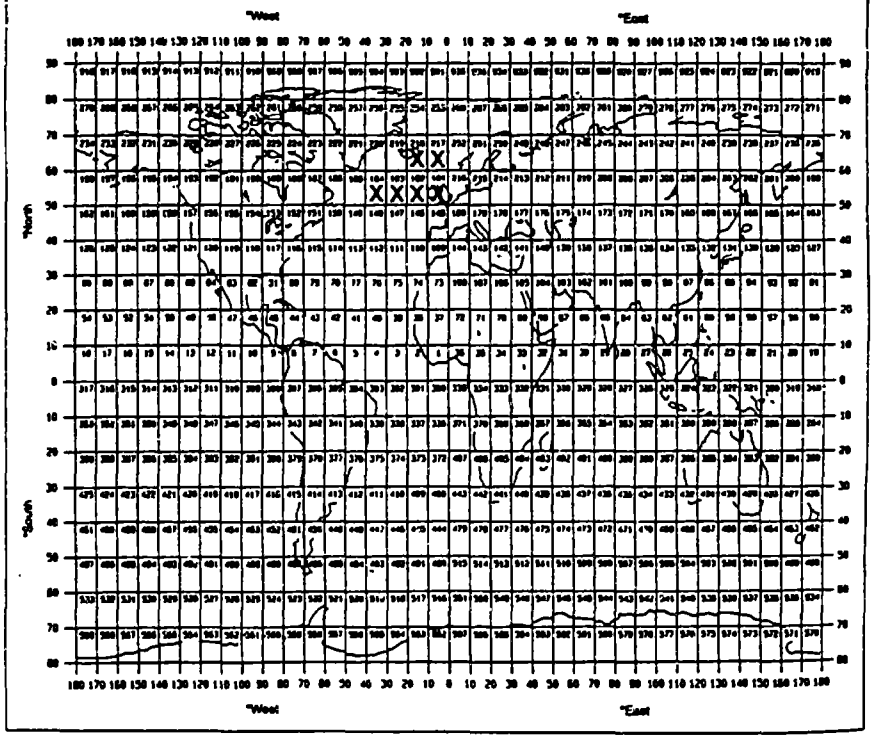
GENERAL OCEAN AREA(S): Enter the names of the oceans and/or seas in which data were collected during the cruise - please use commonly recognised names (see, for example, International Hydrographic Bureau Special Publication No 23, 'Limits of Oceans and Seas').

NORTH EAST ATLANTIC

SPECIFIC AREAS: If the cruise activities were concentrated in a specific area(s) of an ocean or sea, then enter a description of the area(s). Such descriptions may include references to local geographic areas, to sea floor features, or to geographic coordinates.

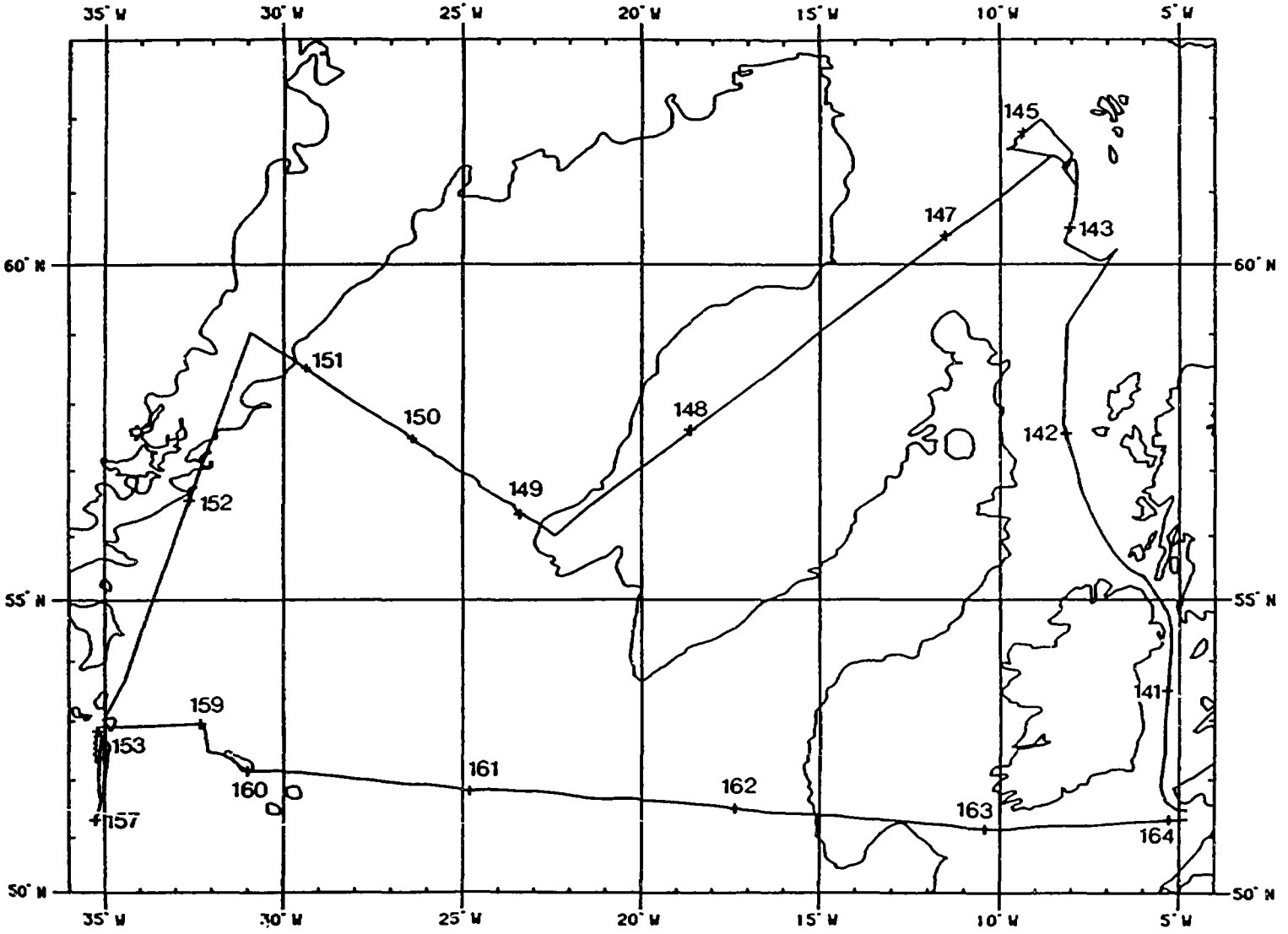
MAIN AREAS: FAEROE BANK CHANNEL; CHARLIE-GIBBS FRACTURE ZONE (35°W)
LONG SECTIONS: ROCKALL PLATEAU; ICELAND BASIN; REYKJANES RIDGE; AND 35°W TO UK AT 51-53°N

