Intergovernmental Oceanographic Commission
technical series

9

Manual on International Oceanographic Data Exchange

Third Edition (Revised)

with IOC country code

Unesco 1973

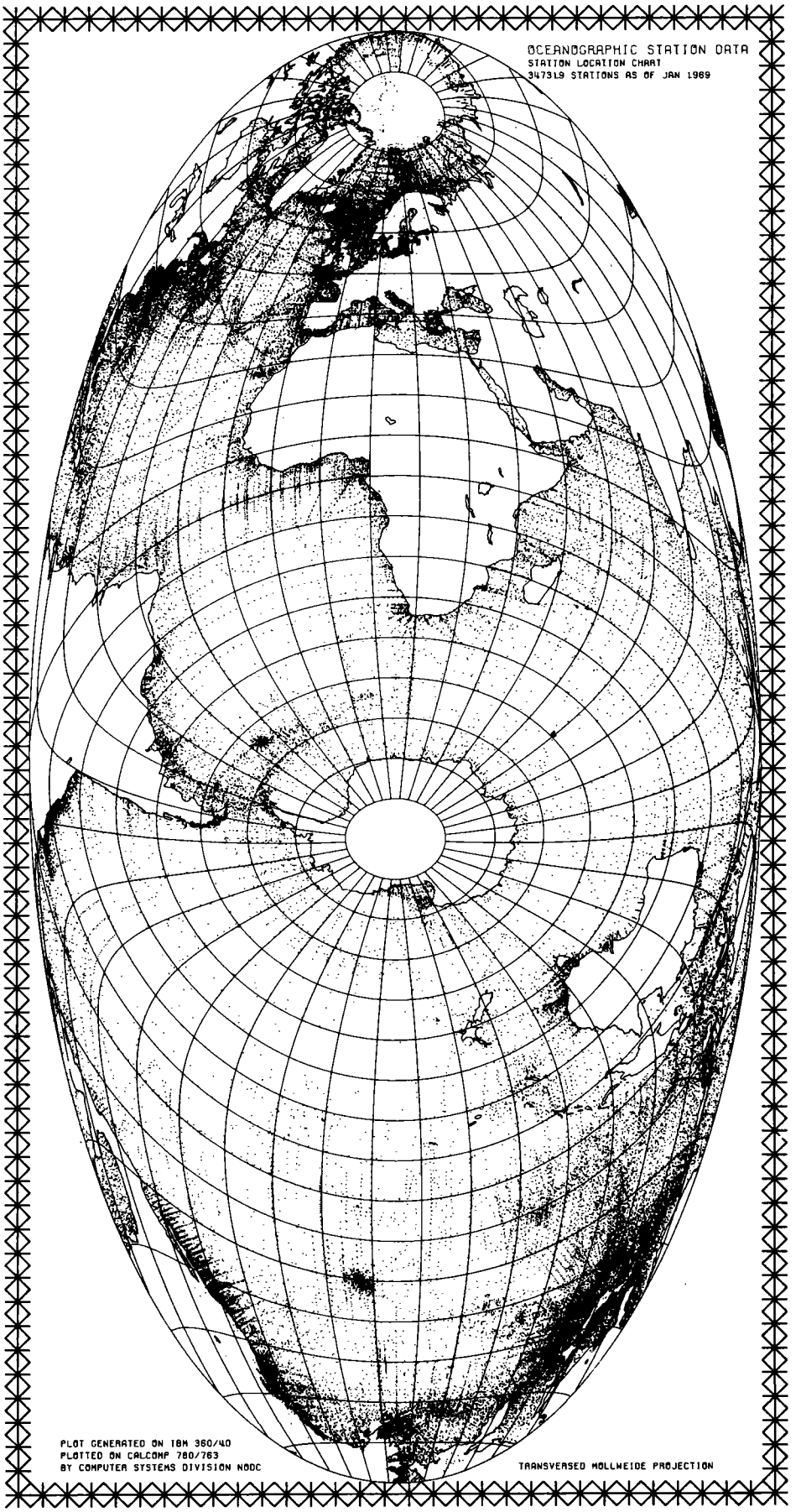
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TABLE OF CONTENTS

* To be completed at a later date, and issued as a supplement to the Manual.

FOREWORD TO THE THIRD EDITION

This Third Edition of the Manual was prepared by the World Data Centres A and B for Oceanography, at the request of the IOC's Working Group on International Oceanographic Data Exchange, in cooperation with the IOC Secretariat, and with the advice of the Joint SCOR/ACMRR Working Group 32, the WMO and other interested organizations. The IOC's Working Group on International Oceanographic Data Exchange is responsible for keeping the Manual under constant review. This Edition has been edited and approved by the IOC in coordination with SCOR, ACMRR, WMO and the ICSU Panel on World Data Centres.

It is important to note this Third Edition supersedes the earlier guides listed below:

1. Section on Oceanography, (p.48-50), of the "Guide to International Data Exchange through the World Data Centres", issued by CIG in November 1963.

2. Supplement No. 1 to the above Guide, issued by CIG in December 1964.

3. Manual on International Oceanographic Data Exchange, issued by Unesco in 1965.

4. Manual on International Oceanographic Data Exchange, Second Edition (revised), issued by Unesco in 1967.

Appendixes to this Manual contain extracts from earlier documents relevant to data exchange, including the "Guide to International Data Exchange through the World Data Centres (for the period 1960 - onwards)", issued by CIG on 11 November 1963.

For the convenience of the reader, material of an instructional or directive nature is underlined in the main portion of this Manual.

The purpose of this Manual is to assemble in a convenient form the procedures, resolutions, recommendations, and various documents concerned with the exchange of oceanographic data of all kinds for the guidance of potential participants and contributors to international oceanographic data exchange. Such participants and contributors include national oceanographic data centres, designated national agencies,(1) academic institutions, organizations and individual scientists.

The international oceanographic data exchange scheme has been established to facilitate marine research. Its success depends on the support of participating member countries and individual marine scientists in contributing data resources.

The full and expeditious exchange of data, information and inventories is an important aspect of scientific co-operation. Successful investigations of phenomena and processes of global dimensions, such as those occurring in the ocean and atmosphere, are particularly dependent on the pooling of data from various sources.

One important mechanism for the international exchange of scientific data is the World Data Centre system. The programme of the International Geophysical Year made necessary the creation of a world-wide data exchange system. Thus, World Data Centres A and B for Oceanography were established in Washington and Moscow, their operations being financed by the U.S.A. and USSR. These centres, together with those in many other disciplines, are now under the guidance of the Panel on World Data Centres of the International Council of Scientific Unions.

In accordance with the guidelines of this Manual, World Data Centres receive oceanographic data and inventories for declared national programmes, international co-operative ventures and from voluntary contributions of nations and individual scientists.

This introduction is followed by a "Guide for the Exchange of Oceanographic Data" and a number of Appendixes which contain extracts from publications and reports relevant to international oceanographic data management, lists of data centres, and international organizations in the marine sciences, descriptions of the facilities of national data centres and permanent specialized centres, sample reporting formats, and a list of acronyms and abbreviations used in this Manual.

It is intended that this Manual will be updated on a timely basis through amendments and Appendixes to cover such topics as exchange of data resulting from technological advances in instrumentation, including those from continuously recording devices on buoys and satellites; information concerning new processing techniques, including methods of computerized or optical reduction; formats for recording or archiving; retrieval of information from automated marine inventories; guidance on the development of regional data centres, etc.

(1) "Designated National Agency" (DNA) is defined as the national agency officially charged with the responsibility of the international exchange of oceanographic data.

1. WORLD DATA CENTRES

Oceanography

A. World Data Centre A
Oceanography
National Oceanic and
Atmospheric Administration
Rockville, Maryland 20852
U. S. A.

B. World Data Centre B
Oceanography
Molodezhnaya 3
Moscow 117-296
USSR

Other World Data Centres which may hold certain types of marine environmental data are listed in Appendix 2.

2. OTHER PERMANENT CENTRES (1)

2.1 Disciplinary

2.1.1 The Permanent Service for Mean Sea Level
Institute of Coastal Oceanography and Tides
Bidston Observatory
Bidston, Birkenhead, Cheshire
L43 IRA, England

2.1.2 International Hydrographic Organization
Monte Carlo, Monaco

2.1.3 FAO Fishery Data Centre
Via delle Terme di Caracalla
00100-Rome, Italy

2.2 Regional

2.2.1 International Council for the Exploration of the Sea
Service Hydrographique
Charlottenlund Slot
DK 2920, Charlottenlund, Denmark

2.3 National

2.3.1 Appendix 5 lists the names and addresses of national oceanographic data centres and designated national agencies.

(1) Additionally, various Fisheries Commissions and Councils collect and maintain data for specific regions or systematic groups.

2.3.2 National centres, especially those with facilities for automation, are encouraged to assume the rôle of regional data centres wherever the solution of regional problems or execution of regional projects would be aided by such an arrangement. National centres acting as regional centres are urged to perform data processing and analysis services on a voluntary basis for data accessioned by participants lacking the requisite facilities, and are urged to aid in the international exchange of automated data within the context of the World Data Centre system as elaborated in this Manual. Appendix 9 provides concepts on the rôle of such regional data centres.

3. PROGRAMMES FOR INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE

3.1 Declared National Programmes

An important form of international co-operation in oceanography is the public declaration by an IOC member of the whole or part of its oceanographic activities which implies the intention to exchange internationally data resulting therefrom.

To announce "Declared National Programmes" (DNP's), lists of research cruises either planned for a certain period of time ahead or already implemented in the past should be communicated to the IOC Secretariat in the format shown in Appendix 6. The lists should be accompanied by an official letter of transmittal. The ROSCOP form (see Appendix 7) may provide a convenient mechanism for compiling the DNP lists.

Data resulting from DNP's are then to be exchanged in accordance with the provisions of this Guide. Lists of other national oceanographic activities resulting or expected to result in data specified in 4.1 and 4.2 below may also be communicated to the IOC Secretariat in the same format for publication and distribution.

3.2 International co-operative expeditions and programmes

Another important form of international co-operation in marine science is participation in an international co-operative oceanographic expedition or programme. The agreement to conduct such an expedition or programme jointly is naturally associated with an intention on the part of the participating countries to share its results. When such an expedition or programme is carried out under the auspices of the IOC, the participants are obligated to exchange the resulting data according to the system outlined in this Guide or by amendments to this Guide that may be made by appropriate international co-ordination groups. If, however, such an expedition or programme is organized by other intergovernmental or non-governmental organizations, pertinent data should enter the present scheme of data exchange either through national, regional or disciplinary centres (see Sections 6.3 and 6.4), or through the mechanism of declared national programmes.

3.3 Other oceanographic programmes of international interest

Countries receiving assistance under the United Nations Development Programme or other multilateral technical aid programmes, which involves 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 World Data Centre system. Countries not members of the IOC are encouraged to exchange oceanographic data through the World Data Centre system in accordance with the provisions of this Guide.

National or international marine biological sorting centres should be encouraged to work closely with the World Data Centre system and participate actively in the exchange of data and information on their holdings.

3.4 Bilateral exchange

National, regional or disciplinary data centres, designated national agencies, marine scientific organizations or institutions, and individual scientists, are also encouraged to exchange data directly on a bilateral basis. Such data exchange programmes, usually in response to specific national or regional requirements, even if not conducted in the context of the World Data Centre system, are urged to supplement or support international exchange by adhering to the precepts outlined in this Guide.

4. TYPES OF OBSERVATIONS AND DESCRIPTION OF DATA

4.1 Standard observations

These are environmental observations or measurements made from oceanographic ships, other mobile platforms, shore or fixed stations (except moored buoys) with generally accepted types of instruments and methods widely known and described in the scientific literature. Data of this classification, when submitted for general use, either require no further correction, or the corrections are well known and generally available. Data resulting from these observations or measurements should be exchanged through the World Data Centres or other permanent centres (see Sections 1 and 2) according to the principles specified in Sections 5, 6 and 8.

The following are the major kinds of standard oceanographic and marine meteorological data recorded in connexion with oceanographic observations:

4.1.1 Values of air temperature, ocean surface temperature, atmospheric pressure, humidity, speed and direction of wind, precipitation, and visual observations of cloud cover and weather, visibility, sea ice and other atmospheric phenomena (see Section 6.4.3).

4.1.2 Visual and instrumented observations of sea and swell (scale numbers and/or estimated directions, heights and periods).

4.1.3 Colour and transparency.

4.1.4 Soundings either on plotting sheets or in tabulation.

4.1.5 Values of temperature, salinity (or its measures) and chemical properties at surface and at depth, including continuous records such as bathythermograms (BT) and salinity-temperature-depth (STD) records.

4.1.6 Mean monthly and annual sea levels computed from hourly observations from recording gauges or tide-staffs; also, mean monthly and annual values of other physical-chemical observations for shore and fixed stations.

4.1.7 Information on bottom samples:
Cores: length and short qualitative description. Where possible, estimates of the probable age of top and bottom parts are especially desirable.
Other samples: short qualitative description and method of collection.

4.1.8 Values of primary production, plant pigments, zooplankton biomass and micro-nekton biomass(1). The methods used in obtaining these and any other biological data exchanged should be described in detail.

4.1.9 Reduced discrete, calculated current velocities.

4.2 Non-standard, experimental and other special observations

These cover all observations and measurements made by devices and instruments of experimental types or in accordance with experimental procedures: observations and measurements of a unique nature made for specific research projects and those special observations which are either very voluminous or require further elaborate analytical techniques for use or exchange.

Data resulting from these observations or measurements are generally to be retained by originating countries and exchanged only upon request. Originating countries are encouraged to report to World Data Centres and/or other Permanent Centres (see Section 2) information on the availability and sources of these data (see Section 6).

It is impractical to provide specifications for 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 Guide. The following list serves only to exemplify some of these types of data:

(1) Phytoplankton and benthos biomass are temporarily omitted from the list of standard data pending the development of better standardized methods.

4.2.1 Unreduced continuous recordings (optical, electric, etc.) for the surface or at fixed depths; for example, recordings produced by instrumented buoys, aircraft, or satellites.

4.2.2 Results of chemical analysis of trace elements, biochemical analyses, etc.

4.2.3 Experimental measurements of waves, swell and orbital velocity.

4.2.4 Unreduced continuous recordings of current measurements.

4.2.5 Bottom photographs, topographic profiles, interim bathymetric charts.

4.2.6 Gravity and geomagnetic field measurements, heat flow, seismic refraction and reflection observations, etc.

4.2.7 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.

4.2.8 Specialized meteorological data recorded in connexion with oceanographic observations, such as solar radiation, gradient values of wind velocity, etc. (see also Section 6.4.3).

4.2.9 Optical transmissivity measurements.

5. GUIDELINES FOR RECORDING AND DOCUMENTATION OF DATA

5.1 Data records containing observations should also contain the date, time, position, depth at station, type of platform, the name of the observing ship or platform, and the organization responsible for making the observation. Records from shore and fixed stations carrying out regular observations should contain hours of these regular observations. The time in use is to be stated, e.g., GMT or zone time. Estimates of precision of positions, and navigational methods used, should be reported.

5.2 Instrumental corrections should always be made before the data are submitted.

5.3 Centigrade scale and metric units should generally be used; however, nautical miles are acceptable.

5.4 Relevant details of instruments, methods and manual or computerized reduction techniques used should accompany all data.

5.5 Specific requirements as to the supplementary information and form of presentation are listed below under sub-divisions corresponding to those given under 4.1 and quoted in parentheses:

5.5.1 (4.1.1) WMO codes should be used for reporting wherever applicable. If other codes are used, they should be specified.

5.5.2 (4.1.2) Scale used should be specified

5.5.3 (4.1.3) The methods used and reporting units should be specified.

5.5.4 (4.1.4) The following specific information is required:

(a) the make and type of echo-sounder used;
(b) value of the velocity of sound at which the apparatus is calibrated;
(c) corrections applied;
(d) all fixes, together with their times and dates;
(e) estimated accuracy of fixing methods in use.

5.5.5 (4.1.5) It is preferable that these data be submitted on punched cards or magnetic tapes, or on forms facilitating machine processing. Complete format documentation for automated data must be included. In the case of deep-water casts the time of the observation is that of dropping the messenger. Information on the disposition of unprotected thermometers at depth and reference to chemical methods used are essential.

