

The plutonic foundations of a fossil (ultra-)slow spreading centre (Pineto gabbroic sequence, Alpine Jurassic ophiolites)

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This work presents new field and petrological data on a poorly known lower crustal section from the Alpine Jurassic ophiolites, the Pineto gabbroic sequence from Corsica (France). This sequence is mainly constituted by troctolitic and gabbroic rocks, whose rock compositions indicate crystallization from MORB-type melts [1]. In particular, the Pineto gabbroic sequence is estimated to be ~1.5 km thick and mainly consists of clinopyroxene-rich gabbros to gabbro-norites near its stratigraphic top and of troctolites and minor olivine gabbros in its deeper sector. The sequence also includes olivine-rich troctolite and mantle peridotite bodies at different stratigraphic heights. The composition and the lithological variability of the Pineto gabbroic sequence recall those of the lower crustal sections at slow and ultra-slow spreading ridges [2; 3]. The gabbroic sequence considered in this study is distinct in the high proportion of troctolites and olivine gabbros, which approximately constitute 2/3 of the section. In particular, the olivines and the clinopyroxenes from the troctolite-olivine gabbro association have high Mg# (89-82 and 90-86, respectively), thereby showing the existence of a chemically primitive, lower oceanic crust. The mineral chemical variations document that the origin and the evolution of the Pineto gabbroic rocks were mostly constrained by a process of fractional crystallisation. The clinopyroxenes from the olivine gabbros and the olivine-rich troctolites also record the infiltration of olivine-dissolving, Cr₂O₃-rich melts that probably formed within the mantle, into replacive dunite bodies. Cooling rates of the troctolites and the olivine gabbros were evaluated using the Ca in olivine geospeedometer [4]. We obtained high and nearly constant values of -2.2 to -1.7 °C/yr log units, which were correlated with the building of the Pineto gabbroic sequence through different, small scale gabbroic bodies intruded into a cold lithospheric mantle.

References cited: [1] Beccaluva, et al. 1977, Contributions to Mineralogy and Petrology, v. 64, p. 11-31. [2] Blackman, et al., 2006, Proceedings of the Integrated Ocean Drilling Program, Volume 304/305: doi: 10.2204/iodp.proc.304305.2006. [3] Dick et al., 2000, Earth and Planetary Science Letters, v. 179, p. 31-51, doi: 10.1016/S0012-821X(00)00102-3. [4] Coogan et al., 2007, J. Petrology, v. 48, p. 2211-2231.