GEOGRAPHIC COVERAGE - INSERT 'X' IN EACH SQUARE IN WHICH DATA WERE COLLECTED



THANK YOU FOR YOUR COOPERATION

Please send your completed report without delay to the collating centre indicated on the cover page



TRACK CHART FOR DISCOVERY CRUISE 174 - 00Z TIMES ARE INDICATED THUS +(Day No)148

(ILLUSTRATIVE EXAMPLE)

SECTION	PAGE	DATE
Appendix 6	A6-5	07/91

CRUISE SUMMARY REPORT

FOR COLLATING CENTRE USE

Centre: Ref. No:

Is data exchange restricted? ☐ Yes ☐ In part ☐ No

SHIP enter the full name and international radio call sign of the ship from which the data were collected, and indicate the type of ship, for example, research ship; ship of opportunity, naval survey vessel; etc.

Name: Call Sign:

Type of ship:

CRUISE NO./NAME enter the unique number, name or acronym assigned to the cruise (or cruise leg, if appropriate).

CRUISE PERIOD start (set sail) ⌊_⌋⌊_⌋ day ⌊_⌋⌊_⌋ month ⌊_⌋⌊_⌋⌊_⌋⌊_⌋ year to ⌊_⌋⌊_⌋ day ⌊_⌋⌊_⌋ month ⌊_⌋⌊_⌋⌊_⌋⌊_⌋ year end (return to port)

PORT OF DEPARTURE (enter name and country)

PORT OF RETURN (enter name and country)

RESPONSIBLE LABORATORY enter name and address of the laboratory responsible for coordinating the scientific planning of the cruise.

Name:

Address:

Country:

CHIEF SCIENTIST(S) enter name and laboratory of the person(s) in charge of the scientific work (chief of mission) during the cruise.

OBJECTIVES AND BRIEF NARRATIVE OF CRUISE enter sufficient information about the purpose and nature of the cruise so as to provide the context in which the reported data were collected.

PROJECT (IF APPLICABLE) if the cruise is designated as part of a larger scale cooperative project (or expedition or programme), then enter the name of the project, and of the organisation responsible for coordinating the project.

Project name:

Coordinating body:

PRINCIPAL INVESTIGATORS: Enter the name and address of the Principal Investigators responsible for the data collected on the cruise, and who may be contacted for further information about the data. (The letter assigned below against each Principal Investigator is used on pages 2 and 3, under the column heading 'PI', to identify the data sets for which he/she is responsible)

A.

B.

C.

D.

E.

F.

MOORINGS, BOTTOM MOUNTED GEAR AND DRIFTING SYSTEMS

This section should be used for reporting moorings, bottom mounted gear and drifting systems (both surface and deep) deployed and/or recovered during the cruise. Separate entries should be made for each location (only deployment positions need be given for drifting systems). This section may also be used to report data collected at fixed locations which are returned to routinely in order to construct 'long time series'.

PI	APPROXIMATE POSITION		DATA TYPE	DESCRIPTION
see top of page.	LATITUDE deg min N/S	LONGITUDE deg min E/W	enter code(s) from list on cover page.	Identify, as appropriate, the nature of the instrumentation, the parameters (to be) measured, the number of instruments and their depths, whether deployed and/or recovered, dates of deployment and/or recovery, and any identifiers given to the site.

Please continue on separate sheet if necessary.

SUMMARY OF MEASUREMENTS AND SAMPLES TAKEN

Except for the data already described on page 2 under 'Moorings, Bottom Mounted Gear and Drifting Systems', this section should include a summary of all data collected on the cruise, whether they be measurements (e.g. temperature, salinity values) or samples (e g. cores, net hauls).

Separate entries should be made for each distinct and coherent set of measurements or samples. Different modes of data collection (e.g. vertical profiles as opposed to underway measurements) should be clearly distinguished, as should measurement/sampling techniques that imply distinctly different accuracies or spatial/temporal resolutions. Thus, for example, separate entries would be created for i) BT drops, ii) water bottle stations, iii) CTD casts, iv) towed CTD, v) towed undulating CTD profiler, vi) surface water intake measurements, etc.

Each data set entry should start on a new line - it's description may extend over several lines if necessary.

NO, UNITS : for each data set, enter the estimated amount of data collected expressed in terms of the number of: 'stations'; 'miles' of track; 'days' of recording; 'cores' taken; net 'hauls'; balloon 'ascents'; or whatever unit is most appropriate to the data. The amount should be entered under 'NO' and the counting unit should be identified in plain text under 'UNITS'.

