Pargasite in fluid inclusions of mantle xenoliths from northeast Australia (Mt. Quincan): sign of interaction of astenospheric fluid

MÁRTA BERKESI[1*], GYÖRGY CZUPPON[2], CSABA SZABÓ[1], ISTVÁN KOVÁCS[3], SILVIO FERRERO[4], CHANTAL PFEIFFERT[5] AND MARIE-CHRISTINE BOIRON[5]

[1] Lithosphere Fluid Research Lab, Eötvös Loránd University, Budapest, Hungary, marta.berkesi@gmail.com
[2] Hungarian Academy of Sciences, Budapest, Hungary
[3] Geological and Geophysical Institute of Hungary, Budapest, Hungary
[4] Universität Potsdam, Institute of Earth and Environmental Science, Potsdam, Germany
[5] GeoRessources Laboratory, Vandoeuvre-lès-Nancy, France

Mantle-derived xenoliths hosted by Cenozoic basaltic rocks are widespread in eastern part of Australia. Among the xenoliths-bearing localities Mt. Quincan is extensively studied indicating that sampled mantle represents depleted MORB source as the Nd, Sr and Os isotope systematics broadly overlap with MORB source mantle (Handler et al., 2005) and noble gas composition of the released from fluid inclusions are MORB-like (Czuppon et al., 2009).

We have carried out detailed study on the fluid inclusions of these xenoliths to reveal further charactersitics of asthenospheric fluid. Extreme high density ($\rho \geq 1$ g/cm^3) CO_2-N_2-H_2O fluids are present in the orthopyroxene porphyroclasts along with clinopyroxene and spinel exsolution lamellae. Pargasitic amphibole associated with clinopyroxene lamellae was found together with the studied fluid inclusions. In addition, synchrothron FTIR imaging revealed the presence of pargasite within the fluid inclusions pointing out that pargasite formation could be the result of an interaction between clinopyroxene and fluid from the asthenophere.

Major and trace elements of the constituent minerals discover metasomatic imprint, followed by the ancient melt extraction, resulted in the enrichment of LREE and LILE in clinopyroxenes. The same elements were found to be related to fluid inclusions by LA-ICPMS. Our results support the idea that fluids from the asthenosphere are capable to overprint pre-existing mantle signature of the xenoliths including the mineral association.

References

Handler M. et al. (2005) Geochim. Cosmochim. Acta 69, 5747-5763

Czuppon Gy. et al. (2009) Chem. Geol. 266, 19-28.