

Noble gas and carbon isotope studies on Ciomadul volcano (South Harghita Mts. Romania): Constraints on the origin of fluids

B. M. KIS^{1*}, SZ. HARANGI¹ AND L. PALCSU²

¹MTA-ELTE Volcanology Research Group, Budapest, Pázmány sétány 1/C, H-1117, Hungary, (*correspondence: kisboglarka85@gmail.com, szabolcs.harangi@geology.elte.hu)

²Institute for Nuclear Research of the Hungarian Academy of Sciences, Hertelendi Laboratory of Environmental Studies, Debrecen, H-4026, Hungary (palcsu.laszlo@atomki.mta.hu)

The Ciomadul is the youngest volcano in the Carpathian-Pannonian Region [1]. The volcanic activity was characterized by an initial extrusive lava dome building period from about 200 ka to 100 ka followed by a more explosive eruption stage from 57 to 32 ka [2]. Although the volcano seems to be inactive, several features (e.g., geophysical anomalies in the crust; fast remobilization of near solidus long lasting crystal mush prior to the past eruptions; [3,4,5]) suggest that melt-bearing magmatic body could still exists beneath the Ciomadul. This is supported by the abundance of mineral water springs and pools, carbon-dioxide, hydrogen-sulfur emanations. Previous helium isotope measurements by Althaus *et al.* [6] and Vaselli *et al.* [7] indicate magmatic origin of these fluids.

In January 2015 we commenced a gas-monitoring study to constrain the origin of fluids at Ciomadul by collecting the gas-phase from several mofettes and mineral water springs. Our results indicate carbon-dioxide content of up to 90% and helium content up to 13.19 ppm. The isotopic composition of helium ranging between 2.86–1.13Ra (air-normalized $^3\text{He}/^4\text{He}$) and $\delta^{13}\text{C}$ from carbon-dioxide ranging between –3.24‰ and –3.59‰ PDB, coherently indicate the magmatic origin of fluids. Further regular sampling is aimed to monitor the changes of the gas and fluid composition for a prolonged period and possible control of the earthquake activity.

[1] Szakács *et al.* (2015), *Bull Volcanol* **77**:12. [2] Harangi *et al.* (2014), AGU FM, V53D-07, [3] Harangi *et al.* (2015), *JVGR*, **290**, 82-96. [4] Kiss *et al.* (2014), *Contrib. Mineral. Petrol.* **167**:986. [5] Popa *et al.* (2012), *Pure Applied Geophys.*, **169**, 1557-1573. [6] Althaus *et al.* (2000), *Chem. Erde*, **60**, 189-207. [7] Vaselli *et al.* (2002), *Chem. Geo*, **182**, 637-654.