Geological Characteristics and Zircon U-Pb Ages of the Qunku Granitic Plutons in Altay, Northwestern China

DING Kun1,2, LIANG Ting1,2 and YANG Xiuqing1,2

1. College of Earth Sciences and Resources, Chang’an University, Xi’an 710054, China
2. Mineralization and Dynamics Laboratory of Chang’an University, Xi’an 710054, China

Abstracts: The Chinese Altay is located in the northern part of Xinjiang Province, the Altay Orogen is a major unit within the Central Asian Orogenic Belt (CAOB). Multiphase tectonic-magmatic events occurred in the region. Granitoids crop out widely distributed in Altay area, Xinjiang, China, covering for 70% of the total area since the Precambrian (Windley et al., 2002). Several intense magmatic intrusions occurred in Altay. Four peaks of Paleozoic magmatism occurred in the area at 460, 408, 375, and 265 Ma (Wang et al., 2006). The Altay magmatic intrusion is formed primarily from the Ordovician to Triassic, with the most widely distributed along regional tectonic lines dated at around 400 Ma. The main rock types were quartz diorite, granodiorite, biotite granite, diorite granite and dolomite granite, which underwent regional deformation and developedgneiss with different degrees. Granite formation was mainlyconcentrated in Devonian (413-372 Ma), which was the period of Altay orogeny in the middle Altay tectonic unit. Generally speaking, the Indosinian magmatism is weak, and there are few studies on its diagenetic age. Only a few studies on the Jiangjunshan, Shanklan and Aral intrusions have been reported. In addition, more and more evidences show that the rare metals in residual melts. For example, the Keketuohai No. 3 pegmatite deposits. It is generally believed that "pegmatite is the product of crystallization differentiation of granite". This separation crystallization resulted in the enrichment of rare metals in residual melts. For example, the Keketuohai No. 3 pegmatite is formed by magma crystallization and its metallogenesis is closely related to Mesozoic granite (Zhu, 2007). Therefore, it is of great significance to study Indosinian magmatism in the Altay orogenic belt.

Halong granitoids are located in the middle Altay tectonic unit, and are a large-scale multiple rock bed. Qunku rock mass is located in the south side of the Halong rock mass, and the predecessors have less research on the diagenetic age of the Qunku rock mass. This paper presents the detailed geological research, as well as a systematic study of zircon U/Pb chronology and regional geological data. Our aim is to provide important basic geological information and granite constraints for the Indosinian tectono-magmatic events in the Altay orogenic belt.

The Qunku granite is situated in the Qunku -Azubahai area of Fuhai County, Xinjiang, and its tectonic location is located in the Middle Altay. The wall rocks of the pegmatites are primarily biotite quartz schist. The rock mass is mainly dolomite granite. Optical microscopy observations show that the granite is mainly composed of quartz (30-35%), plagioclase (25-35%), K-feldspar (10-15%) and muscovite (10-20%). With the accessory minerals of zircon, garnet, and tourmaline (<5%). Zircons for LA-ICP-MS U–Pb dating were handpicked under a binocular microscope, then zircon grains were mounted in epoxy. The spot size used was 30μm in diameter. Calculations of zircon isotope ratios were conducted by ICP-MS DataCal and age calculations were performed using Isotplot 3.7 software. The errors for the mean ages are quoted at 90% confidence levels.

There is a great controversy about the genesis of rare metal pegmatite deposits. It is generally believed that "pegmatite is the product of crystallization differentiation of granite". This separation crystallization resulted in the enrichment of rare metals in residual melts. For example, the Keketuohai No. 3 pegmatite is the most typical pegmatite in the Altay orogenic belt and occurs in the southern outer contact zone of the Aral granite batholith. Many researchers believe that the Keketuohai No. 3 pegmatite is formed by magma crystallization and its metallogenesis is closely related to Mesozoic granite (Zhu, 2007).

The formation ages of the rare metal pegmatites in Qunku, Jiamukai, Kelumute No. 112 pegmatite and Abagong-Talat were all formed Triassic period (Ren, 2011). It can be seen that the Indosinian period is the most important period of rare metal mineralization in the Altay, and its metallogenesis is closely related to the Mesozoic granite (Zhu, 2007). This study believes that the Qunku pluton was formed in the Late Triassic, which is 30 Ma higher than that of Qunku pegmatite (206.8±1.6 Ma), and their spatial distribution is relatively close. In addition, Chen et al. (1999) believe that the Keketuohai No. 3 pegmatite was formed by the long magmatic crystallization differentiation of the granite magma in the deep underground closed system, and its crystallization differentiation process also lasts for 30 Ma. In summary, the Qunku pluton was formed in Indosinian period, pegmatite and dolomite granite may be genetically related.

* Corresponding author. E-mail: 1003492885@qq.com

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References


About the first author (also corresponding author)
DING Kun, male, born in 1990 in Yangling City, Shaanxi Province; master: graduated from Chang’an University; now be studying in the School of Earth Science and Resources, Chang'an University. He is now interested in the study on granitic rocks and rare metal deposits. Email:1003492885@qq.com; phone: 18329961462.