The Safe Storage of Geological Scientific Data and its Support for Geological Exploration

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Abstract: The main body of geological scientific data is all kinds of achievements and research data from geological explorations. This data is the achievement of hard work of many geological workers, the witness and record of geographical and geological environment changes, as well as important social and national basic security information resources, containing inestimable social and economic value. In recent years, big data and cloud information technology has emerged onto the computing information technology scene, but this emergence has been highly concerning to society. The development of these two technologies has also had a wide impact on the traditional geological scientific data management security model. How to promote the transformation of the core business and a management mode of geological exploration to digitalization and spread the information in an well-rounded way, therefore, it is imperative to carry out research on the safe storage and guarantee system of geological scientific data and the support of geological exploration.

In addition to the scientific value, geological scientific data can also have extremely high economic value. To keep and make good use of geological scientific data is not only to carry forward and pass on the wisdom of tens of millions of geological workers, but also to provide strong guarantee for national infrastructure, construction, and social development. It is one of the core tasks of geological scientific data management at the present stage to build an advanced, efficient and stable geological scientific data storage system to provide important basic scientific data guarantees for geological exploration. Big data and cloud information technologies will be fully integrated so as to be useful to mining and other further developments and utilization of geological scientific data. At the same time, at the scientific data management level, the use of information technology means to ensure the safety and effectiveness of geological data and electronic data’s long-term storage. Big data analysis combined with the standardization construction of geological data can further improve the ability of comprehensively using geological data as the basic guarantee for geological exploration.

The construction of safe storage of geological scientific data should meet the requirements of being efficient, safe, stable and green management, and be able to operate independently according to different operations. In the process of construction, the top-level architecture design should follow the following principles strictly: 1. By means of information technology, big data and cloud information technology are used to build a guarantee system of geological scientific data management based on efficient management, efficient utilization and efficient service. 2. Using network technology and storage technology to build a secure scientific data entity system. 3. The combination of storage and backup technology, the detailed planning of backup strategy, and the construction of efficient, reliable and stable data backup security system. 4. In strict accordance with the relevant provisions of computer information security, improve the relevant strategy and management mechanism, and carry out the construction of data information security protection system.

The focus of the operational management of geological scientific data is to provide basic scientific data support for geological exploration. The specific work can be divided into the processes of interchange, reception, acceptance, warehousing, storage, processing, borrowing and online service support. These processes are interlined as the medium between the preceding and the following, with different functional departments undertaking the corresponding business work. According to business requirements, the following components are required for the construction of safe storage of geological scientific data: 1. Network security system: the system is the basic condition of geological scientific data management, which not only need to satisfy the orderly development of management business, but also needs to ensure the safety and control of information data. 2. Data support and guarantee system: the core condition of geological scientific data management, which provides management, maintenance, support and guarantee for raw data, finished data and temporary processing data. 3. Data security system: it not only ensures the safety of geological data storage, but also ensures the information security of geological data collection, therefore, it is necessary to establish an effective data backup system and information security protection system.

To manage the scientific data of geological exploration, it is necessary to carry out standardized and normalized data cleaning for a large amount of data, so as to ensure that the managed data is structured data and effectively improve the ability of data query and analysis. Establish a standard data format conversion mechanism to ensure that early data does not become unusable as software upgrades and changes. Using information technology to ensure the safe storage and long-term preservation of geological exploration data. Meanwhile, the construction investment and standard management of data networks should be strengthened to ensure the safety and reliability of data in the process of
replication and processing. To provide scientific, accurate and authoritative geological data for the planning, deployment and implementation of geological exploration work through the construction of a safe storage system for geological scientific data. Thus geological prospecting can be ensured to be carried out efficiently and accurately using information technology.

With the continuous development and improvement of big data technology, geological data management is facing both challenges and a powerful opportunity for transformation. Patience and perseverance are required of the data management workers in geological sciences in structuring the data content of the achievements of geological exploration. Long-term construction and improvement are needed for the safe use of such data, so to are necessary a large amount of manpower and material resources for the safety and long-term storage of such data. Only in this way can we carry on the real safety management for the achievements of the vast number of geological workers, and ensure the long-term stable and efficient development of geological exploration work at the same time.

**Key Words:** Geological Data, Data Storage, Digital Resources, Security System

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**References**


Kong Zhaoyu, Li Chenyang, Jia Liqiong. Thoughts on geological data security in the era of big data. *China mining industry*, 2017, 06 (S1): 43–46.

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