

# Some Thoughts on Geological Surveying and Mapping Technology and Development in the New Period

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**Abstract:** This paper first expounds the geological surveying and mapping technology in the new period, then discusses its application and development, and finally puts forward some suggestions to promote the development of geological mapping technology, hoping to provide effective reference for the relevant staff and the development of geological mapping technology in China.

**Keywords:** Geological mapping; Development; Application

**Citation:** Minghao Su, 2021. Some Thoughts on Geological Surveying and Mapping Technology and Development in the New Period. *International Journal of Geology*, 6(1): 6-10. <http://doi.org/10.26789/IJG.2021.01.002>

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## 1. Introduction

The development and progress of the times promote and drive the development of the industry to a certain extent. Any industry should be optimized and improved through reform. Of course, geological surveying and mapping technology is no exception. The traditional surveying and mapping technology is affected by the working environment and surveying and mapping equipment, which makes its surveying and mapping data unsatisfactory in accuracy. After entering the new era, the traditional surveying and mapping technology has been unable to meet the development needs of the industry. Therefore, it is imperative to strengthen the reform and innovation of this technology.

The traditional geological mapping technology not only has low precision, but also consumes more manpower and time. The development of social high and new technology provides a driving force for the development of geological surveying and mapping technology. At present, modern surveying and mapping technology has become the main development direction of geological surveying and mapping technology. The following analyzes and expounds the application and development of modern surveying and mapping technology.

## 2. Overview of the Development of Geological Surveying and Mapping Technology

The traditional geological surveying and mapping industry completely relies on the backward theodolite, flat meter and level for surveying and mapping operations. However, this traditional working mode makes many high-tech technologies unable to be effectively and timely integrated into the surveying and mapping industry. In the long run, the development of the industry will fall into a dilemma of stagnation. With the advent of the new era, various modern high-end surveying and mapping technologies gradually replace the "old three instruments", followed by the application of modern new surveying and mapping technologies based on satellite navigation and positioning technology, satellite remote sensing technology and geographic information system technology, and the above technologies are being compared with the current information technology Computer technology and sensor technology are becoming highly integrated, and China's geological surveying and mapping industry will show a good development trend in the future.

In geological exploration, geological surveying and mapping is a basic preliminary work. The quality and efficiency of geological surveying and mapping will be directly related to the smooth development of the overall

work of geological exploration. For example, the accuracy of Surveying and mapping data will directly affect the exploration quality and efficiency of multiple types of work projects such as later rock engineering exploration and hydrogeological exploration. Therefore, in the geological exploration work, in order to better ensure the exploration quality and efficiency, we must do a good job in geological mapping to ensure the mapping efficiency and accuracy, which is of great significance to ensure the smooth and effective development of geological exploration work. In the process of Surveying and mapping, the surveying and mapping personnel mainly take the geological theory as the basis, and then use various technical means, equipment and instruments to observe the geological phenomena related to engineering construction, so as to integrate the observation contents into various elements of geological conditions, draw them on the topographic map according to a certain scale, and finally prepare the engineering geological map. It is the instrument and equipment used in geological surveying and mapping<sup>[1]</sup>. Engineering geological map will play a particularly important guiding role in geological exploration. In order to better ensure the quality of geological surveying and mapping, it is necessary for surveying and mapping personnel to obtain more geological information as much as possible in the process of Surveying and mapping, conduct in-depth analysis and understanding of the actual situation of the project construction site, and accurately judge the underground geological conditions of the project, so as to provide effective support for geological exploration. The application of advanced geological surveying and mapping technology in geological surveying and mapping can also better improve the quality and efficiency of Surveying and mapping.