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.

Data obtained from primary XBT (expendable bathythermograph) and STD (salinity-temperature-depth) or CTD (conductivity-temperature-depth) probes should, whenever possible, be made available in digital rather than analogue form.

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 (Dublin, 1969) offered the following optimum standards for digitizing XBTs:

XBT data for exchange should also be expressed in digital form either at 3-metre intervals, to an accuracy of ± 0.2°C, for the entire depth of the trace, or at "flexure" points determined in such a way that linear interpolations fall within ± 0.2°C of the original record.

At the request of the IOC Working Group on International Oceanographic Data Exchange (5th and 6th sessions) a Joint ICES/IOC Task Team arrived at recommendations concerning the exchange of STD data on the occasion of the 59th Statutory Meeting of ICES; these latest guidelines are given in Appendix 11.

5.5.6 (4.1.6) Additional details of installation and method of reduction of data will be sought as necessary by the Permanent Service for Mean Sea Level.

5.5.7 (4.1.7) Types and sizes of instruments used should be indicated. If codes are used for qualitative description of samples, they should be specified. The address where samples are stored should be reported. (See also Appendix 7)

5.5.8 (4.1.8) The following specific information is desirable where appropriate:

(a) Detailed specification of gear and methods used (with literature references).

(b) Environmental conditions affecting sampling and observations, such as meteorological and sea conditions. Reference to other associated oceanographic data should be made where appropriate.

(c) Time, duration and depth of sampling or observation.

(d) Sorting centre or other address at which samples are stored.

5.5.9 (4.1.9) Standards for exchange of reduced discrete calculated current velocities are under discussion; however, the valuable guidelines established by SCOR Working Group 21 (Dublin, 1969) should be consulted. See Appendix 12.

6. PROCEDURES FOR FORWARDING DATA, INFORMATION AND INVENTORIES

The forwarding of data, information and inventories to data centres should, as far as possible, conform to the following principles:

6.1 IOC members and other interested countries are encouraged to send advance information on oceanographic programmes to the Secretariat for publication. In the case where these are to be considered "declared national programmes", as defined in Section 3.1, the letter of transmittal should emanate from an appropriate national authority and should include a statement concerning the intention to exchange the resulting data. To facilitate prompt dissemination, the information should be submitted in a format similar to that described in Appendix 6.

6.2 Confirmation that proposed programmes have been carried out, should be reported immediately upon completion of a field programme by a suitable inventory form. A convenient method for the immediate reporting of completed programmes is provided by the Report of Observations/Samples Collected by Oceanographic Programmes (ROSCOP) form shown in Appendix 7. Contributors of ROSCOP or other inventory forms should ensure that copies forwarded are suitable for reproduction. Confirmation of the

status of any data provisionally designated as part of a DNP will be made to the Secretariat at the close of each calender year by a declaration through national authorities of the intent to exchange all or part of the data.

6.3 Data should be forwarded through national or regional centres to the appropriate international depositories, or in the absence of national or regional centres, directly to the appropriate international depositories. Individual data sets should be forwarded as expeditiously as possible after the completion of a cruise or observational programme, as each set becomes available. Preferably all data should be made available within one year of their collection; in any case the time interval for various types of data should not exceed the following guidelines: for temperature and salinity data from Nansen casts, STDs, XBTs or BTs, the interval should not normally exceed 18 months. Chemical, biological and geological data may require longer intervals which should not, however, exceed two years. When biological collections for later systematic studies are made on a cruise, details of the hauls made (the same as in Section 5.5.8) should be submitted, along with the temperature and salinity data.

6.4 Except as noted it is preferable that data be sent to both World Data Centres (A, B). When data are sent to only one of these centres a copy of the transmittal letter should be forwarded to the other centre. Regional centres have the obligation to send the data to the World Data Centres where this has not already been done by the originators. Originators should inform the regional centres of such data if they intend to send directly to the World Data Centres.

6.4.1 Mean sea level data (4.1.6) should be sent only to the Permanent Service for Mean Sea Level (2.1.1)

6.4.2 Soundings (4.1.4) either in the form of plotting sheets or in tabulations should be sent to the International Hydrographic Organization (2.1.2), or to any qualified hydrographic office.

6.4.3 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 connexion with oceanographic observations should also be sent to the World Data Centres for Oceanography.

6.4.4 Biological data pertaining to fisheries which would not normally be transmitted to World Data Centres, should be transmitted to the FAO Fishery Data Centre (2.1.3) and/or, according to arrangements existing at the time, to appropriate sorting centres, fisheries commissions or councils.

7. CONTRIBUTIONS OF SCIENTIFIC LITERATURE

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

8. RETRIEVAL AND DISSEMINATION OF DATA AND INFORMATION

8.1 World Data Centres are held responsible for the provision of data and information to any qualified requester in the scientific community. In general, reasonably sized requests from activities or individuals affiliated with national or regional contributors to the World Data Centres for Oceanography will be considered as an exchange service and will be fulfilled without charge. Small requests from non-contributors may be handled in a similar manner. 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 free provision of data or information by the World Data Centre and dictate the following guidelines:

8.1.1 In the case of large specialized requests by non-contributors, the World Data Centre will recover the costs of processing and shipping.

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

8.1.3 World Data Centres 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 institution or disciplinary centre.

8.1.4 Members of the IOC may apply to the IOC Secretariat and Unesco for possible assistance in funding in connexion with their projects.

8.2 Materials may be ordered from the World Data Centres for Oceanography through National Oceanographic Data Centres or Designated National Agencies, or through any other organizations officially designated by national initiative as responsible for communication with the World Data Centres; in the absence of such designated organizations, materials may be ordered directly from the World Data Centres.

8.3 Monthly and annual values of mean sea level data are published triennially by the Permanent Service for Mean Sea Level. A free copy of each publication is sent to all data contributors. All mean sea level publications may be purchased by other interested institutions and individuals from the Permanent Service. Requests for data prior to publication will be met by the Permanent Service at a charge not exceeding the cost of postage.

8.4 Under International Hydrographic Organization (IHO) agreements all sounding data received by the Hydrographic Offices of the IHO Member States are exchanged to facilitate production of the General Bathymetric Chart of the Oceans. Data so received are normally transferred to oceanic plotting sheets after careful quality control. Copies of these plotting sheets may be obtained upon request by any institution either through the IHO or from the relevant Hydrographic Offices. Data in other forms might also be available from the IHO. The conditions of data released by IHO are similar to those specified in 8.1.

8.5 World Data Centres will publish on a periodic basis inventories of their data holdings. In addition, the Centres intend to provide information and referral services from the ROSCOP system (Appendix 7) provided the system receives sufficient support from the scientific community.

8.6 The national and international marine biological centres engaged in sorting samples from international and national cruises are encouraged to disseminate information regarding their holdings of samples (sorted or unsorted) and of reference collections by issuing inventòries periodically.

9. REFERENCES

9.1 International Council of Scientific Unions. Comité International de Geophysique "Guide to International Data Exchange Through the World Data Centres (for the period 1960- onwards)". London, November 1963. (Revision in work 1972; prescribes data exchange procedures through the World Data Centres for all disciplines).

9.2 International Council of Scientific Unions, Scientific Committee on Oceanic Research. "International Ocean Affairs", a special report prepared by a joint working group appointed by ACMRR, SCOR and the Advisory Committee of the WMO. La Jolla, 1967. (Section 8, "Examples of specific marine problems requiring international co-operation", includes a critical review of data/information exchange).

9.3 World Meteorological Organization. "Catalogue of Meteorological Data for Research", Publication No. 174, Technical Paper 86. Included in the introduction is a review of data exchange.

9.4 World Meteorological Organization. "Collection, Storage and Retrieval of Meteorological Data", World Weather Watch Planning Report No. 28. Contains an historical review and current procedures for international data exchange.

9.5 Intergovernmental Oceanographic Commission. "Integrated Global Ocean Station System: the General Plan and Implementation Programme for Phase I". IOC Technical Series # 8.

9.6 World Meteorological Organization. "Technical Regulations". Paragraphs 8.3 and 8.31 prescribe the regulations for data exchange.

9.7 International Hydrographic Organization. "GEBCO, Regulations for the General Bathymetric Chart of the Oceans", March 1970.

Appendix 1

Extract from Introduction to "Guide to International Data Exchange through the World Data Centres", issued by ICSU's Comité Internationale de Géophysique, November 1963.
(Revision in work, 1972)

IGY WORLD DATA CENTRES

The International exchange of data through World Data Centres was first organized during the IGY. This new form of international co-operation - exchange of data through WDCs - was found to be very effective. Instead of having to address themselves to many national organizations, scientists could receive data necessary for scientific work directly from the WDCs. Thanks to the collection and exchange of data through WDCs, it became possible to investigate phenomena on a planetary scale and to study the interdisciplinary relationships among various phenomena.

Experience has shown that the existing system of two universal centres, together with certain discipline centres, satisfies the demands of international exchange of geophysical data, creates optimum conditions for countries, and permits them to fulfil their obligations of exchange of geophysical data with minimum effort.

CIG GUIDE FOR 1960 ONWARDS

At the end of IGY, the responsibility for the exchange of data through the WDCs was assigned by the International Council of Scientific Unions (ICSU) to the CIG. In response to the resolutions of various international scientific organizations (e.g. IUGG, URSI, IAU, COSPAR, SCAR, SCOR and IOC), the Comité International de Géophysique (CIG) has issued a revised "Guide to World Data Centres" based in a large measure on the "Guide to IGY World Data Centres" adopted by CSAGI. In approving the "Guide", the CIG took into account the effective work of the CIG reporters and their working groups over a period of several years, and also the comments of the Geophysical Committees of participating countries and of international scientific organizations including COSPAR, SCAR, SCOR, the Intergovernmental Oceanographic Commission, the Consultative Meeting of Representatives under the Antarctic Treaty and others.

The main principles governing the responsibilities of the WDCs and the nature of data interchange are founded on the IGY "Guide" and the experience gained during the IGY. Both the general principles and the specific details of data exchange through the WDCs have been the subject of discussions and reports in many international scientific meetings, especially at the several meetings of CIG, and the CIG-IQSY Committee.

The revised "Guide" is based on two essential resolutions of the CIG:

1. That the WDCs continue to collect, interchange and make available to the scientific community data from the various geophysical disciplines on a permanent basis. The precise agreements on data to be exchanged should be reviewed periodically to ensure that these agreements continue to be meaningful in the light of rapidly changing scientific interests and findings.
2. The operation of the WDCs should be in accordance with the basic principles laid down by CSAGI, especially:

(a) Each WDC must collect data according to the revised WDC Guide to be adopted by CIG on the basis of recommendations of the discipline specialists gathered by the reporters.
(b) Each WDC must agree to exchange data according to the conditions outlined in the Guide. In particular, the WDCs shall interchange among themselves by discipline in accordance with the Guide and at no charge.
(c) Each WDC is required to supply data (at a cost not to exceed the cost of reproduction) on request of scientists or scientific institutions.
(d) Each WDC must be freely open to visitors and guest workers from any nation participating in the CIG programmes, and all data in the centres shall be accessible to such visitors and workers.

TYPES OF CENTRES

International exchange of geophysical data is effected through the World Data Centres, as in the IGY,

and by means of the activities of certain specialized organizations:

(a) World Data Centres for collection and distribution of data. For each discipline, there are two or three such centres which operate according to the principles set forth in the Guide to WDCs.

(i) World Data Centre A, which consists of eleven subject-matter divisions and includes all disciplines.

(ii) World Data Centre B, which consists of two subject-matter divisions and includes all disciplines.

(iii) World Data Centre C, which consists of several discipline centres in several nations.

(b) Centres for certain kinds of analysis and synthesis resulting in issuance of indices, certain bulletins of summary information, etc. There are two groups of such centres and provision is made for others as needed.

(i) Permanent Services. Certain of these have long operated and were also a part of the IGY World Data Centres. This is expected to continue as in the past; no change in relationships or procedures is involved. Moreover, data sent to the Permant Services, where they are made available to all, unless specifically stated to the contrary, need not be sent in their primary form to the WDCs. The Permanent Services will send their bulletins, etc. to the WDCs; CIG, CIG national committees and all countries participating in IQSY; as appropriate to unions, associations and ICSU committees as well as their special committees corresponding to IQSY or other programmes for which data are exchanged through WDCs. In addition, WDCs shall provide the Permanent Services with their data as needed for the functions of the Permanent Services.

CIG notes:

that in each discipline the CIG Guide to WDCs must differentiate clearly between data flowing to the WDCs and data flowing to Permanent Services;

that WDCs A and B may have data needed by the Permanent Services; such data shall be provided to the Permanent Services by the WDCs free of charge;

that in a few instances certain data collected by the Permanent Services are of interest to the WDCs; and therefore requests that the institutions providing such data to the Permanent Services also provide copies of such data to the WDCs. When Centres A, B or C do not receive such material from the original institution, Centres A, B or C may request such material from the Permanent Service free of charge.

(ii) Special world geophysical centres. During IGY, some of the WDCs compiled and published certain syntheses of scientific value; CIG encourages the furtherance of such activities in connexion with the WDCs. In addition, it may be desirable to establish additional centres of synthesis in connexion with new or existing Permanent Services, the WDCs or other appropriate organizations.

The World Data Centres are maintained at the expense of the countries which organize them. Special centres are maintained at the expense of the countries which establish them or, if they are located in a Permanent Service, at the expense of the Permanent Services. The countries which organize World Data Centres guarantee the condition for collection, storage, reproduction, distribution and safekeeping of materials, and also provide investigators the possibility to work personally with the material stored in the WDCs. The direct administration of WDCs is the responsibility of the appropriate national committee and scientific organization under which the WDC is established.

Every three years, each special world geophysical centre must present a report to the appropriate international scientific unions, associations, and committees about its work for the triennium, together with the proposed plan of work for the succeeding triennium. The unions, committees and associations, having reviewed the reports and proposals of the centres, make their recommendations regarding the continuation, expansion, reduction, or termination of activities of the centres. These recommendations become effective after their approval by the CIG.

CIG RESPONSIBILITIES

Overall co-ordination of the activity of the WDCs and special word geophysical centres is the responsibility of the CIG. Committees and commissions established for carrying out international programmes (Committee for the International Years of the Quiet Sun and others) make recommendations to the CIG on questions of collection and exchange of data essential for accomplishing these programmes.

The data exchange arrangements through the WDCs should be reviewed and revised periodically to reflect the changing scientific problems being undertaken as part of international co-operative programmes. The decisions regarding changes in the list of materials collected in the WDCs, as well as initiation and termination of activities in the special world geophysical centres and changes in the programme of their work, are made by the CIG upon recommendation of international scientific unions and international scientific organizations after consultation with the corresponding

national organizations. The international scientific unions, committees and associations which assist the CIG in the organization of international exchange of data are indicated in the appropriate sections of the "Guide". The Guide to WDCs should be reviewed (and revised as necessary in accordance with the recommendations of the aforementioned groups) every two or three years.

FUNCTIONS AND RESPONSIBILITIES OF WDCs

The objects of establishing several IGY World Data Centres for collecting IGY observational data were (1) to ensure against catastrophic destruction of a single centre, (2) to meet the geographical convenience of, and provide easy communication for, workers in different parts of the world.

WDCs conduct their operation at no expense to ICSU or the ICSU family of unions and committees.

Each WDC is responsible for: (1) endeavouring to collect a complete set of data in the field or discipline for which it is responsible, (2) the safekeeping of the incoming data, (3) correct copying and reproduction of data, maintaining adequate standards of clarity and durability, (4) supplying copies to other WDCs of data not received directly, (5) preparation of catalogues of all data in its charge, (6) making data in the WDCs available to the scientific community. In particular, WDCs are required to supply copies of material in the data centre to any scientific body or investigator in any country (for a cost not to exceed the cost of copying and postage) and, by appropriate arrangement, to enable scientists to work directly with the materials in the WDCs.

In addition the World Data Centres are called upon as follows:

.....

(b) To prepare and issue semi-annual catalogues of data.

(c) In general, to the extent possible, each WDC shall give to each contributor a body of data equivalent to that received; to the extent possible, the WDC may, upon request, give an equivalent volume of data from another discipline.