PI	NO	UNITS	DATA TYPE	DESCRIPTION
see page 2	see above	see above	enter code(s) from list on cover page.	Identify, as appropriate, the nature of the data and of the instrumentation/sampling gear and list the parameters measured. Include any supplementary information that may be appropriate, e g. vertical or horizontal profiles, depth horizons, continuous recording or discrete samples, etc. For samples taken for later analysis on shore, an indication should be given of the type of analysis planned, i.e. the purpose for which the samples were taken.

Please continue on separate sheet if necessary.

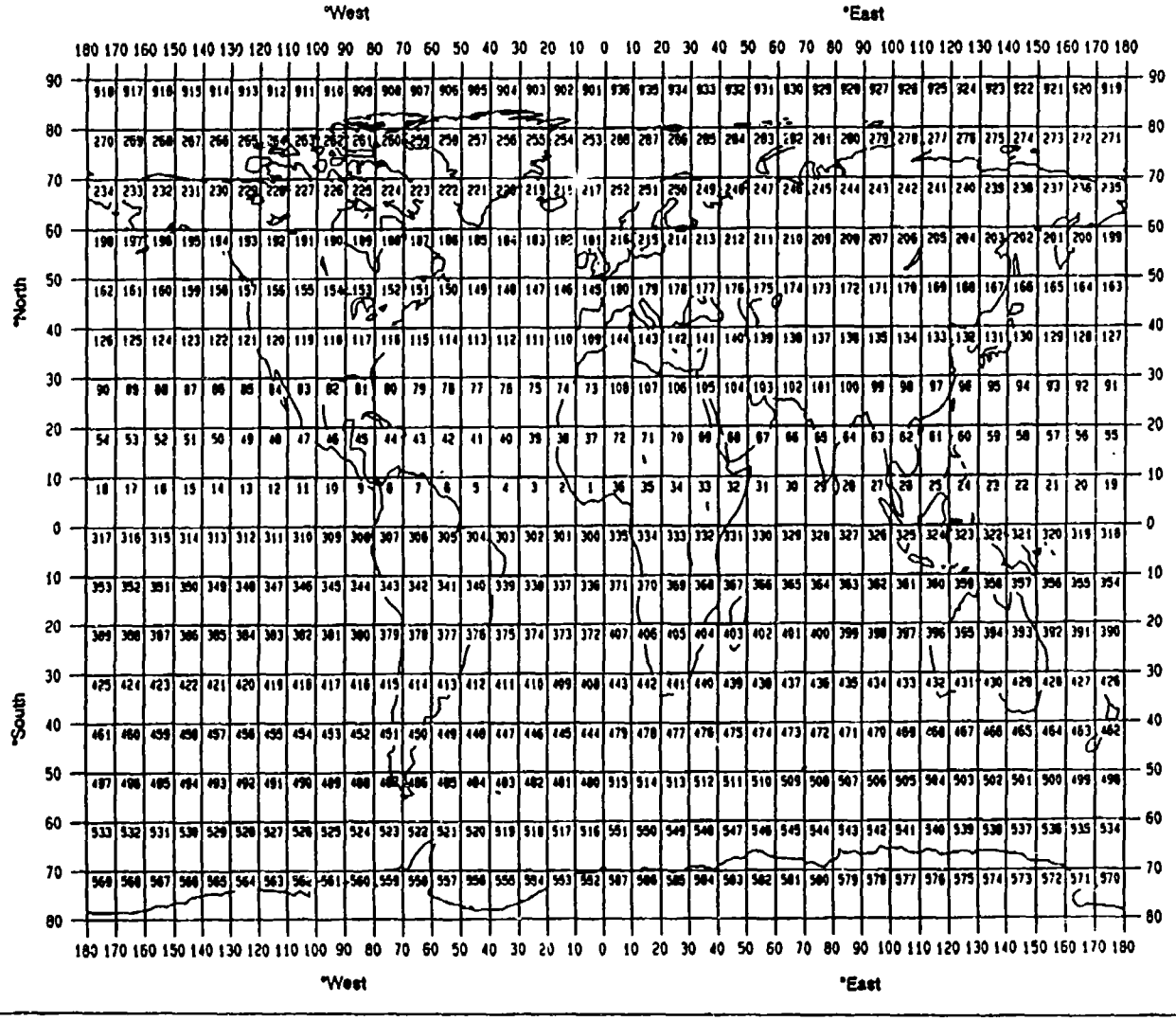
TRACK CHART: You are strongly encouraged to submit, with the completed report, an annotated track chart illustrating the route followed and the points where measurements were taken.

Insert a tick (✓) in this box if a track chart is supplied. ☐

GENERAL OCEAN AREA(S): Enter the names of the oceans and/or seas in which data were collected during the cruise - please use commonly recognised names (see, for example, International Hydrographic Bureau Special Publication No. 23, 'Limits of Oceans and Seas').

SPECIFIC AREAS: If the cruise activities were concentrated in a specific area(s) of an ocean or sea, then enter a description of the area(s). Such descriptions may include references to local geographic areas, to sea floor features, or to geographic coordinates.

