Geophysical Research Abstracts
Vol. 12, EGU2010-9427, 2010
EGU General Assembly 2010

Palaeoclimate from magnetic proxies in loess sequences

Barbara Maher
Lancaster University, Lancaster Environment Centre, Lancaster, United Kingdom (b.maher@lancs.ac.uk)

For the terrestrial environment, sequences of loess sediments provide key aeolian archives on every continent. High-resolution loess/palaeosol sequences can provide both quantitative information on the soil-forming palaeoclimate, and mineralogical, physical and chemical information on dust and dust fluxes. The sensitivity of iron minerals in these sequences to sediment source, and to changes in ambient environmental conditions makes them particularly valuable for paleoclimatic reconstruction. Iron oxide concentrations can be very low (e.g. below the detection limits of x ray diffraction) but produce almost disproportionately large and distinctive effects - for instance, on soil/sediment colour and soil/sediment magnetic properties. Magnetic analyses of loess/palaeosol sequences can differentiate between stratigraphic units robustly and rapidly. Sediment provenance can be constrained where unweathered loess displays distinctive magnetic signatures. Further, understanding of the links between soil-forming processes and soil magnetic properties has enabled quantification of palaeo-rainfall in the classic Quaternary sequences of the Chinese Loess Plateau, and for the Holocene sequences of the Russian steppe. However, loess/palaeosol magnetic properties must always be considered carefully, on a site-specific basis, since they may reflect changes in sediment source and/or the influences of the full range of pedogenic factors (parent material, climate, topography, organic activity and time). Thus, no generic 'model' of loess/palaeosol climofunction exists; rather, the (potentially local) impacts of source and soil-forming environment must be evaluated appropriately.