Re-Os isotopic constraints on the evolution of Bangong-Nujiang Tethyan oceanic mantle

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Chemical and Re-Os isotopic study of the mantle rocks of ophiolites in the Bangong-Nujiang suture zone in central Tibet has provided a coherent picture for the evolution of the Bangong-Nujiang Tethyan oceanic mantle from MOR to SSZ settings.

Cpx-harzburgites and lherzolites in the Bangong Lake ophiolite were formed in a MOR setting. Suprachondritic $^{187}Re/^{188}Os$ (up to 1.833) of bulk-rock and spinels in cpx-harzburgites can be explained by mixing with high Re/Os melts. T_{RD} ages (0.48-0.55 Ga) suggest these rocks represent a Pan-African lithospheric mantle beneath the Gondwana continent. High TiO_2 in spinels and bulk rock imply the lherzolites were formed through a refertilization process. $^{187}Os/^{188}Os$ (0.12113-0.12261) of bulk-rock lherzolite give T_{RD} ages of 1.0-1.3 Ga, indicating the existence of Mesoproterozoic lithospheric mantle under spreading ridges.

Mantle rocks in the SSZ-type ophiolites from Bangong Lake, Dongqiao and Nagqu reflect the complicated evolution of the Bangong-Nujiang oceanic mantle during the subduction stage. Most harzburgites from the Bangong Lake ophiolite give T_{RD} ages of 1.2-1.7 Ga, possibly representing relics of a Mesoproterozoic lithospheric mantle. However, three samples have both high Os contents (1.316-3.699 ppb) and high $^{187}Os/^{188}Os$ (0.12603-0.12971), and may be Mesozoic oceanic lithospheric mantle. $^{187}Os/^{188}Os$ ratios of dunites and harzburgites from the Dongqiao and Nagqu ophiolites vary from 0.11740 to 0.13163 and give T_{RD} ages up to 1.4 Ga, also suggesting the existence of a Mesoproterozoic lithospheric mantle which has experienced later melt percolation.

We interpret the old mantle domains in Bangong-Nujiang ophiolite belt as relics of ancient sub-continental lithospheric mantle, which may have survived during the opening of the Bangong-Nujiang Tethyan ocean basin, and subsequently were incorporated into Mesozoic oceanic lithospheric mantle.

This study was funded by the National Natural Science Foundation of China (Grant no.40972056, 41172059)