

DATA-SHARING WORK OF THE WORLD DATA CENTER FOR GEOPHYSICS, BEIJING

Fenglin Peng^{1,2}, Xiaoyang Shen^{1,2}, Keyun Tang^{1,2}, Jian Zhang^{2,3}, Qinghua Huang⁴, Yuanfang Xu^{1,2}, Bangyan Yue^{1,2}, and Dan Yang^{2,3}

¹Institute of Geology and Geophysics, CAS;

²WDC for Geophysics, Beijing;

³Graduate Univ. of CAS;

⁴Peking University;

WDC for Geophysics, P.O. Box 9825, Beijing, 100029, China; 010-62007977

Email: pengf@mail.ustc.edu

ABSTRACT

The World Data Center (WDC) for Geophysics, Beijing, was founded in 1988. Supported by The Chinese Academy of Science and The Ministry of Science and Technology, our center has made much progress in recent years. The center has not only established the database to restore data which contain heat flow data, geomagnetic data, gravity data, etc. but also put them on the Internet (<http://gp.wdc.cn>) to provide free data service. The center has expended a great deal of effort to rescue the magnetograms observed 100 years ago by the Sheshan Observatory, the earliest geomagnetic observatory in China. The geophysics data of our center are abundant, and the way to get the data and information from the website is very simple and easily obtainable. In the future, the center will edit more data and construct a strong, convenient database in order to provide the better service to users.

Keywords: Geophysics data, World Data Center

1 INTRODUCTION

The study of geophysics is rich in intellectual challenges and has tremendous potential to dramatically alter and improve our society and our lives. Geophysics research in China has a very long history, so the accumulation of various kinds of data information resources has a broad range and abundant records.

The earliest geomagnetic observatory with the modern norm of geo-science research was set up in the 1870s. Its magnetograms are some of the most precious geophysical measurements collected in the world. The Chinese geophysical society was established in the 1940s and accumulated a large amount of observation data. Since the 1950s, with the founding of large numbers of geomagnetic observation posts and earthquake observations stations, the development of space technology and with national geophysical exploration, a large number of data, images, simulation records, and more have been accumulated.. These information resources have widespread use in geology, physical prospecting, surveying and geodesy, earthquake study, military, navigation, and scientific research. How to manage and utilize these information resources effectively, to realize scientific data resource sharing, and to push forward the advance of the entire geophysics discipline is the vital problem that scientific workers pay close attention to. In support of this goal, the task of the data sharing network of WDC is the storage, retrieval, management and exchange of these scientific data.

The WDC works with data about geophysics, solid earth geophysics, solar-terrestrial physics, ancient climatology, etc. In addition, it offers links to relevant educational and other websites. Meanwhile, it still serves as the discipline center of every above-mentioned field of the WDC.

2 OPERATING SYSTEMS AND REGULATIONS OF THE WDC FOR GEOPHYSICS, BEIJING

The Institute of Geophysics, Chinese Academy of Sciences, was founded in 1950, based on the department of geomagnetism of the Institute of Physics, formerly the Central Academy of Science. The institute was the one of the major founders of modern Chinese geophysics, including geophysics, atmospheric physics, space physics, and spaceflight. In 1999, The Institute of Geophysics, Chinese Academy of Sciences and The Institute of Geology, Chinese Academy of Sciences were combined into a new institute, the Institute of Geology and

Geophysics, Chinese Academy of Sciences. Today, the World Data Center for Geophysics, Beijing, is based at the new institute.

The Center is supported by The Ministry of Science and Technology and the Chinese Academy of Sciences. Through more than fifty years of effort, the institute has completed more than 100 national key projects, including 21 Antarctic expeditions, from 1984 to 2005, and collected huge amounts of scientific data, such as geomagnetic data, gravity data, geo-electric field data, and seismic wave data. Some of the systematic data that were collected have been reorganized by the WDC for Geophysics.

The Center also cooperates with the College of Earth Science, the Graduate University of the Chinese Academy of Sciences, the Department of Geophysics, the School of Earth and Space Sciences of Peking University, and the University of Science and Technology of China. The principles we implement are building together, possessing together, sharing together, and managing together.