### 3. Types of Geological Mapping Technology in the New Era

#### 3.1 Remote Sensing Technology

Remote sensing technology is a commonly used detection technology in geological surveying and mapping. It is mainly a technology that collects and processes the electromagnetic wave information of long-distance targets with various sensing instruments according to the electromagnetic wave theory, and finally images, so as to detect the measured targets on the ground. It is the schematic diagram of the principle of remote sensing technology. Generally, any object has broad-spectrum characteristics. They all have different absorption, reflection and radiation properties. Therefore, different objects have different induction to electromagnetic waves of different frequencies, which is the basis of remote sensing technology. The ap-

plication of remote sensing technology in surveying and mapping can analyze the dynamic changes of the surface according to the images reflected by different amplitudes, so as to understand the actual situation of engineering geology<sup>[2]</sup>. The application of remote sensing technology can also obtain maps of different scales of the proposed project and the latest images, which also provides great convenience for the actual survey work in geological exploration. In conclusion, remote sensing technology has the characteristics of large measurement range, high comparability and strong timeliness. This technology plays an important role in improving the quality and efficiency of geological surveying and mapping. With the continuous development and progress of remote sensing technology, the research and development of new sensors is also in progress, and the pyramid of multi-level spatial resolution image sequence has also been formed, which is of great significance to improve the overall level of remote sensing technology surveying and mapping.

#### 3.2 GPS Technology

GPS technology is the abbreviation of global positioning system, that is, global satellite positioning system. It originated from the United States and was first used in military intelligence collection and emergency communication. With the passage of time, it has been applied in all walks of life. GPS technology mainly measures the distance of the receiver through satellites, and then its position can be determined. This technology provides a new development direction for geological surveying and mapping. Geological surveying and mapping has the characteristics of long work cycle and high work intensity. The application of GPS positioning technology effectively reduces the work intensity of staff and improves their work efficiency. The positioning of three-dimensional coordinates by GPS technology is not only faster, but also has high positioning accuracy. At the same time, it can monitor the state of a receiver for a long time.

With the development of GPS technology, RTK is derived on the basis of GPS technology (real-time dynamic) technology, RTK technology can not only measure the target points quickly and accurately, but also generate a one-time electronic map combined with third-party software, which not only improves the measurement efficiency of Surveying and mapping personnel, but also greatly speeds up the speed of mapping. The emergence of RTK technology is a transformational development of surveying and mapping work and points out the direction for the development of Surveying and mapping technology New direction.

### 3.3 RS Technology

RS technology is called remote sensing technology. At present, it has been widely used in geological mapping. RS technology is a technology based on electromagnetic induction. Through the analysis, processing and transmission of electromagnetic wave information on the surface, we can measure and identify various things on the surface from a long distance. RS technology is the same as GPS technology, in which the main tool is "satellite". With the development of RS technology, it has been able to dynamically reflect surface information, which provides great convenience for geological mapping<sup>[3]</sup>.

### 3.4 GIS Technology

GIS technology, namely geographic information system, is also a common geological surveying and mapping technology in geological surveying and mapping. In recent years, with the continuous development and progress of science and technology, the level of GIS technology has also been greatly improved. Now, GIS technology is gradually developing in the direction of data standardization, data multidimensional, system integration and system intelligence, which is also of great significance to improve the application quality and efficiency of GIS technology<sup>[4]</sup>. The application of GIS technology to geological exploration can better ensure the exploration quality and efficiency.

For example, the integration platform of GIS technology is an interoperable geographic information system, which can effectively connect different systems, ensure the smooth information exchange between different systems, and then complete the surveying and mapping of a project more smoothly and quickly. GIS technology has a system specifically for component technology and objects, which can realize the division of GIS modules. In this way, different modules can be responsible for corresponding work tasks and finally conduct centralized processing. This technology plays an important role in improving the efficiency and quality of Surveying and mapping.

### 3.5 3S Technology

3S technology is not a separate technology, but refers to the organic combination of GPS, GIS and RS. In this way, measurement and information processing can form a complete organism. If RS and GPS technology are compared to human eyes, GIS technology is equivalent to human brain. The application of 3S technology provides a complete work system for surveying and mapping personnel, and the work flow of "measurement sorting data processing" can comprehensively optimize the work level of geological surveying and mapping and provide strong technical support for the development of geological sur-

veying and mapping<sup>[5]</sup>.

