Re-Os and highly siderophile element systematics of peridotite xenoliths from Hawaii

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It has been suggested that peridotite xenoliths from Salt Lake Crater (SLC) in Oahu Island, Hawaii and a subset of peridotite xenoliths with the highest mantle temperatures in Malaita, Solomon Islands (OJP: Ontong Java Plateau) are enriched in samples with unradiogenic $^{187}Os/^{188}Os$ less than 0.120 [1, 2]. This implies that the upwelling mantle plumes are principally composed of ancient lithosphere recycled back into deep mantle by subduction processes. However, recent accumulation of data for abyssal peridotites, mantle tectonites in ophiolites and shallow peridotite xenoliths have shown that the modern convecting mantle host domains with low $^{187}Os/^{188}Os$ in particular proportions, and induced arguments that the peridotite xenoliths in Hawaii and OJP sample essentially the same mantle reservoir as abyssal peridotites [3, 4]. In this study, we investigated whole-rock abundances of highly siderophile elements (HSE: Os, Ir, Ru, Pt, Pd and Re) together with $^{187}Os/^{188}Os$ ratios and major/trace element concentrations in SLC peridotites with the aim of examining whether SLC and abyssal peridotites exhibit different HSE characteristics and/or $^{187}Os/^{188}Os$ distributions. Our results along with previously published data [1, 5] demonstrate that approximately three out of ten SLC xenoliths possess unradiogenic $^{187}Os/^{188}Os$ less than 0.120, although they fall within the range of abyssal peridotites. These unradiogenic xenoliths tend to show moderate to strong depletions in the Re, Pd and Pt relative to Ir-group platinum group elements (IPGE: Os, Ir, Ru). Broad correlation of $^{187}Os/^{188}Os$ with Pd/Ir ratio and Al_2O_3 contents suggest that recent melting and metasomatic processes responsible for incompatible element variations have little overall effect on the HSE compositions and that ancient melt depletion is a predominant mechanism creating the observed correlations. These data indicate that SLC xenoliths were derived from the normal convecting mantle slightly enriched in ancient depleted domains.

[1] Bizimis *et al.* (2007) *EPSL* **257**, 259-273. [2] Ishikawa *et al.* (2011) *EPSL* **301**, 159-170. [3] Lassiter *et al.* (2014) *EPSL* **403**, 178-187. [4] Jackson *et al.* (2016) *GCA* **185**, 21-43. [5] Chatterjee and Lassiter (2016) *Chem. Geol.* **442**, 11-12.