Field-reversal versus self-reversal hypothesis: Different intensities of TRM of the reversely magnetized natural basalts and those of the same origin of artificial samples magnetized in laboratory

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A b s t r a c t: The thermoremanent magnetization (TRM) of artificially prepared Fe-Ti containing grinded basaltic grains and those of the reversely magnetized natural basaltic rocks from southern Slovakia was studied. The dominant carriers of magnetic properties are supposed to be the ilmenite-hematites (Ilm-Hem-es) in the basalts under study. As the representative parameter, the Q ratio of the artificial samples was used, to compare the tendency of the artificial samples for acquiring the TRM in the laboratory field. The average value of Q = 12.8 (derived from 21 individual data of laboratory induced TRM) and the average value of volume magnetic susceptibility of $\kappa = 21113 \times 10^{-6}$ SI Units (computed from 94 individual data of natural basaltic rocks) were used to derive the probable intensity of TRM of natural basalts in the time of their origin. This intensity should be 14400 nT, instead of 956 nT, computed from 94 data of individual rock samples. The results have shown that the absolute value of intensity of the laboratory induced TRM (induced in normal field of intensity H = 48 μT) of artificial samples is in average by about 15 times higher than that of the reversed intensity of TRM of natural samples. It has been deduced that these low values of intensity of reversed TRM of basalts have reflected the self-reversal origin of magnetization. The normal polarity geomagnetic field existed during the origin of basaltic rocks under study. The reversed remanent magnetization of these basaltic rocks was acquired by the self-reversal process in non-magnetically ordered particles of Ilm-Hem solid solutions.

Key words: basaltic rocks with Ilm-Hem-es, artificial Fe-Ti oxide containing samples, high values of laboratory induced TRM, low values of TRM of natural samples, self-reversed origin of low intensity TRM natural basalts

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