

A reappraisal of sub-chondritic Os/Ir ratios in off-craton peridotite xenoliths

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Alkali basalt-borne peridotite xenoliths tend to exhibit lower Os concentrations and Os/Ir ratios (<1) than mantle tectonites. This may reflect preferential loss of Os during (i) lava entrainment, (ii) low temperature weathering of base metal sulfides (BMS) or (iii) BMS dissolution during percolation of S-undersaturated silicate melts [1, 2]. To test hypotheses 2 and 3, 27 peridotite xenoliths from the French Massif Central were analysed for PGE-S-Se-Te and Re-Os isotope systematics. These xenoliths show evidences of percolation by S-saturated (group A) or by S-undersaturated (group B) silicate melts/fluids, with BMS weathering in each group spanning 0-100% [2].

Group A xenoliths show PUM-like HSE, S, Se and Te concentrations, similar to those of mantle lherzolite tectonites and mostly attributed to high BMS contents. In contrast, group B xenoliths, which are spatially and temporally associated with the “FMC plume” and the percolation of large volume of S-undersaturated silicate melts show lower than PUM HSE-S-Se concentrations, pronounced sub-chondritic Os/Ir and Re/Pd ratios, and very low BMS abundances. Interestingly, the Os/Ir ratios positively correlate with the Os concentrations but none of these two parameters vary with the extent of BMS weathering.

Our results suggest that the percolation of large volume of S-undersaturated silicate melts, while dissolving BMS, results in low Os concentrations and sub-chondritic Os/Ir in mantle xenoliths, either because (i) Os is more soluble than Ir in silicate melts, (ii) Ir-rich phases (i.e. alloys) are preferentially stabilised in the peridotite xenoliths in response to the desulfurization or (iii) percolating melts that imparted their HSE signature.

[1] Lorand and Alard 2001. *GCA* 65, 2789-2806. [2] Lorand et al., 2003 *GCA* 67, 4137-4153.