Allanite as provenance indicator of volcanic ashes

I. DUNKL[1*], G. ARP[1], D. JUNG[3], R. LUKÁCS[2], H. VON EYNATTEN[1]

[1]University of Göttingen, Germany (*correspondence: istvan.dunkl@geo.uni-goettingen.de)
[2]Eötvös University, Budapest, Hungary (reka.harangi@gmail.com)
[3]Bavarian Geological Survey, Hof/Saale, Germany

The age of impact of the Miocene Ries Impact Structure (southern Germany) is dated precisely by Ar/Ar method at 14.83 ± 0.15 Ma [1]. However, the lacustrine sedimentary crater fill sequence is poorly dated. A zeolitized, thin volcanic ash layers allowed for correlating individual sections and outlining the carter fill architecture [2]. Euhedral volcanic zircon crystals of the ash layers yield 14.0 ± 0.2 Ma laser ablation ICPMS TuffZirc U-Pb age. Strikingly a bentonite layer in the North Alpine Molasse Basin at Unterzell [3] yields an undistinguishable U-Pb age of 14.05 ± 0.15 Ma.

In order to reveal the wider context and analogues for the South German volcanic ash occurrences major and trace element analysis of the unaltered euhedral volcanic allanite crystals within the ash layers has been performed. Both allanite and zircon crystals are considered co-genetic, because the ash layers contain only minor amount of detrital, non-volcanic heavy minerals.

The Miocene mostly eruptive, silicic volcanic sequences of the Carpathian Arc are partly allanite-bearing and were formed between 21 and 13 Ma [3, 4]. These thick formations were considered as prime candidates for the source of the ash layers in the Ries Crater and the adjacent North Alpine Molasse Basin. One of the ash layers in NE Pannonian Basin (DX-46) has similar U-Pb age (14.0 ± 0.1 Ma) and shows obvious similarities in allanite mineral chemistry compared to the Ries and Molasse tuffs. We thus consider the DX-46 tuff as proximal equivalent of the South German distal tuffs.

[1] Jourdan *et al*. (2012) *Elements* **8**, 49-53. [2] Arp *et al*. in prep. [3] Unger & Niemayer (1985) *Geol. Jb. D* **71**, 3-58. [4] Szabó *et al*. (1992) *Tectonophysics* **208**, 243-256. [5] Lukács *et al*. (2015) *Contributions to Mineralogy and Petrology*, **170:52**. DOI 10.1007/s00410-015-1206-8.