3 COLLECTING AND ARRANGING THE SCIENTIFIC DATA OF GEOPHYSICS

The existing data resources have come mainly from long-term experiments and monitoring. The center has geomagnetic main field paper charts stretching over a long history and microfilms of magnetograms from Sheshan that have been rescued, as well as other data stored on CDs and hard disks. The disciplines covered include solid earth geophysics, marine physics, space physics, atmosphere physics and the second tier disciplines such as geothermics, geomagnetism, seismology, ionosphere physics, geo-electricity, earth electromagnetism, etc. In terms of regional coverage, data covers the southeast, Yunnan-Guizhou, the South China Sea Islands, the Qinghai-Tibet Plateau, the Arctic, and the Antarctic; The applications of these data resources are distributed throughout scientific research, national defense, communication, aviation, navigation, and mining.

To enrich the data materials listed above, according to current demand, we have tentatively designed the following databases:

- (1). Basic parameters of geophysics;
- (2). Information system (centre) of geophysics environmental monitoring (alarm);
- (3). Geomagnetism;
- (4). Space physics of high altitude;
- (5). Gravity;
- (6). Deep structure of the earth;
- (7). Geothermics;
- (8). Geoelectricity;
- (9). Geodynamics;
- (10). Several foreign geophysics database mirror image websites;
- (11). History of geophysics study; and
- (12). Scholars' information of Chinese geophysics.

4 A BRIEF HISTORY OF THE DEVELOPMENT OF THE WDC FOR GEOPHYSICS, BEIJING

In the late 1990s, with the growing rapidity of development of the society, the demand for sharing scientific data on the net became stronger every day, while the rapid development of computers, networks, and database technology made this idea gradually feasible. According to the task of the pilot project of the Ministry of Science and Technology, this center began to utilize a computer network to carry on data services, successively setting up the website and database on the server of the research room and then the research institute.

At first, the website was based on the HTML language and offered simple data services. In 2000-2002, we set up the database based on the ASP language and the SyBase environment, which served the system as a special network server and magnetic disc array. Adopting IBM X220 as the network server and RedTech NAS as the network magnetic disc system increased the capacity to nearly 300GB total and established independent websites.

In 2003, we used the PHP language and the MySQL environment for capturing minute mean values from the observational network instead. In searching for magnetograms in the database, we use the same method as the WDC magnetism data center of Japan. This method of producing and storing magnetograms in advance in the

database not only took up a great deal of magnetic disc space but also increased the amount of data transmission, so it negatively influenced the search speed.

In 2004, we upgraded the system again and adopted Java and SQL Server 2000 to set up the minute mean values observational network. In this system, we didn't generate magnetograms in advance but adapt Java to produce the picture only when users submit an inquiry. Since the relevant webpage is produced dynamically, the search speed has improved greatly, and also taking up a large number of magnetic disc rooms is avoided. The technological route analysis is specified below.

Lately, considering that ORACLE is a relevant database system and has an expanded, high-performance design in a client/server environment, we adopted ORACLE as our database to establish a more powerful and convenient system. Because many magnetograms that we have in our center from the Sheshan Magnetic Observatory, the oldest observatory in China, were broken, we tried our best to rescue them by photographing them for microfilm. Now we have scanned part of the magnetogram collection and put it on our website. In the future, the entire collection will be on the Internet.

5 A BRIEF INTRODUCTION TO THE WEBSITE OF THE WDC FOR GEOPHYSICS, BEIJING

The website can be located at: <http://gp.wdc.cn>. In Figure 1 on the left is a frame listing: Geophysics data, World Data Center System, Research Organization in China, Geophysics Observation in China, Related Links, etc. On the right are some notices of meetings, latest news, information, communications, etc. After clicking any link in the left frame, the right frame will present the corresponding page.

World Data Center for Geophysics, Beijing

2006-11-24 Friday am 10:29:43

User Login

Username

Password

New user [register](#)

Home Page

Geophysics Data

World Data Center System

Research Organization in China

Geophysics Observatories in China

Related Links

About Us

Visited times: 9375

a Center for Geophysics, Beijing!

NEWThe Electronic Geophysical Year: 2007-2008

The Historical Magnetogram of Sheshan Observatory from 1946 to 1955 has been added in the Data Service of our Center

Tang Renmin and Yin Jianhua will be awarded master's degree, 27 May 2006

newbook: Studies on Paleomagnetism and Reversals of Geomagnetic Field in China

The Western Pacific Geophysics Meeting (WPGM), 24-27 July 2006, Beijing, China

The 36th Scientific Assembly of COSPAR will be held in Beijing from 16-23 July, 2006.

Dr. Mikhail Zhizhin came to visit our center on January 26, 2006.

The ICSU panel on WDC came to and reviewed our center on July 5.

11th Space Physics Conference, October 2005, Qingdao, China.

