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Correlation of Cassignol-Gillot K-Ar dating and paleomagnetism: chronology of the Mid-Miocene High Börzsöny lava dome complex, Hungary

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The Mid-Miocene volcanism of the Börzsöny Mountains, North Hungary, has been re-studied by correlating new New Cassignol-Gillot K-Ar dating with paleomagnetism. The volcanism developed in three stages. The first-stage activity occurred in a shallow marine environment, producing mostly dacitic volcaniclastics (originating from small-scale ignimbrite eruptions and lava domes). The second stage, not studied here, was characterised by scattered andesitic lava domes. Importantly, during this stage, a ca. 30o CCW rotation occurred. During the third stage, a moderately explosive, andesitic / basaltic andesitic subaerial lava dome complex, called High Börzsöny, grew up, producing lava flows and block-and-ash flows, and showing no rotation. The regular-shaped dome has developed a central, enlarged erosion caldera, clearly recognisable in the landscape despite long-term denudation and intense tectonic faulting over the mountains.

New Cassignol-Gillot K-Ar dating obtained on biotite from dacitic pumiceous lapilli tuff of the first stage yielded an age of 15.68$\pm$0.22 Ma (1σ) , which largely fits to the magnetostratigraphically established age ($\geq$16 Ma) of the first stage (normal polarity, 30o CCW rotation.) Dating effort focussed on the third stage, namely the groundmass of the rocks of the andesitic High Börzsöny. The obtained ages, ranging between 14.99$\pm$0.23 to 14.27$\pm$0.20 Ma, are in agreement with their stratigraphic position from bottom (the internal part of the High Börzsöny erosion caldera) to top (flank lava flows), and are somewhat (ca. 0.5 Ma) older than previous conventional K-Ar measurements (cf. Karátson et al. 2000). Moreover, these ages constrain the activity of the High Börzsöny, which, subsequent to a reverse polarity zone (of the second stage), was active within one or two normal polarity zones ending >14 Ma. The time frame for the High Börzsöny dome complex (0.73$\pm$0.31 My) fits to other well-known domes worldwide (e.g. Montagne Pelée, 550 ky). Whereas uncertainties allow a shorter life time as well (<0.5 My), a longer duration is not likely.

Karátson, D., Márton, E., Harangi, Sz., Józsa, S., Balogh, K., Pécskay, Z., Kovácsvölgyi, S., Szakmány, Gy., Dulai, A. 2000: Volcanic evolution and stratigraphy of the Miocene Börzsöny Mountains, Hungary: an integrated study. Geologica Carpathica, 51/1, p. 325-343