Magnetic, paleomagnetic stability and the origin of the remanent magnetization of the intermediate and acidic volcanics from central Slovakia volcanic fields (Part XII)

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

A b s t r a c t: An analysis of magnetic properties of andesites, rhyolites, including their magnetic minerals, all from central Slovakia volcanic fields, has shown that the magnetic minerals in all petrographical types of the Neogene volcanics have been altered after the emplacement on the earth's surface and during their existence in the field. The titanomagnetites (Ti-Mt-es) which were probably the initial Fe-Ti minerals create in the rocks only some remnants, mostly as oxidized phases, which have a tendency to be transformed in favour of the titanomaghemites (Ti-Mgh-es) and successively to hematites (Hem-es). There are the ilmenite-hematites (Ilm-Hem-es) and in the oxidized phases the Ti-Mgh-es and the Hem-es in the rocks. The typical behaviour for the Ti-Mt-es is an expressive gradual change of magnetic susceptibility κ during heating of sample. There is knowledge that the thermal agitation plays a role only in small particles, or at temperatures close to the Curie point. Under normal circumstances the equilibrium magnetic microstructure must be considered as athermal. So, the cause of increase of κ from lower temperatures to the maximum closely before the Curie point of the Ti-Mt dwells probably in a growth of the magnetic Ti-Mt grains in the superparamagnetic (Sp) range and successively if there is a presence of oxygen, an alteration of the Ti-Mt phase from original to more oxidized state can take place. It has been suggested that the behaviour of κ of Ti-Mt-es reflects the presence of Sp, single-domain (Sd) and multidomain (Md) particles. An increase of κ of the Ti-Mt sample with the temperature has involved the following three processes: i) growth of the Ti-Mt grains in the Sp range; ii) an alteration of the original magnetic Fe-Ti phase to the more oxidized one; iii) the creation of the thermodynamically stable multi-domain state of the Fe-Ti oxide. The hornblende biotite andesites, rhyolites and dacites have been oxidized in the most intense fashion among of other types of volcanics. The lowest magnetic and directional stability of RM has shown the rocks with higher portion of Ti-Mt-es. They carry a thermo-viscous RM, not true TRM origin magnetization. The most stable RM is carried by the oxidized Fe-Ti magnetic phases containing the Ilm-Hem-es and Hem-es. The RM linked with the Hem-es is of the secondary chemical -

[1] Dúbravská cesta 9, 845 28 Bratislava, Slovak Republic; e-mail: geoforky@savba.sk

CRM origin. It follows that the most stable component of RM in volcanic rocks is of a secondary magnetization of CRM origin, the age of which is not possible to be determined.

Key words: low stable thermo-viscous RM in rocks with Ti-Mt-es, highly stable CRM of secondary origin in altered volcanics with the hematite phases