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Fractionation of Highly Siderophile Elements during reactive melt infiltration in lower oceanic crust

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The olivine-rich troctolites are Mg-rich rocks forming by open-system magmatic crystallization in response to primitive melt injections into the growing lower oceanic crust (e.g., Renna et al., 2016).

In the present study, whole-rock highly siderophile (HSE: Os, Ir, Ru, Rh, Pt, Pd, Au and Re) and chalcogen (S, Se and Te) element compositions, and Re-Os isotopes of the olivine-rich troctolites from the Jurassic Alpine ophiolites were determined with the aim to investigate the control that the formation of lower oceanic crust may exert on the fractionation of HSE and other incompatible chalcophile elements in MORB.

The olivine-rich troctolites have initial γOs (160 Ma) ranging from +0.2 to +5.9, and Primitive Mantle (PM)-normalized HSE-Te-Se-S patterns showing a gradual increase from Os to Au, and nearly flat Au-Te-Se patterns. These patterns are similar to those of little-fractionated mantle melts and are parallel, at higher concentrations levels, to those typical of MORB. The olivine-rich troctolites have higher Te and Os/Ir, and lower Se/Te than MORB, which may be reconciled with a process of sulfide accumulation. Sulfide precipitation could be promoted by interaction between melts interstitial to olivine and melts relatively rich in silica, which could migrate from an underlying gabbroic framework (cf. Renna et al., 2016). Melts residual to the formation of olivine-rich troctolites are inferred to have a markedly HSE-fractionated signature comparable to that of MORB.

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