Multiple events in oceanic upper mantle: Ru-Os-Ir alloys in Tibetan ophiolites

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Ru-Os-Ir alloys from podiform chromitites in the Luobusa and Dongqiao ophiolites (see figure) were analysed for PGEs and $^{187}Os/^{188}Os$ (in situ). Most grains are osmiridium or iridosmine (<5% Ru; IMA nomenclature). $^{187}Re/^{188}Os$ is <<0.001; individual grains are isotopically homogeneous ($^{187}Os/^{188}Os$ within 0.1%). In the Luobusa ophiolite, $^{187}Os/^{188}Os$ ratios range from 0.12620±4(1σ) to 0.12672±6(1σ); the average for all grains (n=145) is 0.12645±2(1σ). Re-depleted model ages (T_{RD}) (Enstatite Chondritic Reservoir) range from 197−270 Ma, consistent with the opening of the Neo-Tethyan Ocean. In contrast, $^{187}Os/^{188}Os$ in alloys from the Dongqiao ophiolitic chromitite form two groups, mirroring whole-rock Os data for the chromitites. Group I has $^{187}Os/^{188}Os$ 0.12616±5−0.12664±3 (1σ) and T_{RD} from 208 to 276 Ma. Group II $^{187}Os/^{188}Os$ ranges from 0.12003±5(1σ) to 0.12194±3(1σ) and the T_{RD} ranges from 871 to 1139 Ma. We suggest: 1) the ophiolitic podiform chromitites originated as mantle-melting residues in the Permian to early Triassic time; 2) the Yarlung-Zangbo and Bangong-Nujiang Neo-Tethyan Oceans opened nearly simultaneously; 3) the $^{187}Os/^{188}Os$ of the Mesozoic upper mantle ranges from 0.12639±4(1σ) to 0.12645±2(1σ); 4) the Dongqiao ophiolite contains older material, perhaps relict Rodianian subcontinental lithospheric mantle.

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