Continental mantle heritage in the Tethyan suture zone, central Tibet

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Previous Re-Os studies of ophiolitic peridotites have revealed the existence of ancient mantle domains in Neo-Tethyan suture zones, whereas the provenance of such peridotites in the mantle section of ophiolites is still debated. The pre-existing lithospheric mantle may provide a basement for newborn oceanic crust, or they in the meantime remelt and contribute to the formation of Tethyan oceanic crust.

U-Pb dating of zircons from orthopyroxenite veins in the Dongqiao ophiolite indicates early Paleozoic ages (~495 Ma) , zircon $\varepsilon_{Hf}(t)$ values (-2.4 to -4.9) and $\delta^{18}O$ values (5.70‰ to 6.85‰) indicate orthopyroxenites derived from an enriched lithospheric mantle source, during the subduction of the Proto-Tethyan oceanic lithosphere beneath the Gondwana continent. This offers compelling evidence that part of the mantle peridotites in the Dongqiao ophiolite represent slices of ancient SubContinental Lithospheric Mantle. Moreover, mantle peridotites in the Kaimeng ophiolite have $^{187}Os/^{188}Os$ ratios between 0.1180 to 0.1261, demonstrating the existence of isotopically depleted mantle. Cumulate rocks (troctolites and dunites) from the Kaimeng ophiolite have $^{187}Os/^{188}Os$ ratios between 0.1240 and 0.1277, most of them are less than 0.125 (seven samples show $\gamma Os_{(218\ Ma)}$ values from -1.92 to -1.27), indicating ancient mantle domains contribute into the genesis of primary MORB magma.

Considering the above results, we argue that ancient continental mantle heritage maybe widely distributed in oceanic lithospheric mantle and have a genetic link with crustal rocks.