EXPERIMENTAL STUDY OF FLY-ASH MIGRATION UNDER CONTROLLED WATER REGIME: TEMPERATURE AND MOISTURE CALIBRATION AND PRELIMINARY RESULTS ON SAND FORMATIONS

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Soil magnetometry can serve as proxy for industrial immisions as well as heavy-metal contamination. An important methodological question related to measurements of top soil magnetic susceptibility is whether migration of deposited anthropgenic ferrimagnetics influences the measured values. In spite o the fact that reliable mapping of magnetic susceptibility requires a high temporal stability of accumulated industrial immisions in topsoils, precise knowledge on the mobility of anthropogenic ferrimagnetics in vertical soil profile (and factors affecting this process) is still lacking. In our model experiments in laboratory we used three technical sands with different particle sizes (0.10 – 1.25 mm). Sands in plastic cylinders were contaminated on the surface by fly-ashes from coal-burning power plant. Soil moisture sensors were used to monitor water regime within the sand columns after controlled rain simulation.Vertical migration of ferrimagnetic particles-tracers presented in the fly-ash was measured by SM400 Kappameter. As a first step, calibration measurements were carried out. in order to define the effect of temperature and different moisture on susceptibility values measured by SM400. We observed systematic increase of susceptibility (~$4x10^{-4}$SI) for realistic temperature interval in water saturated sand column (from 10 to 26^{o}C). On the contrary, diamagnetic effect of water content on magnetic susceptibility is very low (-10^{-5}SI). Preliminary results indicated that after the pulls infiltration of defined water volume, gradual decreases of susceptibility peak values were detected in all studied sand formations. Fly-ash migrated more or less freely in coarse sand material. In medium and fine sand the contaminants moved only to the depths of several cm due to the pore-space blocking and water flow decrease.
This research is supported by the Grant Agency ASCR under grant IAA300120701.

Environmental magnetism, pollution, fly-ash

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