Geophysical Research Abstracts
Vol. 16, EGU2014-13367, 2014
EGU General Assembly 2014

Petrology of pyroxenitic vein in spinel-plagioclas lherzolites from Zabargad island, Red Sea, Egypt

Ingrid Gjerazi and Theodoros Ntaflos
Dept. of Lithospheric Research, University of Vienna, Vienna, Austria (igjerazi@gmail.com)

The island of Zabargad (St. John's island), located off the coast of Egypt contains three peridotite bodies, which comprise of Spinel- and Plagioclase-Lherzolithes. The studied rock is a composite peridotite consisting of a pyroxenitic vein with coarse grained augites of approx. 3 cm, originating from the Main Peridotite Hill (MPH) in Zabargad.

Information on the nature and formation of this peridotite from Zabargad was obtained through the mineralogical and petrographic analysis, using a polarizing light microscope and electron microprobe, of five thin sections originating from the aforementioned peridotite. Furthermore, the chemical heterogeneities and the modal changes of the peridotite through its interaction with intrusive pyroxenitic veins were studied in order to create a better understanding of the origin of the rock and of the geology of the island.

Results have shown, that the mineralogical composition of this peridotite comprises of: olivine, clinopyroxene, orthopyroxene, plagioclase, amphibole and spinel. In the host rock, the Fo (forsterite) content of olivine varies from approx. 88% to 89% and in the vein it remains well within the boundaries of 89%. Compared to primary xenoliths originating from the fertile, undepleted mantle with an Mg-number (100*Mg#), which ranges from 89.2% to 89.9%, the similarities with the olivines can clearly be seen.
The vein clinopyroxenes can be divided into three distinct groups. The first groupconsists of coarse-grained, primary augites. The second group corresponds fine-grained clinopyroxenes found closer to the matrix. These clinopyroxenes have been formed due to the recrystallization of the primary augites from the emplacement of the dike. The third group consists of fine-grained clinopyroxenes located in the transition zone between vein and matrix.

The spinels are Cr-rich with 100*cr# ranging from 6 to 22. In the spinel cr# versus olivine mg# diagram, the spinels plot whithin the Olivine-Spinel Mantle Array (OSMA) supporting the lithospheric mantle origin of the Zabargad peridotites.

The presence of amphibole appears to be the result of a reaction between metasomatic introduced fluids and matrix clinopyroxene.

The plagioclase is Ca-rich (An63–73) and always is surrounding spinel. A metasomatic origin of the plagioclase seems to be unlike because augites have plagioclase exsolution lamellae with similar composition to the spinel surrounding plagioclase. This is an evidence for incipient transformation of spinel- to plagioclase-lherzolite stability field as the result of pressure and temperature decrease.

As comparisons with mantle xenoliths show, the Zabargad ultramafites are not ophiolithes but rather, represent the fertile upper mantle. Results indicate, in concordance with previous papers such as Bonatti et al., 1981 and Kurat et al., 1993, that the studied peridotite represents an uplifted fragment of the Red Sea upper mantle which is also evidence for the Red Sea rifting and the formation of the island itself.