CHEN Ming, SUN Min, JIANG Yingde and CAI Keda, 2013. Recycling of Ancient Crustal Material in the Latest Ordovician to Early Devonian Magmatism in Russian Altai, Central Asian Orogenic Belt. *Acta Geologica Sinica* (English Edition), 87(supp.): 297.

Recycling of Ancient Crustal Material in the Latest Ordovician to Early Devonian Magmatism in Russian Altai, Central Asian Orogenic Belt

CHEN Ming [1], SUN Min [1,*], JIANG Yingde [1] and CAI Keda [1,2]

1. Department of Earth Sciences, The University of Hong Kong, Pokfulam Road, Hong Kong, China
2. Xinjiang Research Center for Mineral Resources, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, Urumuqi 830011, China

The Central Asian Orogenic Belt (CAOB) is characterized by amalgamation of various island arcs, ophiolites, accretionary prisms, oceanic plateaus and possibly some micro-continents, during the progressive subduction-accretion processes. Isotopic data suggest significant Phanerozoic crustal growth in the CAOB, whereas recycling of ancient crust is also addressed by some recent researchers. The Russian Altai is one of the key components of the CAOB, consisting of part of the Altai-Mongolian terrane (AM) in Russia, the Gorny Altai terrane (GA) and the Charysh-Terekta-Ulagan-Sayan suture (CTUSs) zone. Voluminous granitoids and their volcanic equivalents, as well as a series of Paleozoic sedimentary and meta-sedimentary rocks occur, but they have not been well investigated. Age and source nature of these rocks can provide critical constraints on the crustal growth, sedimentary basin evolution, and tectono-thermal events in Russian Altai area.

In this study, two volcanic rocks and a biotite-gneiss along the CTUSs zone were collected for zircon U-Pb and Hf-isotope analysis. Zircons from the two volcanic rocks yield consistent crystallization ages of 420.9±1.4 Ma and 421.4±2.5 Ma, respectively, indicating a magmatic activity in the latest Silurian. These zircons are characterized by low initial $^{176}Hf/^{177}Hf$ isotopic ratios, with ε_{Hf}(421 Ma) values varying from -10.8 to -2.8 and two-stage Hf model ages of ca. 2.1-1.6 Ga. It is suggested that recycling of ancient crustal material predominantly contributed to the generation of these magmas. Detrital zircons from the biotite-gneiss give a major age population of ca. 450-380 Ma, with a prominent peak at ca. 420 Ma, suggesting a maximum deposition age of ca. 380 Ma. They are characterized by similar Hf isotopic compositions with those magmatic zircons from the volcanic rocks and give $\varepsilon_{Hf}(t)$ values from -11.3 to -1.3 as well as two-stage Hf model ages of ca. 2.1-1.5 Ga. All the detrital zircons exhibit euhedral crystal shapes and oscillatory zoning, implying a proximal magmatic source. Given the similarity of zircon Hf isotopic compositions and close relationship in localities between the two volcanic rocks and the biotite-gneiss (<60 km in distance), we propose that sediments eroded from the nearby Paleozoic igneous rocks, as represented by the two volcanic rocks in this study, are potential sources for the protolith of the biotite-gneiss. Our results suggest that the latest Ordovician to Early Devonian was an important episode for the crustal evolution in Russian Altai area. Combined with available regional data, this Paleozoic tectono-thermal event possibly resulted from the closure of the Paleo-Asian Ocean during the amalgamation of the GA and AM.

Compared with typical juvenile nature of the Early-Middle Paleozoic magmatism in Chinese Altai, our data suggest that some unrecognized ancient crustal relicts were possibly involved in the Middle Paleozoic magmatism in Russian Altai. Further investigations need to be conducted in order to better constrain the crustal evolution of the Russian Altai.

Acknowledgement

This study is financially supported by Hong Kong Research Grant Council (HKU705311P and HKU704712P), National Science Foundation of China (41273048), HK-Germany Joint Research Scheme and a HKU CGCG grant.

Key words: Gorny Altai terrane; Altai-Mongolian terrane; Zircon U-Pb age; Zircon Hf isotopes; Crustal evolution

* Corresponding author. E-mail: minsun@hku.hk