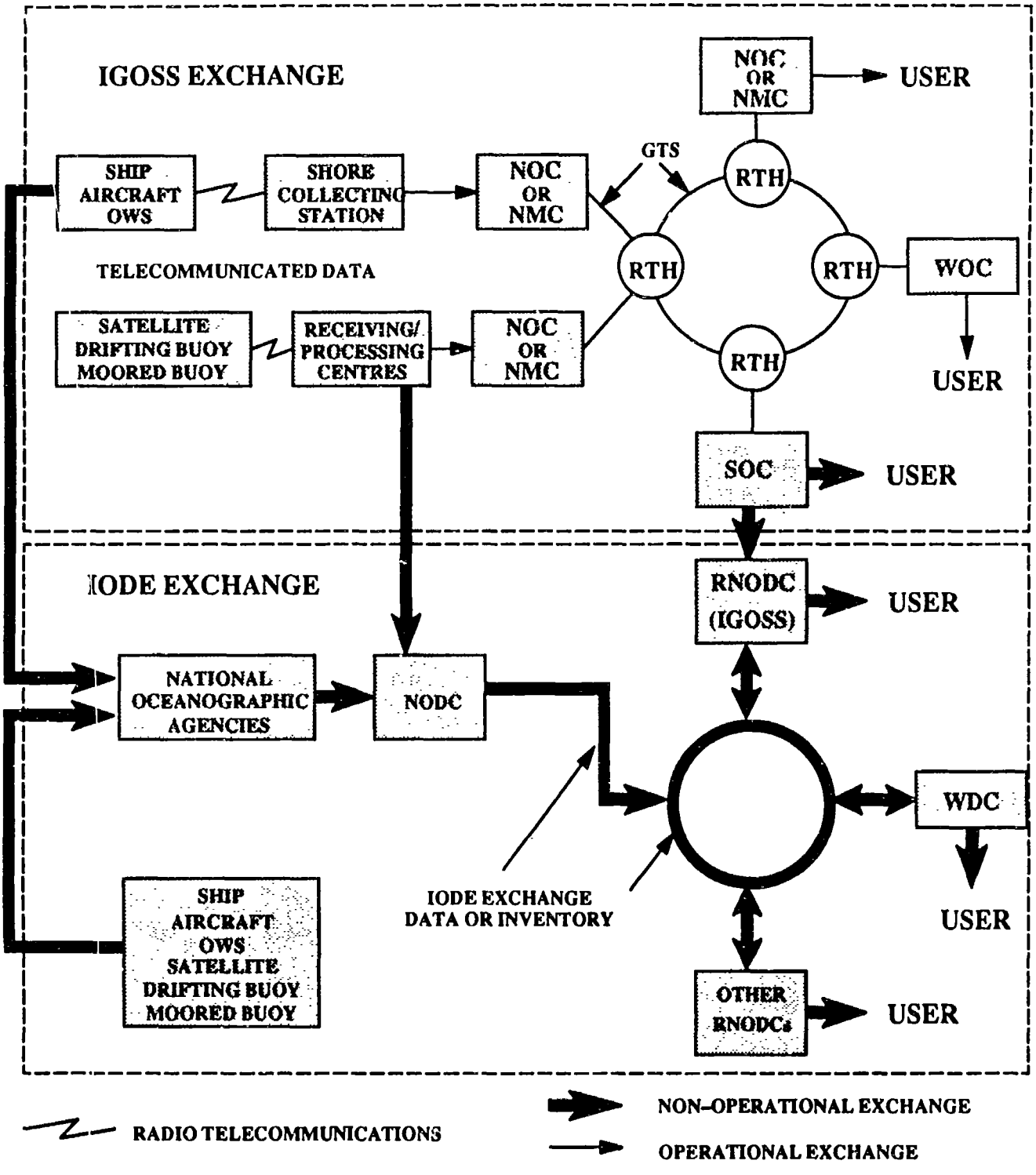
GEOGRAPHIC COVERAGE - INSERT 'X' IN EACH SQUARE IN WHICH DATA WERE COLLECTED



THANK YOU FOR YOUR COOPERATION

Please send your completed report without delay to the collating centre indicated on the cover page

APPENDIX 7
IGOSS/IODE DATA FLOW DIAGRAM



APPENDIX 8
PROPOSED GUIDELINES FOR THE INTERNATIONAL EXCHANGE OF CTD/STD DATA
as prepared by the ICES Working Group on Marine Data Management 11–14 May 1982, Copenhagen and revised 25 August, 1982

Introduction Note: It is recognized that, with modern CTD systems and careful in-situ calibration, it is now possible to obtain good quality, high resolution vertical profiles of temperature and salinity (or conductivity). It is also recognized from past experience that the majority of secondary users are likely to prefer compressed versions of these data, at intervals more compatible with classical water bottle data or the ICES STD Standard Criteria of 1969. However, in satisfying this majority user need, it is important to ensure that good quality, high resolution data are not lost to those scientists that require them. National archives, whether they be at data centres or originating laboratories, should endeavor to maintain versions of these data with minimal loss of information, in addition to any compressed versions that might be prepared for more general use.

These guidelines relate specifically to data maintained to minimize information loss, rather than to versions compressed to satisfy particular user needs. It is, however, recognized that on occasions these two versions may sometimes be one and the same, and that on occasions data compression techniques may be applied without significant loss of real information.

1. DATA STANDARD

1.1 As a matter of routine, data should not be exchanged at a finer depth resolution than 2 metres (2 decibars pressure) in oceanic depths, and 1 metre (1 decibar pressure) in continental shelf depths; note 1 decibar = 10 to the fourth power Pascals.

Only if the data have been collected for some specialist study, e.g. micro or fine-structure measurements, should finer depth resolutions be considered.

It is recognized that in many cases calibrated data sets may only have been produced to coarser resolutions arising either, for example, from the circumstances of the instrument performance, or from the nature of the data originator's investigations.

1.2 The expression of data at 'flexure points' may be seen as a means of achieving economy of storage relative to recording at fixed pressure intervals. If this technique is used, there should not be significant loss of information about the profile in comparison with fixed pressure interval data prepared according to 1.1 above, and the flexure point criteria used should be clearly stated.

1.3 All relevant corrections should be applied to the data including instrumental calibrations, and field corrections. The data should be fully checked for quality and pre-edited or flagged for erroneous values such as spikes, gaps, etc. An explicit statement should be made of the corrections, checks and editing applied to the data.

1.4 If available, the reference values used for in-situ calibration/comparison, e.g. reversing thermometer measurements, bottle salinities, should accompany the data.

1.5 Sufficient self-explanatory series header information and documentation should accompany the data so that they are adequately qualified and can be used with confidence by scientists/engineers other than those responsible for their original collection, processing and quality control (see 3 and 4).

