Os isotope and PGE systematics of peridotites from the Othris Opiolite, Greece

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Re-Os isotopic data and the concentrations of platinum-group elements (PGE) were determined in MOR-type peridotites from the well-characterized Fournos Kaïtsa sub-massif of the Jurassic Othris Ophiolite in central Greece. We analyzed a suite of mantle rocks with rock types ranging from harzburgite to lherzolite to plagioclase peridotite. Refractory, Cr-rich spinel compositions and light rare earth element depleted clinopyroxenes in the harzburgites are consistent with ~15% dry partial melting [1]. The plagioclase peridotites have higher Ti and REE contents in the pyroxenes but similar refractory spinel compositions to the harzburgites, indicating that they may be products of impregnation of harzburgites with a fractionating melt [1].

The samples have variable $^{187}Os/^{188}Os$ (0.1249-0.1291) with the plagioclase peridotites being less radiogenic than the harzburgites and lherzolites. Os abundances range from 4.5 to 5.6 ppb and show a positive correlation with $^{187}Os/^{188}Os$. Robust age information could not be obtained. However, Os-Al_2O_3 analogue 'ages', ranging from Mesozoic to Proterozoic, are consistent both with the 170 Ma emplacement age of the Othris Ophiolite and an earlier melting episode in the Proterozoic similar to other circum-Tethyan peridotite bodies such as Ronda [2] and the Ligurian ophiolites [3].

Os isotope ratios vary significantly with little variation in Al_2O_3 (1.78-1.95 wt%). Since the peridotites are comparatively fresh, contain primary residual sulphides, and show little evidence of metasomatism, the 'vertical' $^{187}Os/^{188}Os$-Al_2O_3 trend most likely formed during recent (Jurassic) re-melting of a mantle, which had already seen an ancient melting event (at least of Proterozoic age). However, it cannot be excluded that the vertical $^{187}Os/^{188}Os$-Al_2O_3 trend is the result of mixing or reaction between harzburgite and a mantle melt containing unradiogenic Os.

References

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