

# Field-reversal versus self-reversal hypothesis: Magnetic and paleomagnetic properties of basalts from central and southern Slovakia (Part XIII)

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**Abstract:** Basaltic rocks of the Pleistocene to Quaternary age from 45 localities from volcanic territories of Slovakia were studied. It is very interesting that basalts from 35 localities (78%) were reversely magnetized, basalts from only 10 localities acquired normal remanent magnetization (RM). The detailed description of relations between the type of magnetic Fe-Ti phases and magnetic characteristics, including the stability, directions and polarities of RM of basaltic rocks was performed. The author has applied new knowledge about different magnetic state of Ti-Mt-es for the explanation of reversed RM of basalts as well as for more detailed description of Fe-Ti magnetic phases with so called inversion temperatures. Quite new, so far unpublished, conception about true cause of the origin of more oxidized Fe-Ti oxide magnetic phases with the inversion temperatures has been suggested by the author. Experimental results have revealed that there is a real *exchange anisotropy* inside of each grain of oxidized Fe-Ti oxides, except of strong magnetostatic interactions among of individual grains of different magnetic state of the Fe-Ti oxides. One - the original titanomagnetite of high content of ulvöspinel - probably in superparamagnetic-like state, and other - more oxidized, from original Ti-Mt formed Fe-Ti oxide with thermodynamically stable domain structure. This structure was nucleated during low-temperature oxidation. The author has presented an idea that in basalts with the Ti-Mt-es of well developed domain structure the normal RM of TRM origin is acquired during cooling of magma. But when there are the Ti-Mt-es of SP-like state in basalts, there is a chance to acquire the thermo-viscous RM of a reversed sense by the self-reversal process during cooling of basaltic magma.

**Key words:** superparamagnetic-like state of high content of ulvöspinel titanomagnetites, self-reversal RM, exchange anisotropy, magnetostatic interactions

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