

Petrological investigation of garnet- and olivine-bearing gabbroic rocks in the Sesia Valley (Ivrea-Verbano Zone, Italy)

MATTEO DEL RIO¹, LUCA ZIBERNA¹, AMERIGO CORRADETTI² AND ANA ČERNOK¹

¹University of Trieste

²Department of Mathematics, Informatics and Geoscience,
University of Trieste, Trieste, Italy

The detailed processes related to magmatic underplating in continental settings remain a topic of ongoing investigation. The Ivrea-Verbano Zone (IVZ), western Southern Alps, provides a rare opportunity to contribute to this debate, being an exhumed, nearly complete section of the continental crust that also includes the roots of a completely exposed Permian magmatic system (Mafic Complex). This work focuses on an 80-meter-wide outcrop within the Upper Zone (UZ) of the Layered Series [1] in the Mafic Complex, which is located between the villages of Isola and Vocca in the Sesia Valley. It includes a lithological sequence primarily composed of partially foliated hornblende gabbro-norites with variable amounts of garnet, along with lenses of garnet-olivine gabbros, olivine-hornblende garnetites, anorthosites and garnet hornblendites, cross-cut by pseudotachylites and mafic pegmatites.

As a first objective of this work, we use the garnet-olivine gabbros of this outcrop to constrain the P-T conditions of magmatic crystallization and subsequent metamorphic re-equilibration of the UZ. A comprehensive characterization of the outcrop is ongoing, which includes virtual outcrop modelling, structural and petrographic field characterization and petrological analyses.

The garnet-olivine gabbros show granoblastic to polygonal textures formed by pyroxenes, plagioclase, hornblende and hercynite-magnetite. Garnet ($\text{Alm}_{0.50-0.52}$, $\text{Py}_{0.31-0.34}$, $\text{Gr}_{0.15-0.17}$) shows significant modal variability and mostly occur as poikiloblastic, granoblastic, polygonal or coronitic textures, suggesting a metamorphic origin. Plagioclase is sometimes zoned and shows exsolution lamellae of hercynite-rich spinel within the cores. Olivine ($\text{Fo}_{0.5}$ to $\text{Fo}_{0.6}$) shows anhedral to euhedral prismatic habit. Clino- and orthopyroxenes show granoblastic to polygonal textures and have compositions of En_{35-39} , Fs_{14-18} , Wo_{46-48} and En_{64-67} , Fs_{32-35} , $\text{Wo}_{0.8-1.7}$, respectively.

Application of a recently developed geobarometer [2] for the assemblage spinel + clinopyroxene + olivine + plagioclase indicates a pressure of 6.7 ± 1.8 kbar, consistent with or slightly lower than estimates from the metapelitic lithologies of nearby outcrops [3]. Further calculations are ongoing, which are part of an approach that include multiple-reaction thermobarometry, pseudosection modelling and petrographic constraints to decrypt the P-T path.

[1] Rivalenti et al. (1984), *Tscher. Miner. Petrog.*, 33, 77–99.

[2] Ziberna et al. (2017), *Am. Mineral.* 102, 2349–2366. [3]