Origin of the dunite-harzburgite association from Rocca di Argimonia, Ivrea Mafic Complex (Ivrea-Verbano Zone)

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We present a preliminary petrological investigation of the Rocca d'Argimonia peridotite-pyroxenite sequence, which intrudes the lowermost continental crust of the Ivrea-Verbano Zone (South Alpine domain). This sequence is up to 400 m thick and is enclosed within gabbronorites from the southern-western sector of the Ivrea Mafic Complex. The main purpose of this study is to unravel the evolution experienced by primitive magmas intruding the lower continental crust.

The peridotites are amphibole-bearing dunites to harzburgites, which are locally characterized by poikilitic orthopyroxenes (up to 15 wt%). The pyroxenites are olivine websterites to olivine-free, plagioclase-bearing websterites. The peridotites and the pyroxenites show substantial variations in incompatible trace elements patterns. Hornblende gabbronorite dykes (up to 30 cm thick) crosscut the peridotites and show, amphibole-bearing orthopyroxenite reaction zones (mm-scale thick) along the contact with host rocks. Oxygen isotope analyses were conducted on selected olivine grains from the peridotites and the olivine pyroxenites. The $\delta^{18}O$ values of olivine increase from +5,8 to +6,6 ‰, with decreasing forsterite proportion, which in turn ranges from 90 to 85 mol%. This correlation is attributed to increasing crustal component with ongoing magmatic evolution. There is no correletion between $\delta^{18}O$ of olivine and variations in incompatible element patterns.

We hypothesize a two-phase magmatic evolution for the origin of Rocca di Argimonia sequence: (1) fractional crystallization driven by formation of olivine + accessory Cr-spinel ± clinopyroxene, and concomitant assimilation of material, and (2) reactive melt migration of evolved melts, leading to consumption of olivine + clinopyroxene and crystallization of orthopyroxene and amphibole.