PARTICIPATION IN DATA EXCHANGE THROUGH WDCs

The international exchange of geophysical data through WDCs may be participated in by all countries of the world, both members of international scientific unions and other international organizations and non-members as well.

A country wishing to participate in the international exchange of data through the WDCs can so advise either a WDC or the CIG. In so doing, the country reports: the kind of data that will be sent to one or another of the WDCs; the organization that will be responsible for communication with the centres; and from which centre it wishes to receive requests for transmittal of data in the event of special events. This information is then distributed either by the WDCs or the CIG to all interested centres and national committees.

Scientific organizations and individual scientists may order materials from the centres directly or through their national organizations responsible for communication with the WDCs. In those cases in which materials are ordered directly, it is desirable for the centres to inform the organization responsible in that country for communication with the WDCs what materials were sent to other organizations in that country. For the purpose of assuring to scientists greater accessibility of materials from the centre, it is recommended that materials received from the centres be concentrated in one or in several scientific organizations of the country from which they can be obtained for work by any interested scientist of the country.

The organizations which are responsible for communication with the WDCs verify whether all data sent by them are included in the WDC catalogues and, in the event of discovery of some sort of omission in the material sent by them, they so inform the appropriate centres and take measures to search for and complete the collection of the missing materials.

The national organization responsible for communication with the WDCs as well as any scientific organizations and individual scientists may borrow from the WDCs any publication for which duplicates are available in the centre for temporary use for a period not to exceed one month, not including time of transmittal. If it is desired, a microfilm copy of the publication can be made for a cost not to exceed the cost of copying and transmittal.

The transmittal of data and publications to the WDCs and analytical centres is made within the period of time and according to formats indicated in the appropriate sections of the "Guide".

GENERAL DATA EXCHANGE AGREEMENTS

Transmittal to WDCs

(a) The basic recommendation is that one copy of data shall be sent to each relevant WDC, if practicable.

(b) Alternatively, enough copies may be sent to one WDC for forwarding to all other WDCs;

(c) or, lastly, one copy may be sent to one WDC which will then make copies for the other WDCs.

The selection of the WDCs to which to send data is the responsibility of the station or of the participating committee.

The data specified for exchange are, in general, closely related to international scientific programmes. In addition to the data specified in the Guide, scientists, institutions or participating committees are asked to send to the WDCs special publications related to these programmes, i. e. articles not available in the widely circulated geophysical journals, maps, atlases, reports, etc. Three copies should be sent to each WDC or six copies to one WDC for forwarding to the other WDCs.

In the event that a country sends data to one of the WDCs only, the country should notify the other WDCs (for example, by means of sending a copy of the transmittal letter).

Quality of data. WDCs are not generally responsible for accuracy of data in their possession. In some disciplines (for example, solar activity), the WDCs may be requested by the CIG reporter to monitor data.

Exchange among WDCs. Each WDC will provide within two months of receipt, and on a free-exchange basis, copies of all incoming data to any other WDCs (for the discipline) which have not received those data.

Catalogues. Catalogues of data received by the WDCs will be issued at six-monthly intervals. Catalogues are sent free to other WDCs, special world geophysical centres, organizations responsible for communication with the WDC and to addresses supplied by the geophysical committees of the countries participating in the exchange.

Catalogues of newly received publications, data and materials are prepared in accordance with established formats for each discipline. The names of publications are given in the language of the original and, if necessary, in translation into one of the widely known European languages. Information about the data received by the WDC is given in the catalogue by discipline, country and station. For each station the following is given: station name, kind of data, and period for which data were received.

Use of data in WDCs. All WDCs shall satisfy promptly, in any case within three months, the demands of scientific bodies or investigators in any country for copies of material, or extracts thereof. The fee charged should not exceed the cost of copying plus postage. (Exceptions to the time schedule may be made when the WDC must give priority to requirements of CIG and participating committees).

Each WDC shall be freely open to visitors and guest workers from any country participating in the CIG programmes, and all data in the centres shall be accessible to such visitors and workers.

Acknowledgement. When data are supplied by a WDC in response to a request, the WDC shall transmit them with a letter stating the location of the observations and the name and address of the investigator responsible for securing the data. The letter shall contain a request to the person receiving the data to respect the usual rights of the investigator.

For all disciplines the recipient of data shall be requested to make appropriate acknowledgement to the original investigator, and the WDC in any subsequent publication involving the data.

Appendix 2

World Data Centres of ICSU

There are three World Data Centres: WDC-A in the United States; WDC-B in the USSR; and WDC-C, comprising a number of discipline centres in various nations. At present there are no WDC-Cs for Longitude and Latitude, Meteorology, Oceanography, Tsunami or Upper Mantle Project. There are two WDC-Cs for Airglow, Geomagnetism, Ionosphere, and Nuclear Radiation; one in Western Europe (C1) and one in Japan (C2). There are several WDCs for Solar Activity which collect and analyse data for specific solar activity projects. The organization and addresses of the WDCs and of related permanent services and specialized centres are given on the following pages.

WORLD DATA CENTRE A

World Data Centre A, for which the U. S. National Academy of Sciences through the Geophysics Research Board and its Committee on Data Interchange and Data Centres has overall responsibility, consists of the WDC-A Co-ordination Office and nine sub-centres at scientific institutions in various parts of the United States. The GRB periodically reviews the activities of WDC-A and has conducted several studies on the effectiveness of the WDC system. As a result of these reviews and studies, some of the sub-centres of WDC-A have been relocated so that they could more effectively serve the scientific community. Several of the discipline centres of WDC-A dealing with the solar-terrestrial physics were consolidated in the WDC-A for Upper Atmosphere Geophysics during the period 1 July 1966 to 1 July 1968. The WDC-A for Rockets and Satellites was moved from the National Academy of Sciences to a location adjacent to the National Space Science Data Centre at NASA Goddard Space Flight Centre on 1 January 1969. The WDC-A for Tsunamis was moved from Rockville to Honolulu in May 1969. The WDC-A for Glaciology was moved from the American Geographical Society in New York to a location adjacent to the U. S. Geological Survey Project Office for Glaciology in Tacoma, Washington on 1 October 1970. The addresses of several sub-centres were changed when the National Oceanic and Atmospheric Administration (NOAA) was established in October 1970.

Communications regarding data interchange matters in general and World Data Centres as a whole should be addressed to the WDC-A at the National Academy of Sciences. Inquiries and communication concerning data in specific disciplines should be addressed to the appropriate WDC-A sub-centre. The addresses of WDC-A and its sub-centres are given below:

World Data Centre A
National Academy of Sciences
2101 Constitution Avenue, N. W.
Washington, D. C., U. S. A. 20418
(Dr. P. Hart - Director)

Geomagnetism, Seismology and Gravity:

World Data Centre A:
Geomagnetism, Seismology and Gravity
Environmental Data Service, NOAA
Boulder, Colorado, U. S. A. 80302
(Mr. Kendall Svendson - Acting Director)

Glaciology:

World Data Centre A: Glaciology
U. S. Geological Survey
1305 Tacoma Avenue South
Tacoma, Washington, U. S. A. 98402
(Dr. Mark F. Meier - Director)

Longitude and Latitude:

World Data Centre A: Longitude and Latitude
U. S. Naval Observatory
Washington, D. C., U. S. A. 20390
(Dr. R. Glenn Hall - Director)

Meteorology (and Nuclear Radiation):

World Data Centre A: Meteorology
National Climatic Centre
Federal Building
Asheville, North Carolina, U.S.A. 28801
(Mr. William H. Haggard - Director)

Oceanography:

World Data Centre A: Oceanography
National Oceanic and Atmospheric Administration
Rockville, Maryland, U.S.A. 20852
(Mr. William L. Molo - Director)

Rockets and Satellites:

World Data Centre A: Rockets and Satellites
Goddard Space Flight Centre
Code 601
Greenbelt, Maryland, U.S.A. 20771
(Dr. James I. Vette - Director)

Solar and Interplanetary Phenomena, Ionospheric Phenomena, Flare-Associated Events, Aurora, Cosmic Rays, Airglow:

World Data Centre A: Upper Atmospheric Geophysics
National Oceanic and Atmospheric Administration
Boulder, Colorado, U.S.A. 80302
(Miss J. Virginia Lincoln - Director)

Tsunamis:

World Data Centre A: Tsunamis
National Oceanic and Atmospheric Administration
P.O. Box 3887
Honolulu, Hawaii, U.S.A. 96812
(Dr. Gaylor Miller - Director)

WORLD DATA CENTRE B

World Data Centre B is under the auspices of the Soviet Geophysical Committee of the Academy of Sciences, Molodezhnaya 3, Moscow 117-296, USSR. Dr. V.V. Beloussov, President of the Committee, is WDC-B representative on the ICSU Panel on World Data Centres.

WDC-B consists of two main Data Centres in Moscow (WDC-B1 and WDC-B2) and two WDC-Bs for special solar activity projects in Crimea and Kiev.

WDC-B1 is administered by the Institute of Aeroclimatology. Dr. N.K. Klyukin is the Director of the Institute; Dr. V.B. Philippov, his Deputy-Director, is directly responsible for administrative matters of WDC-B1.

WDC-B2 on Solar-Terrestrial Physics is administered by the Soviet Geophysical Committee of the Academy of Sciences.

The addresses of the four WDC-B Centres are given below:

Glaciology, Gravity, Longitude and Latitude, Oceanography, Meteorology (and Nuclear Radiation), Rockets and Satellites:

World Data Centre B1
Molodezhnaya 3
Moscow 117-296
USSR
(Mrs. L.G. Fevralyova - Director)

Solar and Interplanetary Phenomena, Ionospheric Phenomena, Geomagnetic and Magnetospheric Phenomena, Flare Associated Events, Aurora, Cosmic Rays, Airglow:

World Data Centre B2 on Solar-Terrestrial Physics
Seismology, Upper Mantle Project
Molodezhnaya 3
Moscow 117-296
USSR
(Dr. V.P. Golovkov - Director)

Solar Magnetic Flares:

World Data Centre B
The Crimean Astrophysical Observatory
Simeiz, Pochtovoye, Crimea, USSR

Observation of Comet Tails:

World Data Centre B
Main Astronomical Observatory of the
Ukrainian Academy of Sciences
Kiev 41, USSR

WORLD DATA CENTRE C

Airglow:

World Data Centre C1
Institut d'Astrophysique
98 bis, Boulevard Arago
Paris 14e, France

World Data Centre C2
Tokyo Astronomical Observatory
Mitaka, Tokyo
Japan

Aurora:

(For all-sky photographs)

World Data Centre C
Kiruna Geophysical Observatory
Kiruna C, Sweden

(For visual observations)

World Data Centre C
Balfour Stewart Auroral Laboratory
University Department of Natural Philosophy
Drummond Street
Edinburgh 8, United Kingdom

Cosmic Rays:

World Data Centre C1
Cosmic Ray Group
Institute of Physics
Observatorieparken
Uppsala, Sweden

World Data Centre C2
Cosmic Ray Laboratory
Institute of Physical and Chemical Research
Itabashi, Tokyo, Japan
(Dr. Y. Miyazaki - Director)

Geomagnetism:

World Data Centre C1
Meteorological Institute
Chalottenlund, Denmark

World Data Centre C2
Kyoto University Library
Kyoto, Japan

Glaciology:

World Data Centre C
Scott Polar Research Institute
Lensfield Road
Cambridge, England

Gravity:

World Data Centre C
Observatoire Royal de Belgique
3 Avenue Circulaire
Uccle, Belgium
(Dr. P. Melchior - Director)

Ionospheric Phenomena:

World Data Centre C1
Radio and Space Research Station
Ditton Park
Slough, Bucks., United Kingdom

World Data Centre C2
Radio Research Laboratories
Ministry of Posts and Telecommunications
2-1 Nukui-Kitamachi 4-chome
Koganei-shi
Tokyo 184, Japan

Nuclear Radiation (IGY discipline):

World Data Centre C1
International Institute of Meteorology
Lindhagensgaten 124
Stockholm K, Sweden

World Data Centre C2
Observation Division
Japan Meteorological Agency
Otemachi, Chiyoda-Ku
Tokyo, Japan

Rockets and Satellites:

World Data Centre C for
Rockets and Satellites
Radio and Space Research Station
Ditton Park,
Slough, Bucks., England

Seismology:

World Data Centre C
International Central Seismological Bureau
5 rue René Descartes
67 - Strasbourg, France

Solar and Interplanetary Phenomena and
Flare Associated Events:

(Sunspot Numbers)

World Data Centre C
Eidgenössische Sternwarte
Schmelzbergstrasse 25
8006 Zürich, Switzerland
(Prof. Dr. M. Waldmeier - Director)

(Calcium plages)

World Data Centre C
Observatorio Astrofisico
Via San Leonardo 75
Arcetri-Firenze, Italy

(H-α Observations and Flares,
Calcium plages)

World Data Centre C
Observatoire de Meudon
92 Meudon, France
(Dr. R. Michard - Director)

(Sunspots and H- Observations)

World Data Centre C
Fraunhofer Institut
Schöneckstrasse 6
78/Freiburg im Breisgau, Baden
Federal Republic of Germany

(Solar Corona)

World Data Centre C
Observatoire du Pic-du-Midi
Service de la Couronne
65 Bagneres-de-Bigorre, France

(Sudden Ionospheric Disturbances)

World Data Centre C
Observator
Ondrejov-u-Prahy, Czechoslovakia

(Sudden Ionospheric Disturbances and
Observations of Solar Protons)

World Data Centre C1
Radio and Space Research Station
Ditton Park
Slough, Bucks., United Kingdom

(Solar Radio Emissions, Radio Maps)

World Data Centre C
Sterrewacht, Sonnenborgh
Servaasbolwerk 13
Utrecht, Netherlands

(H-α Observations)

World Data Centre C
Osservatorio Astronomico di Roma
Via del Parco Mellini 84
(Prof. M. Cimino - Director)

(Observations of Comet Tails)

World Data Centre C
Max-Planck-Institut für Astrophysik
Fohringer Ring 6
München 23
Federal Republic of Germany

(Solar Radio Flux Measurements)

World Data Centre C2
Research Institute of the Atmosphere
Nagoya University
Toyokawa, Aichi, Japan

RELATED PERMANENT SERVICES
AND SPECIALIZED CENTRES

Geomagnetism:

World Digital Data Centre for Geomagnetism
Institute of Geological Sciences
Geomagnetism Unit
Herstmonceaux Castle, Hailsham
Sussex, England

World Digital Data Centre for Geomagnetism
Physical Research Laboratory
Navranopura, Ahmedabad-9, India

Permanent Service of Geomagnetic Indices
Royal Netherlands Meteorological Institute
De Bilt, Netherlands

Permanent Service for Geomagnetic Indices
Institut für Geophysik
Herzberger Landstrasse 180
34 Göttingen
Federal Republic of Germany

Permanent Service for Geomagnetic Indices
Observatorio del Ebro
Apartado 9
Tortosa, Spain

Cosmic Rays (Observation of Solar Emissions):

Permanent Service - Solar Particles
and Radiations Monitoring Organization
(SPARMO)

Glaciology:

Permanent Service on the Fluctuations of Glaciers
Section on Hydrology and Glaciology
Research Institute on Hydraulics and Soil
Mechanics
Federal Institute of Technology
Voltastrasse 24
8044 Zürich, Switzerland
(Eng. P. Kasser - Director)

Gravity:

Permanent Service
Bureau Gravimetrique International
39 ter rue Gay Lussac
Paris 5e, France

Gravity (Earth Tides):

Centre International des Marees Terrestres
c/o Observatoire Royal de Belgique
Avenue Circulaire, 3
1180 Bruxelles, Belgium

Longitude and Latitude:

Bureau International de l'Heure (BIH)
Observatoire de Paris
Paris 14e, France

International Polar Motion Service (IPMS)
Mizusawa Observatory
Mizusawa, Iwete-ken
Japan

Meteorology:

(Ozone Data)

Department of Transportation
Meteorological Branch
Toronto, Canada

(Solar Radiation and Atmospheric Electricity)

Voeikov Main Geophysical Observatory
7 Karbysheva
Leningrad K-18, USSR

(Noctilucent Clouds)

Füüsika ja Astronomia Institut
Moomemani, Tarto
Estonian SSR, USSR

Oceanography:

The Permanent Service for Mean Sea Level
Institute of Coastal Oceanography and Tides
Bidston Observatory
Birkenhead, Cheshire, England

International Hydrographic Bureau
Monte Carlo, Monaco

International Council for the Exploration of the Sea
Charlottenlund Slot
DK-2920 Charlottenlund, Denmark

Seismology:

International Seismological Centre
The Geophysics Laboratories
6 South Oswald Road
Edinburgh, EH9 2HX, Scotland

Solar and Interplanetary Phenomena, Ionospheric Phenomena, Flare Associated Events, Geomagnetic and Magnetospheric Phenomena, Aurora, Cosmic Rays (Short-term interchange of specially arranged data):

International Ursigram and World Days Service (IUWDS)
NOAA
Boulder, Colorado, U.S.A. 80302
(Miss J. Virginia Lincoln - Deputy Secretary)

Tsunami:

International Tsunami Information Centre
NOAA, P.O. Box 3887
Honolulu, Hawaii, U.S.A. 96812

Appendix 3

IOC resolutions on the exchange of oceanographic data

RESOLUTION III-11 - EXCHANGE OF OCEANOGRAPHIC DATA

The Intergovernmental Oceanographic Commission,

Desiring to foster the full and expeditious exchange of oceanographic data,

Recognizing that this desire is closely related to the intention of IOC members to co-operate in joint scientific study of the oceans,

Recognizing further that this intention expresses itself either in participation of IOC members in international co-operative expeditions or in declaring publicly their own national oceanographic programmes with a view to exchange data resulting therefrom,

Recognizing the special interest of members in the organization and operation of World Data Centres and specialized and regional centres for the collection and exchange of oceanographic data, in accordance with the principles of equality of rights and mutual assistance,

Resolves:

(1) To approve the new text of the Provisional Guide for Exchange of Oceanographic Data as prepared by the IOC Working Group in co-operation with SCOR;

(2) To submit it for inclusion into the General CIG Guide to International Data Exchange through the World Data Centres; and

(3) To keep it under constant review by the Commission's working group in co-operation and consultation with SCOR and ACMRR.

