The origin and tectonic setting of the Cuobuzha peridotite, Yarlung Zangbo suture zone, China: constraint from Re-Os isotopic

GUANGYING FENG[1], JINGSUI YANG[1], YILDIRIM DILEK[2], FEI LIU[1], FAHUI XIONG1[1]

[1]CARMA, Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China. Email: fengguangying198@163.com;
[2]Department of Geology & Env. Earth Science, Miami University, Oxford, OH 45056, USA

The upper mantle section of the Cuobuzha ophiolite in the northern sub-belt of the Yarlung–Zangbo Suture Zone (YZSZ) in SW Tibet comprises mainly clinopyroxene (cpx)–rich and depleted harzburgites. Spinels in the cpx-harzburgites show lower $Cr^{\#}$ values (12.6–15.1) than the spinels in the harzburgites (26.1–34.5). The harzburgites have subchondritic Os isotopic compositions (0.11624–0.11699), whereas the cpx-harzburgites have suprachondritic $^{187}Os/^{188}Os$ ratios (0.12831–0.13125) with higher Re concentrations (0.380-0.575 ppb). The cpx-harzburgites plot in a Re vs. Al_2O_3 diagram as a result of subsequent addition of Re following the last partial melting event that occurred during mid-ocean ridge melt evolution processes.

Both peridotite types in the ophiolite represent mid-ocean ridge type upper mantle units, their melt evolution trends reflect different mantle processes. The cpx-harzburgites formed from low-degree partial melting (~5%) of a primitive mantle source, and they were subsequently modified by melt–rock interactions in a mid-ocean ridge environment. The depleted harzburgites, on the other hand, were produced by re-melting of the cpx-harzburgites, which later interacted with MORB- or island arc tholeiite (IAT)-like melts possibly in a trench-distal backarc spreading center. Our new isotopic and geochemical data from the Cuobuzha peridotites confirm that the Neotethyan upper mantle had highly heterogeneous Os isotopic compositions as a result of multiple melt production and melt extraction events during its seafloor spreading evolution.