

Zircon U-Pb Dating and Hf Isotopes of the Yaxi Gabbro Body and Their Tectonic Significances in Central Tianshan Mountains, Xinjiang Autonomous Regions, China

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Abstract: The Yaxi gabbro intrusion in Central Tianshan Mountains, Xinjiang, China is outcropped in the south side of the Aqikekuduke-Shaquanzi fault. It contains main lithofacies of gabbro, which is obviously V-Ti magnetite mineralized, and minor lithofacies of pyroxenite and diorite. The LA-MC-ICP-MS technique is applied to date U-Pb ages and to analyze Lu-Hf isotopes of zircons of the Yaxi gabbro intrusion in this paper. The results show that the gabbro was emplaced in Late Carboniferous as the $^{206}\text{Pb}/^{238}\text{U}$ weighted average age of its zircons is 311.7 ± 3.5 Ma (MSWD = 0.104, $n = 14$). The $(^{176}\text{Hf}/^{177}\text{Hf})_i$ values of zircons are varied from 0.282637 to 0.282945, with corresponding $\varepsilon_{\text{Hf}}(t)$ values varying from +2.1 to +13 (average +4.7). The calculated Lu-Hf single-stage mantle mode ages vary from 430 Ma to 865 Ma, with mean age of 772 Ma which is older than U-Pb age. These characteristics indicate that the parental magma was mainly derived from the depleted mantle with minor contamination of crustal material. Combining with previous researches on the characteristics of Hf isotopes and ages of gabbros in the eastern Tianshan mountains, it is believed that the chronological and Hf isotopic data of the Yaxi gabbro body have provided important evidences for the view that the Junggar paleoceanic crust was southward subducted in Late Palaeozoic.

Keywords: Petrogenesis; Zircon U-Pb dating; Hf isotope; Gabbros; Central Tianshan