Hyperspectral FTIR imaging as a method to detect volatile-bearing microphases in peridotite xenoliths from the Carpathian-Pannonian region

N. LIPTAI[1,2]*, I. J. KOVÁCS[1,2], T. P. LANGE[1,3], Z. PÁLOS[2,3], M. BERKESI[1,3], C. SZABÓ[1,3], V. WESZTERGOM[1,2]

[1]MTA CSFK Lendület Pannon LitH2Oscope Research Group, Budapest-Sopron, Hungary
*correspondence: liptai.nora@csfk.mta.hu
[2]HAS, RCAES, Geodetic and Geophysical Institute, Sopron, Hungary
[3]Lithosphere Fluid Research Lab, Eötvös University, Budapest, Hungary

Nominally anhydrous minerals (NAMs) in the Earth's mantle are an important reservoir for 'water', which can occur either as H_2O in fluid or melt inclusions, or as structurally bound hydroxyl in mineral structures. In the latter case, it can be present in small concentrations (tens to hundreds of ppm) in NAMs, or in higher concentrations (~2 wt. %) in volatile bearing mantle minerals. The most abundant of these is pargasite, which appears interstitially or as micro-lamellae within NAMs. Above the pargasite stability field (~1050-1150 °C in water-undersaturated conditions typical for the upper mantle), 'water' is expected to be incorporated in NAMs, or occur as aqueous phase (e.g., in fluid inclusions) or dissolved in incipient partial melt [1,2].

Hyperspectral imaging carried out with Fourier-transform infrared spectroscopy can be a useful method to detect the presence and distribution of pargasite lamellae or other water-bearing micro-phases (such as fluid inclusions) within the NAMs of peridotite xenoliths. The results can be used to pinpoint areas for further, higher resolution analytical methods such as Raman spectroscopy. In this study we present infrared spectra and hyperspectral mapping carried out on upper mantle xenoliths from the Carpathian-Pannonian region, a young extensional basin system in Central Europe. Our results provide insight into how 'water' storage in the upper mantle can change with depth and time in an extensional tectonic environment.

[1] Green, D. H., Hibberson, W. O., Kovács, I., & Rosenthal, A. (2010), *Nature,* 467(7314), 448-451.

[2] Kovács, I., Lenkey, L., Green, D. H., Fancsik, T., Falus, G., Kiss, J., Orosz, L., Angyal, J. & Vikor, Z. (2017). *Acta Geodaetica et Geophysica*, 52(2), 183-204.