Geophysical Research Abstracts
Vol. 19, EGU2017-9352, 2017
EGU General Assembly 2017

Textural evolution of a dunitic matrix during formation of hybrid troctolites: insights from the Monte Maggiore peridotitic body (Corsica, France).

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Many recent studies investigate the formation of hybrid troctolites after melt-rock interactions and impregnation of a dunitic matrix (Drouin et al, 2010; Sanfilippo et al, 2015). They describe the reactive percolation of a melt in a dunite, dissolving olivine and crystallizing interstitial minerals (plagioclase $\pm$ clinopyroxene), thus leading to the dismembering of mantle olivines and variations in the olivine crystal number, size and shape (Boudier & Nicolas, 1995). However, despite the number of studies describing a hybrid origin for troctolites, this process is rarely documented in a field-controlled geological setting allowing the observation of a gradient of the amount of melt impregnation in mantle dunites. The Monte Maggiore peridotitic body (Corsica, France) preserves a multi-stage melt-rock reaction decompressional evolution (Rampone et al, 2008), marked by a first episode of olivine-saturated melt percolation at spinel facies, which dissolved mantle pyroxenes and crystallized olivine, thus leading to the formation of replacive dunites. A second diffuse melt impregnation in the spinel peridotites and dunites dissolved olivine and crystallized interstitial plagioclase, orthopyroxene and clinopyroxene at plagioclase-facies conditions. This increasing modal proportion in interstitial phases led to the replacive formation of plagioclase peridotites, plagioclase dunites and hybrid troctolites. This makes the Monte Maggiore peridotites an ideal case study to investigate the formation of hybrid troctolites and the associated textural evolution of the rock-forming minerals by detailed field and microstructural observations. In order to quantify the evolution of the olivine matrix texture (i.e. number of grains, grain size, shape factor, aspect ratio) at thin section scale with ongoing melt impregnation, we used EBSD maps of 12 samples from spinel dunites to plagioclase dunites and troctolites. In these samples, reactive melt percolation and melt entrapment led to decrease of modal olivine coupled to increase of modal interstitial phases. We observed a correlated evolution of textural parameters in olivine at increasing amount of melt impregnation, namely a progressive increase of the number of grains, decreasing grain size and a decrease in the shape factor and aspect ratio of the grains. Overall, this textural evolution is indicative of a dismembering of corroded mantle olivine grains into several small rounded grains (low shape factor and aspect ratio), caused by reactive melt percolation and crystallization. These observations confirm the possible hybrid origin of troctolites after impregnation of an olivine matrix, and quantify the evolution of the texture and dismembering of olivines after melt-related corrosion.

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