Publications of the Institute of Geophysics, Polish Academy of Sciences
Geophysical Data Bases, Processing and Instrumentation
vol. 423 (C-112), 2018, pp. 73-74
DOI: 10.25171/InstGeoph_PAS_Publs-2018-038
16th Castle Meeting New Trends on Paleo, Rock and Environmental Magnetism, Chęciny, Poland, 2018

Loess-palaeosol Magnetism as a Tool for Reconstruction of Past Environmental Processes: Examples from the Czech Loess Regions

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A b s t r a c t

Loess-palaeosol sequences provide one of the most widespread palaeoenvironmental records. Aeolian dust deposition and loess formation dominated in glacial Pleistocene stages, whereas during temperate interglacial (or interstadial) periods the loess surface was altered to soil. The pedogenic processes caused diagnostic changes of iron minerals present in primary loess (e.g., Maher 2011). Primary magnetic fabric of the loess, described by anisotropy of magnetic susceptibility principal directions, fabric magnitude, and a fabric shape, was deformed due to neo-formation of ultrafine superparamagnetic (SP) particles and sediment bioturbation (e.g., Tarling and Hrouda 1993). Additionally, the interglacial (interstadial) flash precipitation events could trigger slope processes and the soft sediment reworking.

Mid- to Late Pleistocene loess-palaeosol sequences, located in the central European loess belt, were investigated using a spectrum magnetic techniques. Magnetic mineralogy and grain size generally follow common Eurasian magnetic susceptibility pattern – i.e., palaeosols reveal magnetic enhancement due to formation of the SP particles, which significantly reduce the anisotropy degree in the palaeosols. The AMS directions differ between sedimentary horizons formed in glacial and interglacial climates. The magnetic lineation and foliation in the loess indicate dominating wind directions from W (SW) to E (NE) across south Moravia. This is in agreement with recent results by Lagroix *et al*. (2011). We identified the loess magnetic fabric deformation independent on the pedogenic SP particle formation. The decreasing trend in the anisotropy degree is, most probably, connected with

periglacial freezing/melting cycles affecting the loess deposits. The magnetic fabric in the paleosol horizons was strongly altered by reworking due to unconcentrated slope runoff controlled by local morphology.

Keywords: loess, palaeosol, magnetism, environmental reconstructions.

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