1.6 a) All data values should be expressed in oceanographic terms, in SI units, which should be clearly stated. Practical salinity values should be clearly distinguished from salinity (pre-1978 definition) values, as should pressure values be distinguished from depth values.

b) Other parameters measured as part of the series, e.g. sound velocity, oxygen should be included with the data.

c) Unless calibrated against depth measurements, the data cycles should include pressure in preference to depth. If conductivity is included instead of salinity, then pressure should be included.

d) If salinity is included it should be expressed as practical salinity for data collected after January 1st, 1982.

2. FORMAT STANDARD

2.1 Data should be exchanged on magnetic tape in GF3 format.

2.2 Guidelines for the formatting of CTD data in GF3 may be obtained from:

RNODC (Formats),
ICES Service Hydrographique,
Palaegade 2-4
DK-1261 Copenhagen K,
Denmark.

3. SERIES HEADER INFORMATION

Each CTD series should include entries in the appropriate GF3 fields for the following: -

3.1 Name of the country and organization responsible for collection and processing of the data

3.2 Project, platform (e.g. ship) and cruise identifiers.

3.3 Dates and times of start and end of CTD cast.

3.4 Originator's reference number/identifier for the series.

3.5 Latitude, longitude, (start and end positions if known) and sea floor depth.

3.6 Reference values collected for in-situ calibration/comparison, e.g. reversing thermometer measurements, bottle salinities.

4. DATA DOCUMENTATION

Sufficient plain language documentation should accompany the data so as to ensure that they are adequately qualified and may therefore be used with confidence by a secondary user. Such documentation should be included within the plain language part of the GF3 format and, where applicable, should cover all items listed below. (Note that a worked up example of a fully documented CTD series may be found in the GF3 guidelines referenced in 2.2.)

4.1 Instrumentation:

a) Description of each instrument used – manufacturer and model number – refer to publication or briefly describe.

b) Instrument modifications and their effect on the data.

4.2 Data Collection:

a) Description of operational procedures for collecting CTD data and in-situ calibration data – indicate whether data are from down cast or some combination of down and up casts.

b) Sampling rate, sensor resolutions, and lowering rate – indicate any changes during the cast.

c) Method to monitor CTD depth or CTD height above sea floor.

d) Methods of position fixing and sea floor depth determination.

4.3 Data Calibration/Quality: for each parameter or sensor

a) Type or principle of sensor (e.g. platinum resistance, thermistor).

b) Method, quality (including response range) and dates of sensor calibration.

c) Method and quality of in-situ comparisons.

d) Report on corrections applied to data including corrections for bias, drift, in-situ calibration and system malfunctions.

e) Estimate of final uncertainty in the data as evidenced by the calibrations and comparisons, and by sensor performance.

4.4 Data Processing: brief description of processing procedures (and their sequence) used to obtain final data values starting from original samples including

a) filtering/de-spiking/smoothing methods.

b) editing/quality control procedures – indicate how missing or erroneous data are identified and treated.

c) time lag correction scheme (for each sensor in question) and values used.

d) adjustments made because of variations in calibration during cast or because of sensor design and arrangement.

e) computation of salinity.

f) pre-sorting of data by depth or pressure.

g) data compression method

e.g. pressure interval averaging – state interval
flexure point compression – state criteria
averaging over n original data cycles
edited original data set

4.5 Report any additional item or event that may have affected the data, or have a bearing on the subsequent use of the data.

APPENDIX 9
PROPOSED GUIDELINES FOR THE INTERNATIONAL EXCHANGE OF MOORED CURRENT METER DATA
as prepared by the ICES Working Group on Marine Data Management 11–14 May, 1982, Copenhagen and revised 15 July, 1982

1. DATA STANDARD

1.1 Data should, whenever possible, be exchanged at the original sampling frequency unless:

a) the data have already been reduced in frequency prior to quality control by the data originator, or

b) the original sampling frequency was particularly high, for example, greater than one reading every 2 minutes.

1.2 All relevant corrections should be applied to the data including instrumental calibrations. The data should be fully checked for quality and pre–edited or flagged for erroneous values such as spikes, constant values, values obtained during instrument deployment, etc. An explicit statement should be made of the corrections, checks and editing applied to the data.

1.3 Sufficient self explanatory series header information and documentation should accompany the data so that they are adequately qualified and can be used with confidence by scientists/engineers other than those responsible for their original collection, processing and quality control.

1.4 a) All data values should be expressed in oceanographic terms, in SI units, which should be clearly stated.

b) Depending on the method of measurement, current velocity may be expressed in terms of speed and direction and/or in terms of easting and northing components.

c) A clear statement should be made on whether or not the data have been corrected for magnetic variation -- if the correction has been made then the magnetic variation that was assumed should be stated.

d) The time zone in use should be clearly stated and each data cycle should include date/time of observation (without loss of precision).

e) Other parameters measured as part of the series, e.g. temperature, pressure, conductivity, should be included with the data.

2. FORMAT STANDARD

2.1 Data should be exchanged on magnetic tape in GF3 format.

2.2 Guidelines for the formatting of moored current meter data in GF3 may be obtained from:

RNODC (Formats),
ICES Service Hydrographique,
Palaegade 2–4,
DK–1261 Copenhagen K,
Denmark.

3. SERIES HEADER INFORMATION

Each current meter series should include entries in the appropriate GF3 fields for the following:

3.1 Name of the country and organization responsible for collection and processing of the data.

3.2 Platform/mooring type and identifier.

3.3 Dates and times of instrument deployment and recovery.

3.4 Dates and times of start and end of usable data.

3.5 Precise time interval between successive data cycles in the series.

3.6 Original sampling interval – for cases where the processed observation is derived/extracted from higher resolution data (optional).

