

Overview of research status and research methods of neotectonic movement

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Abstract

This paper explores the new tectonic movements in the study area by morphological, seismic, and chronological methods of terraces and faults in the study area. It is believed that the neotectonic movement has the characteristics of universality, rhythm and inheritance. There are many different views on the starting time of the neotectonic movement in China. This paper analyzes that the neotectonic movement in China began in the middle Miocene.

Keywords

Neotectonic, Middle Miocene, Quartz grains.

1. Overview of Neotectonics Research

The neotectonic movement is a crustal movement carried out during the Neo-Tertiary-Quaternary geological period, and also includes modern tectonic movements that can be studied by humans and instruments and historical archaeology for thousands of years. Domestic scholars such as Xie Yuping, Yi Mingchu, Xu Xuehan, Huang Yukun, Wrinkle Peace, Zhang Wei, etc., have reached a very high level of theoretical research on the neotectonic movement. The Qinghai-Tibet Plateau is a hotspot of the international new tectonic movement. Many domestic and foreign scholars have carried out research on the new tectonic movements in this area. For example, Sun Jimin proposed the specific years of plateau uplift through the relationship between stratigraphic performance and new structure. Guo Zhengtang used the relationship between the neotectonic movement and the accumulation, and used the data of the Loess Plateau to propose the age at which the Qinghai-Tibet Plateau began to rise. At the Second National Hydrogeological Engineering Geology Conference held by the Ministry of Geology and Minerals in 1959, the neotectonic movement was mainly reflected in the regional geomorphology, Quaternary sediments, geological structures and earthquakes. The active areas of neotectonic movements are often earthquakes. The new tectonic movement in the high-incidence and high-intensity areas laid the basic outline of contemporary geomorphology. The neotectonic movement also has a great influence on the direction, inclination and distribution of glaciers, valleys and even debris deposits on the Qinghai-Tibet Plateau.

The influence of neotectonic movement on the geological environment is mainly reflected in the formation of geological units such as valleys and basins (Li Sen, 1993; Hu Dongsheng, 2010), and restricts the types, distribution and geomorphological characteristics of sediments (Zhang Dehou, 1994; Li Chang'an, 1997) Lin Nianfeng, 2005); Neotectonics control the evolution of water systems and their patterns (Li Sen, 1993; Chang Yuxing, 1998), accelerating the evolution of ancient rivers, promoted the lake contraction and gradually disappeared (Fan Zhuguo, 2002), directly or indirectly controlled the evolution of geological environment and the development of geological disasters (Fan Zhuguo, 2002). Coastal Regional, neotectonic movement and climate have significant effects on coastal development, landform morphology, coastline distribution, river network layout, and distribution of eroded and accumulation areas (Wu Yihui, 1997). The neotectonic movement also exists for the distribution, occurrence and exploration of ore bodies. Influence, on the one hand, due

to the elevation of the terrane, the ore-bearing geological body is denuded and transported and deposited under favorable geomorphological conditions and suitable hydrodynamic conditions, and finally enriched to form new deposits (Knee Pei Dao, 1988; Zhang Xiaojun, 2003); on the other hand, the continued activity of the structure after the mineralization period will destroy the integrity of the pre-existing ore body, complicating the ore body shape. Diversification, even causing fragmentation of existing ore bodies, which increases the difficulty and cost of exploration; or due to the overthrowing of the earth's body, some ore bodies are subsequently lifted to the surface and subjected to strong erosion. And the middle and deep ore bodies are brought into the deep part of the earth's crust under the action of extrusion and pushing, resulting in various deformations and deepening of the ore-bearing parts and other adverse effects.

2. Characteristics of neotectonic

According to the research results, the emergence and development of the neotectonic movement can be found to be universal, rhythmic and inherited.

1) Universality. Universality means that new tectonic movements are occurring all over the world, and new tectonic movements will occur. Of course, in the active tectonic movements, the activities of neotectonic movements will be more frequent. In general, the world is constantly generating and carrying out new tectonic movements, whether it is a relative activity zone or a relatively stable area.

2) Rhythm. Rhythm is usually called volatility or intermittent. The new structure and activity structure are not continuous or linear, but have a certain rhythm. The speed of tectonic movement in an area is usually slow or slow, or sometimes the movement is stagnant. Neotectonic movements often form various types of multi-level landforms on the topography, such as the formation of different level planes at different levels, or river terraces at all levels, and the rhythm evolution in the lithofacies of related sediments. When there are different types of multi-layered landforms, it can be used as a reliable basis for comparing and dividing the Quaternary strata and judging the relative age of landform formation.

3) Inheritance. Inheritance means that when a new tectonic movement occurs, it usually has a certain inheritance similarity with the old tectonic movement. Usually, the new tectonic movement reproduces along the old structure and is generated by the old structure. The structural weak surface produces concentrated stress and has a certain degree of control over the generation of new tectonic effects.

