MARINE DATA AND INFORMATION RESOURCES OF WORLD DATA CENTER A FOR OCEANOGRAPHY

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ABSTRACT

World Data Center A for Oceanography is one of the US components of a global network that facilitates international exchange of scientific data and information. WDC-A, Oceanography is collocated with the US National Oceanographic Data Center (NODC), which operates this facility under the auspices of the US National Academy of Sciences following guidelines of the International Council of Scientific Unions. WDC-A, Oceanography receives both data and publications from more than 50 countries and international organizations; it is the primary conduit by which foreign oceanographic data enter NODC’s archive data files. Through its Catalogue of Data, Catalogue of Accessioned Publications, and other products and services, World Data Center A for Oceanography provides researchers in the United States and around the world with convenient access to a unique and valuable data and information resource. This paper provides a user-oriented description of WDC-A, Oceanography’s operations, products, and services, and its role within the broader context of the international marine data exchange network.

INTRODUCTION

The World Data Center (WDC) system is part of the organizational infrastructure through which nations cooperate in advancing scientific study of the earth. Because the scale of many geophysical phenomena requires observation programs that transcend national borders, progress in the geophysical sciences - including oceanography, meteorology, and solid-earth geophysics - demands international cooperation. Precedents for such cooperation go back to the mid-19th century and even earlier. The event that marks the beginning of the modern era of large-scale earth observation programs, however, is the International Geophysical Year (IGY) of 1957-58.
The World Data Center system was established in 1957 to collect and make available data from the numerous and widespread observational programs of the IGY. Operating under principles set forth by the International Council of Scientific Unions (ICSU), the WDC system served to make these data readily available for an indefinite period of time to interested scientists and scholars. The system also provided a politically neutral mechanism for exchanges between Eastern-bloc and Western nations. Its great success in meeting the needs of the IGY resulted in the system being continued as a permanent part of the international scientific data and information exchange network. Today the operation of the WDC system comes under the purview of the ICSU Panel on World Data Centers.

The system comprises WDC-A subcenters located in the USA; WDC-B subcenters in the USSR; and, for some disciplines, WDC-C subcenters in Western Europe, Australia, and Japan. WDC-A, which is established under the auspices of the US National Academy of Sciences, includes eight discipline subcenters for:

1. oceanography,
2. meteorology,
3. glaciology,
4. solid-earth geophysics
5. marine geology and geophysics,
6. rotation of the earth,
7. solar-terrestrial physics, and
8. rockets and satellites.

These centers are located by the Academy at institutions that can provide appropriate data handling capabilities for their respective disciplines. Five of the eight WDC-A discipline centers (oceanography, meteorology, solid-earth geophysics, solar-terrestrial physics, and marine geology and geophysics) are operated by the US national data centers within the National Environmental Satellite, Data, and Information Service (NESDIS) of the National Oceanic and Atmospheric Administration.

**WDC-A, OCEANOGRAPHY OPERATIONS**

WDC-A, Oceanography is operated by the US National Oceanographic Data Center (NODC), Washington, DC. WDC-A functions are carried out within NODC's International Programs Branch, part of NODC's Information Services Division. The Director, NODC also serves as Director of World Data Center A for Oceanography; the Branch Chief serves as Associate Director.

WDC-B, Oceanography is located in Moscow where it operates under the auspices of the USSR State Committee for Hydrometeorology and Control of Natural Environment. There is no WDC-C for Oceanography. The two WDC's for Oceanography provide each other with copies of all data they receive so that duplicate data collections are maintained to guard against catastrophic loss.
The framework for international oceanographic data exchange is set forth in the ICSU Guide to International Data Exchange through the World Data Centres¹ and the Intergovernmental Oceanographic Commission (IOC) Manual on International Oceanographic Data Exchange.² Although WDC-A, Oceanography welcomes submission of any appropriate data, it has a special mission to receive data from "Declared National Programs." Declared National Programs are those that a nation has specifically designated with the implied intention of exchanging the resulting data internationally. Lists of such programs are compiled, usually annually, by the various national committees on oceanography, submitted to the IOC, and published in various IOC information documents.

The NODC provides data processing support for WDC-A, Oceanography. Appropriate types of data received in computer-readable form are processed by NODC and incorporated into NODC's global data files where they are available for selective retrieval. About 27 percent of all data sets accessioned by NODC are of foreign origin. In its Oceanographic Station Data File, nearly 80 percent of the data are from sources outside the US. WDC-A, Oceanography has played a major role in augmenting the total volume and geographic coverage of NODC data holdings.