3.7 Originator's reference numbers/identifiers for mooring and series.

3.8 Latitude, longitude, positional uncertainty and sea floor depth.

3.9 Height of meter above sea floor and/or depth of meter below sea surface.

4. DATA DOCUMENTATION

Sufficient plain language documentation should accompany each data series so as to ensure that the data are adequately qualified, and may therefore be used with confidence by a secondary user. Such documentation should be included within the plain language part of the GF3 format and, where applicable, should cover:

4.1 Instrument

a) Instrument Description – manufacturer, model, principle of measurement (each sensor) – refer to publication or briefly describe.

b) Instrument modifications and their effect on the data.

c) Accuracy, resolution and response range of individual sensors.

d) Standard of calibration, e.g. method, quality and dates.

4.2 Observation platform/mooring

a) Brief description including estimated scope (horizontal and vertical components of instrument oscillation) of movement and depth of near surface buoyancy where appropriate.

b) Methods of position fixing and determination of depths – in shallow water the datum to which depths are measured should be stated.

4.3 Data sampling/processing – description of original sampling scheme and its relation to the final processed data, for each parameter, including for example,

a) Type of sampling (e.g. instantaneous, averaged, burst recording).

b) Sensing interval of meter (raw data).

c) Duration of individual sample (raw data).

d) Number of raw data samples used in processed value.

e) Nominal interval of processed data.

f) Methods of averaging, filtering, or compression.

4.4 Data editing/quality control – brief description of procedures.

4.5 Data quality

a) report on data quality and any errors or uncertainties known to be present in the data.

b) report on corrections applied to data, including treatment of errors (particularly timing errors) or system malfunctions.

4.6 Any additional item or event that may have affected the data or have a bearing on the subsequent use of the data, e.g. effects of near surface buoyancy, sea state, fouling, etc.

APPENDIX 10
LIST OF ACRONYMS

BODC	British Oceanographic Data Centre
BT	Bathy-thermogram
CSR	Cruise Summary Report
CTD	Conductivity Tempterature Depth
DNAs	Designated National Agencies
DNP	Declared National Programme
ECOR	Engineering Committee for Oceanic Research
FAO	Food & Agriculture Organization
GF3	General Format 3
GLOSS	Global Sea Level Observing System
GOOS	Global Ocean Observing System
GTS	Global Telecommunications System
GTSPP	Global Temperature-Salinity Pilot Project
ICES	International Council for the Exploration of the Seas
ICSU	International Council of Scientific Unions
IGBP	International Geosphere-Biosphere Programme
IGOSS	Integrated Global Ocean Services System
IHO	International Hydrographic Organization
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data & Information Exchange
INFOCLIMA	Climate Data Information Referral Service
ISLPP	IGOSS Sea Level Pilot Project in the Pacific
JASIN	Joint Air-Sea Interaction
JEDA	Joint Environmental Data Analysis Centre
JGOFS	Joint Global Ocean Flux Study
JODC	Japanese Oceanographic Data Centre
MARPOLMON	Marine Pollution Monitoring Programme
MEDI	Marine Environmental Data & Information Referral System

MEDS	Marine Environmental Data Services
MGD77	Marine Geophysical Data Exchange Format
MIAS	Marine Information Advisory Service, UK
MIAS/BODC	Marine Invormation Advisory Service/British Oceanographic Data Centre
NASA	National Aeronautical and Space Administration
NESDIS	National Environmental Data Information System
NMC	National Meteorological Centre
NOAA	National Oceanic and Atmospheric Administration
NOC	National Oceanographic Centre (IGOSS)
NODC	National Oceanographic Data Centre
NOP	National Oceanographic Programmes
OWS	Ocean Weather Station
PIANC	Permanent International Association of Navigation Congress
PSMSL	The Permanent Service for Mean Sea Level
RNODC	Responsible National Oceanographic Data Centre
ROSCOPs	Report of Observations/Samples Collected by Oceanographic Programmes
RTH	Regional Telecommunications Hub
SCOR	Scientific Committee on Oceanic Research
SI	Systeme Internationale
SOC	Specialized Oceanographic Centre (IGOSS)
STD	Salinity Temperature Depth
TC-IODE	Technical Committee-International Ocean Data Exchange
TOGA	Tropical Ocean-Global Atmosphere
UNESCO	United Nations Educational, Scientific and Cultural Organization
WDC	World Data Centre
WESTPAC	Western Pacific Programme of Oceanographic Observations
WOC	World Oceanographic Centre
WOCE	World Ocean Circulation Experiment
WMO	World Meteorological Organization
XBT	Expendable Bathy-thermogram

APPENDIX 11
INSTRUCTIONS FOR PREPARING A MEDI ENTRY

Restricted distribution

IOC/INF-742 Rev.
Paris, 11 May 1990
English only

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of Unesco)

How to Prepare

a MEDI Entry

HOW TO PREPARE A MEDI ENTRY

WHY DO IT?

MEDI[1] is a directory system for data sets, data catalogues and data inventories within the framework of the IOC's International Oceanographic Data Exchange (IODE) system. The entries are deliberately kept simple so that they can be collected and disseminated as rapidly as possible.

By taking the time to prepare a MEDI entry for your organization, you will make data held by you or your organization available to the increasing numbers of scientists and ocean users who are seeking data. In order to speed up data entry and get the directory information to users soonest, we prefer that you follow the instuctions given below. If you have a document that already contains all or almost all the information requested, you may use this as an alternative method of submitting information. Your dataset may be just the one the users are looking for; make sure they find it; write your MEDI entry today .... right now!

WRITING YOUR ENTRY

Each MEDI entry starts with a section describing the data holding *organization*. This is followed by one or more sections, each giving a description of a single *data set*, *data catalogue* or *data inventory* held by the organization.

