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Zircons, key tools to study piroclastic rocks: a case study from Harsány, Bükkalja, North-Hungary

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Outcropping silicic ignimbrite layers are abundant in the Bükkalja Volcanic Field (BVF). One of the most spectacular occurrences is the Harsány area close to the eastern end of the BVF. The pyroclast body, earlier believed to represent homogeneous material was found to contain several distinct pumice populations in the Harsány ignimbrite.

Zircons are quite abundant in the formation. First of all morphological analysis was carried out on separated zircons from the Harsány pyroclastic material. The first results immediately pointed out that the distribution of zircon crystals, based on their morphological characteristics is bimodal, which is indicated by the presence of both S-type and P-type crystals indicating crystallization from magmas of crustal and mantle origin, respectively.

Prior to detailed geochemical studies CL photos were made on the zircon crystals. These photos enable to trace episodes occurring during the growth of the crystal, whereas they also help to decide the exact locations of the geochemical analysis. Relict cores are observed in some of the grains studied, whereas indications for geochemical disturbances during the growth of the crystals are also found, which may imply that magma mixing indeed took place.

Trace element analysis has been carried out on the zircon crystals themselves and also on the enclosed glass or silicate melt inclusions. These inclusions represent drops of magma from the early history of rock formation, thus contain valuable information about magma evolution.

Zircons favorably collect radioactive elements in their structures, i.e., U, Th and as a

consequence of their decay also Pb. These isotopes are highly suitable for dating the formation and different steps of evolution in the zircons. The crystals from the BVF are relatively young (Upper Miocene) which makes age dating more difficult. Nevertheless, data measured on the LA ICP-MS, in the Natural History Museum of London give surprisingly concordant zircon ages which perfectly coincides with earlier K-Ar dating.