Geophysical Research Abstracts
Vol. 20, EGU2018-6716, 2018
EGU General Assembly 2018

Correlation of the deposits of an extensive Miocene silicic explosive volcanism by combining paleomagnetic marker horizons and magnetic polarities: new results from the Mátra and Bükk Mts, NE Hungary

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The paleomagnetic marker horizons in northern part of the Pannonian Basin are related to two episodic and important rotational events which occurred between 18.5-17.5 Ma and 16.0-14.5 Ma. The marker horizons divide the Tertiary successions into three segments: i) a Late Eocene-Early Miocene segment, which contains formations older than ∼18.5 Ma, ii) a middle segment which was aggraded between ∼17.5-16 Ma, and iii) a younger than 14.5 Ma segment, containing the youngest "tuff complex" in the above mentioned area. The first and the second segments are characterized by ∼90° and ∼30° CCW rotations, respectively. The rotations were observed first on strongly welded ignimbrites in the foreland of the Bükk Mts., where they could be readily separated to an older and a younger group with regard to paleomagnetic rotations, which is in correspondence with their subdivision based on available geological maps. The youngest segment shows no rotation.
Recently, interest renewed in the volcanology and stratigraphy of the tuff complexes widely distributed over NE Hungary. In this work we present paleomagnetic results relevant to the correlation of their voluminous, non-welded pyroclastic deposits, mostly ignimbrites, on the basis of the combination of the aforementioned one-way pattern of the declination change in time with the magnetic polarity.
(1) One of the target studies was the correlation of the ignimbrites of the Mátra and Bükk Mts. Based on the absence of CCW rotation and reversed polarity, the non-welded ignimbrites of the former (e.g. Tar quarry, Mátrabérc road cut) can be traced as far as the western part of the latter (e.g, Sirok castle hill and Demjén – Nagyeresztvény quarry). In this case, biotite trace element geochemistry reinforces the correlation based on paleomagnetism.
(2) Further east in the foreland of the Bükk Mts, a number of outcrops are considered to be coeval, as demonstrated by their physical volcanological features, and are proposed to belong to the youngest "tuff complex". These outcrops often comprise products deposited from several eruption pulses separated by paleosoil horizons. The paleomagnetic results support a perfect correlation between the studied outcrops, since all have normal polarity and similar declinations. However, they must belong to the middle "tuff complex" due to the declinations suggesting about 30° CCW rotation.
The above results were partly obtained on samples drilled in the field from several pumice clasts at the same outcrops of poorly consolidated pyroclastic material. We documented the perfect suitability of the pumices for obtaining reliable paleomagnetic directions since the directions obtained for the pumices were consistent up to 600°C, and also with that of the matrix, where the latter also provided good drill cores. The high emplacement temperature of the related pyroclastic flow was also supported by the low structural hydroxyl concentration of quartz phenocrysts.
Acknowledgements: This work was supported by Hungarian Scientific Research Fund (NKFIH OTKA) projects no. K105245 and K115472. The volcanological research of TB was supported by the ÚNKP-16-3 New National Excellence Program of the Ministry of Human Capacities.