

SURVEYING AND MAPPING GEOGRAPHIC INFORMATION INDUSTRY'S DATA SOURCE CONSTRUCTION RESEARCH

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ABSTRACT: The demand for surveying and mapping geographic information service in various fields is increased greatly along with the rapid economic and social development. The data source construction is not only the source of geographic information industry chain, but also the basis for mapping geographic information services. Therefore, to enhance data acquisition capabilities and build standardized co-ordination mechanisms for data management and sharing are inevitable requirement of social services and social-economic development.

KEY WORDS: Geographic Information Service, Data Source Construction, Data Acquisition Alliance

1. INTRODUCTON

International mapping and geographic information industry has developed rapidly in recent years. Developed countries, especially Europe and the United States attach great importance to data sources construction. In terms of data sources, the world's major developed countries and some developing countries have developed or are developing their own high-resolution earth observation satellite system aiming at "full coverage, high precision".

Since the space age, United States had been in a leading position in the field of earth observation satellites. CORONA, a reconnaissance satellite project, had enabled the United States to take the initiative in the 1960s. In the 1970s, the Landsat program provided the first civilian remote sensing satellites used to monitor changes in the earth's surface. The United States was also living in hegemony of the high-resolution commercial remote sensing satellites. Space Imaging launched the commercial high-resolution observation satellite IKONOS, making the United States leader in the field of high-resolution remote sensing satellites in September 1999. GeoEye, WorldView and QuickBird have reached sub-meter level supported by NextView scheme in the United States at present.

On the basis of sufficient assessment of the global security situation and national security future, the United States has adjusted related policies about high-resolution remote sensing satellite. He lifted the control of high-resolution remote sensing satellite technology, allowed the entrance of commercial departments, and supported the development of high-resolution commercial satellite industry as an important national policy in 1994. USA released a new policy in 2003, taking high-resolution remote sensing satellite images into the national image system. Government departments should make full use of commercial high-resolution satellite imagery resources. These policies aimed at capturing the image market which has great potential for development to gain the greatest economic and military interests.

ESA is the EU's national international cooperation in space technology, which is responsible for co-ordinating, planning and constructing the European and other countries' remote sensing satellite and the ground receiving treatment facility in order to makes full use of various types of satellite data and remote sensing ground receiving treatment facility by sharing resources.

ESA launched the first remote sensing satellite ERS-1 in 1991. The payload included synthetic aperture radar (SAR), a radar altimeter and some other equipment for measuring sea surface temperature and wind speed. ENVISAT, as the largest earth observation satellite, was launched in 2002. It carried 10 optical and microwave devices. It could provide continued observation of ocean, land, ice and atmosphere. ESA also has a high resolution program such as SPOT and MOMS. In aspect of coordinating and applying the data source, ESA proposed a project of INfrastructure for SPatial Information in the European (INSPIRE). This project was dedicated to deploying regional remote sensing satellite receiving and processing system through international and regional cooperation. It insisted on the principle about "data collected only once", "information collected must be shared", "geographic information which should be enriched and approved widely" to achieve the resource sharing of remote sensing ground facilities. It greatly reduces the cost of satellite remote sensing applications and enhances the ESA's international competitiveness.

India also plays an important role in the international field of remote sensing. Indian Space Research Organization (ISRO) is mainly responsible for the research of aerospace and space science. ISRO had begun the research on about remote sensing technologies before 1970s. It explored "IRS" plan in 1978, and launched India's first practical remote sensing satellite IRS-1A in 1988 successfully. India has largest constellation of remote sensing satellites in the world at present, and the series of "Indian Remote Sensing Satellite" is considered as the one of the best civilian remote sensing satellites, which was widely used in land, ocean, agriculture, forestry, ecology and environment monitoring. Remote sensing, as high-tech industry, was prompted by policies established by India government to ensure a higher position of science and technology in national economic and social development and to obtain a long-term and continuous support for high-tech industry from the government. During the process of developing aerospace industry, India emphasizes freedom spirit and strives for foreign aid widely. Its space technology began through the introduction, then turned to develop by itself, and gradually had its own characteristics. The Prime Minister of India directly leads the development of aerospace industry to ensure the unity and efficiency of government agencies. Indian aerospace organization has established a commercial department called ANTRIX as early as 1992. Through the unremitting efforts done by ANTRIX, the sales of the Indian satellite images have made great success in the world aerospace market.

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With the rapid development of science and technology in China, data acquisition has increasingly rich, coverage and accuracy of data is gradually as well as the world advanced level, even better than some developed countries. The first civilian high-resolution stereo mapping satellite ZY-3 was successfully launched in 9th Jan. 2012, which has revolutionary significance to the development of surveying and mapping in China. It is a milestone in the history of satellite mapping in China. The quality of the imaging data is better than the quality of the past civil Land Observing Satellite. Its quality is close to or reaches the international advanced level. Meanwhile, the widespread use of low-altitude unmanned aerial vehicles (UAV) has greatly improved the capabilities of getting remote sensing data in China. The UAVs have the characteristic of "small, fast and agile". It has a unique advantage in emergency response. Geographic information emergency monitoring vehicles are developed which have capabilities of fast response, acquisition, processing, interpretation, real-time transmission and information release. With the rapid development of high technology, the air-space-ground integration data acquisition network will be established gradually.