Recommends that all scientific data originating from "declared national oceanographic programmes" and "international co-operative oceanographic expeditions" (as defined in the above Provisional Guide), comprising results of observations and measurements by ships and recording stations outside territorial waters, as well as sea-level observations, be exchanged by the methods and under the definitions and specifications prescribed in the above Provisional Guide for Exchange of Oceanographic Data, commencing with 1 January 1960;

Recommends that in view of the great scientific value of long-time series records, mean sea-level observations should be reported back to the time of establishment of the gauge wherever practicable;

Resolves that upon acceptance by CIG, the principal documents regulating the exchange of oceanographic data between members will be the present resolution, the Provisional Guide for Exchange of Oceanographic Data approved herein, the induction and general sections of the CIG Guide to International Data Exchange, and associated recommendations of the Commission's Working Group on Oceanographic Data Exchange;

Instructs the Secretary to prepare and distribute widely a manual on international oceanographic data exchange which will include the documents mentioned in the preceding paragraph, lists of national and specialized oceanographic data centres together with their addresses, methods of operation and services and facilities available, and such other information as will be useful in facilitating the full and expeditious exchange of oceanographic data;

Recommends that the Commission, through its Secretary, communicate the present resolution and associated documents to the CIG, at the same time indicating its desire to be represented on that body.

EXCERPTS FROM RESOLUTION IV-9

"The Intergovernmental Oceanographic Commission,

Noting with concern that the submission of data on Declared National Oceanographic Programmes is progressing slowly,

Noting further that less than half of the Member States have declared any national programmes as defined in the Manual on International Oceanographic Data Exchange,

Desiring to remedy this situation in order to promote the full and expeditious transmission of oceanographic data to the data centres and through them to the oceanographic community,

Requests all Member States to review their own oceanographic programmes since 1960 and by 1 February 1966 to inform the Secretary of the Commission on which programmes they are prepared to exchange data in accordance with the procedures provided in the Manual on International Oceanographic Data Exchange;

Requests further that Member States take the necessary steps to submit their data from such Declared National Programmes to the appropriate World Data Centre as quickly as possible;"

RECOMMENDATIONS OF THE 7TH MEETING OF THE IOC BUREAU

Recommendation 7.29 ..... The Bureau took note of the extensive discussion which took place through correspondence on the Report of the 3rd Meeting of the IOC Working Group on Oceanographic Data Exchange and resolved to approve this Report and the Manual revisions contained therein with a number of amendments as specified in Annex V to the present Bureau Report.

Recommendation 7.30 ..... The Bureau approves the Revised Manual and instructs the Secretary to proceed, subject to approval by the CIG, with publishing the second revised edition of the Manual on International Oceanographic Data Exchange on the basis of the revisions provided by the 3rd Meeting of the IOC Working Group on Oceanographic Data Exchange and approved by the 7th Meeting of the IOC Bureau and Consultative Council in February 1967.

RESOLUTION V-20 A - OCEANOGRAPHIC DATA EXCHANGE

The Intergovernmental Oceanographic Commission,

Accepts the report of the third meeting of the Working Group on Oceanographic Data Exchange (IOC/V-13), appreciates the recommendations contained in the report of the Ad Hoc Group on Format Standardization (IOC/V-13A), and applauds the Working Group for its work on the Second Edition (Revised) of the Manual on International Oceanographic Data Exchange as approved by the 7th Meeting of the Bureau and Consultative Council (IOC/B-30), and particularly thanks the Canadian Oceanographic Data Centre for its assistance on these matters;

Amends the terms of reference of this Working Group (resolution I-9) by adding the following:

(a) to review and reappraise the whole international oceanographic data exchange system as recommended in Section 8 of the report "International Ocean Affairs" (IOC/V-INF. 111), and as reaffirmed in Recommendation (ix) of the summary of the recommendations of the Working Group meeting in The Hague in September 1967 (IOC/V-4);

(b) to continue and encourage the present work leading towards format standardization for use with automated techniques for data input, storage, retrieval, dissemination and exchange, but recognizing the considerable financial implications inherent in such automation;

(c) to continue the development of means whereby geological, geophysical, biological, special air-sea interaction data, and data from "continuously recording" sensors are incorporated into the international oceanographic data exchange system;

Directs the Working Group to establish and maintain close collaboration with National and Regional Data Centres and with those groups of the Working Committee concerned with various aspects of the Integrated Global Ocean Station System (IGOSS); and

Invites WMO, FAO and other interested organizations to send observers to the meetings of the Working Group.

RESOLUTION VII-25 - OCEANIC DATA MANAGEMENT

The Intergovernmental Oceanographic Commission,

Considering that the effective international exchange of oceanographic data is essential for international co-operation in the study of the nature and resources of the oceans,

Noting that the system for the international exchange of oceanographic data through World Data Centres (oceanography) that has been in operation for over ten years has demonstrated its viability and requires no fundamental changes,

Noting also the contribution to international data management made by the specialized and regional data centres,

Considering that the volume of data is going to increase considerably in the next few years in consequence of the use of new means of measuring oceanographic parameters, and the expanding activities of LEPOR,

Noting the discussion and emphasis given to data and information management by the GELTSPAP (Doc. SC/IOC-VII/11),

Noting with appreciation the progress made by the Working Group on International Oceanographic Data Exchange as is presented in the reports of its Fifth and Sixth Sessions (Doc. SC/IOC-VII/31 and 32),

Considering the steps taken by the Working Group on International Oceanographic Data Exchange:

(a) to develop a marine data inventory (ROSCOP) programme in order to maintain and make available a ready appraisal of oceanographic data being collected, including biological and pollution data,

(b) to prepare a revision of the IOC "Manual on International Oceanographic Data Exchange" and a "Manual on IGOSS Data Archiving and Exchange",

(c) to undertake consideration of the interdisciplinary and inter-organizational implications inherent in data and information management in such areas as air-sea interaction, marine resources, marine pollution, and recreation and safety,

Approves the recommendations made by the Working Group (on Data Exchange) in the reports of its Fifth and Sixth Sessions (Doc. SC/IOC-VII/31 and 32),

Calls upon the Secretary to report to the Executive Council and to the Working Group (on Data Exchange) the results of negotiations concerning the establishment of a Joint Task Team on Interdisciplinary and Inter-organizational Data and Information Management and Referral,

Accepting Recommendation 12.12 of the Bureau and the Consultative Council (Doc. SC/IOC-VII/8),

Requests SCOR and ECOR in consultation with FAGS to review the requirements for mean sea level data as compiled and made available by the Permanent Service for Mean Sea Level (PSMSL) and to transmit their findings to the Executive Council for review and appropriate action,

Decides, with a view to improving and increasing the effectiveness of the present system for the international exchange of oceanographic data:

(a) to request Member States or organizations responsible for the operation of the World Data Centres A/B (Oceanography) and of the regional and specialized data centres as well as those countries having national oceanographic data centres to take such action as is necessary to cope with the impending increase in the input of data;

(b) to adopt the interim standard international data inventory form (ROSCOP) for the submission of information on expeditions that have been carried out in accordance with the Declared National Programmes and programmes of international co-operative research;

(c) to request the IOC Working Group on International Oceanographic Data Exchange to prepare as expeditiously as possible compatible formats for the international exchange of oceanographic data, and to keep under review the arrangements for international data exchange with a view toward achieving ultimately standard forms for conventional data;

(d) to request Member States to submit their Declared National Programmes and data for exchange through the World Data or other appropriate international Data Centres;

(e) to refer the contents of the "Brief Instructions for Filling in the Unified Form for Results of Oceanographic Research" (Doc. SC/IOC-VII/32 Add. 1) to the Working Group on International Oceanographic Data Exchange for consideration at its next meeting.

Appendix 4

Recommendations of the IOC Working Group on International Oceanographic Data Exchange

The following recommendations were approved by the Commission at its Third Session, June 1964, and by the IOC Bureau at its Seventh Meeting, January 1967.

WORLD, REGIONAL AND NATIONAL DATA CENTRES

The IOC Working Group on Oceanographic Data Exchange agreed that the primary responsibility of World Data Centres lies in the collection and distribution of data and that the responsibility for processing of oceanographic data should be at the national level.

The Group reaffirmed earlier recommendations concerning the importance of national data centres as focal points for the submission of data to the World Data Centres, and noted that such national centres, working closely with participating national laboratories and institutions, were the appropriate bodies to ensure that data entering the World Data Centre system are of the highest possible accuracy.

The Working Group recognized that responsibility for the quality of data entering the World Data Centre system rests with the originating bodies, not with the World Data Centres. However, the World Data Centres could provide a valuable service to international oceanography by monitoring the quality of incoming data and advising originating governments of any errors so detected. It is recommended that the assistance of SCOR, ACMRR and other appropriate advisory bodies, should be sought to establish technical specifications for data quality.

If contributors of data require assistance in processing, arrangements may be made through a World Data Centre or appropriate national or regional data centre, the terms being established by mutual agreement. It was recognized that submission of data in forms, facilitating machine processing as recommended in the Provisional Guide, would expedite dissemination of such data.

The need to co-ordinate the data exchange systems of ICES and IOC was recognized by the ICES meeting of the Service Hydrographique in March 1966 at which meeting the following recommendation was adopted:

> "Since both ICES and IOC schemes of data exchange pursue one and the same goal of making oceanographic data internationally available, the ICES member countries and their national laboratories should be asked to co-ordinate their participation in the ICES data exchange scheme with their commitments to the IOC within the framework of their "declared" national programmes. This co-ordination should result in rapid transmission of the relevant data both to the Service Hydrographique and to the Exchange System of the IOC (WDC-A and/or B)".

SYNOPTIC OCEANOGRAPHIC SERVICES

In considering the problem of the speedy utilization of oceanographic data, the Working Group recognized that synoptic oceanographic services were already functioning on a national or regional basis in a few cases. Further experience with such restricted programmes is required before an effective international programme can be designed. Consideration of the problem by a working group of the ACMRR is expected to contribute

to a better understanding of the problem as well as to that of the desirability or otherwise of including fishery statistics amongst the data to be submitted to the World Data Centres.

BIOLOGICAL DATA

The World Data Centres were originally established for handling geophysical data, under the Comité International de Géophysique. The parent body, the International Council of Scientific Unions, is concerned with all aspects of science. The IOC is similarly concerned with both the biological and non-biological aspects of oceanography.

The present version of the Guide includes certain sections pertaining to biological data (4.1.8, 4.2.8, 5.5.8).

The Working Group considered that a minimum requirement should be to submit along with physical and chemical data, details of what biological sampling was done. This information should include if possible: position, date, time and zone, sounding, and the type of sampling (that is, phytoplankton, zooplankton or benthos sampling, mid-water trawling, long-lining, or other forms of fishing, underwater photography, acoustic studies, surface collections, etc.) or measurements (primary production, optical measurements, etc.). Details of the sampling should also be included, incorporating information about the type of gear used, the times of commencement and completion of sampling and, the upper and lower depth of sampling etc. It should also be stated where further information concerning the samples or measurements can be obtained.

Biological results, on the other hand, can be divided into a number of categories which lend themselves in varying degrees to handling by data centres.

The bulk measurements, such as chlorophyll or zooplankton biomass, are conveniently included in the World Data Centres. Although such measurements are less precise than many standard chemical measurements, it was noted that biological concentrations commonly undergo seasonal changes of orders of magnitude which may be usefully described even by the relatively crude measurements now possible.

Some biological data are collected in the course of oceanographic investigations or are closely associated with other characteristics of the environment; disposition of such data should be provided for in the Guide.

Other biological data, such as fishery statistics, including systematic or taxonomic information, descriptions of organisms, publications etc., are less closely associated with oceanographic and environmental studies, and they might be treated in a separate data exchange system co-ordinated by the FAO Fishery Data Centre. It was suggested that FAO might consider the development of a Guide for the exchange of such data.

The Working Groups feel, therefore, that the categories of biological results which can usefully be handled by data centres at the present time are the following:(1)

1. Primary production
2. Plant pigments
3. Micro-nekton biomass
4. Zooplankton biomass.

The submission of such data in any form is acceptable providing they are accomp nied by precise details of the methods used. It is hoped that after consideration by specialized working groups of SCOR, ACMRR etc., and as a result of the standardization and intercalibration work being conducted by SCOR and other bodies it may eventually be possible to reach agreement on standardized reporting. As methods improve in the future it will become desirable to include other biological observations, in particular those which may be of importance to fishery oceanography.

The Group therefore recommends that SCOR and ACMRR should continue to give attention to the problems of biological data exchange along the lines proposed by SCOR/ACMRR Working Group 18, and to develop guidelines for the submission and retrieval of biological data, in particular of the types listed in the Revised Manual on International Oceanographic Data Exchange under 4.1.8.

(1) See Summary Report of the 3rd Meeting of the IOC Working Group on International Oceanographic Data Exchange. Doc. AVS/9/89F of 10 May 1966, pp. 2, 3, Annex I p. 3. See also footnote on page 11 of this Manual.

World and Regional Data Centres should be encouraged to store and index data in such a way that retrieval of environmental data associated with biological observations would be facilitated.

The SCOR/ACMRR Working Group on Biological Data has proposed an expansion of biological data exchange, principally through inventories or specialized data centres.

These would include several disciplinary and regional data centres, primarily associated with regional fisheries councils and commissions and concerned with fishery data, in the list of Specialized Data Centres in Part II of the Guide. It was generally felt that such inclusion was premature, it being necessary to study further the interrelationship of these centres with each other and with the FAO Fishery Data Centre before action could be recommended.

The following recommendations were approved by the Commission at its Sixth Session, September 1969:

RECOMMENDATION No. 1

The IOC Working Group on Oceanographic Data Exchange,

Taking into account that the number of national and regional oceanographic data centres considerably increased during the past years and continue to increase,

Noting that the amount of oceanographic data entering the international data exchange system is also increasing and will continue to increase,

Noting further the proposal by the United Nations Secretary-General (Doc. E/4487) that the Intergovernmental Oceanographic Commission be strengthened and developed further as a focal point with respect to the envisaged expanded programme of international co-operation with a view to better understanding of the marine environment through science.