## 4. Application of Surveying and Mapping Technology in the New Era

### 4.1 Application in Hydraulic Engineering

In hydraulic engineering, 3S technology is mainly applied. Firstly, the hydrological situation in the construction area is detected through RS technology, and then combined with the disaster records in the construction area, GIS technology is applied to analyze the data, so as to provide reliable data for the establishment of disaster prevention and control measures. The measurement method based on 3S technology can not only detect the construction site, but also provide reliable prevention information for the occurrence of "water damage", so as to avoid blind construction of water conservancy projects. At present, 3S technology is not only applied to the site selection and field investigation of water conservancy projects, but also widely used in the process of water conservancy project construction. With the help of the data measured by GPS and RS technology, and then build the corresponding hydrological model. With the help of the data statistics and analysis function of GIS system, it can provide a reliable reference basis for the development and completion acceptance of water conservancy projects. In addition, the digital map drawn with the help of GPS and RS technology can also provide reference data for urban drainage pipe planning, so as to improve the accuracy and efficiency of urban planning.

### 4.2 Application in Mine Survey

China has a vast territory, so it is extremely rich in mineral resources. When developing and utilizing minerals, mining survey must be carried out first, and GPS and RS technology provide strong support for mining survey. GPS technology is mainly used for surface movement monitoring. Relevant personnel can establish corresponding control network through data, so as to provide guarantee for China's mineral development. RS technology has been used in mine survey for a long time. This technology can provide reference data for the protection and development of the mining area by analyzing the electromagnetic wave data in a certain area. At the same time, RS technology also plays an auxiliary role in ore prospecting<sup>[6]</sup>.

### 4.3 Application in Ecological Monitoring

Through the characteristics of RS technology, it is possible to analyze the growth and distribution of plants in the area based on the electromagnetic wave data reflected on the surface, and then apply GIS technology to analyze these data, and then update the ecological conditions in

the area. The application of 3S technology can also realize real-time monitoring of the ecological situation in the region. At present, modern surveying and mapping technology is widely used in wetland ecological monitoring. Wetland is an important part of China's ecosystem. At present, many wetlands have been listed as China's ecological protection areas.

## 5. Thoughts on the Development of Geological Surveying and Mapping Technology

With the rapid development of social economy, the demand for geological surveying and mapping work is also increasing. At the same time, the requirements for geological surveying and mapping work are also getting higher and higher. In order to promote the better development of geological surveying and mapping technology, The innovation and reform of geological surveying and mapping technology must be strengthened. For example, in the current new era, if you want to promote the rapid development of geological surveying and mapping technology, you must change traditional concepts, establish a brand-new concept of geological surveying and mapping, and improve, optimize, and innovate surveying and mapping technology to improve geological surveying and mapping, technique level. Relevant technicians should also continue to broaden their thinking. For example, they should pay attention to thinking about problems with open and comprehensive thinking, and then find out the cause of the problem, and finally take effective measures to solve the problem. This is also important for improving the level of geological surveying and mapping technology. Significance' While promoting the development of geological surveying and mapping technology, it is also necessary to pay attention to the expansion of the field and scope of surveying and mapping work, that is, to further expand the service range and application scope of geological surveying and mapping technology, so that geological surveying and mapping technology has more extensive applications in surveying and mapping work. Play a more important role<sup>[7]</sup>. This requires technicians to continuously strengthen their own professional knowledge and professional skills, and at the same time increase the research strength of related professions, such as effective communication, exchange, and discussion with technicians of different professions, and strengthen the development of new technologies. New functions, in order to better improve the technical level of geological surveying and mapping, and then provide a more powerful guarantee for the work of geological surveying and mapping. In addition, in order to better promote the development of geological surveying and mapping technology, it is also necessary to increase

the intensity of talent training. A complete talent reserve is the basis for the development of geological surveying and mapping technology.

