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REPORT ON ACTIVITIES OF THE WORLD DATA CENTRES

World Data Center for Oceanography - Tianjin, China
REPORT ON ACTIVITIES OF THE WORLD DATA CENTRES:
World Data Center for Oceanography - Tianjin, China

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   WDC for Oceanographic, Tianjin, China

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3. Data Centre Address
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   People's Republic of China

4. Data Center URL (homepage):
   http://www.coi.gov.cn

5. Data Centre on-line data access URL (if applicable):
   • WDC-D for Oceanography, Tianjin, China Information Website
     http://wdc-d.coi.gov.cn
   • Asian Regional Forum Ocean Information Website
     http://www.arfmarinfo.org
   • NEAR-GOOS Website
     http://near-goos.coi.gov.cn
   • China Argo Data Center Website
     http://www.argo-cndc.org
   • JCOMM information Website
     http://jcomm.coi.gov.cn

6. IODE Data Center Designation Date:
   1982

7. Description of World Data Center data flow:

   How does data flow operate in your World Data Center (if possible illustrate by means of one or more diagrams)? This should cover:
   (1) Metadata management:
   (2) Quality control:
   (3) Data Archiving:
   (4) Data dissemination:
The data flow in WDC-D for Oceanographic Tianjin, China includes the following steps: collection of marine data; analysis and sorting out; quality control; format transferring; establishment of marine metadata database and group of databases; archiving and maintenance; product making and provision of services.

Data Flow in WDC-D for Oceanographic Tianjin, China

1. Collection of Marine Data

Collection of Marine Data is conducted through native survey and international exchange.

The data of native survey are collected from the following agencies: State Ocean Administration; Chinese Academy of Sciences; Bureau of Fisheries; State Environmental Protection Administration; Universities and Colleges; China Meteorological Administration.

The survey data from State Ocean Administration can be directly delivered to CNODC. The delayed data from other agencies can be collected through some procedure.

The data from international survey are collected from the following agencies:

a. World Data Center (WDC’s)
b. Responsible National Ocean Data Center (RNODC’s)
c. Marine Data Center (MDC’s)
d. National Oceanographic Data Center (NODC’s)
e. Intergovernmental Oceanographic Commission (IOC/IODE)
f. World Meteorological Organization (WMO)
g. International operational oceanographic cooperation projects and programs, such as JCOMM ARGO NEAR-GOOS GODAR GTSPP GTS and so on.

These international data are collected through distribution from relative data management agencies, download from some websites, asking for some data by e-mail or letters and bilateral data exchange.

(2) Analysis and Sorting out

After the above data are collected, some analysis and sorting out need to be made:

a. To analysis and sort out the collected data, to check the elements, spatial and temporal coverage in the dataset and to evaluate the value of the dataset;
b. To check the necessary information, record format and relative codes in the dataset;
c. To check duplication;
d. To check the quality of the dataset.

If there is any important problem to be discovered from the dataset, it will be solved through contact with the original agencies.
e. To design plans for processing the dataset;
f. To begin the data processing;

(3) Quality Control

In order to get higher quality of the dataset, the National Marine Data and Information Service (NMDIS) has developed a quality control system. The system includes three steps: data field verification; relative verification and meteorological verification.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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<tbody>
<tr>
<td>step1</td>
<td>Data field verification</td>
</tr>
<tr>
<td>step2</td>
<td>Relative verification</td>
</tr>
<tr>
<td>step3</td>
<td>Meteorological verification</td>
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</tbody>
</table>

Data Field Verification

It is to check the value of every field in the dataset, to see if every value is acceptable, which include time check, range check and code check. By this procedure it can be sure that the type of every term is right, all values are acceptable, all codes are reasonable, the mandatory fields are present, and there are no illegal characters in all terms.
Relative Verification

As we know, the marine environmental parameters are relative closely. The method using this specificity to do quality control is called relationship verification. For example, the densities of sea water should increase in sequence at one station and same time, if they are not, the water at the station and the time is not stable or some observation value is not correct. By this procedure it can be assured that each observed value is reasonable.

Meteorological Verification

Meteorological verification is to check the values in the dataset and see if they are consistent with those in the meteorological models.

By these procedures of quality control the quality of dataset can be sure.

Format Transferring

With reference to common record format used in the world and combining with the status of native marine data, the NMDIS designed “Application Formats for Oceanographic Data Records”. After quality control all data are transferred into the record formats.

Establishment of marine metadata bases and groups of marine databases

The NMDIS is establishing marine metadata standards and management system for them.

