CARBONATES AND MELT-ROCK REACTIONS IN SULPHIDE-BEARING ULTRAMAFIC INTRUSIONS OF THE IVREA-VERBANO COMPLEX

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Ultramafic intrusions emplaced in the Ivrea-Verbano (I-V) Complex contain substantial amounts of volatiles including carbon in form of carbonates or graphite (Garuti et al., 2001; Locmelis et al., 2016 and ref. therein). Especially the Valmaggia ultramafic "pipe" and the pyroxenite intrusion of Campello Monti are highly enriched in carbonates intergrown with the magmatic silicate-oxide assemblage and with remarkable Ni-Cu-PGE blebby to nodular sulfide mineralization (Sessa et al., 2017). Among the I-V pipes, the Valmaggia intrusion displays impressive evidence of pervasive melt-rock reactions between a peridotitic crystal mush, or brecciated protolith, and a volatile-rich percolating melt similar to adakite. Augite oikocrysts, olivine and enstatite were extensively overprinted by pargasitic amphibole, enstatite II, phlogopite and spinel at PT conditions of 4 to 8 kbar and 700 to 900°C. The metasomatic replacement occurred along progressive reaction fronts marked by multiple coronas between the Ca-Na plagioclase-rich melt and the peridotitic assemblage. Carbonates, like sulfides, appear to be strictly related to the metasomatic assemblage. Similar carbonate-silicate assemblages also occur in sulfide-rich samples from the Campello Monti Ni mine. Carbonates are interstitial to silicates and sulfide aggregates, occasionally embedded in sulfides, and range from Fe-rich calcite, dolomite to siderite according to the nature of the associated mineral (amphibole, olivine/enstatite/phlogopite, core of sulfide nodules). At Campello Monti carbonates are also included in silicates. The origin of carbon in these intrusions is controversial: mantle degassing, carbonatite component or derivation from sedimentary sources (e.g. marbles from the I-V basement)? Compositional features of carbonates, involving major to trace elements, suggest mantle affinity. Carbonates from the Valmaggia intrusion were analyzed for carbon-oxygen isotope analysis together with samples from calcitic and dolomitic I-V marbles. Preliminary results exclude assimilation of C from sedimentary sources as isotopically heavy, sedimentary signatures discriminate the marbles from the isotopically light magmatic carbonates plotting within the mantle range and close to, but not within the Primary Igneous Carbonatite zone. This result is compatible with the markedly deep, mantle-related radiogenic and sulfur isotope signatures obtained for the I-V pipes by Fiorentini et al. (2018).

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