Fluid transfer in the lithospheric mantle beneath the margins of the Pannonian Basin – a xenolith study

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Plio-Pleistocene alkali basaltic volcanism brought large number of mantle derived xenoliths to the surface of the Miocene extensional Pannonian Basin System (PBS). The Styrian Basin Volcanic Field (SBVF) is located at the western edge, meanwhile the Persani Mountains Volcanic Field (PMVF) at the eastern part of the PBS. Both area has a charactersitic geodynamic location, since subducted slabs are suspected beneath these areas [1] [2] and subduction related volcanic rocks are present. In our study we present new mineral chemistry and fluid-inclusion data from amphibole enriched (±phlogopite, ±apatite) and veined peridotite xenoliths from the SBVF and the PMVF. Primary fluid inclusions were found in ortho-, clinopyroxenes, amphiboles and apatite. The inclusion are dominantly high density liquid CO_2 inclusions (~1 g/cm^3), with minor amount of H_2O (<1.3 mol%) and N_2 (<0.3 mol%). Raman mapping and FIB-SEM revealed the presence and distribution of mainly submicron sized solid phases within the inclusions such as magnesite, quartz, glass, Fe-Ni sulphide and anhydrite. Moreover, amphibole-hosted fluid inclusions in the SBVF xenoliths display a complex mineral assemblage, consisting also of alkali-hydrocarbonates (e.g. nahcolite) and various sulfate minerals (e.g. thenardite).

The fluid system found in the studied inclusions highly likely represent a residual fluid-rich phase from which the metasomatic assemblage might have formed. Our study agrees with previous studies [3] [4] that besides CO_2, significant amount of other volatiles and alkalis (Na, H, N, S) can be present. The source of these volatiles under the studied areas probably are the subducted slabs, from which the released fluids could have played a significant role in volatile transport and mantle metasomatism.

[1] Qorbani et al. (2015) *EPSL* **409**, 96-108. [2] Wortel & Spakman (2000) *Science* **290**, 1910-1917. [3] Frezzotti et al. (2012) *EPSL* **351-352**, 70-83. [4] Berkesi et al. (2012) *EPSL* **331**, 8-20