ON THE PHYSICS OF ACQUISITION OF DRM

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Acquisition of sedimentation magnetization is tied to the process of sediment formation. DRM is imparted by a partial orientation of a magnetic moment of individual particle during settling to the bottom of a basin. Reported measurements of magnetization of settling material showed that the magnetization on the settling stage is considerably stronger than the magnetization of settled sediment measured after the formation of DRM. Hence, during the settling and compaction the magnetization rather decays from its initial value than acquires. This statement is supported by numerical and analytical study of settling process. The aggregates created due to the flocculation has average fractal dimension 1.83. A certain coupling of magnetic grains happens only at high concentrations giving additional argument in the biogenic origin of chains of magnetic particles found in deposits. The process of deposition obeys the scaling principle: the number of clusters with given number of particles is invariant when product of depth of the basin H and the rate of sedimentation u is constant. Thus, to imitate the process of sedimentation, it is better to choose a material from possibly deep natural water basin and redeposit it into shallow settling tubes by possibly small but frequent portions. The coagulation drastically decreases the magnetization of suspension at relatively high rate of sedimentation typical for the re-deposition experiments, lake and shallow sea conditions, while for deep sea areas flocculation is likely not important. Intensity of magnetization of a suspension at intense flocculation is defined by at least seven parameters, characterizing both magnetic and nonmagnetic particles and the liquid media. Such the multi-parametric dependence practically prohibits absolute determinations of the ancient geomagnetic field by re-deposition method due to impossibility to adequately reproduce natural basin conditions of sedimentation in laboratory experiments.