Recommends that the international exchange of oceanographic data should continue for the years to come in accordance with the principles specified in the Provisional Guide for the Exchange of Oceanographic Data, taking into account the increasing rôle and importance of National Oceanographic Data Centres.

Commends to the IOC for approval the recommendations formulated by the Ad Hoc Group on Format Standardization (Doc. IOC/V-13A) which represent the guidelines for future development of the international system of the exchange of oceanographic data and which were revised by the Working Group as follows:

1. Primary recordings and primary data (in digitized and analogue form) from high density sampling devices should be retained at the originating activity or national (regional) data centres; corresponding reduced data should be transmitted to the World Data Centres. The extent of reduction will be a function of the type and volume of the measurements involved.

2. The IOC Working Group on International Data Exchange should seek expert advice on what needs to be preserved as primary recordings of the variables measured.

3. Primary data should be available "on request" according to the principles to be specified in the Provisional Guide.

4. Bearing in mind the rapid proliferation of continuously recorded data to be expected in the next few years. World Data Centres (for Oceanography) will gradually need to move towards becoming automated documentation centres with regard to such data.

Considers further that this future development should continue to be guided by the Intergovernmental Oceanographic Commission which for that purpose should establish a close working relationship with the ICSU Panel for the Management of the WDCs and continue to rely for advice on SCOR and ACMRR.

Proposes that the Commission continue to encourage development, with the assistance of Unesco, FAO, and other organizations of the United Nations System as appropriate, of the existing Specialized Data Centres, of NODCs and of Joint National Data Centres serving the needs of those countries which wish to combine their efforts, and that the Commission also undertake to facilitate close co-operation of these centres with WDCs with a view to increasing the scope of internationally exchangeable data.

Proposes further that the Commission undertake to study ways and means of providing, where appropriate, international assistance to WDCs and to national laboratories and centres for obtaining from WDCs the data with special processing requirements.

RECOMMENDATION No. 2

The Working Group has reviewed and commended the Report of the Ad Hoc Group on Format Standardization (IOC/V-13A) for acceptance by the IOC at its Seventh Session with a number of minor amendments introduced in the recommendations of that Report.

On the basis of the Ad Hoc Group's Report, and

Considering that

(a) the national and regional data centres are at various stages of development in their data processing capabilities;

(b) internationally acceptable formats or an "IOC Standard Format" have not been developed;

(c) the WDCs - Oceanography - are in fact supported by the data processing capabilities of the co-located national data centres;

The Working Group recommends

1. To IOC to continue the work of the Ad Hoc Group on Format Standardization for the establishment and the continuing improvement of a standard coding system for exchange, archiving and retrieval of data, in order to make the various national formats more compatible. The composition of this Ad Hoc Group should include representatives of WDC-A, WDC-B, ICES, and the Chairman of the IOC Working Group on Oceanographic Data Exchange. Experts from regional and specialized centres as well as from NODCs may also be invited as appropriate;

2. That it is desirable that the future evolution of the WDCs envisage development of the capability to retrieve and exchange data in computer compatible form. To this end the WDCs should maintain close working contacts with each other;

3. That national and regional data centres may submit their data in their own formats to the WDCs, but they should take into account those recommendations that may be developed by the above Ad Hoc Group with respect to formats;

4. That all efforts by various international bodies at standardization of measuring techniques and descriptive information receive continued emphasis, especially when such efforts may result in standardization of processing and coding methods;

5. That supplements to the present IOC "Manual on International Oceanographic Data Exchange" be issued periodically following approval by the IOC with the advice and endorsement of SCOR and after consultations with ACMRR and WMO as appropriate.

   These supplements would focus on:

   Developments in data processing systems contributing to the WDCs.

   Technical recommendations concerning formats for the exchange of automated data through the WDCs or among member nations.

   Standardization achieved in specific data disciplines.

Recognizing further the development in handling biological data since the preparation of the report of the SCOR/ACMRR Working Group on Biological Data (W. G. 18) including the continuing increase in number of NODCs and marine biological sorting centres and the application of automated techniques.

The Working Group also recommends that the report of the SCOR/ACMRR Working Group be reviewed with a view to arranging for the implementation of specific proposals in it, and to further development of proposals for dealing with the wide range of biological data records, materials, and related documentation. This might best be done by a new joint SCOR/ACMRR Working Group constituted in such a way as to ensure collaboration of experts connected with the WDCs and with such NODCs as are actively considering the means of handling biological information.

It is to be understood that the present WDC methods for handling "hard copy" material be continued unchanged. The Working Group concurs with the concept that the WDCs avail themselves of modern storage-retrieval systems.

RECOMMENDATION No. 3

The Working Group on International Oceanographic Data Exchange,

Noting:

1. Recommendation III of the IOC Working Group on Ocean-Atmosphere Interaction [SC/CS/150 Annex XI];

2. Resolution V-20 of the IOC [SC/CS/150(1)];

3. Resolution V-20A of the IOC [SC/CS/150(1)];

4. Resolution V-20C of the IOC [SC/CS/150(1)];

5. Recommendations, First Meeting of the IOC Working Committee of IGOSS (Annex III, IOC/B-37, April 1968, attachment D) which recommended certain tasks to be given to a joint IOC/WMO Panel of Experts on Co-ordination of Requirements concerning real time aspects of data exchange and dissemination;

6. The establishment of national and international co-operative ocean-atmospheric data collection projects as BOMEX, CICAR, IDOE, etc.;

7. The Review of Problems Related to the Accessibility of Oceanographic Data, prepared by the IOC Secretariat (AVS/9/89F, Paris, 11 July 1968);

8. Recommendation 8.14 of the IOC Bureau and Consultative Council, concerning the proposed establishment of a joint ICSU, WMO, IOC Working Group on ocean-atmosphere interaction studies within the framework of the joint WMO/ICSU organizing committee for GARP.

Considering:

1. The desirability of making available to researchers non-real time oceanographic and meteorological data common in space and time in compatible formats;

2. The desirability for assuring ready access to these specially collected data.

Recommends:

1. That the IOC Working Group on International Oceanographic Data Exchange be actively represented on the joint IOC/WMO Panel of Experts on Co-ordination of Requirements and on the Working Committee on IGOSS, especially to assure consideration of the definition of what data collected and transmitted in real time by systems such as IGOSS and WWW, and various Air-Sea Interaction Experiments will later on be dealt with in non-real time by National, Regional and World Data Centres.

2. That the IOC request the joint IOC/WMO Panel of Experts on Co-ordination of Requirements to consider the principle of the creation of common formats for the future recording of relevant data from oceanographic and meteorological sources, which are common in space and time, for the purpose of facilitating a co-ordinated file of such data.

3. That the IOC seek assistance from the WMO in urging Member States to urgently consider what steps might be taken to assure that National, Regional and World Data Centres for both oceanographic and meteorological data co-ordinate their data files, so as to assure the ready availability in the future in compatible format, those non-real-time oceanographic and meteorological data which are collected so as to be common in space and time for the study of sea-air interaction.

4. That IOC call the attention of the Working Group on IGOSS to the problem of the real-time data gathered through the IGOSS system, and the fact that the economy of archiving of non-real-time data depends very much on the codes and formats of the real-time data gathered through the IGOSS system.

The following recommendations were adopted by the Working Group on International Oceanographic Data Exchange, September 1970, and approved by the Commission at its Seventh Session, November 1971:

RECOMMENDATION 1: DATA INVENTORY

The Working Group on International Oceanographic Data Exchange

Having noted Resolution V-20A of the Fifth Session of the IOC;

Noting the apparent proliferation of partial solutions, to the problem of data-exchange inventory formats such as those used or proposed by ICES, IUGS/CMG, WDC-A, and critical remarks concerning these partial solutions, e. g. the report of SCOR/ACMRR Working Group 32 (April 1970, Washington);

Recognizing the urgent need for a single inventory of oceanographic activities in a simple multi-disciplinary format;

Recommends the ROSCOP form for adoption by IOC as an interim inventory form to facilitate the initial exchange of marine data;

Undertakes to keep under constant review and revision, as necessary, the format of the multi-disciplinary inventory, and to study its relation to other proposed inventories;

Calls upon the Secretary to inform other relevant international agencies of the activities of the Working Group on International Oceanographic Data Exchange in the development of inventory forms and to inform all Member States of the IOC concerning the purpose and availability(1) of the ROSCOP forms.

RECOMMENDATION 2: IGOSS NON-REAL TIME DATA EXCHANGE

The Working Group on International Oceanographic Data Exchange,

Noting the requirements of the IGOSS Plan - phase I, as laid down in Annex VI of the Summary Report of the Sixth Session of the IOC, Paris, September 1969 (Document SC/MD/19, dated 1 June 1970);

Further noting the requirements on data exchange and storage in the IGOSS framework, mentioned under item 8. 3 of the Summary Report of the third meeting of the Joint WMO/IOC Group of Experts on Co-ordination of Requirements (distributed as SC/IOC. WG-1 (V)/9, dated September 1970);

Being concerned that the permanent value of certain IGOSS data for climatological studies be fully recognized;

Endorses the suitability of the codes for handling of real-time accessioned data for BATHY and TESAC as given in IOC Circular Letter No. 307, dated 1 September 1970;

Having established the Working Group's Task Team for the preparation of a manual on all aspects of non-real-time handling of IGOSS data that is working in close co-operation with appropriate bodies of IOC and WMO concerned with IGOSS and is also considering the proposal tabled by the U. S. A. entitled: "A proposal for storage and non-real-time data exchange of oceanographic data for IGOSS", dated 2 September 1970, annexed to the Summary Report; (cf. Annex VI);

(1) Pads of ROSCOP forms can be obtained by sending a request to the Director of World Data Centre A (Oceanography), Washington, D. C., U. S. A. 20390.

Calls upon the Secretary to forward the USNODC document to the Working Committee for IGOSS and to inform of the establishment of the Task Team in response to the charges laid to the Working Group on International Oceanographic Data Exchange by other bodies;

Recommends that the Working Committee for IGOSS arrange for harmonization of the work of the Task Team with the work of those involved in preparing procedures for real-time data handling that might be included in the Manual on IGOSS Data Exchange.

RECOMMENDATION 3: RELATIONSHIPS AMONG THE WDCs, NODCs, REGIONAL AND SPECIALIZED CENTRES

The Working Group on International Oceanographic Data Exchange,

Desiring to strengthen, modernize and expand the system for international data exchange in the context of IOC Resolution V-20A;

Appreciating the success of the WDCs (Oceanography) in the exchange of many types of oceanographic data and convinced of their continuing importance to international co-operation and especially to developing countries;

Bearing in mind the proliferation of oceanographic data both in quantity and in type accruing from on-going and planned programmes such as LEPOR, Marine Pollution Monitoring and IGOSS;

Concerned over the ability of the WDCs to continue indefinitely accessioning unlimited amounts of data and yet providing rapid and effective service;

Noting Recommendation 1 of the fourth meeting of the Working Group as accepted by the Sixth Session of the IOC that the WDCs gradually become automated documentation centres for certain types of data; and,

Further noting the continued emergence and strengthening of NODCs and DNAs;

Taking into account that WDCs are funded entirely by the host countries;

Considering with appreciation some aspects of the excellent document by the IOC Secretariat, IOC document SC/IOC. WG-1 (V)/4, "Suggestions for adjusting the scope and nature of the arrangements for international oceanographic data exchange and developing these into a co-ordinated system" (cf. Annex VIII).

Recommends:

1. That the IOC encourage NODCs, especially those with facilities for automation, to assume the rôle of regional data centres wherever the solution of regional problems or execution of regional projects would be aided by such an arrangement. It is further recommended that such NODCs acting as regional centres be urged to perform data processing and analysis services on a voluntary basis for data accessioned by participants lacking the requisite facilities and aid in the international exchange of automated data in the context of the WDC system, and further suggests that future revision of the IOC Manual on International Oceanographic Data Exchange include guidelines for the development of regional centres;

2. That the present rôle of the WDC system and ancillary specialized centres as described in the Manual on International Oceanographic Data Exchange in international data exchange continue to be supported by the IOC, but, in order to strengthen and augment the system, the concept of a "World Data Bank" which is comprised of the various holdings of individual NODCs be explored and receive serious consideration by DNAs, NODCs and regional data centres, especially for such existing or new types of data and information not now commonly exchanged (e.g. data from continuous measuring devices, non-standard data, etc.). It is further proposed that the Secretary call attention to the possible utility of the World Data Bank concept in the management of voluminous records resulting from new initiatives such as IGOSS and Marine Pollution Monitoring;

3. That the Members participating in exchange of data be urged to give careful consideration to the problem of safeguarding and preservation of those primary data holdings which may be of value to future research (but are not held by the WDCs) and to bear in mind that such data constitute an important international resource. It is further recommended that the IOC continue to solicit the

advice of scientific bodies of the ICSU/SCOR apparatus, ACMRR, and of appropriate other bodies concerned with IGOSS, LEPOR, etc., on what types of primary records are likely to have long-term use or significance;

4. That the IOC continue to draw on the good offices of SCOR and ACMRR to find ways to integrate the holdings of biological and fisheries centres into the international data exchange scheme and also consult appropriate advisory bodies on the implications of such new specialized centres as may be established.

RECOMMENDATION 4: RESOURCES FOR INTERNATIONAL DATA CENTRES

The Working Group on International Oceanographic Data Exchange,

Recognizing the increasing rôle of international data centres in the expediency of data exchange, especially that of the WDCs and specialized centres within the WDC system;

Noting the increasing number of tasks for the World Data Centres assigned by various IOC subsidiary bodies and other international advisory groups (e.g. the IOC Working Groups on International Oceanographic Data Exchange, Ocean Data Stations, and the Working Committee for IGOSS; the International Co-ordinating Group for CICAR; the Joint Group of Experts on Scientific Aspects of Marine Pollution; SCOR/ACMRR WG 32 on Biological Data Inventories; the Commission for Marine Geology (CMG) of the IUGS (in collaboration with Unesco/IOC); the International Council for the Exploration of the Sea (Hydrography Committee));

Noting with concern the urgent need of increased and continuous financial support needed for the Permanent Service for Mean Sea Level as expressed in the statement of the Director of the Service and a problem of WDC-A relating to available resources for undertaking additional projects as was expressed in the report made by WDC-A, Oceanography, to the Working Group;

Recommends that the Bureau and the Consultative Council, together with other interested international organizations, consider arranging for an improved method of funding to maintain the activities of the Permanent Service for Mean Sea Level as a specialized centre in the WDC system;

Further recommends that the Secretary inform all IOC subsidiary bodies of the need to consider additional resources that may be required by the World Data Centres for special tasks that are to be assigned by these bodies; to explore the sources for such additional resources or to modify requirements to the extent possible so that the tasks could be absorbed by the Centres or performed with the assistance of national oceanographic data centres (NODCs) or designated national agencies (DNAs).

RECOMMENDATION 5: DECLARED NATIONAL PROGRAMMES (DNP)[1]

The Working Group on International Oceanographic Data Exchange,

Considering the importance of the concept of the "declared national programme" as a means of monitoring international oceanographic data exchange;

Recognizing the essential function performed by Unesco/IOC in announcing such programmes in the quarterly journal "International Marine Science" (IMS);

Considering the absence of definitions of the terms "National Oceanographic Programme" (NOP) and "Declared National Programme" (DNP) in IMS, which has given rise to some confusion, and, in particular, the apparent lack of comprehension of the obligations inherent in the DNPs;

Noting that the present method of listing national programmes in IMS often leaves unanswered the question as to whether the cruises have been completed or not.

(1) DNP announcements are now made through IOC circular letters and therefore will not be contained in future issues of IMS.

Recommends

1. That the section of IMS in which these programmes are announced contain a definition of the terms NOP and DNP, including a note on the obligation to exchange DNP data internationally under the provisions of the "Manual on International Oceanographic Data Exchange";

2. That the designation DNP be assigned only to those programmes for which the Member States have declared their intention to exchange internationally resulting data in accordance with the Manual;

3. That the Member States contributing information to the IOC on their programmes for inclusion in the IMS designate their programmes as either (1) completed or (2) planned, and that these be listed separately in the IMS;

4. That Member States adopt the proposed "Report of Observations/Samples Collected in Oceanographic Programmes" (ROSCOP) system as a convenient method for reporting completed DNPs to the IOC (cf. Annex IV);

5. That the editors of IMS rearrange the NOP listing, if possible, to provide an additional column to show whether or not a programme is a DNP.

