



Accessory minerals as petrogenetic indicators in the chromitites of the Finero massif (Western Italian Alps)

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The Finero phlogopite-peridotite (Ivrea Zone, Western Alps) represents an important example of partially depleted upper mantle, re-enriched by reaction with flushing fluids carrying incompatible elements and volatiles. As a result, a metasomatic mineral assemblage (phlogopite-amphibole-rutile-ilmenite-apatite-carbonate) is found associated with a strongly residual assemblage (olivine-orthopyroxene-chromian spinel) in a totally fresh and coarse-grained re-crystallized harzburgite. Various aspects of the metasomatism at Finero are currently debated and still unresolved: i) the provenance (mantle or crust) of the contaminant fluids and ii) the geodynamic environment (sub-continental mantle plume vs. a subduction setting). Detailed mineralogical investigation of small podiform chromitite bodies associated with the phlogopite peridotite of Finero has revealed the presence of an unusual association of accessory minerals that significantly differs from that of podiform chromitites in suprasubduction settings. Platinum-group-mineral inclusions in chromian spinel are characterized by Laurite in a Rh-rich PGM assemblage mainly consisting of cuprorhodsite, Rh-rich cuproiridsite and other rare Rh minerals. Barium-rich phlogopite, apatite, Ca-Mg carbonates and Ni-Cu sulfides and alloys also occur included in chromian spinel. Furthermore, the chromitite contains an association of “exotic” minerals of Ti-Zr-Th-U dominated by zircon along with zirconolite, baddeleyite, thorianite, uraninite and thorite or huttonite. The assemblage and composition of micro-inclusions in the Finero chromitites, as a whole, indicate that the metasomatizing fluid had an alkaline-carbonatite affinity. The formation of carbonatite-type liquids and hydrous fluids is commonly related to the emplacement of mantle plumes in continental rift systems worldwide. This supports the conclusion that the metasomatism of the Finero mantle was a result of mantle diapirism at the base of the continental crust induced by extensional tectonics in pre-

Hercynian times, not related with a subduction zone.