World Data Center for Geophysics
P.O.Box 9825, Beijing
Postalcode: 100029, P.R.China
Tel: 8610-62007702 (Chief Executor)
8610-62007977 (Secretary)

Figure 1. Homepage

Today the main databases in our center are the following:

- (1) Geomagnetic database.
 - a. We have rescued the magnetograms (1877-1962) from Sheshan Observatory, the earliest geomagnetic observatory with modern norms of geo-science research in the 19th century. The magnetograms of Sheshan Observatory are some of the most precious geophysics materials in the world. All of them have been put onto microfilm and parts of them are put into the website.
 - b. The minute means values of BMT, Zhongshan Station;
 - c. The geomagnetic K index of BMT observatory (1992-2006);
- (2) Heat Flow database.

Its data include continental areas in China, some islands and areas in the China Sea for about 50

years. It is the largest and most complete database in China at present;
(3) Gravity database.

Its data were measured in the 1940's, and cover most of China.

For example, if we select *Geomagnetism Date: minute means value*. We can find the geomagnetic variation in Zhongshan Station as shown in Figure 2.

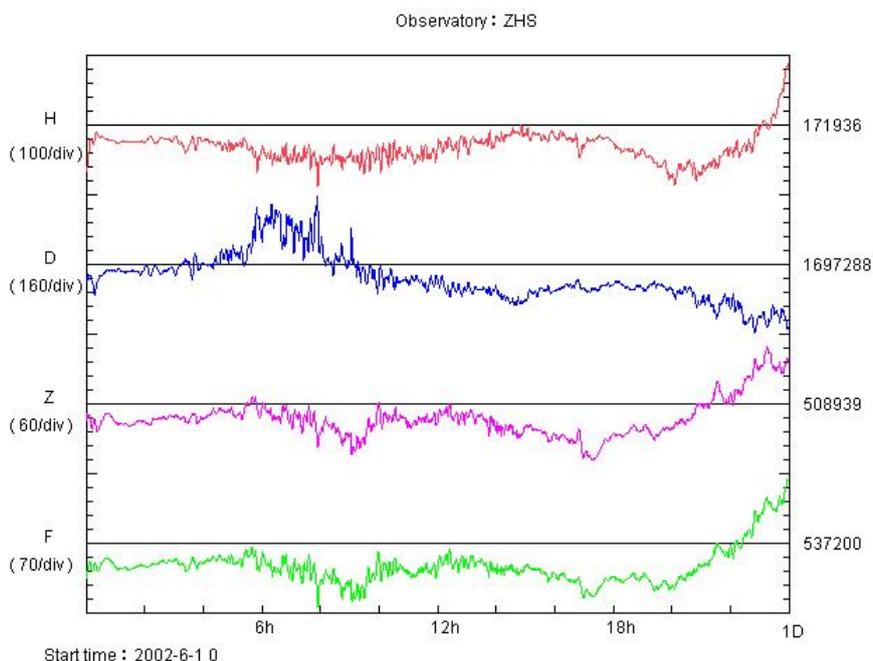


Figure 2. The dynamic magnetogram of geomagnetic observatory at Zhongshan Station, Antarctica

6 SUMMARY

Geophysics contains a multiplicity of data types and sources and massive volumes of data. Through active collection, international exchange, and mirroring, we have collected quite a significant part of the geophysics data at the WDC for Geophysics, Beijing. All data held in the WDC are available for no more than the cost of copying and can be obtained by sending the requested information. Online access is always free.

In the last 15 years, more than 380 users and user units from the fields of sciences, education, government, and industrial enterprises obtained and utilized this data. In the future, we will put more information about geophysics on the web and provide more convenient service to the users.

Besides these data, which are stored in an ORACLE database, we also provide links to the websites of observatories and databanks for ionospheric physics, atmospheric physics, and so on. For future demands, we are going to design other databases, some of them are now only frameworks, and the others have partly filled data sets, such as:

- (1). Database for the inner structure of the Earth;
- (2). Magnetotelluric data in China (Inner Mongolia and the Tibetan plateau);
- (3). Several foreign geophysics database mirror image websites;
- (4). Database of the history of geophysics study;
- (5). Scholars' information database of Chinese geophysics;

In the coming years, we will collect, reorganize, and provide more data in the network for users all over the world.

7 REFERENCE

Gao, M., Lu, W., Wen, X., et al. China Geophysics Database in WDC-D for Geophysics, *CODATA Bulletin, Volume 24, Number 2*, April-June 1992.