

Analysis of Remote Sensing Technology Promoting the Development of Spatial Information Industry

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Abstract: In recent years, the Chinese government, the Institute of Spatial Information Industry and related scholars have paid more and more attention to the application of remote sensing data and the development of related industries. Remote sensing technology is gradually developing to the civilian field and related applications have served the public, and the space information industry has developed rapidly. This is precisely because the development of remote sensing technology promotes national demand and the space information industry also benefits from this. The formation of spatial information industry has systematically analyzed and discussed the relationship between remote sensing technology and spatial information industry, the role of remote sensing technology in promoting the development of spatial information industry, and the development value, current situation and development direction of China's spatial information industry. It is proved that remote sensing technology has a strong role in promoting the development of spatial information industry.

Keywords: Remote Sensing Technology, Spatial Information Industry, Space Technology, GIS.

1. Introduction

Remote sensing, its research field only includes electromagnetic detection, but the detection that does not directly contact the research phase can be called remote sensing. Space information industry is a strategic emerging industry and high-tech service industry based on remote sensing, satellite communication, navigation and other technologies, which integrates multidisciplinary and multi-field integration^[1]. The overall level of China's spatial information industrialization is low, the scale is smaller than that of developed countries, and the leading enterprises with international influence are scarce. The developed remote sensing technology can promote the development of space information industry and make up for its defects. In addition, the remote sensing satellite industry is a national strategic emerging science and technology industry. Accelerating the development of the satellite industry is conducive to promoting the development of the national space information industry and benefiting the development of the national society. It plays a very important role in making China's aerospace industry firmly in the leading position in global development and enhancing the comprehensive national strength of the country.

2. Development Status of Remote Sensing Technology

The development trend of remote sensing technology is that remote sensing technology is developing in the direction of quantification, intelligence, trend, application and Internet of things. In the past ten years, it has been widely used in various aspects, and its application will be more and more extensive in the future^[2].

(1) Development stage of remote sensing technology

The development of remote sensing technology has gone through four stages:

① Unrecorded ground remote sensing stage(1608-1838)

② Recorded regional remote sensing stage (1839-1857)

③ Aerial photography remote sensing stage(1858-1956)

④ Space remote sensing stage (1957-present)

(2) The development of remote sensing technology in China

In general, the development of remote sensing in China has gone through the initial stage and the experimental stage, and then to the later stage of industrialization. It has made great contributions to basic theory, development platform, sensor localization, system integration, application research, scientific research and talent cultivation, and also promoted the development of remote sensing industry and national economic construction.

(3) Remote sensing technology achievements

Due to the airborne remote sensing experiment and application research, especially the new sensor experiment and system integration experiment using the airborne platform, good results have been achieved. China has the ability to independently develop remote sensing sensors and realize the localization of sensors. China has been able to independently develop common photographic types, scanning types, radar imaging types and non-image type remote sensing sensors, and has realized the localization of sensors.

As of September 2020, there are 824 remote sensing satellites in orbit around the world, with 182 in China, ranking second. It includes satellite resource series satellites for detecting and studying earth resources, environment series satellites of earth observation system for environment and disaster monitoring, and remote sensing satellites such as high-resolution series of autonomous controllable satellites for establishing a set of high time resolution, high spatial resolution and high spectral resolution.

At present, China has built five satellite receiving stations, which are located in Miyun, Kunming, Sanya, Kashgar and Antarctica. It can provide a considerable amount of data and related services for China's scientific research, disaster

monitoring, environmental testing, agricultural production and other aspects. At the same time, it is also the largest civil receiving station in the world to receive and process data. And it covers most of Asia, providing a data base for the development of China's remote sensing industry.

In the future, the development of remote sensing in China must also strengthen investment, strengthen basic research and new sensor research, continue to strengthen mutual penetration with adjacent disciplines, jointly promote the development of 'digital earth', and constantly innovate to achieve remote sensing. The leap of the cause serves the sustainable development of human beings, social progress and the improvement of human quality of life.

3. Development Status of Spatial Information Industry

The spatial information industry in China is now emitting vigorous vitality and has a bright future. The development status of the spatial information industry will be described in the following three aspects:

(1) Development stage of spatial information industry

Spatial information technology is currently undergoing a rapid development period. With the strong support of the state, China's spatial information technology industry is gradually opening up with relevant policies, and is accelerating the transition to a business model. The national soft science research plan project "Research on Technology Prediction and Roadmap of Typical Strategic Emerging Industries" points out that although China's geospatial information industry still faces many problems, its industrial application has covered various fields of social economy. China's spatial information industry is currently cooperating with the Internet of Things industry, service industry, and high-end manufacturing industry, presenting a favorable form of diversified development.

