

MELT AND SUBDUCTION-RELATED FLUIDS IN THE PERȘANI MOUNTAINS, ROMANIA UPPER MANTLE XENOLITHS

PINTÉR, Zs., SZABÓ, Á.*, BERKESI, M., TÓTH, A. & SZABÓ, Cs.

Lithosphere Fluid Research Lab, Department of Petrology and Geochemistry, Eötvös University, Pázmány Péter sétány 1/C, H-1117 Budapest, Hungary

* E-mail: sz_abel@yahoo.com

The Plio-Pleistocene alkali basalts in the Carpathian–Pannonian Region brought a large amount of lithospheric mantle xenoliths to the surface. The easternmost and youngest alkaline basaltic volcanic field is developed in the Perșani Mountains (Eastern Transylvanian Basin, Romania), where numerous upper mantle xenoliths have been studied (SZABÓ *et al.*, 2004). By studying these xenoliths, we can insight into the lithospheric mantle regarding its chemical and physical processes such as partial melting, metasomatism, deformation. Compilation of the impact of these processes on the lithospheric mantle provides significant information about their relationship to the subduction of the European plate beneath the Eastern Carpathians, which is the major geodynamic event of the studied area.

Seven spinel lherzolite/hornblendite composite and four amphibole-clinopyroxenite xenoliths were selected for this paper to study the metasomatic process. The peridotites contain small amount of interstitial amphibole, whereas the hornblendites and amphibole-clinopyroxenites contain occasionally other OH-bearing minerals such as apatite and phlogopite. The amphiboles and clinopyroxenes in spinel lherzolites are depleted in incompatible trace elements, where the same minerals in hornblendites and amphibole-pyroxenites show elevated incompatible trace element content. These geochemical characteristics and their high La/Lu ratios suggest that the hornblendites and amphibole-pyroxenites were formed by an incompatible element enriched mafic silicate melt (POWELL *et al.*, 2004).

Three spinel lherzolite/hornblendite composite and one clinopyroxenite xenoliths were selected for fluid inclusion study. In the composite xenoliths two generations of fluid inclusions can be distinguished. Older generation (Type 1) fluid inclusions can be seen randomly in the hornblendite vein. These fluid inclusions show negative crystal shape with 30–70 μm average

size, and they are partly decrepitated along the cleavage plains of amphiboles. Younger generation (Type 2) fluid inclusions occur in ortho- and clinopyroxenes near to the hornblendite vein. They trapped along healed fractures, which cross the hornblendite vein too. These fluid inclusions have also negative crystal shape with an average 15–30 μm size. Solid phases inside of the fluid inclusion are also observed under the petrographic microscope in both types. Microthermometric and Raman analyses (at room temperatures and elevated temperatures up to +150 °C, after BERKESI *et al.*, 2009) indicate that the two generations of fluid inclusions have different character. The Type 1 inclusions contain CO₂, however Type 2 fluids contain CO₂, N₂ and in some cases small peak of H₂O as a dissolved component. By Raman spectroscopy, magnesite as well as apatite, Mg- and Na-rich carbonate minerals and quartz were detected inside the fluid inclusions hosted in the hornblendite vein (Type 1). Solid phases in Type 2 fluid inclusions were identified as magnesite. Based on synchrotron coupled infrared spectroscopy, beside the CO₂, H₂O was also detected and mapped in hornblende hosted fluid inclusions from Type 1.

These features indicate a complex melt-mantle interaction beneath the study area, which can be related to a subducted slab.

References

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