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Stratigraphic interpretations of loess-paleosol sequences and their relevance for paleoclimatic implications

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Loess-paleosol sequences represent the by far most widespread geoarchives in Eurasia. Assessment of common chronostratigraphic patterns and differences in these terrestrial paleoclimatic records is crucial for the understanding of Eurasian climate evolution, especially during the Quaternary. Yet, the reconstruction of the climatic evolution of Eurasia is still challenging, i.e. due to time scale issues. This represents a major limitation for understanding the interaction and evolution of Northern Hemisphere climate systems over the continental areas, and also their relation to marine and other proxy records and reference datasets, including orbital and greenhouse gas forcing. Here, we compare magnetic susceptibility records as proxies for the intensity of pedogenesis from the central Chinese Loess Plateau in Asia and the Carpathian Basin in Europe. Inconsistencies and crucial issues concerning timing, correlation and interpretation of these loess-paleosol records are outlined. Probably most of the current timing/age differences between different records may be overcome once a common stratigraphic interpretation is achieved.
Here we focus on investigating the effect of time scale (in)consistency for paleoclimatic interpretations of several loess-paleosol sequences from Eurasia. The effect of different stratigraphical relationships/correlations is tested by (a) using original time scales, and also different alignments (b) forcing linear models of reference datasets (including orbital parameters and a deep marine oxygen isotope record) to explain the patterns seen in loess paleoclimate data. This way the effect of alignment and different stratigraphic (age model) interpretations onto inferred origins of paleosol formation in loess records are compared. Finally, we draw conclusions on how important time scale alignment is for the interpretation of forcing mechanisms driving loess-paleosol sequence formation.