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Geochemistry of trace elements (REE-PGE) and Os isotopes in the Finero chromitites (Western Alps, Italy): metasomatism in a subcontinental mantle plume versus an origin in a subduction zone.

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In past decade, ICP-MS has turned out to be an extraordinarily powerful and very versatile tool for the geochemical analysis in earth sciences. The introduction of the MC-ICP-MS has allowed the routine analysis of non-traditional isotope systems. In case of osmium isotopes, N-TIMS still has an advantage over MC-ICP-MS systems in terms of sensitivity and selectivity. But for in-situ Os isotope analysis MC-ICP-MS is the instrumentation of choice. In this work we present Os isotope data obtained with ICP-MS and N-TIMS in combination with PGE and other trace element determined in chromitites and whole rocks from the Finero body, aiming to better understand the formation and evolution of the famous Ivrea-Zone orogenic peridotites.

The Finero metasomatic mantle phlogopite-peridotite, cropping out in the deep continental crust of the Ivrea Zone (Western Alps), contains small chromite bodies. The chromitites formed concomitantly with the episode of alkaline-carbonatitic metasomatism. A reaction would have taken place between the restitic mantle and a contaminant fluid phase causing instability of Cr-diopside and crystallisation of abundant Ti-rich chromite. However the nature and origin of these fluids, i.e. mantle or crustal derived, or mixing of both is still matter of discussion. Some authors suggested that metasomatic fluids have been derived from a crustal slab in a subduction setting (Hartmann & Wedepohl 1993, Zanetti *et al.* 1999, Morishita *et al.* 2003). Fluids have also been attributed to a mantle plume emplaced at the base of the subcontinental crust by ex-

tension and thinning of the lithosphere (Exley *et al.* 1982, Stähle *et al.* 1990, Shervais & Mukasa 1991, Henk *et al.* 1997, Garuti *et al.* 2001, Zaccarini *et al*., 2004).

The total PGE concentrations in the chromitites are very low (45 ppb, average of 10 samples). Os, Ir, Ru are unfractionated (5-8 times the mantle concentration), forming flat patterns, whilst the content of Rh is quite high (about 10 times the mantle concentration) giving a positive anomaly in all the analyzed chromitites. Low contents of Pt $>$ Pd (less than the mantle concentration) is reflected in a strong negative slope. The platinum group mineral (PGM) assemblage fits well with the PGE distribution. The laurite, the most abundant PGM, is accompanied by a number of cuprorhodsite, Rh-rich cuproiridsite and other Rh minerals, whilst Os-Ir-Ru alloys, are absent. These results are very different when compared with those reported in chromitites formed in the subduction zone ophiolites. The REE distribution in the chromitites is not consistent with a major contribution from the continental crust.

The $^{187}Os/^{188}Os$ compositions are dominantly subchondritic with compositions indistinguishable from that of host orogenic peridotites and that of the European subcontinental mantle. There is no or only little evidence that metasomatism had an affect on the PGE distribution and the Os isotopic composition.

The obtained data support the hypothesis that the metasomatism in the Finero mantle was a result of mantle diapirism at the base of the continental crust, induced by extensional tectonics and not by a compressive regime as typical of the subduction zone. Furthermore, there are no evidences of crustal contamination, suggesting that the mesatomatic agent was produced by the mantle itself.

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