

FluidsByDepth: an inclusion-based research project on the better understanding of lithosphere-scale fluid transfer

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The ‘Lendület’ (Momentum) grant, supported by the Hungarian Academy of Sciences offers an excellent opportunity to base research groups with outstanding research potentials. In 2022 this fund was awarded, among others, to the FluidsByDepth Research Group. The project has started its activity on 1st October 2022. In the followings, we give a brief introduction to the plan of the research group activity and the expected results.

Since the project commencement, an extended geodatabase was created including all available geochemical data, ages, xenolith properties, physical volcanological data, and geophysical data. Spatial and temporal patterns of the Plio-Pleistocene monogenetic volcanoes of the study area, the Bakony–Balaton-Highland Volcanic Field (BBHVF, Fig.1) were analyzed using different GIS (geographic information system) geostatistical methods in order to broaden our knowledge about the reasons and processes of monogenetic basaltic volcanism from a ‘source-to-surface’ point of view. Our aim is to unravel the yet hidden statistic correlation of fluid events and the above listed parameters.

Due to extensive field work on BBHVF upper mantle, lower, middle and upper crustal xenoliths had been sampled from about 40 sites giving the base of the upcoming fluid inclusion study representing different depth level of the lithosphere.

The planned achievements of the MTA-EPSS FluidsByDepth Lendület Research Group are to see the compositional and density distribution of the C-O-H-N-S fluids, of deeper origin, along by a vertical cross-section of the lithosphere including the changing $\delta^{13}\text{C-CO}_2$, $\delta^{18}\text{O-CO}_2$ and noble gas isotope compositions. We can synthesize the data from fluid inclusions with the compositional variations – including C-isotope composition – in soil gas to estimate the extent of deep lithospheric contribution. We will discriminate stages of the

fluid/rock interactions and model its effect on fluid transport and the isotope fractionation. The results could be readily extrapolated to intracontinental lithospheres in similar geodynamic settings and to refine the models on natural CO_2 degassings.

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Figure 1. Satellite image of the study area- Bakony-Balaton Highland Volcanic Field indicating the locations of volcanic edifices, Numbers denote Ar/Ar ages ^[1]

[1] Wijbrans, J. et al. (2007) JVGR, 164,193-204.

