Geophysical Research Abstracts
Vol. 18, EGU2016-7053, 2016
EGU General Assembly 2016

Correlation between anisotropy of frequency-dependent susceptibility and anisotropy of out-of-phase susceptibility in loess/paleosol sequences

Martin Chadima (1,2), Frantisek Hrouda (1,3), Jaroslav Kadlec (4), and Josef Jezek (3)

(1) Agico, Ltd., Brno, Czech Republic, (2) Institute of Geology of the CAS, v. v. i., Prague, Czech Republic, (3) Faculty of Science, Charles University, Prague, Czech Republic, (4) Institute of Geophysics of the CAS, v. v. i., Prague, Czech Republic

The preferred orientation of magnetic minerals in loess/paleosol sequences is traditionally investigated through the anisotropy of magnetic susceptibility (AMS). Recently developed techniques of anisotropy of frequency-dependent susceptibility (fdAMS) and anisotropy of out-of-phase susceptibility (opAMS) can assess the magnetic sub-fabrics of viscous particles on transition between SP and SSD. The width of the particle size interval investigated by the fdAMS is controlled by the operating frequencies used. In case of opAMS, the interval is always narrower than that in fdAMS and depends also on the operating frequency used. To demonstrate our approach we present several loess/paleosol sequences from the Czech Republic where the degrees of AMS, fdAMS, and opAMS are significantly lower in paleosols than in loess horizons. This indicates that the preferred orientation of magnetic particles created during pedogenesis is much weaker than that of the particles deposited during loess deposition. In addition, the degrees of fdAMS and opAMS are much higher than that of AMS. This may indicate strong grain anisotropy of viscous magnetic particles, because the fdAMS and opAMS are primarily controlled by them. The principal directions of AMS, fdAMS, and opAMS are mostly roughly co-axial suggesting more or less identical origins of magnetic sub-fabrics according to grain size. Less frequently, the principal directions of fdAMS or opAMS differ from those of AMS probably indicating post-depositional effects on particular grain-size classes. The fdAMS and opAMS show as powerful tools in the investigation of magnetic sub-fabrics due to different grain-size classes of magnetic minerals.