DESCRIBING AN ORGANIZATION

A MEDI entry section describing an *organization* should contain three components – the organization *name*, the organization *address* and a plain text *description*. Give the address for user enquiries. In the *address* give mailing, telephone, fax, telex, cable, electronic mail and communications network addresses, if any. In your *description*, mention any special conditions and procedures for the supply of data.

EXAMPLE

Organization Name: National Oceanographic Data Center
Contact for Services: User Services Branch
Address:NOAA/NESDIS E/OC21
Washington, DC 20235
USA
Tel: +1 (202) 673-5549 Telemail/OMNET: NODC.WDCA
SPAN: NODC::SERVICES Fax: +1 (202) 673-5586

NODC is an NODC within the IODE system and operates WDC-A Oceanography and RNODCs for IGOSS and MARPOLMON-P. Archived NODC datasets are available from NODC as magnetic tape copies of specified data subsets. For the major global files, data are also available as formatted printouts, data summaries, analyses, and plots. These files are sorted by cruise number (cruise file) and by a geographic grid system (geofile). Datasets in originator formats are provided only as direct copies of whole data tapes. Subsets cannot be retrieved. The data files, as well as products, inventories, and cost information, are described in more detail in the NODC Users Guide (available from the above address). Data are on 1600 bpi tapes unless noted as being 6250 bpi tapes.

[1] Marine Environmental Data Information Referral System

DESCRIBING A DATA HOLDING

A MEDI entry describing a data *holding* should contain a *name* for the data holding, *identifiers* which describe the holding in general terms and a narrative *summary*. The summary provides additional information which may help the user select a data set. For the identifier fields the IOC has extracted a subset of Directory Interchange Format (DIF)[2] fields which seem most appropriate for ocean and ocean related data and would prefer to receive new entries that follow the outline given below as closely as possible.

The simplified DFI entry outline is as follows:

FILE: Write the name of the file as it is used by the organization holding the data.
GEOGRAPHIC COVERAGE: Choose names from the list in Annex I.
TIME PERIOD: Provide starting date and ending date, when appropriate.
PARAMETER: Choose names from the data type list given in Annex II, based on the list used in the oceanographic cruise summary system recently adopted by the IOC. Since this list is specific to oceanographic ship collections, the parameter list may be supplemented by additional names using any parameter the holding institution finds appropriate.
SENSOR: Provide types of instruments used to collect data; leave blank if instrument type is not appropriate to a data holding.
FILE SIZE: Provide number of Station/observations and, when appropriate, size in terms of bytes or the equivalent.
STORAGE MEDIA/FORMAT: Provide media upon which data are archived; for those data on magnetic tape or disk provide general format information such as whether it is in local format or one that is internationally recognized such as GF3.
NARRATIVE SUMMARY: In plain language add any information which might help potential users to select files that may be needed to meet the aims of a research program or project. Among those items might be a statement of data sources e.g. are they all national or were foreign sources used to compile the data set. Are there restrictions on the availability of data that the user should know? Was this data holding associated with a national or international project that is not contained in the file name? Is this part of a long time series and useful to climate change studies? Are there some special quality characteristics that the user should know? If there is nothing special to add, you may leave this field blank.

EXAMPLE

DATA CENTER: USNODC
FILE: North Pacific Time Series
GEOGRAPHIC COVERAGE: California Current region
TIME PERIOD: May 1952 to May 1986
PARAMETERS: Water temperature, salinity, oxygen, nutrients, pH, water color, water transparency
SENSOR/INSTRUMENT: Multi-bottle Nansen casts with reversing thermometers, water samplers, and STD/CTD
FILE SIZE: 38,081 station; 98,018,712 bytes
STORAGE MEDIA/FORMAT: Magnetic tapes in NODC SDII format
NARRATIVE SUMMARY: This file contains physical-chemical oceanographic data recorded at discrete depth levels with 5% obtained using CTD or STD instruments. The CTD/STD data were reported to NODC at depth levels equivalent to Nansen Cast Data, they are processed and stored the same as the Nansen Data. Values of sound velocity, sigma-t, and dynamic depth anomaly are computed.
Cruise information, position, date, and time are reported for each station, each Station contains the measurements taken at observed levels, but also includes data values interpolated to a set of standard depth levels.

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[2] Directory Interchange Format is a standardized format now being used to exchange directory information about environmental datasets

SENDING YOUR MEDI ENTRY

The quickest way of submitting your MEDI entry is to send it as a Telemail message to IOC.SECRETARIAT (Omnet) with the subject given as "MEDI INPUT".

If you are unable to use this medium, submit the MEDI entry on a IBM-PC compatible floppy disk (3 1/2" or 5 1/4", low or high density). A simple DOS text file is best but most common word processor file formats can also be accepted.

Alternatively, simply mail or fax the MEDI entry on paper.

Floppy disk and paper MEDI entries should be addressed to

MEDI Co-ordinating Centre
Intergovernmental Oceanographic Commission
UNESCO
7 Place de Fontenoy
75700 Paris
France.

Tel: +33 (1) 45 68 40 08
Fax: +33 (1) 40 56 93 16

This same centre will give you details on how you can get information from MEDI.

Thank you very much for your willingness to assist the effective use of oceanographic data by submitting a MEDI entry.

ANNEX I

Geographic Area Names

These names are based on those in I.H.B. Special Publication N° 23 (Third Edition, 1953) – 'Limits of Oceans and Seas', which contains a precise definition of each area. Modifications to the I.H.B. system include the addition of sub-divisions for the major oceans and of entries for the Southern Ocean (Southern limit – the Antarctic Continent. Its northern limit is dependent on the oceanographic conditions e.g. Antarctic Convergence, and is typically 50 S) and the use of the name 'global' to describe data holdings covering a worldwide range. Except for the name 'global' the same names are also used in the GF3 data formatting system.