3. The start time of the neotectonic

Different scholars have different views on the start time of the new tectonic movement. But in general, most of the new tectonic movements are considered to be the latest stage of tectonic movement. Due to the different research areas of different scholars, the study of the theoretical knowledge and basic data of neotectonic movements, there are many different viewpoints on the starting time of neotectonic movements, and the definition of the starting time of neotectonic movements varies greatly. From the middle of the Paleogene to the beginning of the Quaternary Middle Pleistocene, it has a time span of 40 to 0.73 Ma from the present. This not only caused the conceptual differences in the description of the neotectonic movement, but also caused the chaos of the tectonic evolution period, which led to the study of the new tectonic movements using the geomorphology and geology formed in the respective identified geological time periods. The results were inconsistent or even contradictory. Contrastive analysis is also impossible in the region, making it difficult to study and develop new tectonic movements.

The new tectonic movement must have a unified dynamic background different from the previous one. Therefore, from the aspect of the dynamic conditions of the new tectonic movement, that is, from the analysis of the characteristics of the current crustal movement and the modern tectonic stress field in China, the main driving factors of their formation and the time of their emergence are

reasonable, and then the new generation of geology is caused. The change of dynamic environment of tectonic development discusses the start time of new tectonic movement in China

The results of a large number of crustal deformation measurements show that China's current crustal movement has two basic modes of motion, vertical and horizontal, with horizontal motion being more prominent. According to the GPS monitoring data from 1999 to 2007, Wang Min concluded that the current crustal movement in China's mainland is characterized by unity, continuity and integrity. In addition to the horizontal movement of the earth's crust, according to the results of a large number of earthquakes and seismic geology, the modern tectonic stress field in China is mainly characterized by near-level horizontal compressive stress. The compressive stress distribution of China's modern tectonic stress field indicated by a large number of focal mechanism decompression stress axes shows that the current crustal movement and modern tectonic stress field in China also have uniformity and integrity, and the crustal movement direction and the direction of the compressive stress axis of the tectonic stress field. Basically consistent. However, in the ancient times, the eastern and western parts of China were in two distinct geotectonic environments, with western compression and eastern extension. Until the middle Miocene, the Sichuan-Yunnan, Bayan-Kala-Songpan and other blocks in the eastern part of the Qinghai-Tibet Plateau were laterally extruded. They slipped from north to south to the northeast-south direction and pushed the crust blocks in eastern China. After the body moved forward, it began to gradually integrate the western and eastern parts of China into a unified movement of tectonic movement. It can be concluded that the dynamic conditions of the current horizontal crustal movement and modern tectonic stress field in China are basically from the middle of the Miocene. Therefore, the mid-Miocene can be used as the starting time for the new tectonic movement in China.

4. Neotectonic exercise research methods

There are many ways to study new tectonic movements. According to the methods of observation, the means and objects of collecting data, and the methods of organizing data, the research methods of new tectonic movement can be divided into: geological method, hydrological method, geodetic method, geophysical method, hydrogeological method, geomorphology method, astronomical method, historical archaeological law, etc. According to these methods and characteristics, they can be classified into two categories: quantitative method and qualitative method.

The research on the new tectonic movement mainly depends on the following aspects: (1) The regional geological survey is the foundation. First, the regional geological survey should be carried out on the study area to understand the basic geological conditions of the study area, and carry out scientific research work in the study area. Mineral census work. Have a full and complete understanding of the study area. (2) Focus on key areas, establish geological structure grids, and focus on new forms of tectonic movements such as river terraces and active faults. (3) Sampling and analysis of valuable areas. For river terraces, gravel statistical methods can be used to conduct statistical analysis of gravel, gravel and gravel directions of gravel layers at all river terraces. The change of the movement speed of the Mingshui flow and the general flow of the ancient water flow can roughly determine the trend of the paleocurrent; the chronological analysis of the river terrace is usually the ESR dating method; and the remote sensing detailed analysis and interpretation is used to derive the water system. The changing landscape features. Then the results of the comparative study are carried out to determine the age of the activity, and the age result is relatively accurate. The geomorphological variation characteristics of the area are obtained, and the combination law of these faults is analyzed to study the relationship and influence between the structures of the region. For the fault research method, the OSL method can also be used to determine the approximate age of recent fault activity. However, due to the defect of OSL itself and the objective conditions at the time of sampling, the morphological characteristics of the quartz surface are statistically analyzed by SEM scanning quartz surface morphology of fault mud. According to the research results of Y.Kanaori, the identification results of OSL can be confirmed to ensure the reliability of the results. (4) Identify the seismic activity characteristics of the study area as much as possible, preliminarily grasp the basic laws of seismic

activity, form a preliminary understanding of the seismic activity in the area, and explore the intrinsic relationship between seismic activity and neotectonic fault activity. To explore the impact of new tectonic activities and activity structures on the region. (5) According to the background of regional geology and the regional tectonic framework thus established, the geological conditions of the region are studied and analyzed, and the activity of the neotectonic movement in the study area is discussed.

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