**Neogene-Quaternary volcanism of the Carpathian-Pannonian Region, eastern-central Europe – Volcanic heritage to understand how volcanoes work from the source to the surface and a potential in geotourism**

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Neogene to Quaternary volcanism of the Carpathian-Pannonian Region (CPR) is part of the extensive volcanic activity in the Mediterranean and surrounding regions. This volcanic activity in the CPR for the last 20 Ma has been characterized by wide range of erupted magmas (from basalts to rhyolites). The long-lasting volcanism formed extended ignimbrite plateaus, developed and then collapsed composite volcanoes, coalescing lava-dome complexes and different basaltic volcanic landforms from shield volcanoes to deep maars, among others. Remarkably, the (one of) largest volcanic eruptions in Europe for the last 20 Myr could have occurred in the Pannonian Basin during an ignimbrite flare-up period between 14 and 18 Ma. The extensive volcanism has gradually calmed down and the volcanic landforms have changed considerably, leaving the eroded remnants of the volcanic edifices. However, this transformation provided a unique benefit, i.e. a spectacular insight into the nature and the structure of the inner parts of the volcanoes. Origin of the magmas and pre-eruption processes in the magma storage system have been constrained by combined petrologic and geochemical tools. A particular issue, studied in detail for the past decade, is the potential reawakening of seemingly inactive, long-dormant volcanoes. The last eruption in the CPR occurred only at 32 ka and our integrated on-going research suggests that there is still a potential for future volcanic activity. Zircon dating indicates long-lasting (>100 kyr) magma storage beneath the youngest, dacitic volcano of Ciomadul, the detailed mineral-scale studies suggest rapid reactivation of the felsic crystal mush, whereas the geophysical and gas geochemical studies revealed that melt-bearing magma (crystal mush) body could still exist in the crust. Finally, an outline about the significance of the volcanic heritage of CPR in the geotourism is presented, showing how the geopark, volcano park and volcano route concepts give a new perspective in the Earth Sciences.

**Preliminary silicate melt inclusion study in phenocrysts from the Csomád (Ciomadul) volcano (Eastern Carpathians)**

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The last volcanic eruptions in the Carpathian-Pannonian Region took place between 60-30 ka at Ciomadul volcano situated in the south-eastern end of the Călimani-Gurghiu-Harghita volcanic chain (Eastern Carpathians) (e.g. Szakács et al., 1993; Seghedi et al., 2011; Harangi et al., 2015a). The long-lived high-K dacite of Ciomadul was produced both by effusive and explosive volcanic activity. The activity could begin 1 Ma ago and long breaks divided its volcanic activity. The latest studies detected a geophysical anomaly beneath the volcano which was suggested representing a melt-bearing crystal mush (e.g. Popa et al., 2012; Harangi et al., 2015b).

Two types of crystal clots are present in the crystal-rich dacite. These were identified as a felsic and a mafic components. The felsic crystal clots consist of plagioclase, amphibole, biotite, titanite, zircon, and apatite +/- K-feldspar and quartz. These are originated from the silicic crystal mush. The mafic component is represented by clinopyroxene, olivine, Cr-spinel +/- orthopyroxene derived from primitive basaltic intrusions (e.g. Vinkler et al., 2007; Jankovics et al., 2011; Kiss et al., 2014).

Silicate melt inclusions were trapped in the biotite, amphibole and plagioclase phenocrysts of the felsic crystal clots in a pumice-bearing pyroclastic flow deposit. The petrography shows the presence of large number of primary SMIs containing glass + bubble phase, together with primary fluid inclusions (FI). Based on textural observations, the silicate melt inclusions formed in multiple steps.

The main goal is to study the nature and the origin of these SMI and FI, which seems to be generated in an open system, where accumulation and mixing of different magmas happened with intensive melt/fluid-rock interaction.

**References:**

Harangi et al. (2015a) J. of Volcanology and Geothermal Research 301, 66-80.

Harangi et al. (2015b) J. of Volcanology and Geothermal Research 290, 82-96.

Harangi et al. (2010) Radiocarbon 52/2-3, 1498-1507.

Jankovics et al. (2011) Abstract, Soufrière Hills Volcano 15 Years On Conference, Montserrat, W.I.

Kiss et al. (2014) Contributions to Mineralogy and Petrology 167/3, 1-27.

Popa et al. (2012) Pure and Applied Geophysics 169/9, 1557-1573.

Seghedi et al. (2011) Tectonophysics 502/1–2, 146-157.

Szakács et al. (1993) Revue Roumaine de Géologie Géophysique et Géographie, Géologie 37, 21-37.

Vinkler et al. (2007) Bulletin of the Hungarian Geological Society, 137/1, 103-128.