OCEAN/SEA AREA NAMES

Global
Baltic Sea
- Gulf of Bothnia
- Guld of Finland
- Gulf of Riga

Kattegat, Sound and Belts
Skagerrak
North Sea
Greenland Sea
Norwegian Sea
Barentsz Sea
White Sea
Kara Sea
Laptev (or Nordenskjold) Sea
East Siberian Sea
Chuckchi Sea
Beaufort Sea
The Northwestern Passages
- Baffin Bay

Davis Strait
- Labrador Sea

Hudson Bay
- Hudson Strait

Arctic Ocean
- Lincoln Sea

Inner Seas off the West Coast of Scotland
Irish Sea and St. George's Channel
Bristol Channel
English Channel
Bay of Biscay
North Atlantic Ocean
- NE Atlantic (Limit 40 W)
- NW Atlantic (Limit 40 W)

Gulf of St. Lawrence
Bay of Fundy
Gulf of Mexico
Caribbean Sea
Mediterranean Sea
- Western Basin
- Eastern Basin
- Strait of Gibraltar
- Alboran Sea
- Balearic Sea (or Iberian Sea)
- Ligurian Sea
- Tyrrhenian Sea
- Ionian Sea
- Adriatic Sea
- Aegean Sea (The Archipelago)

Sea of Marmara
Black Sea
Sea of Azov
South Atlantic Ocean
- SE Atlantic (Limit 20 W)
- SW Atlantic (Limit 20 W)

Rio de La Piata
Gulf of Guinea
Gulf of Suez
Gulf of Aqaba
Red Sea
Gulf of Aden
Arabian Sea
Gulf of Oman
Gulf of Iran (Persian Gulf)
Laccadive Sea
Bay of Bengal
Andaman or Burma Sea
Indian Ocean
- Mozambique Channel

Malacca and Singapore Straits
- Malacca Strait
- Singapore Strait

Gulf of Thailand (Siam)
East Indian Archipelago (Indonesia)
- Sulu Sea
- Celebes Sea
- Molukka Sea
- Gulf of Tomini
- Halmahera Sea
- Ceram Sea
- Banda Sea
- Arafura Sea
- Timor Sea

Flores Sea
Gulf of Boni
Bali Sea
Makassar Strait
Java Sea
Savu Sea
South China Sea (Nan Hai)
Eastern China Sea (Tung Hai)
Yellow Sea (Hwang Hai)
Japan Sea
Inland Sea (Seto Naikai)
Sea of Okhotsk
Bering Sea
Philippine Sea
North Pacific Ocean
NE Pacific (Limit 180 deg.)
NW Pacific (Limit 180 deg.)
Gulf of Alaska
Coastal Waters of SE Alaska and British Columbia
Gulf of California
South Pacific Ocean
SE Pacific (Limit 140 W)
SW Pacific (Limit 140 W)
Great Australian Bight
Bass Strait
Tasman Sea
Coral Sea
Solomon Sea
Bismarck Sea
Southern Ocean
Atlantic Sector of Southern Ocean
Indian Ocean Sector of Southern Ocean
Pacific Sector of Southern Ocean
Land Areas

ANNEX II

Data types

These names are adapted from those used for the IOC Cruise Summary Report (ROSCOP 3rd edition) form. The data types 'Data catalogue' and 'Data inventory' have been added.

GENERAL

Data catalogue
Data inventory

PHYSICAL OCEANOGRAPHY

Surface measurements underway (T,S)
Bathythermograph drops
Water bottle stations
CTD stations
Subsurface measurements underway (T,S)
Thermistor chain
Transparency (e.g. transmissometer)
Optics (e.g. underwater light levels)
Geochemical tracers (e.g. freons)
Current meters
Current profiler (e.g. ADCP)
Currents measured from ship drift
GEK
Surface drifter/drifting buoys
Neutrally buoyant floats
Sea level measurements (including bottom pressure recorders and inverted echo-sounders)
Instrumented wave measurements
Other physical oceanographic measurements

CHEMICAL OCEANOGRAPHY

Oxygen
Carbon dioxide
Other dissolved gases
Phosphates
Total - P
Nitrates
Nitrites
Total - N
Ammonia
Silicates
Alkalinity
pH
Trace elements
Radioactivity
Isotopes
Other chemical oceanographic measurements

CONTAMINATION

Suspended matter
Trace metals
Petroleum residues
Chlorinated hydrocarbons
Other dissolved substances
Bottom deposits
Contaminants in organisms
Other contaminant measurements

BIOLOGY & FISHERIES

Primary productivity
Phytoplankton pigments (e.g. chlorophyll, fluorescence)
Particulate organic matter (e.g. POC,PON)
Dissolved organic matter (e.g. DOC)
Biochemical measurements (e.g. lipids, aminoacids)
Sediment traps
Phytoplankton
Zooplankton
Seston
Neuston
Nekton
Eggs/larvae
Pelagic bacteria/micro-organisms
Benthic bacteria/micro-organisms
Phytobenthos
Zoobenthos
Birds
Mammals & reptiles
Pelagic fish
Demersal fish
Molluscs
Crustaceans
Acoustic reflection on marine organisms
Taggings
Gear research
Exploratory fishing
Other biological/fishery measurements

METEOROLOGY

Upper air observations
Incident radiation
Occasional standard measurements
Routine standard measurements
Atmospheric chemistry
Other meteorological measurements

GEOLOGY & GEOPHYSICS

Dredge
Grab
Core – rock
Core – soft bottom
Bottom photography
In-situ seafloor measurements
Geophysical measurements made at depth
(below near surface and above seafloor)
Single-beam echosounding
Multi-beam echosounding
Long/short range side scan sonar
Single channel seismic reflection
Multichannel seismic reflection
Seismic retractions
Gravity measurements
Magnetic measurements
Other geological or geophysical measurements