Geological Characteristics and Zircon U-Pb Ages of the Dahongliutan Metasomatic Granite in the Western Kunlun Orogenic Belt

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Abstracts: The West Kunlun Orogenic Belt (WKOB) in the southwestern part of Xinjiang was formed as an important part of the Central Orogenic Belt of China, as the belt occupies a key tectonic junction between the southward growth of the Paleo-Asian continent and the evolution of the Tethyan tectonic domains (Xiao et al., 2005). The WKOB with frequent magmatic activity, wide distribution of granitoid rocks is an ideal place to study the diagenesis of granites in orogenic belts. The Dahongliutan rare metal pegmatite mining area is situated in the south of the Mazha-Kangxiwa fault in the eastern part of the western Kunlun orogenic belt and the north side of the Tianshuihai. In recent years, great breakthroughs have been achieved in prospecting in Dahongliutan area of West Kunlun. At present, more than 2,000 pegmatite veins and 8 lithium-beryllyum mineral sites have been discovered, with Li2O resources of more than 2 million tons, with an average grade of 1.5%. This is the primary super-large pegmatite-type lithium deposit discovered in the West Kunlun metallic belt in China, showing great prospecting potential. Due to the weathering of the source area, some granite bodies in the area are altered. This paper discusses whether the diagenetic age of Dahongliutan intrusion coincides with metasomatic granites? Is there a genetic connection between the metamorphic hydrothermal fluid and the Dahongliutan rock mass?

The Dahongliutan rock mass is situated about 150 km southwest of Hotan County, with convenient transportation. The geotectonic position belongs to the Tianshuihai-Karakoram in the South China plate, the northern part of the Karakorum, the south side of the Mazha-Kangxiwa suture zone. The surrounding rocks are Triassic Bayan Kalashan Group and the Paleoproterozoic Kangxiwa Group. The rock mass has obvious lithofacies zoning, mainly including biotite monzonitic granite, biotite soda granite and two mica granite. The metasomatic granites are mainly migmatized granite.

The mineral assemblage is composed of quartz (30-35%), microcline (25-30%), andesine (20-25%), Muscovite (10-15%) and biotite (10-15%). With the accessory minerals of zircon, apatite (<5%), and have massive structure, medium to coarse grained texture. The andesine with strong sericitization is commonly granular. Tourmaline is embedded in it. Strong silicification and potassium occur in rocks, and the metasomatism is quite obvious.

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 30 μm in diameter. Calculations of zircon isotope ratios were conducted by ICP-MS DataCal and age calculations were performed using Isoplot 3.7 software. The errors for the mean ages are quoted at 90% confidence levels.

Sample D006: Zircon is columnar crystal with a length of about 40-120 μm and an aspect ratio of about 1:1-1:2. It has obvious oscillating zones of magmatic zircon. Most of the zircons have higher Th and U contents, ranging from 8.2 to 1392.6 ppm and 246.7 to 9183.3 ppm, respectively, and the Th/U ratio varies from 0.0028 to 0.94. The total age of 28 analysis points for 24 zircons varied from 219.2 Ma to 2679.9 Ma.

Sample D007: Most zircons are heteromorphic, and a few are short columnar crystals with a length of about 50-100 μm and an aspect ratio of about 1:1-1:2. CL images of zircons show that zircons can be divided into two types: the first type has narrow growth edges on the outside and the second type is black without oscillating bands. Zircon LA-ICP-MS dating method yields 20 analytical data with a harmonic degree of more than 90%. The former type of zircon yields 9 points, and the second type of zircon has 11 points. The contents of Th and U in zircon are 17.1-349.6 ppm and 77.6-4580.4 ppm, respectively. The ratio of Th/U is 0.005-0.84. The 206Pb/238U dating of 20 zircons at 20 analysis points ranged from 219.2 Ma to 979.5 Ma.

Sample D009: Most zircons are self-shaped columnar with a length of about 80-180 μm and an aspect ratio of about 1:1-1:2. CL images of zircons are similar to sample D007. The LA-ICP-MS dating method of zircon yields 33 analytical data with a harmonic degree of more than 90%. The first type of zircon yields 27 points and the second type of zircon have 4 points. The contents of Th and U in zircon are 3.85-738.79 ppm and 100.14-13584.46 ppm respectively, and the ratio of Th/U is 0.005-0.84. Th/U ratio ranged from 0.0014 to 0.997. Age ranged from 207.9 Ma to 1294.4 Ma.

Sample D028: Zircons in the samples are mostly plate-shaped and elliptical, with a length of about 60-120 mm. The aspect ratio is approximately 2:1. CL images show magmatic oscillation zones. Most zircons have lower Th and higher U contents, ranging from 36.5 ppm to 830.7 ppm and 238.2 ppm to 2504.1 ppm, respectively. The Th/U ratio ranged from 0.037594 to 0.997.
1.620246, and the zircon U-Pb age ranged greatly. Zircon age test results range from 215.8 Ma to 1931.49 Ma.

The predecessors (Qiao et al., 2015; Wei et al., 2017; Zhang et al., 2017) have carried out isotope dating of Dahongliutan intrusion. The age results are mainly 220 ±2.2-209.6 Ma, which is the result of magmatic activity and belongs to the Late Triassic magmatism.

The zircon U-Pb age range of the four metamorphic granites studied in this paper is relatively large, ranging from 207.9 to 2679.9 Ma. The youngest zircon (207.9±4.2 Ma) is in agreement with the zircon age in the granite, suggesting that the metamorphic granite hydrothermal fluid may be related to Dahongliutan rock mass intrusion.

The surrounding rocks of Dahongliutan are mainly the Triassic Bayanlashan Group. The zircons in the metasomatic granite show an obvious peak value of 228 Ma, which may represent the captured zircon in the surrounding rock. At the same time, zircons from more diverse Paleozoic and Archean basement have been caught.

**Key words:** LA-ICP-MS zircon U-Pb age, Dahongliutan pluton, West Kunlun orogen, China

**Acknowledgements:** This research was jointly supported by the Project (2017YFC0602701) supported by the National Key Research and Development Plan, China; Project (DD20160004-8) supported by the Geological Survey of China Geological Survey, China.

**References**


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