EGU21-9440
https://doi.org/10.5194/egusphere-egu21-9440
EGU General Assembly 2021

First noble gas results from fluid inclusions of the Late Miocene-Pleistocene Macedonian volcanics

Kata Molnár, Marjan Temovski, and László Palcsu
Isotope Climatology and Environmental Research Centre, Institute for Nuclear Research, Debrecen, Hungary
(molnar.kata@atomki.mta.hu)

Late Miocene to Pleistocene volcanism within the Vardar zone (N. Macedonia) covers a large area, has a wide range in composition and it is largely connected to the tectonic evolution of the South Balkan extensional system, the northern part of the Aegean extensional regime. A recent study indicated an increasing rate of mantle metasomatism towards the younger centers in the region [1]. During the last stage of activity, ultrapotassic (UK) centers that formed between ca. 3.2 and 1.5 Ma originated from the lithospheric mantle beneath the region [2]. Although there are no reported mantle xenoliths from these centers, the erupted mafic rocks contain abundant olivine as phenocrysts [3]. Noble gas isotopic characteristics of fluid inclusions in olivine can reveal important information about the origin of the fluid and the metasomatic state of the lithospheric mantle. We analyzed for the first time the noble gas composition of fluid inclusions of olivine phenocrysts from the Mlado Nagoričane volcanic center, the northernmost member of the UK centers with an eruption age of 1.8 ± 0.1 Ma [2]. The R/R_A ratios give a range of 3.1-4.5 with $^4He/^{20}Ne$ values of 11.7-14.6. These R/R_A values are lower than the MORB and the averaged subcontinental lithospheric values, and considering the negligible amount of atmospheric contribution, imply a more metasomatized character for the underlying lithospheric mantle beneath the region. Mantle-derived noble gases were detected in a recent geochemical study on the thermal springs and gas exhalations in the region, with up to 20% of mantle contribution calculated based on their noble gas composition using the MORB R/R_A value [4]. These new Mlado Nagoričane fluid inclusion noble gas values indicate that the mantle contribution in the recent gas emissions in the region could be higher than what was thought.

This research was supported by the European Union and the State of Hungary, financed by the European Regional and Development Fund in the project of GINOP-2.3.2-15-2016-00009 'ICER' project

[1] Molnár et al. 2020 – EGU2020-13101.

[2] Yanev et al., 2008 – Mineralogy and Petrology, 94(1-2), 45-60.

[3] Yanev et al., 2008 – Geochemistry, Mineralogy and Petrology, Sofia, 46, 35-67.

[4] Temovski et al. 2020 – EGU2020-2763.