RECOMMENDATION 6: MANUAL ON INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE

The Working Group on International Oceanographic Data Exchange,

Recalling that the Commission by its Resolution III-11 on Exchange of Oceanographic Data decided to keep the Manual on International Oceanographic Data Exchange under constant review by this Working Group in co-operation and consultation with SCOR and ACMRR;

Considering that the present Manual, IOC Technical Series 4, Second Edition, 1967, is in need of updating;

Noting that Recommendation 2 adopted at the Working Group's Fourth Meeting recommended "that supplements to the present IOC Manual... be issued periodically following approval by the IOC with the advice and endorsement of SCOR and after consultations with ACMRR and WMO as appropriate";

Noting that suggestions for revisions have been proposed by SCOR Working Group 32 on Biological Data Inventories, by WDC-A (Oceanography) and others;

Considering that the comments received to date indicate a need for complete revision, rather than a supplement to, the present Manual;

Recognizing the concern and responsibility of the ICSU Panel on World Data Centres in the international exchange of oceanographic data through the World Data Centres;

Being of the opinion that advancements in instrumentation and technology will require continual updating of the Manual in the future;

Calls upon the Secretary to arrange with the Directors of World Data Centres A and B (Oceanography) and of other centres as appropriate and in co-ordination with the ICSU Panel on World Data Centres, to have prepared a revision of the Manual and to submit same to an editorial committee of the Working Group for release to the Secretary within one year for publication in loose-leaf form. Assistance and advice from SCOR, ACMRR, WMO and other sources should be sought as appropriate;

Recommends that the Secretary undertake, as feasible, the task of issuing interim amendments to the present Manual;

Further recommends that major revisions should consider the following; the exchange of data resulting from technological advances in instrumentation, including those from continuously recording devices on buoys and satellites; information concerning new processing techniques, including methods of computerized or optical reduction; formats for recording or archiving; retrieval of information from automated marine inventories; guidance on the development of regional data centres, etc.

The following recommendations were adopted by the Working Group on International Oceanographic Data Exchange, September 1971, and adopted by the Commission at its Seventh Session, November 1971.

RECOMMENDATION 1: IGOSS MANUALS

The Working Group on International Oceanographic Data Exchange

Having established a Task Team for the preparation of a Manual for non-real-time exchange and storage of IGOSS data;

Notes with satisfaction that an outline and a number of completed chapters for a draft Manual on IGOSS Data Archiving and Exchange has been circulated to the members of the Task Team;

Considering the summary of the substantive contents of the draft Manual given in SC/IOC. WG-1(VI)/INF-14;

Recognizing the need for utilizing uniform procedures for the archiving, inventorying, service and exchange of data resulting from or collected in conjunction with the IGOSS Pilot Project for Collection, Exchange and Evaluation of Bathythermograph Data; and that one of the objectives of the Pilot Project, which is to begin in January 1972, is to test the non-real-time data handling procedures for IGOSS data and realizing that the development of IGOSS will be a long-term process;

Recommends that, after review and receipt of comments from the members of the Task Team on the draft Manual on IGOSS Data Archiving and Exchange, the draft Manual be translated into the four working languages and be issued to serve as a provisional Manual for the purpose of the IGOSS Pilot Project and until such time as a final approved first edition of the Manual is issued;

Decides:

(a) to discontinue the Task Team, expressing its appreciation for completion of the assigned task;

(b) to establish an Ad Hoc Group on IGOSS Data Archiving and Exchange, the Group to keep under continual review the content and concepts contained in the draft Manual on IGOSS Data Archiving and Exchange, with particular attention to the experience gained during the IGOSS Pilot Project and make recommendations concerning changes and additions to the Manual and to act in an advisory capacity to the IOC Working Committee for IGOSS;

Further recommends that the Ad Hoc Group include representation from WMO and ICES and other interested international organizations.

RECOMMENDATION 2: MANUAL ON INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE

The Working Group on International Oceanographic Data Exchange

Noting with appreciation the work of World Data Centres-A/B, Oceanography, and of the secretariat, in producing a draft revision of the IOC's "Manual on International Oceanographic Data Exchange" (Technical Series No. 4, Unesco, 1967);

Noting that the IOC secretariat has submitted the draft Manual to SCOR, ACMRR and WMO for review;

Noting with satisfaction that the ICSU Panel on World Data Centres has decided (Moscow, August 1971) to update "in early 1972" the 1963 Comité International de Géophysique (CIG) "Guide to International Data Exchange through the World Data Centres";

Considering that the IOC Manual and ICSU Guide should be in essential agreement, all WDC's being part of an ICSU family of centres;

Realizing that the continued revision of arrangements and evolution of procedures for international oceanographic data exchange will require a continuously updated Manual in a format adaptable to changes;

Having reviewed the changes suggested to date by individuals and groups within and outside this Working Group;

Considering the value of the Manual and its appendices as a medium for keeping the participants in the exchange system and research institutions informed of decisions on exchange procedures, and on facilities at their disposal;

Requests the Directors of WDC-A/B, Oceanography, to complete the draft revision of the Manual by considering the suggestions of the Working Group and those received previously and approved by the Group, and to submit the completed draft to the IOC secretariat by 31 December 1971;

Calls upon the Secretary:

to arrange for the editing of the completed draft;

to obtain the concurrence of SCOR and the ICSU Panel on World Data Centres on the final draft;

to arrange for translation, printing and distribution of the revised Manual in loose-leaf format to permit rapid updating;

Further requests the Directors of WDC-A/B, Oceanography, to co-ordinate the preparation of the oceanographic portion of the revised ICSU "Guide to International Data Exchange through the World Data Centres" with the ICSU Panel on World Data Centres, to keep the ICSU Guide and IOC Manual in essential agreement, and to keep this Working Group informed of the progress of work and of any problem requiring further consultation between IOC and ICSU.

RECOMMENDATION 3: JOINT TASK TEAM ON INTERDISCIPLINARY AND INTERORGANIZATIONAL DATA AND INFORMATION MANAGEMENT AND REFERRAL

The Working Group on International Oceanographic Data Exchange

Recognizing the multiorganizational involvement in global environmental data and information exchange in areas of common and overlapping interests, such as air-sea interaction, marine resources, and pollution problems of concern to transportation and commerce, resources development and management, and recreation and safety;

Noting the enlarged perspective for data and information exchange which is evolving from considerations of the Long-Term and Expanded Programme of Oceanic Exploration and Research (LEPOR) and as apparent in the preparations for the United Nations Conference on the Human Environment and other considerations, particularly the recommendations which have been made by:

(a) the Intergovernmental Working Group on Marine Pollution (London, June 1971);

(b) the Intergovernmental Working Group on Monitoring or Surveillance (Geneva, August 1971);

(c) the Group of Experts on Long-Term Scientific Policy and Planning (GELTSPAP) (Monaco, November 1970);

(d) the Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) (Rome, February 1971);

(e) the ICSU Scientific Committee on Problems of the Environment (SCOPE) (Canberra, September 1971);

(f) the WMO Executive Committee Panel on Collection, Storage and Retrieval of Data for Research (Geneva, April 1970);

(g) the FAO Technical Conference on Marine Pollution and its Effects on Living Resources and Fishing (Rome, December 1970); and

(h) the Joint Seminar on Methods of Detection, Measurement and Monitoring of Pollutants in the Marine Environment (Rome, December 1970);

Recommends the establishment of a Joint Task Team, with participation by Unesco/IOC, FAO, WMO, IMCO, IAEA and other interested and relevant organizations,

(a) to assess and document ongoing information and data management activities within the respective organizations;

(b) to propose a concept for interdisciplinary and interorganizational arrangements for data and information management and referral whereby full use will be made of the extensive arrangements for centres already in existence for the processing, storage and evaluation of data;

(c) to propose a multidisciplinary referral system for providing users with information as to availability and location of environmental data (as recommended by the Intergovernmental Working Group on Monitoring or Surveillance at its first session);

Calls upon the Secretary of the Commission to take steps as necessary to determine from executive heads of the respective proposed participating organizations their willingness to assist in the work of such a Joint Task Team and to make an interim report to the Seventh Session of the Commission on such negotiations; and

Urges that the representatives selected for the Joint Task Team be knowledgeable in the field of data and information management.

Appendix 5

NODCs and DNAs

Servicio de Hidrografia Naval Avenida Montes de Oca, 2124 Buenos Aires, Argentina	DNA
Australian Oceanographic Data Centre Hydrographic Office Garden Island, N. S. W. Australia	NODC
Diretoria de Hidrografia e Navegacao Ministerio da Marinha Ilha Fiscal Rio de Janeiro, Brazil	DNA
Canadian Oceanographic Data Centre 615 Booth Street Ottawa, Canada	NODC
Centro Nacional de Datos Oceanograficos de Chile Instituto Hidrografico de la Armada Casilla 324 Valparaiso, Chile	NODC
Marine Sciences Department [to become Oceanographic Institute] Escuela Naval de Colombia Ministerio de Defensa Nacional Manzanillo Island Cartagena, Colombia	DNA
Instituto de Oceanologia de la Academia de Ciencias de Cuba La Habana, Cuba	DNA
Instituto Oceanográfico de la Armada Casilla 5940 Guayaquil, Ecuador	DNA
British Oceanographic Data Service National Institute of Oceanography Wormley, Godalming Surrey, England	NODC
Institute of Marine Research Merentutkimuslaitos Helsinki 4, Finland	DNA

Centre National pour l'Exploitation des Oceans Boîte Postale 107 Paris 16e, France	DNA
Bureau National des Donnes Oceanographiques (BNDO) Centre Oceanologique de Bretagne (COB) BP 337-29N-Brest France	NODC
Deutsches Ozeanographisches Datenzentrum c/o Deutsches Hydrographisches Institut 78 Bernhard-Nocht-Strasse 2 Hamburg 4, Federal Republic of Germany	NODC
Forschungsgemeinschaft der Institute für Meereskunde 253 Rostock Warnemunde Seestrasse 15 German Democratic Republic	DNA
Department of Physical and Chemical Oceanography Marine Research Institute Skulagate 4 Reykjavik, Iceland	DNA
Indian National Oceanographic Data Centre Planning and Data Division National Institute of Oceanography Miramar, Panaji, Goa, India	NODC
Centro Nazionale Raccolta Dati Oceanografici Consiglio Nazionale della Ricerche 7 Piazzale della Scienze Rome, Italy	NODC
Centre de Recherches Océanographiques 29 rue des Pecheurs Boîte Postale VI8 Abidjan, Côte d'Ivoire	DNA
Japanese Oceanographic Data Centre Hydrographic Division Maritime Safety Agency 5-Chome, Tsukiji Chuo-ku, Tokyo Japan	NODC
Centro Nacional de Datos Oceanographicos (CENADO) Instituto de Geofisca (Anefo 3er piso) Universidad Nacional Autonoma de Mexico Mexico 2D. F., Mexico	NODC
Royal Netherlands Meteorological Institute Utrechtsweg 297 De Bilt, Netherlands	DNA
Meteorological Services Government of Pakistan Karachi, Pakistan	DNA

Instituto del Mar Esquina Camarra y General Valle Chucuito-Callao Apartado 3734 Lima, Peru	DNA
The National Data Centre c/o The Library National Institute of Science and Technology Manila, Philippines	NODC
Information and Documentation Center of the Polish National SCOR Komitet Badan Morza P.A.N. SOPOT Ulica Abrahama Nr, 18 Poland	DNA
Service d'Oceanographie Rua das Trinas, 49, Lisboa Portugal	DNA
South African Oceanographic Data Centre Institute of Oceanography University of Cape Town Private Bag, Rondebosch, Cape South Africa	NODC
Instituto Español de Oceanografia Alcala 27, 4° Madrid-14, Spain	NODC
The Fishery Board of Sweden Box 4031 400-40 Goteborg 4, Sweden	DNA
Turkish Navigational and Hydrographic Department Cubuklu Istanbul, Turkey	DNA
National Oceanographic Data Center Rockville, Maryland 20852, U.S.A.	NODC
National Oceanographic Data Center Molodezhnaya 3, Moscow 117-296, USSR	NODC
Instituto Oceanografico Universidad de Oriente Cumana Estado Sucre, Venezuela	DNA
Institut Océanographique Nha Trang, Republic of Viet-Nam	DNA

Appendix 6

National Oceanographic Programmes
(Sample)

Ship	Area	Period	Programme	Operating Agency	Comments
Skagerak	Kattegatt The Sounds, Baltic	Late Febr. - mid March	Do	Fishery Board of Sweden	Sections, Deep Basins
Skagerak	Kattegatt The Sounds, Baltic Gulf of Bothnia	Late May - early June	Do	Fishery Board of Sweden	Sections, Deep Basins
Skagerak	Kattegatt The Sounds, Baltic	Mid August - late August	Do	Fishery Board of Sweden	Sections, Deep Basins
Skagerak	Kattegatt The Sounds, Baltic	Late Oct. - early Nov.	Do	Fishery Board of Sweden	Sections, Deep Basins
Thetis	Skagerrak	Mid January	Do	Fishery Board of Sweden	Sections
Thetis	Skagerrak	Mid April - late April	Do	Fishery Board of Sweden	Sections
Thetis	Skagerrak	Mid June - early July	Do	Fishery Board of Sweden	Sections
Thetis	Skagerrak	Late August - mid Sept.	Do	Fishery Board of Sweden	Sections
Thetis	Skagerrak	Early Dec. - mid Dec.	Do		

Do: Descriptive oceanography

INTRODUCTION

The Report of Observations/Samples Collected by Oceanographic Programs (ROSCOP) is intended as an important new mechanism in support of the international oceanographic data exchange system. Compilation of ROSCOP forms will provide the basis for timely inventories of data and samples resulting from ongoing programs available for international exchange. ROSCOP is thus intended to fill the gap between the first announcement of an oceanographic program in International Marine Science and the eventual cataloging of data actually received by the World Data Centers (WDC's). Further, the ROSCOP inventory could be used by the international scientific community to provide a referral service to data which may not be routinely exchanged through the WDC system.

The ROSCOP form has been recommended for immediate use and will be kept under constant review by the Intergovernmental Oceanographic Commission's Working Group on International Data Exchange.

Send form as soon as practicable after completion of a cruise or observational program to one of the following (as arranged):

Your National Oceanographic Data Center or Designated Agency;
or
Service Hydrographique, Charlottenlund Slot, 2920 Charlottenlund, Denmark;
or
World Data Center A, Oceanography, National Oceanic & Atmospheric Administration, Rockville, Maryland, 20852, U.S.A.;
or
World Data Center B, Oceanography, Molodezhnaya, 3, Moscow B-296, U.S.S.R.

INSTRUCTIONS FOR COMPLETING ROSCOP ENTRIES

Ship or platform.—Enter complete name of the vessel or other platform from which the data were gathered. Include registry.

Scientist in charge.—Enter name of the person responsible for the overall scientific aspects of the cruise or data collection program. If more than one, list others in "Comments" column.

Expedition or project.—Enter name, acronym, or number of the expedition or project, if appropriate.

Examples:

"Overflow," CICAR, IIOE.

Originator's cruise No.—Enter the originator's cruise identifying number.

Country.—Enter country sponsoring the oceanographic program.

Institution or operating agency.—Enter name and nationality of the institution or agency primarily responsible for operating the vessel or other platform during the cruise.

Date of cruise.—Enter day, month, and year of the beginning and ending of the cruise or program.

Programs.—Programs undertaken during the course of the cruise are grouped under the following categories:

1. Descriptive oceanography.
2. Current measurements.
3. Meteorology.
4. Geology and geophysics.
5. Biology.
6. Other observations.

Total number of stations.—The manner in which the volume of data or samples should be reported depends on the nature of the data parameter. The following types of entries should be made in the column "Total number of stations":

1. **Number of stations.**—For most parameters, report the number of stations at which one or more measurements or samples were obtained. Do *not* report the total number of discrete measurements or samples obtained unless only one measurement was made at each station. Continuous measurements at a station should be counted as one regardless of duration.
2. **Kilometers.**—For parameters followed by "km" on the form, enter the total number of kilometers steamed while the particular measurement was being made.
3. **Check.**—For parameters followed by a check mark (✓) on the form, merely enter a check mark if the parameter was obtained at any time during the project. No quantitative entry is required.

