Metasomatic Re addition overprints unradiogenic Os in sub-arc mantle

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The extent of slab contribution *versus* crustal assimilation in arc lavas is debated, as is the origin of their commonly radiogenic Os [1]. In the Cabo Ortegal Complex (Spain), the pyroxenite-rich Herbeira massif has been interpreted as a delaminated arc root exhumed during arc-continent collision [2, 3]. The pyroxenites exhibit a wide range of $^{187}Os/^{188}Os$ (0.16-1.44) resulting from radiogenic ingrowth at highly variable $^{187}Re/^{188}Os$. The latter is correlated with the modal abundance of amphibole, which occurs as mostly post-kinematic crystals commonly associated with Cu-rich sulfides. Based on these observations, it is suggested that Re was mobilized by S-rich, hydrous fluids during retrograde metamorphism under amphibolite-facies conditions. We propose a simple calculation to correct for this metasomatic Re addition. It yields relatively homogeneous initial $^{187}Os/^{188}Os$ (0.118-0.256), only slightly more radiogenic than that of the host harzburgites and associated dunite-hosted chromitites (0.114-0.129), which is consistent with very limited slab contributions to parental mantle-wedge melts. These relatively unradiogenic compositions, comparable to those of the most mafic lavas of the Lesser Antilles, are consistent with radiogenic Os in arc lavas being mainly due to crustal assimilation [4].

Following this correction, corresponding Os and Re-depletion model ages exhibit clusters between 0.6 and 2.0 Ga, in good agreement with the development of the Avalonian-Cadomian arc on the northern margin of the Western African Craton documented by U-Pb and Hf-isotope systematics in zircon [5]. Accordingly, such involvement of Proterozoic material is consistent with numerical diffusion-percolation models which reproduce the strong Hf-Nd isotopic decoupling measured in Cabo Ortegal pyroxenites and peridotites ($\Delta\varepsilon_{Hf(i)}$ up to +97).

[1] Alves *et al*. (2002), *EPSL* **198**, 355-369 [2] Tilhac *et al*. (2016), *J Petrol* **57**, 1921-1954. [3] Tilhac *et al*. (2017), *EPSL* **474,** 390-502. [4] Bezard *et al*. (2015), *GCA* **150**, 330-344. [5] Albert *et al*. (2015) *Gondwana Res* **28**, 1434-1448.