Archiving and Maintenance of Marine Data

The NMDIS has established the national marine data archives. All marine data collected by the NMDIS are stored there.

Data Products

Some products have been made by the NMDIS. The main products include:

- Global Marine Climate Atlas
- Marine Atlas of South China Sea
- Marine Atlas of Bohai Sea, Yellow Sea and East Sea
- Atlas of Marine Environment and Economic Resources
- Dataset of ARGO Data on CD-Rom

Data Products

8 Provision of Service

The NMDIS actively provides marine data and data products to users. All data developed by the NMDIS are stored after digitization and can be distributed through the websites. Users can also contact with NMDIS directly. Service is provided by the NMDIS through the following ways:

- To directly access to NMDIS for native users
- Download from websites;

Up to now the following websites have been established by the NMDIS. Users can download marine data from them.

- China Oceanic Information Network” (COINet )
  - Chinese version: http://www.coi.gov.cn
- Marine Information Sharing Website
  (The Department of National science & Technology)
  http://sdinfo.coi.gov.cn
- WDC-D for Oceanography Tianjin China Information Website
9 Marine Data Quality Management

Marine Data Quality Management includes the quality of service, management and data processing. In order to guarantee the quality of marine data, the NMDIS takes the following measurements:

In the procedure of data collection, processing and management "ISO9001-2000 Quality Management Standards are implemented

To establish some specifications for native marine survey, such as:

• The Specification for Marine Biological Survey
• The Specification for Observation of Chemical Parameters in Sea Water
• The Specification for Ocean Monitoring
• The Specification for Geology and Geophysical Investigation
• The Specification for Acoustical and Optical Parameters in the Sea
• The Specification for Marine Meteorological Observations

Up to now some standards of marine information have been established

• Marine Information Sorts and Codes
• Codes of Marine Database Parameters
• Standards of Marine Metadata
• Specification for Quality Control of Marine Data
• Application Formats for oceanographic data records
• The Marine Bio-taxonomic Codes

8. During the last intersessional period:
8.1 How many organizations sent data to your World Data Centre?

Native There are 6 agencies delivering marine data to NMDIS. They are State Ocean Administration; Chinese Academy of Sciences; Bureau of Fisheries; State Environmental Protection Administration; Universities and Colleges; China Meteorological Administration.

International There are 11 agencies delivering marine data to NMDIS. They are U.S. NODC of USA; NCDC of USA; NGDC of USA; JODC of Japan; Topex Satellite Data Center of France; Global Sea Level Data Center of USA; BODC of U.K.; UCAR of USA; Japan Meteorological Agency; IFREMER of France; MEDS of Canada and PICES center.

8.2 What data products and publications were produced and distributed by your WDC:

The following data products and publications were produced and distributed:

1 Data products
Marine Climate Atlas in the World; Marine Atlas of South China Sea; Marine Atlas of Bohai Sea, Yellow Sea and East Sea; Atlas of Marine Environment and Economic Resources; Dataset of ARGO Data on CD-Rom; Dataset of Temperature and Salinity Profile Data; Monthly Sea Level Data;

According to the agreement between China and USA, WDC-D for Oceanographic Tianjin, China will provide the hourly sea level data of one station to the U.S. NODC.

2  Publications
   Marine Abstracts;
   Oceanic Science Bulletin;
   Marine Information;
   China Ocean Yearbook;
   China Marine Statistical Yearbook;

8.3 Who (physically) visited your WDC (ie as a person, not on-line)?
   WDC-D for Oceanographic Tianjin, China received 14 delegations and 25 experts to visit the NMDIS in 2003-2004.
   (1) Ms. Sylvie and Prof. Gerard from IFREMER visited NMDIS from February 27 to 28, 2003
   (2) Prof. Bob Molinari visited NMDIS from March 11 to 12, 2003.
   (4) The US delegation (Dr. H. Lee Dantzler, Mr. Robert D Gelfeld, Dr. Charles L Sun and Mr. Steven J. Worley) from NODC visited NMDIS from October 20 to 22, 2003
   (5) Prof. Kari Arbouin, Prof. Colin Ryan and Prof. Sharon Ness from James Cook University (Australia) visited NMDIS on December 3, 2003
   (7) Iouri Oliounine from visited NMDIS on March 23, 2004
   (8) Prof. Patricio Bernal, IOC UNESCO Executive Secretary visited NMDIS on April 15, 2004.
   (9) Dr. Charles Sun from NODC of the United States visited NMDIS from April 16 to 25, 2004.
   (10) Dr. Yankov the vice chairman of the International Ocean Institute visited NMDIS on July 7, 2004.
   (13) Dr. Frank Aikman III visited NMDIS from Sept. 21 to 30, 2004.