Q.—See explanation for "Queries concerning data."

FD.—See explanation for "Final disposition of data."

Type of format available.—Specify the format in which the data are expected to be available in their final disposition. Use the following abbreviations:

RDS — Raw data sheets.
RDC — Reduced data cards (or sheets).
PUB — Publication (or report).
AMT — Analog magnetic tape.
MT — Digital magnetic tape.
PC — Punched cards.
AT — Analog traces (or graphs).
Please identify any other abbreviations used.

Queries concerning data.—Enter the names of individuals or agencies to whom questions concerning the data should be addressed. To tie the name to the data, enter the letter printed on the line of the name into the column headed "Q" on the line of specified data.

Final disposition of data.—Enter name of the institution; national, regional, or World Data Center; or other repository from which the data will be available for international exchange. To tie the name to the data, enter the letter printed on the line of the name into the column headed "FD" on the line of specified data.

Comments.—Enter in the "Comments" column any information deemed necessary to amplify or clarify entries, f. ex., identification of the types of plankton nets used, the types of coring devices used, etc.

Total kilometers steamed.—Enter the total number of kilometers steamed during the course of the cruise.

Area covered by the observational program.—This information may be provided in any or several of the following ways:

1. Mark the Marsden square(s) in which data were gathered with an "X" on the chartlet printed on the form.
2. Attach copy of the cruise track chart.
3. To index the types of data collected by 5° or 1° square, use the attached optional table. Enter parameter number or groups of numbers on the left and applicable Marsden and 5° or 1° square code numbers on the right. For coding 5° and 1° square numbers, please use the coding key provided on the optional table.

GPO 903-444

OPTIONAL TABLE FOR INDEXING
GEOGRAPHIC DISTRIBUTION OF OBSERVATIONS/DATA/SAMPLES

Parameter Number(s)	Enter 10° square (Marsden square) and either 5° square or 1° square.

REPORT OF OBSERVATIONS/SAMPLES COLLECTED BY OCEANOGRAPHIC PROGRAMS (ROSCOP)

SHIP OR PLATFORM	SCIENTIST IN CHARGE	EXPEDITION, PROJECT, AND/OR ORIGINATOR'S CRUISE NO.	COUNTRY
INSTITUTION OR OPERATING AGENCY		DATE OF CRUISE FROM: DAY / MONTH / YEAR TO: DAY / MONTH / YEAR	

PROGRAMS UNDERTAKEN	TOTAL NO. OF △ STATIONS	Q	F D	TYPE OF FORMAT AVAILABLE
DESCRIPTIVE OCEANOGRAPHY				
D 1 SERIAL STATIONS				
D 2 STD				
D 3 OXYGEN				
D 4 PHOSPHATES				
D 5 TOTAL-P				
D 6 NITRATES				
D 7 NITRITES				
D 8 TRACE ELEMENTS				
D 9 pH				
D 10 ALKALINITY				
D 11 SILICATES				
D 12 RADIOACTIVITY				
D 13 ISOTOPE CHEMISTRY				
D 14 OTHER DISSOLVED GASES				
D 15 BATHYTHERMOGRAPH (XBT) (NO OF DROPS)				
D 16 BATHYTHERMOGRAPH (MECH.) (NO OF DROPS)				
D 17 TRANSPARENCY (NO OF OBS.)				
D 18 SOUND VELOCIMETER DATA				
D 19 INSTRUMENTED WAVE RECORDING (✓)				
D 20 TIDES (✓)				
D 21 SEA (✓)				
D 22 SWELL (✓)				
D 23 ICE (✓)				
D 24 BOTTOM TEMPERATURE (≤ 10M FROM BOTTOM)				
D 25 SEA SURFACE TEMPERATURE (✓)				
CURRENT MEASUREMENTS				
C 1 CURRENT METERS				
C 1 CONTINUOUS TIME SERIES (NO OF DAYS)				
C 2 GEK (✓)				
C 3 DROGUES (✓)				
C 4 SWALLOW FLOATS (✓)				
C 5 SURFACE DRIFTERS (NO RELEASED)				
C 6 BOTTOM DRIFTERS (NO RELEASED)				
METEOROLOGY				
M 1 UPPER AIR OBSERVATIONS (✓)				
M 2 SURFACE METEOROLOGICAL OBS (✓)				
M 3 INCIDENT RADIATION (✓)				
GEOLOGY AND GEOPHYSICS				
G 1 DREDGE AND GRAB SAMPLES (NO OF SAMPLES)				
G 2 CORES (NO CORES)				
G 3 SEISMIC—REFLECTION PROFILES (Km)				
G 4 SEISMIC—REFRACTION PROFILES				
G 5 HEAT FLOW				
G 6 GRAVITY (Km)				
G 7 MAGNETIC (Km)				
G 8 CHEMICAL ANALYSIS OF SEDIMENT (✓)				
G 9 PHYSICAL ANALYSIS OF SEDIMENT (✓)				
G 10 ENGINEERING PROPERTIES OF SEA BOTTOM				
G 11 BOTTOM PHOTOGRAPHY (NO. OF CAMERA STATIONS)				
G 12 PALEONTOLOGY (✓)				
G 13 PALEOMAGNETISM AND ROCK MAGNETISM (✓)				
G 14 GEOCHRONOLOGY (✓)				
G 15 MINERAL RESOURCES (✓)				
G 16 BATHYMETRY—WIDE BEAM (Km)				
G 17 BATHYMETRY—NARROW BEAM (Km)				
G 18 BOTTOM RESISTIVITY				
G 19 SOUND PROPAGATION IN SEDIMENT				
G 20 DRILL HOLES (NO. OF DRILL HOLES)				
G 21 BOTTOM TEMPERATURE (≤ 1M FROM BOTTOM)				

Q **QUERIES CONCERNING DATA SHOULD BE ADDRESSED TO:**

a

b

c

d

e

f

F D **FINAL DISPOSITION OF DATA**
(NATIONAL REPOSITORY, INSTITUTION, REGIONAL CENTER, OR WORLD DATA CENTERS)

a

b

c

d

e

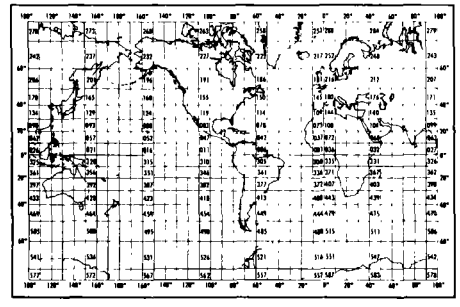
f

△ ENTER NUMBER OF STATIONS, EXCEPT WHEN ANNOTATED OTHERWISE FOLLOWING PARAMETER WHEN OBSERVED PARAMETER IS FOLLOWED BY A CHECK MARK (✓); DO NOT ENTER ANY NUMBER BUT ENTER THE CHECK MARK INSTEAD

WHEN THE OBSERVATION IS IN NAUTICAL OR STATUTE MILES RATHER THAN KILOMETERS, INDICATE SO

PROGRAMS UNDERTAKEN	TOTAL NO. OF △ STATIONS	Q	F D	TYPE OF FORMAT AVAILABLE
GEOLOGY AND GEOPHYSICS (CONTINUED)				
G 22 BOTTOM RADIOACTIVITY (✓)				
G 23 SIDE-SCANNING SONAR (Km)				
BIOLOGY				
B 1 PRIMARY ORGANIC PRODUCTION				
B 2 PHYTOPLANKTON PIGMENT CONCENTRATION				
B 3 PARTICULATE ORGANIC MATTER				
B 4 DISSOLVED ORGANIC MATTER				
B 5 NEUSTON AND PLEUSTON				
B 6 BACTERIA AND OTHER MICROORGANISMS				
B 7 PHYTOPLANKTON				
B 8 ZOOPLANKTON				
B 9 FISH EGGS AND/OR LARVAE				
B 10 MICRONEKTON				
B 11 INVERTEBRATE NEKTON				
B 12 PELAGIC FISHES				
B 13 DEMERSAL FISHES				
B 14 PHYTOBENTHOS				
B 15 ZOOBENTHOS				
B 16 AVES (✓)				
B 17 PINNIPEDIA (✓)				
B 18 CETACEA (✓)				
B 19 BIOLOGICAL SOUNDS (SPECIFY CRUSTACEA PISCES, CETACEA, OTHER) (✓)				
B 20 SOUND SCATTERING LAYER (DSL) (✓)				
B 21 BIOLUMINESCENCE (VISUAL OR INSTRUMENTED) (✓)				
B 22 FIELD OBSERVATIONS ON BEHAVIOR (SPECIFY GROUP) (✓)				
B 23 BORERS AND FOULERS (✓)				
B 24 BIOLOGICAL POLLUTANTS				
OTHER OBSERVATIONS				
O 1				
O 2				
O 3				
O 4				

GENERAL AREA OF PROGRAM



Prepared By _____
(NAME AND AFFILIATION)

REMARKS

IF ALL DATA WERE OBTAINED AT A FIXED STATION ENTER COORDINATES

° ′ ″ N/S

° ′ ″ E/W

TOTAL KILOMETERS STEAMED

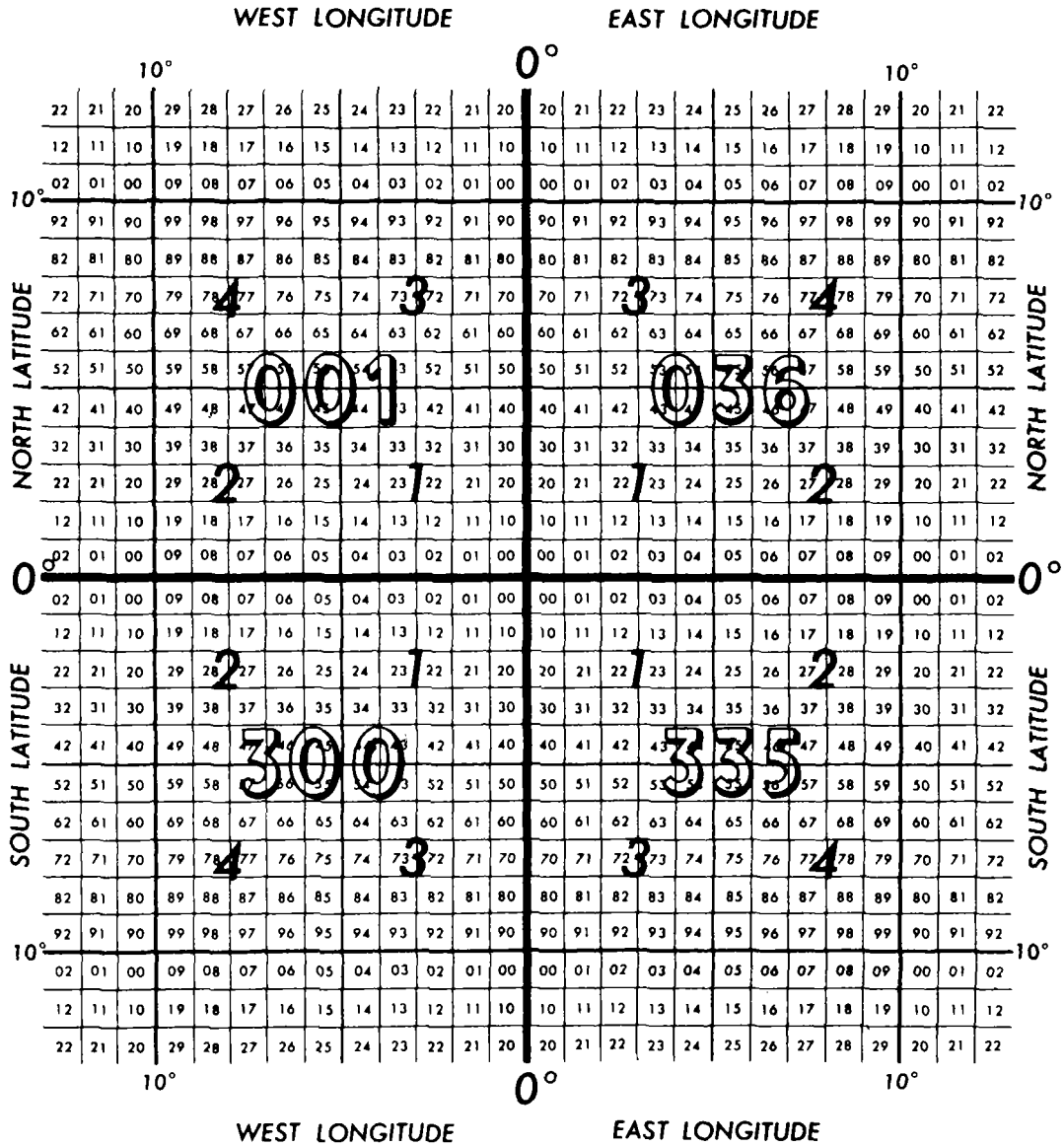
DATA REPORTED ON THIS FORM ARE DECLARED NATIONAL PROGRAM (DNP)

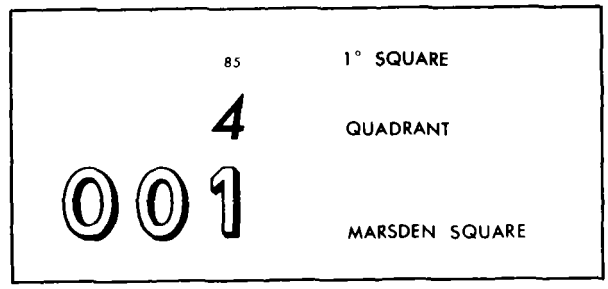
( ) YES

( ) NO

( ) PART (SPECIFY)

CODE KEY FOR 5° AND 1° DIVISIONS OF MARSDEN SQUARES





INTERNATIONAL GEOLOGICAL / GEOPHYSICAL CRUISE INVENTORY

CRUISE MASTER SHEET

REFERENCE

PLATFORM

SHIP / PLATFORM

Name: .....

Type: .....

INST

INSTITUTE RESPONSIBLE FOR PROGRAMME

Name: .....

Address: .....

.....

.....

CTY

CHIEF SCIENTIST

Name: .....

Insttitute Address: .....

.....

.....

CRUISE

Name / Number: .....

Leg: .....

Dates:

	year	month	day
From			
To			

INSTRUCTIONS

1. Begin a new pad for each cruise/leg, or with each change of Chief Scientist. Alternate Daily Log Sheets are perforated at top for easy removal of carbon copies for your own records. Mail pads otherwise intact, even if only partially used.

2. Complete Cruise Master Sheets at top and bottom of each pad.

3. TRAVERSE ENTRIES. Use two consecutive lines for the start and end positions respectively of each traverse. For inventory purposes, a traverse is terminated by (a) a major course alteration, (b) a point at which an instrument system starts or ceases to operate, and (c) a station. Along the line for the end position of each traverse, check the columns for each data collecting system in operation during that traverse.

4. STATIONS. Use one or more separate lines (interposed between the end of one traverse and the start of the next) to check the appropriate columns for date, position, depth and type(s) of data collected at each station. (Disregard change of position due to drift on station if less than five miles).

NOTE : This form, upon completion, should be sent to the appropriate national oceanographic data center or designated national agency where so instructed ; otherwise sent to WDC-A or WDC-B, Oceanography.

INTERNATIONAL GEOLOGICAL / GEOPHYSICAL CRUISE INVENTORY

Page ...... of .....

