The Hf-O isotopes of porphyry system in the Southern Yare composite pluton, western Lhasa terrane, Tibet Plateau

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Southern Yare composite pluton is considered as a typical emergence of barren Miocene porphyry system, which is located in the western Lhasa terrance, Tibet Plateau. Previous studies of the pluton declared that the U-Pb age of this Miocene prophyry system was 16 ~ 17 Ma and the magma originated from ancient lower crust melting. To enhance our understanding for the petrogenesis of this prophyry system and correlation between the barren and fertile systems, we conducted Hf-O isotopic analysis, i.e., zircon *in situ* Hf isotopic ratio on LA-ICP-MS and O isotopic ratio on SIMs. After 49 data points were collected, the zircon Hf isotopic ratio $\varepsilon_{Hf}(t)$ ranges from -13.5 to -3.52. For oxygen isotope, δO^{18} is from 6.24 to 8.75 (22 data points). Comparing with other Miocene porphyry systems located in Lhasa terrance, especially the eastern area, the porphyry in our study area, which also represents the westen Lhasa terrance and barren system, shows more enrichment in Hf isotope and higher δO^{18} values. On the δO^{18}-$\varepsilon_{Hf}(t)$ plot, it shows a significantly negative correlation between barren porphyry and fertile porphyry. This indicates that the barren porphyry system, represented by Southern Yare pluton, has the most negative $\varepsilon_{Hf}(t)$ values and highest δO^{18} values; while the fertile porphyry systems, such as the cases of Qulong and Chongjiang, both siutated in Lhasa terrance, own positive $\varepsilon_{Hf}(t)$ values and lower δO^{18} value in contrast. Combined with the major and trace element data, we infer that the origin of Miocene porphyry system from Southern Yare composite pluton is contributed by the melting of ancient lower crust. Lack of juvenile crustal compositions may explain why the porphyry formed in western Lhasa terrance did not evolve into porphyry copper deposits.