8.4 What kind and how many requests did your World Data Centre receive? Was this different from previous reporting periods?
   In 2003, 10 requests from users were received, which included 5 requests for marine data (such as the data on marine environment and resources), 2 for inquiring relative technology, one for marine environment protection issue and 2 for words of praises on services of the website.
   In 2004, 59 requests from users were received, which included 2 for inquiring the title of the arctic exploration station, 11 for inquiring marine farming technology, 17 for asking for relative marine data (such as data on marine pollution, tide, disaster and sea ices), 4 for words of praises on services of the website and so on.

8.5 What data and information get passed on to other World Data Centres? Has there been any joint activity with other World Data Centres?
   WDC-D for Oceanography Tianjin, China provided marine data to other WDCs:
(1). China as an IOC Member State takes active part in GLOSS (Global Sea-level Observing System). NMDIS provided monthly sea level data of 7 Chinese gauge stations in time to UH Sea Level Center. The NMDIS also provided hourly sea level data of 14 Chinese gauge stations.

(2). NEAR-GOOS China delayed database has been established and issued on the website. Every month all delayed data are processed, merged and loaded on the NEAR-GOOS database. It meets the requirement that all real-time data are merged into the NEAR-GOOS database after they are issued on website for 30 days. It is convenient for users to access and retrieve these data. WDC-D for Oceanography provided Chinese temperature and salinity data, sea wave data, satellite data, GTS data, buoy data, VOS data and other data to NEAR GOOS website.

(3). China-USA joint air-sea interaction studies in the tropical Western Pacific Ocean
China actively participated in TOGA project. As a part of it, USA-PRC finished air-sea interaction studies in the tropical Western Pacific Ocean 1986-1990. China finished 8 cruises in the equatorial Pacific Ocean. The data of 691 stations were delivered to WDC-A.

(4). China ARGO Data Center has established operational system. By its website Chinese ARGO data can be received, processed and distributed timely. The global ARGO real time data can be received, processed and serviced.

(5). China actively participates in the activities of JCOMM project and coordinates the management of global data. At present China is establishing JCOMM-ODAS Metadata Management Center. Some metadata formats and record formats of some datasets have been collected and sorted. MEDI and ODAS metadata formats have been compared with other metadata formats. The JCOMM metadata navigation website has been established (http://jcomm.coi.gov.cn). Marine metadata standards have been made.

According to the first DMCG meeting held at Paris on May 2002, NMDIS is responsible for processing and serving some sea surface current data stored by BODC. These data have been transferred to and sorted in the NMDIS. Quality control and standardization have been made. They are 5 127 577 stations. Their metadata have been made and issued on website.

(6). China actively participated in GODARS project. NMDIS and NCDC of USA rescued and digitized 3,500,000 records of historical sea surface observed data. It made the temporal coverage of COADS ahead of 50 years. These data have been delivered to WDC-A. China also rescued some native historical data. 400,000 records of historical sea surface data have been digitized and delivered to WDC-A.

(7). The cooperation activities between WDC-D for Oceanography and other WDCs include:
* Bilateral meeting of marine data and information exchange between WDC-d for Oceanography and WDC-A is held every 2 years. Since 1988 the first meeting for marine data exchange, CNODC of China and NODC of USA have been continuously making exchange of marine data and technology. Up to now, eight meetings for marine data exchange have been held. This year the 9th meeting will be held. At the meetings both sides exchanged their marine data, management technology and data processing methods. China has provided the U.S. side with temperature and salinity data of East China Sea and South China Sea, sea level data of 14 gauge stations, T-T data of 14 coastal stations and wave data of 9 coastal stations. According to the plan between USA-PRC, WDC-D for Oceanography will provide the hourly sea level data of one gauge station to WDC-A.
8.6 Do you have contacts with IODE RNODCs? (if so please specify)

Yes. The cooperation between WDC-D for Oceanography and RNODC of Japan has been established.

9 What are the strengths and problems of the present arrangements for the World Data Centre System?

The strengths of the present arrangements for the World Data Center System are in the following fields:

1. It has established world data center network including 70 marine data centers, 3 WDCs and 84 national marine data centers. The network is the base of existence and development of the World Data Center System.

2. It has established necessary organizations to guarantee the development of the World Data Center System.

3. It has planned some global ocean survey projects to provide vitality for the development of the World Data Center System.