In addition to numeric data, (in either computer-readable or hard copy form), WDC-A also receives and archives marine science publications. The international marine data base of WDC-A, Oceanography now contains over 1.9 million observations: WDC-A holds approximately 25,000 marine science publications and articles. In 1984 WDC-A, Oceanography added to its holdings more than 86,000 marine observations (including over 31,000 oceanographic stations) and 1,159 marine science publications and articles from 37 countries and 12 international organizations.³

THE WDC-A, OCEANOGRAPHY CATALOGUES

All data received by WDC-A, Oceanography are listed and described in its Catalogue of Data⁴ which is updated by Change Notices that are now issued annually. The original catalogue and Change Notices Nos. 1-16 are incorporated into a six-volume loose-leaf set. These cover data received from July 1957 through June 1975. Beginning with No. 17, each Change Notice is printed in a modified format as a separate bound publication describing all data received during a specified six-month or one-year period.

Each data set entry includes: country/catalogue number, ship or station name, cruise name or number (if any), data time period, geographic area, amounts and types of observations (measured parameters), data center reference number, and WDC-A accessioned publication number. Each data set is assigned a unique catalogue number that includes data series, country of origin, contributing institution, and ship or platform name. Data series identifies data from either ships or moving platforms (100 series) or from fixed or shore stations (200 series). For example,
catalogue number 106.9 AA-20 denotes ship data (100 series) from Canada (country 06) submitted by the Bedford Institute of Oceanography (Canadian institution 9) and collected on the 20th cruise from which data were received from the Gadus Atlantica (Canadian ship AA).

The catalogue includes lists of country and institution codes. Although coded into the catalogue numbers, ship or station names are also spelled out in each entry. Two indexes are provided: an alphabetical index of ship, platform, or station names and a geographic index based on the International Hydrographic Bureau codes for oceans and seas. Two catalogue features are particularly significant. If data are available in processed digital form, the data reference number of the holding center is provided. The notation "JODC 49826202," for example, means that the data are available under this number from the Japan Oceanographic Data Center. Finally, if the data set is related to a publication submitted to WDC-A, the WDC-A accessioned publication number is listed.

All publications submitted to WDC-A, Oceanography are listed in its Catalogue of Accessioned Publications, which is updated by issuance of annual Supplements. The catalogue includes a listing of publications grouped by country, plus keyword and author indexes. Each publication is assigned an identifying catalogue number similar to those used for data sets. The first two digits identify originating country; the next two digits (after a decimal point) identify the contributing organization; the final three digits (following a dash) are unique sequential numbers assigned to each document. For example, catalogue number 43.02-057 was assigned to the fifty-seventh publication received from the Korean (country 43) Fisheries Research and Development Agency (institution 02). If a publication contains data submitted separately to WDC-A, the relevant data catalogue numbers are listed.

The unique cross-referencing between its data holdings and publication archives is one of the most useful features of the WDC-A, Oceanography system. Through use of its catalogues, researchers and information specialists can approach their needs and requirements from either a data or a publication perspective.

OTHER WDC-A, OCEANOGRAPHY PRODUCTS AND SERVICES

The third of WDC-A, Oceanography's three serial publications is its report on Oceanographic Data Exchange. This publication is an annual report on WDC-A, Oceanography operations. It includes tabular summaries of data received by WDC-A, Oceanography during the year and cumulative totals of data received to date; summaries of data inventory forms and publications submitted and information on data and information supplied to other nations and international organizations are also included.

WDC-A, Oceanography also receives and maintains a file of international marine data inventory forms called the Report of Observations/Samples Collected by Oceanographic Programs (ROSCOP). ROSCOP forms are completed by principal investigators at the end of a cruise or other
data gathering activity. ROSCOP forms provide information on the availability of internationally exchangeable data in advance of the actual receipt of the data by WDC-A, Oceanography and are also useful in providing referrals to data not intended to be exchanged through the WDC system. Through its contacts with oceanographic institutions around the world, WDC-A, Oceanography can provide useful referrals and special services. In a recent example of such service, WDC-A, Oceanography and WDC-B, Oceanography arranged for the exchange of satellite remotely-sensed and in situ chlorophyll data for the Baltic Sea between US and Soviet scientists. The WDC system provides a formal mechanism by which special data or information exchanges can be accomplished.

