Field-reversal versus self-reversal hypothesis: Paleomagnetic properties and magnetic mineralogy of the Neogene andesites of central Slovakia (Part I)

O. Orlický
Geophysical Institute of the Slovak Academy of Sciences[1]

A b s t r a c t : Magnetic, paleomagnetic properties and magnetic mineralogy of andesitic rocks of the 8 geological formations from central Slovakia were studied. Magnetites (cubic phase) and quasi homogeneous titanomagnetites (Ti-Mt; cubic phase) are carriers of only normal remanent magnetism in the andesitic rocks. Ilmenite-hematites (Ilm-hem; rhombohedral phase) carry either reversed remanent magnetism (RM) of self-reversed origin, or normal RM of field-reversal origin, depending on the proportion of hematite in the Ilm-hem solid solutions. If there is a composition of Ilm-hem between $Ilm_{55}hem_{45}$–$Ilm_{72}hem_{28}$ in the sample, the RM is reversed of the self-reversal origin. If there is other proportion of ilmmenite and hematite in the Ilm-hem solid solutions, namely if there is a high share of hematite within these minerals, RM of rocks will be of normal polarity, mostly of very high paleomagnetic stability. If there are present two different phases - e.g. quasi homogeneous Ti-Mt and Ilm-hem in the rock, Ti-Mt will carry normal RM, of low stability and Ilm-hem will carry reversed RM, mostly of high paleomagnetic stability. Andesitic rocks of studied geological formations originated in the time of the Badenian to the Middle or Lower sarmatian age (16.05–12.9 M.Y.). The geomagnetic field should have been changed its polarity twelve times, during this period, according to the geological time scale. The mineralogical differences in andesitic rocks indicate the self-reversal origin of the reversed RM, and also indicate that the geomagnetic field was not reversing its polarity during the delineated time interval, when these rocks were acquiring their remanent magnetism.

Key words: the Neogene andesites, magnetism and magnetic mineralogy, self-reversal origin of the reverse RM

[1]Dúbravská cesta 9, 842 28 Bratislava, Slovak Republic; e-mail: geoforky@savba.sk