First results on nano-scale investigations of mantle minerals from Carpathian-Pannonian Region peridotite xenoliths

ZSÓFIA PÁLOS[1,2*], ISTVÁN J. KOVÁCS[2,3], PÉTER PEKKER[4], MIHÁLY PÓSFAI[4], THOMAS P. LANGE[1,2], NÓRA LIPTAI[1,2], MÁRTA BERKESI[1,2], CSABA SZABÓ[1]

[1] Lithosphere Fluid Research Lab (LRG), Eötvös Loránd University, Budapest, Hungary (*correspondence: paloszsofia@gmail.com)

[2] MTA CSFK Lendület Pannon LitH2Oscope Research Group,

[3] MTA CSFK Geodetic and Geophysical Institute, Sopron, Hungary

[4] Nanolab, University of Pannonia, Veszprém, Hungary

The present project provides a new, nanoscale approach on the chemistry and structure of upper mantle minerals. Previous petrographic and EBSD investigations in the peridotite xenoliths from the Carpathian-Pannonian Region provide pieces of evidence for various deformation and exsolution phenomena. The earlier, in-depth investigations of upper mantle xenoliths hosted in Plio-Pleistocene alkaline basalts in the Carpathian-Pannonian Region made this area a natural laboratory for understanding upper mantle processes with special regard to deformation, metasomatism and the role of 'water' [1] [2].

Although TEM investigations were carried out on some mantle minerals in the past decades, obvious connections between nano-scale structural features and mantle processes are yet to be revealed. It is the foremost goal of our study to explore the presence of nano-scale amphibole (pargasite) lamellae in pyroxenes. Our assumption is that over geological times the trace amount of structural hydroxyl stored in pyroxenes (and other nominally anhydrous minerals (NAMs)) contributes to the formation of amphibole lamellae while depleting the NAMs in hydroxyl. As the rheological strenghth of NAMs increases with decreasing structural hydroxyl content this process leads to increased rheological strength of the lithosphere where amphibole is stable.

The Scanning Transmission Electron Microscopy (STEM) technique was applied to a set of specific clino- and orthopyroxenes separated from mantle peridotite xenoliths from central areas of the Pannonian Basin.

This research is supported by KEP-8/2018 MTA Excellence Grant.

[1] Aradi et al. (2017) *Tectonics* **36**, 2987-3011. [2] Patkó et al. (2019) *Chemical Geology*, **507**, 23-41.