With the continuous improvement of Chinese market economic system, the technology applications of the satellite remote sensing, positioning and geographic information system will be increasingly improved. GIS data is widely used in the field of land resources, transportation, water conservancy, railway, civil affairs, agriculture, forestry, environmental protection, public emergency. Its applications and services have extended to all aspects of people's routine life. The wide use of geographic information technology promotes the intensive demand for GIS data. Therefore, to strengthen the construction of data source has been an urgent problem should be solved.

2. CONSTRUCTION AND APPLICATION OF DOMESTIC DATA SOURCE

At present, domestic data source building still in its primary stage compared to the world advanced level. The strategies of data acquisition, processing, distribution services and data sources construction are imperfect, so the conflict between data source chaos and intensive need for data become increasingly evident.

Firstly, the data market is turmoil. Chinese space technology has made great progress, with the meteorological, oceanographic and resources satellite systems. Combining air and ground data acquisition technology, three-dimensional data acquisition capabilities have been preliminarily formed. Simultaneously, the policy of applying army satellite to civilian is also gradually opening up, high-resolution satellite army satellites will play a significant role in the future. The domestic level of data acquisition has been greatly improved, but all-day and all-time data is still a shortage.

Secondly, it is difficult to coordinate and share data in different industry. In order to improve the use efficiency of national public funds, to achieve the share of aeronautics and astronautics remote sensing images, the co-ordination mechanism of national aeronautics and astronautics remote sensing image acquisition, processing and service should be established as soon as possible. China's remote sensing data sharing problem has not been solved for a long time, and the problem of repetitive structure is still very seriously. Because of the relationship among the industries, the repetitious investment of remote sensing satellites and their ground processing system

result in a huge waste. And industry counterparts' sharing is also a serious problem. Various departments have different administrative level and the purpose is inconsistent when they use remote sensing data which usually cause repeated acquisition and processing. So it not only causes enormous pressure of local finance, but also wastes a lot of manpower and resources.

The top priority for development of geographical information industry currently is how to break industrial barrier, establish the mechanisms for co-ordinating sharing services, improve the utilization of remote sensing data, so as to achieve on-demand access of remote sensing data.

3. SKHEME FOR CONSTRUCTION OF DATA SOURCE

3.1 Improve Data Acquisition System

With the continuous progress of science and technology development, surveying and mapping equipment and technology has been enhanced greatly. We need to utilize new technologies and new equipments to build tridimensional data acquisition system to implement geographic information acquisition. Ground data acquisition system mainly depends on artificial field reconnaissance and ground data acquisition vehicles, which can get high accuracy data, but long production. It is only suitable for small area data acquisition. Airborne data acquisition system mainly leans upon large aircraft and low altitude UAV, which can get high spatial resolution data, but low production efficiency and high cost. It doesn't support large-area data acquisition. However, satellite remote sensing data has become the main data source because of its favourable data acquisition ability. Therefore, we need to accelerate the establishment of the data acquisition system, and gradually implement data acquisition system mainly based on satellite remote sensing data. At the same time, we need to strengthen the cooperative acquisition ability of ground, airborne and space-based data to provide a solid guarantee for the mapping and geographic information industry data source.

3.2 Build a Data Acquisition Alliance

We should make full use of sharing mechanism to establish a data access alliance for mapping and geographic information industry. We should gradually realize remote sensing image data unified procurement, exchange, sharing, jointly controlled access and comprehensive utilization. Data acquisition alliance is based on surveying and mapping geographic information data acquisition needs, it uses the multi sensor data acquisition platform to achieve full surface coverage, and it will enhance the data sharing and management through the data uniform access. Internationally, we cooperate with many Intelsat Ltd to expand the domestic satellite business market. In China, we can sufficiently unify domestic satellites and play their advantages to meet demand of social economic development. At the same time, we take the advantages of high precision military satellites to improve civil military cooperation.

3.3 Develop Scientific Data Management Scheme

With the data acquisition alliance as a foundation, we can make reasonable data acquisition scheme according to the principle of four rules "demand, possess, ability and use".

“**Demand**” refers to the in-depth analysis of the social and economic demand for surveying and mapping geographic information data. We will determine the data temporal resolution, spatial resolution, spectral characteristics and obtain frequency in accordance with the professional demand.

“**Posses**” refers to the full use of archived data for social service. We would meet the application requirements by comprehensive analysis of the existing data.

“**Ability**” refers to analysis of data acquisition and alliance capability.

“**Use**” refers to fully use domestic remote sensing data. In order to establish the most economical, practical, optimal data utilization scheme to meet the requirements such as data acquisition time, frequency, resolution, sensor, wavelength and so on.

3.4 Establish Image Library

With the data acquisition alliance, we can establish image library with a variety of data, including optical data, SAR, LiDAR, control points, spectra. According to the actual application requirements, we establish different precision cube grid so as to meet different application demands and to provide intelligent information service for government decision-making and public life.

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