4. It has designed relative marine data exchange policies to make the World Data Center System more perfect.

The problems of the present arrangements for the World Data Center System are in the following fields:

The marine activities of every country in the world are different. The World Data Center System should fully consider the interests of every country, especially the interests of the developing countries.

10 What improvements could be made to the World Data Centre System?

The World Data Center System should enhance the exchange and the spread of the advanced application technology, especially the advanced data processing, managing and applying technology of developed countries. Some necessary measurements should be taken for their spread in order to make more countries to use them.

11 What future activities are planned by your WDC?

1. To improve the construction of WDC-D for Oceanography;
2. To improve the construction of ODAS metadata center for JCOMM;
3. To improve the bilateral cooperation and exchange of marine data and information technology.

12 The activities of WDC-D for Oceanographic Tianjin, China

A. The Activities of the International Cooperation Projects
As an IOC Member State, China has actively participated in the activities of the international cooperation projects organized by the IOC.

(a). GLOSS Project

As an IOC Member State, China actively took part in the GLOSS project. Its activities see 8.5 (1).

(b). NEAR-GOOS delayed database construction

China actively participated in the GOOS (Global Ocean Observing System) project organized by the IOC. NEAR-GOOS is one part of it. China delayed database has been established by NMDIS and it has been issued on the website. Every month all delayed data are processed, merged and loaded on the NEAR-GOOS database. It meets the requirement that all real data are merged into the NEAR-GOOS database after they are issued on website for 30 days. It is convenient for users to access and retrieve these data. WDC-D for Oceanography provided Chinese temperature and salinity data, sea wave data, satellite data, GTS data, buoy data, VOS data and other data to NEAR GOOS website. All the Chinese data have been made quality control, such as consistent check, reasonable check, range check, season check and relative check.

Table 1. Data Type and Amount on NEAR-GOOS website

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Amount MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buoy data</td>
<td>2</td>
</tr>
<tr>
<td>Ship Data</td>
<td>13.7</td>
</tr>
<tr>
<td>Coastal T-S Data</td>
<td>0.9</td>
</tr>
<tr>
<td>Coastal Sea Wave Data</td>
<td>4</td>
</tr>
<tr>
<td>Coastal Real-time Data</td>
<td>3.7</td>
</tr>
<tr>
<td>Satellite Data</td>
<td>SST</td>
</tr>
<tr>
<td>Satellite Data</td>
<td>5.3</td>
</tr>
<tr>
<td>GTS Data</td>
<td>358</td>
</tr>
<tr>
<td>Total</td>
<td>387.6</td>
</tr>
</tbody>
</table>

Most of them are Chinese data. It is 97.52%. Up to now the database has received more than 20,000 visitors. With the expanding of the delayed database it will be used by more and more users.

(c). China-USA joint air-sea interaction studies in the tropical Western Pacific Ocean (TOGA)

The activities of WDC-D for Oceanographic, Tianjin China see 8.5 (3).

(d). To establish China ARGO Data Center operational system.

ARGO (The Array for Real-time Geostrophic Oceanography) is a global survey project organized by the IOC. China joined the project in October 2001. China ARGO data center was established on December 2002. The construction of its operational system has proceeded. Some achievements have been made:

* To establish receiving, processing and distribution system of ARGO data
  This system has been established and operated. By this system ARGO data can be searched and received automatically. The real-time data can be processed and distributed on website.

* To establish ARGO databases
  The ARGO databases have been established preliminarily. They include ARGO real-time profile database, metadata database, floating trace database, technology database and float deployment database. The relative database management system and distribution system are being developed.

* The ARGO float profile data in ASCII format have been distributed on the website of China ARGO data center since March 2003. The data are updated every day. With the improvement of
ARGO databases, the website service of these databases is provided. The design of the relative information and web page has been finished primarily.

* In order to process the ARGO data and serve users, the relative marine background data product has been designed and has been provided for users through China ARGO data center website.

* The application study of salinity and density model and Annie method in ARGO data quality control has been made. Some results have been achieved. The relative quality control operational model has been developing. The visual quality control system has been designed.

(e). The activities for JCOMM

JCOMM (Joint WMO/IOC Technical Commission for Oceanographic and Marine Meteorology) is an important international oceanographic and meteorological cooperation project. China is actively working for it. Dr Shaohua Lin, as Chairperson of Data Management Programme Area Coordination Group of JCOMM (DMCG/JCOMM), presided over the first session of DMCG and made the global data management coordination. The China National Marine Data And Information Service (NMDIS) requested to undertake task and has worked out the detailed work plan for carrying out comparative studies of the metadata formats of the JCOMM data. The following related comparative research work has been conducted by NMDIS in accordance with the above-mentioned plan.

