
Evidence for uninterrupted glacial and interglacial dust accumulation in Eurasian dry steppe regions

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Résumé

Lithospheric dust plays a key role in the Earth's system connecting litho- and pedosphere with atmo-, hydro-, cryo- and even biosphere. Here we discuss spatial and temporal patterns of dust accumulation in the Danube Basin and stratigraphic records of environmental proxy data in recent soils, palaeosols and loess and their implications for palaeoclimate reconstruction, pedogenesis and archaeology in Eurasian steppe environments. Especially widespread on the mid-latitude Eurasian continent, dust accumulations, known as loess, generally exhibiting a characteristic feature of stratigraphic intercalations of distinct horizons differing mainly in colour and possibly in grain size and chemical composition. Those horizons are interpreted as the result of dominantly synsedimentary alterations of the pristine minerals controlled by elevated moisture and the related biome forming the pedosphere. In loess environments, the intensity of pedogenesis acts on a wide range of amplitudes reflecting temporal hydroclimate variabilities and transforming accumulated lithospheric dust into loess (loessification) and sometimes into pedohorizons, which become eventually buried forming the characteristic feature of loess-palaeosol sequences (LPS), fossil soils (palaeosols) interbedded with loess. We will present results showing that in those steppe environments, synsedimentary pedogenic transformation dominates over translocation processes, in this way preserving primary depositional sedimentary features even in interglacial pedo-complexes. Moreover, the continuous nature of dust accumulation is proven by the occurrence of numerous volcanic tephra layers and the excellent preservation of delicate archaeological find horizons. Therefore, physical properties of LPS reflecting directly synsedimentary environmental conditions

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provide distinctive patterns of environmental proxy records as characteristic fingerprints allowing thereby for unambiguous continent-wide correlations giving evidence for a quite similar accumulation and/or loessification history. Furthermore, direct dating, geoarchaeological evidence and direct observations of dust falls suggest a significant contribution of aeolian dust to interglacial soils characterising LPS in Eurasian dry steppe regions as unique archives of palaeo-environmental and human cultural evolution.