(2) Development Trend of Spatial Information Industry

Due to the in-depth development of informatization, networking, and digitization, the Internet and geographic information technology are intertwined, and the Internet of Things and Smart Earth are gradually moving from concept to development, application, and popularization. Satellite navigation and location-based services have become highlights in the development of the spatial information industry^[3]. Therefore, the spatial information industry has also stepped onto the international stage, becoming an effective means for countries to improve their comprehensive national strength and international competitiveness.

With the development of the spatial information industry, remote sensing applications are becoming increasingly diverse, popular, and universal, and are moving towards an international trend of industrialization and commercialization. The field of satellite navigation is also showing vigorous vitality, and GPS is not leading the world at this stage. But a variety of navigation satellites are springing up like mushrooms, and the era of GNSS has arrived.

With the continuous development of 3S technology, the continuous expansion of the scale of spatial information system applications, and the rapid formation of the popularization and industrialization of spatial information systems. The spatial information industry developed through the integration of 3S technologies can maintain a high rate of sustained growth.

In the future, with the establishment of a PNT (positioning, navigation, and timing) service system with satellite navigation as the main application, and the advent of the era of integrating spatial information technology with information carriers such as mobile communications and the Internet, the spatial information industry will inevitably enter a new stage of development in which Space-Earth Integration, services are ubiquitous, and information intelligence is realized.

(3) Achievements in the spatial information industry

With the continuous development and integration of geographic information technology, significant progress has been made in some important information technologies in China. In terms of spatial information technology, China has developed a fundamental geographic information spatiotemporal database management system software, developed nonlinear map processing technology, three-dimensional geographic information technology, developed the National Spatial Information System of the State Council, NewMap Geographic Information Platform software, resource and environment remote sensing dynamic monitoring information service system, SuperMap GIS series of fundamental platform software, GIS-based resource and environmental information management system, and the Western Mapping Safety Monitoring System As well as geographic information system foundation software and various application software with independent intellectual property rights such as Shenzhou Aoyou. Among these software platforms, some of them have surpassed some foreign GIS software platforms in terms of algorithm performance and hardware adaptation, reaching world-class levels.

4. Promotion of Remote Sensing Technology to the Spatial Information Industry

(1) Remote sensing provides talent support for the spatial information industry

Graduates of remote sensing technology have the ability to acquire, process, and analyze spatial information, Master image information acquisition and processing, target recognition and 3D reconstruction, Methods of geographic information management and application. The development of remote sensing technology enables people to solve practical problems such as spatial information analysis and expression using remote sensing knowledge principles. It provides talent support for the spatial information industry.

(2) Remote sensing provides technical support for the spatial information industry

The rapid development of remote sensing technology can provide more reliable data support for the spatial information industry, which makes remote sensing play an important role in the spatial information industry. Through remote sensing technology, spatial data can be collected on a large scale, providing a leading role for industrial development. The development of the spatial information industry requires a large amount of spatial information data, and remote sensing technology can quickly and completely collect spatial data, providing necessary data resources for the spatial information industry. Using remote sensing technology to obtain macro and multi-scale spatial information, provide necessary spatial information services for the development of the spatial

information industry, and better meet the needs of social users. Remote space observation using remote sensing technology can collect a large amount of global data, develop a large amount of information for the spatial information industry, obtain and process effective spatial information in real time, conduct accurate trend analysis and prediction, and provide accurate spatial information data services for relevant institutions, industries, and social organizations.

(3) Remote sensing optimizing spatial information industrial structure

The multidimensional spatial information data obtained by remote sensing technology can be used to optimize the spatial information industry, such as high-precision terrain data obtained by remote sensing technology, which can be used to provide basic data for urban planning, transportation planning, resource management, etc. Remote sensing technology can obtain data on vegetation, soil, water, and other aspects, which can be used for agricultural production management, precision agriculture, and can effectively improve agricultural production efficiency and quality. Remote sensing technology can obtain data on minerals, forests, water resources, and other aspects, which can be used for resource management, resource evaluation, and provide a more scientific basis for resource development. In summary, high score data is released together with application products, service products, and corresponding standards. With the continuous advancement of social digitization and informatization, the spatial information industry has become China's modern governance capacity, innovative development, and livelihood security in the digital new economy. Accurately implementing data fusion, geographic information resource management, resource spatial coding etc, thereby obtaining rich spatial data and information. That is, remote sensing technology can effectively help the spatial information industry achieve intelligent development, and promote its development into a new industry that can meet market demand.

5. Conclusion

The application of remote sensing technology in spatial information industry is a typical representative of China's industrial innovation and leapfrog development in the new era, and also plays an important role in China's information industry. Different from the traditional high-tech industrial base construction ideas and construction mode, the ultimate goal of space information industry base construction is to achieve higher commercial value of data value-added services. Therefore, the basic conditions of the space information industry base not only need the traditional infrastructure such as office facilities, but also need the professional infrastructure such as remote sensing satellites. It requires not only professional basic data from remote sensing satellites, aircraft and other platforms, but also comprehensive and professional government basic data from local provinces, cities, counties, township governments and industries.

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