It has collected part of the metadata formats and the actual data record formats and sorted out part of the content.

It has made preliminary comparison of the metadata formats MEDI and ODAS.

It has carried out comparison of the MEDI and ODAS formats with several other metadata formats and get some comparative research information.

It has accomplished the design of the main web page for navigation service of JCOMM metadata.

The standard of marine metadata information has been designed.

(f). China actively participated in GODARS project. Some work has been done:

The activities see 8.5 (6).

B. The Construction and Service of WDC-D for Oceanographic (NMDIS)

(a). Construction of WDC-D for Oceanographic Tianjin, China

NMDIS has made great progress in the construction of WDC-D for Oceanography:

1. To enhance marine data collection, procession, management and service;

2. To establish marine data standard system. The following standards have been established:

   - Marine Information Sorts and Codes;
   - Codes of Marine Database Parameters;
   - Standards of Marine Metadata;
   - Specification for Quality Control of Marine Data;
   - Application Formats for oceanographic data records;

3. To establish the native metadata database and group of databases. This work has made remarkable progress.

4. To enhance the importance of new product development. Some work is proceeding.

5. To establish the network navigation system. The data of 14 Chinese coastal stations have been distributed through this network.
6 To develop quality control methods and data assimilation technology
   The quality control system has been established. The ISO9000 standard has been used. The data
   assimilation technology has been developing, such as the assimilation of sea level data and tide
   data.
7 To develop the extraction technology of satellite data.
8 To work for some international cooperation projects, such as GOOS, NEAR-GOOS,
   SEAGOOS, ARGO etc;
9 To establish WDC-D oceanographic center website
   The following websites have been established:
   • China Oceanic Information Network (COINet)
     – Chinese version:
     http://www.coi.gov.cn
     – English version
     http://www.coi.gov.cn/eindex.html
   • Marine Information Sharing Website
     (The Department of National science & Technologic)
     http://sdinfo.coi.gov.cn
   • WDC-D for Oceanographic Tianjin China Information Website
     http://wdc-d.coi.gov.cn
   • Asian Regional Forum Ocean Information Website
     http://www.arfmarinfo.org
   • NEAR-GOOS Website
     http://near-goos.coi.gov.cn
   • JCOMM Information Website
     http://jcomm.coi.gov.cn
   • China-America Costal Management Cooperation Website
     http://www.coi.gov.cn/projects/us-china
   • SOA Government Information Website
     http://www.gov.cn
(b). Asian Regional Forum Ocean Information Website
   The Asian Regional Forum Ocean Information Website was established by NMDIS in Nov. 2001.
   Some information, such as marine data inquiring, retrieving and products, has been issued on the
   web.
(c). To participate in the International Symposium of Marine Data Policy
(d). To provide the international exchange and service of marine data
   China, as IOC Member State, distributed its marine data to the countries and organizations in
   the world.
   • The monthly sea level data of 7 Chinese gauge stations observed before 2004 and the hourly sea
     level data of 14 Chinese gauge stations observed before 1997 have been delivered to the World
     Sea Level Center.
   • The hourly sea level data of 14 Chinese gauge stations observed before 1997, the T-S data of 14
     Chinese coastal stations, the sea wave data of 9 Chinese coastal stations and some
     oceanographic station data have been delivered to NODC of USA.
The T-S data, sea wave data, satellite data and GTS data from China have been issued on the NEAR-GOOS website.

• To provide service of tidal analysis and prediction.
• To provide service for editing the bathymetric charts of the Western Pacific Ocean.

C. To develop the bilateral cooperation with USA, Korea, Japan, Vietnam and Greece and other relative countries

The eighth meeting of PRC-US joint coordination panel for data and information cooperation was held in China on October 2003. The ninth meeting of the panel will be held in 2005. The cooperation plan between China and Korea has been drafted. The Yellow Sea Observation System (YOOS) would be established through cooperation between China and Korea. The cooperation plan between China and others has been proceeding.

The coverage of the cooperation includes:
(a). To establish bilateral cooperation mechanism

The aim is to establish bilateral intergovernmental cooperation mechanism.
(b). To conduct the exchange of marine data.
(c). To develop the cooperation and exchange of data management and processing technology, especially the exchange of the advanced technology.
(d). To make marine data products
(e). To conduct mutual visitation of data managers and experts of both sides.