DAILY LOG SHEET

Ship ______________________ Cruise ______________________

DATE			LAT.			LONG.			DEPTH	TRAVERSE						STATION																	REMARKS
Year	Month	Day	Degrees	Minutes	N. or S.	Degrees	Minutes	E. or W.	Metres	Magnetic	Gravity	Seis. Reflect.	Seis. Refract.	Side Scan. Son.	Other (specify)	Core	Drill Hole	Dredge, Grab	Direct Sample	Bottom Resist.	Sound Prop.	Photo,Movie,T.V.	Heat Flow	Bottom Current	Bottom Rad.	Geotech.	Gravity	Near-Bottom Water Sample	Other (specify)	CONSEC. NUMBER (Leave Blank)	ORIGINATOR STATION NUMBER		
1 2	3 4	5 6	7 8	9 10	11	12 13 14	15 16	17	18 19 20 21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42 43 44 45	46 47 48 49		

Appendix 8

Selected recommendations of SCOR and ACMRR Working Groups

Extract from
Report of SCOR Working Group 32
Biological Data Inventories
Washington, D. C.
7-10 April 1970

SCOR/ACMRR Working Group 32 Recommends:

1. That the IOC take steps to provide it, as a basis for further work of the Group, with up-to-date information on the status and current mode of operation of National Oceanographic Data Centres (NODC's) and Designated National Agencies (DNA's) with respect to biological data and information. It suggests that such information be obtained by the Chairman of the IOC Working Group on Data Exchange from these centres and agencies.

2. That WDC-A run trials on the Smithsonian Global Reference Code System for geographical areas for marine inventory retrieval and report the results to the IOC Working Group on Data Exchange for its meeting in September 1970.

3. That the terms of reference of Working Group 32 be broadened to include, at a future meeting, improvements and standardization of shipboard data logging for marine biological samples.

4. That a directory of marine biological centres engaged in sorting of samples collected in international and national cruises be published by IOC. The Working Group invites the Smithsonian Oceanographic Sorting Center to collect the necessary information from the marine biological centres for evaluation and processing by SCOR/ACMRR Working Group 32. The Smithsonian Oceanographic Sorting Center is also invited to draft a format and procedures for inventories of sample holdings in marine biological centres and report back to the Working Group.

5. That the Smithsonian Oceanographic Sorting Center, in collaboration with WDC-A, develop standardized forms to serve as a retrieval system on the data derived from the sample holdings of marine biological centres and report back to this Working Group.

6. That SCOR urge IUBS/ICSU to affect an immediate selection and adoption of a uniform automated processing system for retrieval of taxa.

7. That IOC consider the possibility of training selected staff members of the national oceanographic data centres and marine biological centres engaged in sorting samples by awarding fellowships or holding training courses on information storage and retrieval as well as data recording and processing.

United Nations Educational,
Scientific and Cultural Organization

INTERNATIONAL OCEANOGRAPHIC COMMISSION

Working Group on International Oceanographic Data Exchange

(Fifth session, United Nations, Geneva
21-25 September 1970)

Appendix 9

SUGGESTIONS FOR ADJUSTING THE SCOPE AND NATURE OF THE ARRANGEMENTS FOR INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE AND DEVELOPING THESE INTO A CO-ORDINATED SYSTEM

(Prepared by the Secretariat)

1. BACKGROUND

Since the inception of the International Geophysical Year, the exchange of oceanographic data has been a foremost example of international co-operation in scientific endeavours. Through a series of evolutionary steps the arrangements for international oceanographic data exchange involve the following actions:

(a) Announcement of National Oceanographic Programmes, and the main data categories, planned or completed in the publication, International Marine Science(1) with a voluntary declaration that all or part of the data will be available for international exchange. Such data is included in the "Declared National Programme" (DNP);

(b) The submission of certain types of data, so far mainly physical and some biological, to the WDCs in accordance with the provisions of the IOC Manual on International Oceanographic Data Exchange. The WDCs are maintained at the expense of the host country and their policies subject to review by the steering committee for WDCs under CIG-ICSU;

(c) The Manual for International Oceanographic Data Exchange, prepared by the IOC in accordance with IOC resolutions, be kept under constant review by the IOC Working Group on International Oceanographic Data Exchange. Its contents rely on the advice of SCOR and ACMRR;

(d) The WDCs for Oceanography exchange all data in their files, publish catalogues of their holdings (and of some types of DNP data not actually held) and provide copies of their data to any requesters on an equivalent exchange basis. Though authorized, the WDCs have not imposed direct charge for their services. Additionally, data not part of DNP have been donated to the WDCs;

(e) Additional arrangements for data exchange and distribution exist for special exchanges on a disciplinary or regional basis. Specialized centres exist for fishery and certain general biological data, and for tidal, sea-level and bathymetric data. Regional arrangements are of two kinds - permanent regional centres such as that of ICES, established under international agreements, and selected NODCs which serve for a limited duration as regional centres in connexion with specific co-operative investigations. In each case working agreements of some kind must exist to define the relationships between these elements with the WDCs and generally within the world system.

2. PROBLEM

New national and international initiatives in oceanography will no doubt result in rapid proliferation of data both in quantity and in variety with the parallel development of new instruments and methods. At the same time increased demands for types of data not fully exchanged in the past, especially geologic, geophysical and biological must be anticipated. Apprehension that the present arrangements for exchange will prove inadequate to manage the coming flood of data and thus fail to create an international resource yielding the full scientific benefits from these new initiatives, has been expressed by various groups of the scientific community (cf. Global Ocean Research - Ponza Report; Comprehensive Outline for the Long-Term and Expanded Programme - LEPOR). The IOC early recognized the need for strengthening procedures for data exchange with these considerations culminating in Resolution V-20A which directs the Working Group on International Oceanographic Data Exchange to reappraise the international data exchange system and to find means to make it more responsive to the needs of new programmes (such as LEPOR and IGOSS). The Ad Hoc Group on Format Standardization, considering the technical and financial implications to WDCs of managing the eventually very voluminous data bases accruing under the present concept, recommended that the WDCs gradually

(1) DNP announcements are now made through IOC circular letters and therefore will not be contained in future issues of IMS.

become automated documentation centres and urged that exchange of data be facilitated through development of international acceptance of standard formats for all types of oceanographic data. Work on the latter has proved to be a lengthy and difficult process and it is somewhat premature to expect the achievement of effective results for some time to come. In this respect the emergence of a growing number of NODCs with their diverse computer capabilities and practices has added a new dimension to the problem, and possibly to the solution, of standard formats. Meanwhile, other bodies, notably those concerned with the planning of LEPOR, IGOSS and co-operative investigation, look to the Working Group on International Oceanographic Data Exchange to develop procedures for an oceanographic data exchange system.

3. PROPOSED ACTION

It is suggested that the Working Group consider the following matters concerning the revision and redefinition of components of the international oceanographic data exchange arrangements:

(a) Establishment of an international referral-inventory system. Under this concept each member nation would:

(1) on a timely and continuing basis, report the types of data and samples resulting from ongoing national or co-operative programmes which it intends to make available for international exchange. This report would serve as the equivalent of the DNP;

(2) periodically provide an inventory of the types volume and distribution of data available for international exchange that are held in processed form by its NODC, DNA, designated regional or special centre. Such individual data holdings may represent the national effort or be a compendium of existing data from various sources providing coverage for a specific area. The WDCs would be requested to assume responsibility for compiling, maintaining and providing service from these two types of indexes/inventories.

(b) Establishment of a world data bank (WDB) for oceanography. It is proposed that all such data held by NODCs, DNAs, etc., for which inventories have been submitted to the WDCs be considered part of a world oceanographic data bank. Participants in the world data bank would have the following obligations:

(1) maintaining, safeguarding and providing documentation and reviewing quality of all WDB data;

(2) exchange WDB data and documentation on request with member countries at national expense, either directly or through the WDCs. Until such time as internationally or regionally agreed standards for specific data types have been established, provide the data, as feasible and practicable, in formats and media appropriate to the requesters' data-processing capability, especially in the case of developing countries.

(c) Continuation of WDC data functions. It is proposed that the WDCs continue the present system of data services for (1) all member countries which do not have an NODC and which wish to use the WDCs as a repository of their internationally exchangeable data and (2) any other data voluntarily contributed by any source to the WDC for international exchange. The WDC would continue to catalogue their own holdings.

(d) The rôle of the IOC Manual. It is proposed that the Manual be revised in format and content so as to serve as an authoritative and timely source of information on all aspects of data exchange. Under this concept the Manual would report on the substance and detail of:

(1) intergovernmental agreements and resolutions concerning data exchange;

(2) specific obligation to declare inventory and/or exchange data and information resulting from co-operative ventures, or under the aegis of international programmes such as LEPOR, IDOE, IGOSS, etc.;

(3) details and mechanics of the established data exchange system including the rôle and responsibility of the NODCs, DNAs, regional and disciplinary specialized centres, etc.;

(4) standardization of formats, methods and procedures to enhance the quality and exchangeability of data.

In accordance with existing IOC resolutions, preparing specific proposals for revision of the Manual would be the responsibility of the IOC Working Group on International Oceanographic Data Exchange, in co-operation as necessary with other subsidiary bodies of the IOC that may be concerned with the advice of the Commission's scientific advisory bodies, and in consultation with ICSU and other organizations concerned with related aspects of international exchange of environmental and resource data.

Appendix 10

List of acronyms and abbreviations used in Manual

ACMRR	Advisory Committee on Marine Resources Research
BOMEX	Barbados Oceanographic and Meteorological Experiment
BT	Bathythermograph (or bathythermogram)
CICAR	Cooperative Investigations of the Caribbean and Adjacent Regions
CIG	Comité International de Géophysique
CIM	Cooperative Investigations of the Mediterranean
CMG	Commission for Marine Geology (IUGS)
COSPAR	Committee on Space Research (ICSU)
CSAGI	Comité Spécial de l'Année Géophysique Internationale (Special Committee for the International Geophysical Year)
CSK	Cooperative Study of the Kuroshio
CTD	Conductivity-Temperature-Depth
DNA	Designated National Agency
DNP	Declared National Programme
ECOR	Engineering Committee on Oceanic Research
FAGS	Federation of Astronomical and Geophysical Services (ICSU)
FAO	Food and Agriculture Organization
GARP	Global Atmospheric Research Programme
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Pollution
GELTSPAP	Group of Experts on Long-Term Scientific Policy and Planning
IAEA	International Atomic Energy Agency (UN)
IAU	International Astronomical Union
ICES	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
IDOE	International Decade of Ocean Exploration
IGGCI	International Geological/Geophysical Cruise Inventory
IGOSS	Integrated Global Ocean Station System
IGY	International Geophysical Year
IHB	International Hydrographic Bureau
IHO	International Hydrographic Organization
IMCO	Intergovernmental Maritime Consultative Organization
IMS	"International Marine Science", a Unesco quarterly journal
IOC	Intergovernmental Oceanographic Commission
IQSY	International Years of the Quiet Sun
IUBS	International Union of Biological Sciences (ICSU)
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences (ICSU)
LEPOR	Long-Term and Expanded Programme of Oceanographic Exploration and Research (IOC)
NODC	National Oceanographic Data Center
NOP	National Oceanographic Programme
PSMSL	Permanent Service for Mean Sea Level
ROSCOP	Report of Observations/Samples Collected by Oceanographic Programmes
SCAR	Scientific Committee on Antarctic Research
SCOPE	Scientific Committee on Problems of the Environment (ICSU)
SCOR	Scientific Committee on Oceanic Research
STD	Salinity-Temperature-Depth
UNESCO	United Nations Educational, Scientific and Cultural Organization
URSI	Union Radio Scientifique Internationale (International Scientific Radio Union) (ICSU)
WDC	World Data Centre
WMO	World Meteorological Organization
WWW	World Weather Watch (WMO)
XBT	Expendable bathythermograph

Appendix 11

Standard criteria for the exchange of STD data

STD DATA

1. Minimum standard (Nansen cast equivalent standard). Sufficient depth or pressure levels selected to describe the major features of the vertical temperature and salinity (or conductivity) profile, determined subjectively but with special care to include the top and bottom of isothermal and isohaline intervals and additionally, including the IAPSO standard depths. STD data encoded in this manner should be the equivalent of data resulting from a well sampled (multicast) serial depth station. It is assumed that generally at most 18 depths plus the IAPSO standard depths would be needed to adequately describe the upper 1500 metres of the water column.

2. Intermediate optimum standard (99 level standard). Selection of depth or pressure levels from digital STDs according to the original optimum ICES specifications or better but with progressive relaxation of these standards whenever necessary to confine the record to a maximum of 99 depth (or pressure) levels including the IAPSO standard depths. If possible the compression technique used should preserve isothermal and isohaline intervals especially in the upper 200 to 300 metres of the water column.

3. Optional optimum standard (1969 ICES standard). The optimum standard for STD data as proposed in 1969(1) should continue to be considered for eventual use in exchange of STD data between participants which have suitable computer facilities. However, such participants should be prepared to further compress their STD data to the standards recommended in (1) or (2) above when so requested by an activity not wishing to receive voluminous records.

4. For STD data in any of the 3 categories above, whenever possible every effort be made to adjust the record with the intention to achieve accuracies compatible with Nansen casts, including removal of any spurious "spikes" or "noise" prior to exchange.

5. All STD data in exchange be accompanied by some written or codified documentation concerning method of reduction, accuracy, format of records, etc.

6. Institutes and NODCs be encouraged to store and preserve the primary (i.e. uncompressed) digital and/or analog STD data at least for a period of several years, and to make copies of such data available for those researchers for whose purposes the compressed records may not suffice. It is assumed that such data can be readily located through inventories such as ROSCOP.

(1) Note: Standards for exchange of STD data originally proposed (Dublin 1969); optimum standard: "-- STD data should be in digital form, processed if possible with the intention to achieve, as a minimum, an accuracy compatible with Nansen cast data. Data should be recorded at 2-3-metre depth intervals or at "flexure" points, the latter spaced such that linear interpolations will not deviate more than +0.03°C and 0.04 o/oo from the original record.

Appendix 12

Extract from
Report of SCOR Working Group 21
on
Continuous Current Velocity Measurement (with IAPSO and Unesco)

REPORT OF MEETING IN DUBLIN, 25-27 SEPTEMBER 1969

Submission of Current Metre Data to Data Centres. The group discussed the question of whether raw or processed current metre data should be submitted for compilation in data centres. While recognizing the need for data centres to be able to meet requests from industrial and other users for information about currents, it was the opinion of the group that data centres should not store lists of raw current metre data. It was proposed that summaries of current information should be submitted. Such summaries might include the following, as a tentative minimum.

Position of observation; depth; depth of metre; type of metre; time of start of record; time of end of record; sampling interval; mean velocity (over whole period); mean velocity (per day or other interval); maximum velocity (over some period); minimum velocity (over some period); speed histogram; direction histogram; progressive vector diagram; location of data repository; data format.

Appendix 13

IOC country code for oceanographic data processing purposes

The following Country Code was recommended by the seventh session of the Intergovernmental Oceanographic Commission Working Group on International Oceanographic Data Exchange for incorporation in the Manual on International Oceanographic Data Exchange. Its maintenance and updating will be provided by the Intergovernmental Oceanographic Commission Working Group on International Oceanographic Data Exchange on a continuing basis.

Code	Country
72	Albania
AL	Algeria
08	Argentina
09	Australia
10	Austria
11	Belgium
13	Bolivia
14	Brazil
15	Bulgaria
12	Burma
18	Canada
19	Ceylon (Sri Lanka)
20	Chile
21	China
22	Colombia
RC	Congo
CR	Costa Rica
CU	Cuba
DA	Dahomey
26	Denmark
70	Dominican Republic
28	Ecuador
27	Egypt
75	El Salvador
34	Finland
35	France
96	German Democratic Republic
06	Germany, Federal Republic of
GH	Ghana
36	Greece
37	Guatemala
GU	Guinea
38	Haiti
HO	Honduras
46	Iceland
41	India
86	Thailand
88	Tunisia
89	Turkey
90	Union of Soviet Socialist Republics
74	United Kingdom
42	Indonesia
IN	Intergovernmental/International
45	Ireland
47	Israel
48	Italy
IC	Ivory Coast
JA	Jamaica
49	Japan
24	Korea, Republic of
52	Lebanon
55	Madagascar
MS	Malaysia
57	Mexico
MO	Monaco
56	Morocco
MZ	Mozambique
64	Netherlands
59	New Calendonia
61	New Zealand
NI	Nigeria
58	Norway
62	Pakistan
PA	Panama
65	Peru
66	Philippines
67	Poland
68	Portugal
73	Romania
SE	Senegal
SL	Sierra Leone
91	South Africa
29	Spain
19	Sri Lanka
SU	Sudan
77	Sweden
ZA	Tanzania, United Republic of
31	United States of America
99	Unknown
92	Uruguay
93	Venezuela
94	Viet-Nam, Republic of
95	Yugoslavia