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The Isotopic Geochemistry Tracing of the Miocene Ore-Bearing Granite Porphyry on Southern Margin of Gangdese, Tibet

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In this contribution, we studied the major element, trace element, Zircon U-Pb geochronology and Sr-Nd-Pb-Hf isotope of the ore-bearing adakitic porphyries located in Chongjiang and Zhunuo in the southern margin of Gangdese. The results show that the timing of intrusion of Chongjiang's porphyritic biotite monzogranite is ca. 14.9 ~ 14.8 Ma and that of Zhunuo's granite porphyry is ca. 14.9 ~ 15.3 Ma, which are consistent with the results of previous studies. The Chongjiang porphyritic biotite monzogranite zircons have $\epsilon_{\text{Hf}}(t)$ values between +0.5 and +5.1, respectively, corresponding to the two-stage model age from 1.6 to 2.2Ga. This result indicates that the Chongjiang porphyritic biotite monzogranite zircons may derive from partial melting of juvenile crust. The Zhunuo granite porphyry zircons have $\epsilon_{\text{Hf}}(t)$ values between -6.9 and -0.1, corresponding to the two-stage model age from 1.6 to 2.2Ga, which reflects the possibility of their derivation from partial melting of ancient crust.

The Chongjiang and Zhunuo granites have similar Sr-Nd-Pb isotopic compositions. Their $\epsilon_{\text{Nd}}(t)$ values range from -6.85 to -2.48, which fall in the Yarlung Zangbo

MORB to Lhasa Block ancient lower crust evolution line and the Yarlung Zangbo MORB to Anduo orthogneiss evolution line. Their $^{208}\text{Pb}/^{204}\text{Pb}$, $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{206}\text{Pb}/^{204}\text{Pb}$ have a range of 38.326~39.947, 15.469~15.701 and 18.310~18.759. These high radiogenic Pb isotopic compositions are consistent with what have been found in Himalayan gneiss and granite. The trace elements show that both Chongjiang monzogranite and Zhunuo granite porphyry have geochemical characteristics of adakitic rocks. This may partially reveal that both places are outcome of the melting of the thickened lower crust.

These Sr, Nd, Pb and Hf isotope compositions indicate that ca. 15Ma adakitic porphyritic magma source in Gangdese has both juvenile crustal material and ancient crustal material. The adakitic magma source may include the Indian continental crust, the Yarlung Zangbo ophiolite, and Linzizong volcanic rocks.

Keywords: zircon U-Pb, Sr-Nd-Pb-Hf isotope tracing, Gangdese, adakitic porphyry, partial melting

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