Geophysical Research Abstracts, Vol. 9, 06693, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06693

Glacial and interglacial eolian dust dispersal patterns across the Chinese Loess Plateau inferred from decomposed loess grain-size records

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Previous studies have indicated that a genetically meaningful decomposition (unmixing) of loess grain-size distributions can be accomplished with the end-member modeling algorithm EMMA. The independent decomposition of two series of loess grain-size records from the NE Tibetan Plateau and Loess Plateau spanning the last glacial-interglacial cycle indicates that the two data sets are described by very similar mixing models. The average mixing model presented here is regarded as representative for the vast loess region in northern China, and allows quantification of the contribution of three loess components to the loess grain-size distributions. A genetic interpretation and the paleoclimatic significance of the average mixing model has been provided by comparison of the modeled loess components with modern dust samples in terms of their grain-size distribution and flux rates, and by the distribution patterns of the loess components across the Loess Plateau reconstructed for the last two glacial-interglacial cycles. The sandy and silty loess components represent the coarse dust fraction supplied by saltation and short-term suspension processes over the proximal part of the Loess Plateau during major dust outbreaks in spring and early summer. The low-level winter monsoon (north-westerly wind system) is the likely transporting agent for these dust events. A clayey loess component represents the fine dust component supplied over the entire Loess Plateau by long-term suspension processes during major dust outbreaks and as part of a background supply system. The clayey loess component in the glacial loess deposits is dominantly supplied during major dust outbreaks by the north-westerly winter monsoon, whereas the clayey loess component in the inter-

glacial paleosols is mainly supplied by non-dust-storm processes, presumably with a significant contribution by the high-level subtropical jet stream (westerly winds).