## 6. Suggestions for the Future Development of Geological Surveying and Mapping Technology in the New Era

### 6.1 Adhering to the Principle of Innovation and Development of Surveying

Today's world is an era that focuses on innovation and development, and technological innovation and development should be the main development concept of the geological survey industry. Through a detailed analysis of the geological survey industry, it is not difficult to know that there are many aspects that can be used as entry points for innovation and development: innovation in geological survey technology and technology, innovation in geological survey equipment, and the operating system of the geological survey industry. Through the reform and innovation of geological survey technology and technology, not only can improve work efficiency and reduce work costs, but also significantly improve the quality of detection data; and the upgrading of related survey equipment will inevitably lead to a significant improvement in work efficiency and work quality. ; Finally, it is about the reform and innovation of the operating system of the geological survey industry. On the one hand, the reform and innovation of this system can help enterprises to abandon the traditional management mode as soon as possible, and it can also guide and supervise the development of the entire enterprise in the direction of modernization.

### 6.2 Strengthen the Management of Geological Survey Enterprises

Affected by the basic characteristics of the geological survey industry, the main work scenes of geologists are all on the spot, and the distribution range is wide and scattered. Therefore, the corresponding management difficulty coefficient is relatively high. If there is no scientific and systematic management mechanism To escort them will inevitably lay undesirable risks to the development of the enterprise and the entire industry. Therefore, relevant companies and departments must continue to optimize and reform the management of geological survey companies. Specifically, they can adopt a number of new management mechanisms such as task assignment system, job responsibility system, performance appraisal system, and talent introduction system. To effectively strengthen internal management and control, and ultimately ensure the healthy and orderly development of the geological survey industry<sup>[8]</sup>.

### 6.3 Establish a New Scientific Concept of Geological Survey

In recent years, under the influence and impact of various new geological survey technologies, the dominance of traditional models and concepts in the geological survey industry has been severely affected and impacted. Although it will take some time for the concept of geological survey thinking to change, the replacement of old concepts by new concepts belongs to The inevitable way of industry development<sup>[9]</sup>. In the new era, relevant state departments and leading companies in geological surveys should take the lead in taking the lead, actively implement various new measures, transform their thinking as soon as possible, and reform and innovate work methods based on the actual situation of survey projects. This has effectively promoted the liberation of traditional concepts and the rapid development of the entire industry.

### 6.4 Actively Expand New Areas of Geological Survey

Nowadays, the concept that science and technology are the primary productive forces has been universally recognized around the world. Therefore, the development of the geological survey industry is inseparable from the effective use of modern science and technology. If the geological survey industry wants to make further progress, it must introduce a variety of advanced science and technology in a timely manner to continuously improve or broaden the level and scope of survey technology.

### 6.5 Solve Various Problems in Geological Survey in Time

With the continuous reform, innovation and application of related technologies, geological survey technology will inevitably promote the service quality level and service scope of the modern geological survey industry. At the same time, the various problems faced by the geological survey industry will become more complicated. Many of these issues are rarely involved in traditional work experience. Therefore, relevant technicians must attach great importance to such issues, because this is not only a problem for the development of the geological survey industry, but also an improvement in the quality of the industry. Effective Ways.

## 7. Conclusions

With the rapid development of the social economy, the development of various industries in China has been strongly promoted, such as the engineering construction industry and the mining industry. In this context, the society's needs and requirements for geological surveying and mapping work have become higher and higher. With

the continuous development of science and technology in China, the level of geological surveying and mapping technology has also been greatly improved, and its role in geological surveying and mapping is becoming more and more important. Various geological surveying and mapping technologies such as remote sensing technology, global satellite positioning technology, and geographic information technology can effectively meet the needs of social development and provide support and guarantee for various geological surveying and mapping tasks. In order to better promote social and economic development, it is also necessary to continuously strengthen the research and development of geological surveying and mapping technology, continuously improve the level of geological surveying and mapping, and then better provide guarantee for the work of geological surveying and mapping.

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