

Hf isotopic mapping of Paleozoic Granitoids in the Yili Block, NW China: implications for continental growth in the Central Asian Orogenic Belt

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Revealing basement nature of microcontinents is crucial for understanding the accretionary history and continental growth of the CAO. The Yili Block is a triangular microcontinent bordered by sutures and fault zones in the western Chinese Tianshan. Voluminous igneous rocks, mostly granitoids, were exposed and constitute two major belts stretching in southern and northern margins of the Yili Block. We synthetically compile up-to-date geochronological, zircon Hf isotopic and whole-rock geochemical data for granitoids from the Yili Block and adjacent tectonic domains. Paleozoic granitoids were mainly emplaced at three stages, i.e., ~470 to ~390 Ma, ~370 to ~320 Ma and ~320 to 250 Ma. The first-stage granitoids are characterized by relatively ancient Hf isotopic compositions [$\epsilon\text{Hf}(t)=-5.2$ to $+8.3$, crustal Hf model ages (TDMc) range from 0.91 to 1.77 Ga, mostly >1.1 Ga]. On the contrary, the second- and third-stage granitoids show more juvenile Hf isotopic signatures ($\epsilon\text{Hf}(t)=-4.5$ to $+15.7$, TDMc=0.35 to 1.60 Ga, mostly <1.15 Ga). Spatially, granitoids with more ancient Hf isotopic features are dominantly exposed in comparatively marginal parts of the Yili Block, whereas the inner parts are dominated by granitoids with juvenile Hf isotopic features. The temporal and spatial variation in zircon Hf isotope is indicative of heterogeneity in lithospheric architecture. The genesis of granitoids with juvenile isotopic signatures was likely related to anatexis of basic to intermediate, juvenile igneous/metagneous rocks. Based on these results, it is proposed that, although the Yili Block likely has an origination from the Neoproterozoic Tarim and the basement was initially dominated by ancient materials, the reamination by basaltic to andesitic magmas associated with slab melting plausibly occurred in active continental margins during the long-lasting subduction history.

Key words: Hf-in-zircon isotope; Granitoid; Yili Block

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