**WDC-A, OCEANOGRAPHY, NODC, AND THE INTERNATIONAL OCEANOGRAPHIC DATA EXCHANGE NETWORK**

The National Oceanographic Data Center was established in 1961 as the US central archive for global oceanographic data and was the world's first such center. Today - 25 years later - there are NODC's in 30 countries around the globe. The national centers and the two World Data Centers for Oceanography maintain cooperative working relations through the Intergovernmental Oceanographic Commission (IOC). The IOC, which was also established in 1960 and is celebrating its 25th anniversary this year, is a semi-autonomous body that operates within the framework of the United Nations. It helps to coordinate and support international oceanographic programs in much the same way that the World Meteorological Organization (WMO) does for meteorological programs.

The IOC, through its Working Committee on International Oceanographic Data Exchange (WC/IODE), encourages the adoption of those practices intended to facilitate the exchanges of data and information internationally. The WC/IODE approach utilizes task teams, groups of experts, and discipline-oriented rapporteurs to deal with specialized problems confronting international oceanographic data and information exchange. Some of the more important accomplishments of the WC/IODE have been:

1. standardizing forms for reporting and coding data,

2. promulgating the concept of Declared National Programs (DNP's) as national activities being carried out with the intention to exchange the resulting data,

3. assisting in development of national oceanographic data centers,

4. supporting and facilitating exchange of, and access and referral to, information resulting from international programs such as the Marine Environmental Data Information (MEDI) Referral
System and the Aquatic Sciences and Fisheries Information System (ASFIS),

5. adopting the automated General Format 3,

6. providing the mechanism for creation of Responsible National Oceanographic Data Centers (RNODC's), and

7. issuing the *Manual on International Oceanographic Data Exchange*.

The Working Committee usually meets biennially to review and reappraise the entire international oceanographic data and information exchange system. Task teams, groups of experts, and rapporteurs usually conduct their business during the intersessional period, frequently by correspondence.

A Responsible National Oceanographic Data Center (RNODC) is a National Oceanographic Data Center (NODC) that volunteers its data management capabilities or advanced data processing services in support of specific international data exchange programs. For example, the US NODC - in collaboration with the French Bureau National des Données Oceaniques - is RNODC for the FGGE Operational Year (FOY) and the UK NODC - the Marine Information and Advisory Service (MIAS) - is the RNODC for wave data. RNODC's serve as Regional Data Centers, project data centers, or as archiving and inventory centers for specialized data. Regional or project data centers are national centers that make their computer facilities available for a limited period and perform data processing and analysis services in support of specific international cooperative research investigations or projects. RNODC's provide particular support to IOC Member States having few or no data processing facilities, by converting internationally exchangeable data from their national (or international) program into IOC-approved exchange formats and/or on to computer compatible media.

Over the past 25 years the individual components of the international oceanographic data exchange network - the World Data Centers, national data centers, and the IOC - have grown and developed and established functional working relationships needed to support the increasing demands of global "big science" oceanographic research programs.

**OBTAINING WDC-A, OCEANOGRAPHY PRODUCTS AND SERVICES**

In general, small requests from individuals or activities affiliated with national or regional contributors to WDC-A, Oceanography will be considered as exchange services and will be fulfilled without charge. Similar requests from non-contributors may be handled in the same way. In the case of large or specialized requests by noncontributors, WDC-A, Oceanography will recover the costs for processing and shipping. Unusually voluminous requests, or requests for special data services or
products not readily available at WDC-A, Oceanography may be serviced by a regional, national, or disciplinary center or by a Responsible National Oceanographic Data Center, at the request of WDC-A, Oceanography. The requester will be charged an amount not to exceed the cost of processing and shipping. It should be re-emphasized that WDC-A, Oceanography has no facilities for computer processing of data; all ADP support for its operations is provided by the collocated US NODC. Detailed information on NODC digital data files is provided in the *NODC Users Guide*.6

Arrangements can be made to borrow from WDC-A, Oceanography any publication for which a duplicate is held by the Center. The normal loan period is one month, excluding transmittal time. Copies or extracts of noncopyrighted materials may be provided on request, at a cost not to exceed that of reproduction and mailing.

All requests for WDC-A, Oceanography products and services should be directed to:

World Data Center A for Oceanography
NOAA
Washington, DC 20235

Telephone: 202-634-7249 (commercial)
FTS 634-7249

CONCLUSION

As an archival facility for both numeric data and marine science publications received from institutions around the world, World Data Center A for Oceanography provides a unique data and information resource for marine researchers. Because many data acquired by WDC-A, Oceanography enter the digital data files of the US National Oceanographic Data Center, WDC-A operations have therefore also benefitted most NODC data users. Although WDC-A, Oceanography data and information are available without restriction to all users, limits on available funding, personnel, and facilities may restrict the level of service that can be provided to individuals and activities that are not contributors.

BIBLIOGRAPHY


