Isotopic heterogeneity of mantle melts migrating through the Lanzo ophiolites: a Re-Os perspective

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The Lanzo South ophiolite is a lithospheric mantle section exhumed during the opening of a Jurassic basin akin to the modern slow to ultraslow spreading ridges. The peridotites are mainly constituted by Pl-bearing depleted harzburgites with evidence for refertilization by MORB-type melts [1]. Here, we found two types of replacive bodies, formed by melt which is relusted in extreme geochemical variability [2]. The first type is constituted by Px-free dunites, concordant to the foliation of the host-rocks and related to migration of melts with a MORB-like geochemical affinity. The second type consists of Px-poor harzburgites that are clearly discordant and geochemically depleted.

With this contribution we show that the whole-rock Re-Os isotopes and PGE compositions of these two types of replacive rocks in consistent with a formation by melts with different geochemical affinities. The host Pl-peridotites have nearly flat PGE patterns and initial $^{187}Os/^{188}Os$ ratios (at 165 Ma) of ~0.124, in agreement with an event of refertilization by MORB-type melts. Compared to the host rocks, the MORB-type dunites result preferentially enriched in Pd and Re, though having similar initial $^{187}Os/^{188}Os$ ratios (~0.123-0.126), thereby confirming the formation by MORB-type melts at very high melt flux. Differently, the replacive harzburgites are depleted in Pd and Re and have initial $^{187}Os/^{188}Os$ ratios extending towards highly unradiogenic compositions (down to 0.117), in accordance with the highly radiogenic Hf compositions of the cpx from the same rocks. These data substantiate the idea that the replacive harzburgites from Lanzo South formed through an incomplete reaction with an ultra-depleted melt originated by a anciently depleted (>1 Gy) portion of the asthenosphere [2].

[1] Piccardo et al., (2007) *Lithos,* 94, 1-4. [2] Sanfilippo et al., (2019) *Earth Planet. Sci. Lett.*, 511, 89-98.