Sediment distribution and controls on desert migration during the last interglacial-glacial cycle in north China.

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ABSTRACT
Desert expansion and contraction in north China influence grain size stratification and the architecture of the peripheral Malan loess formation. The architecture of the wind-blown Malan loess follows a pattern of thick proximal deposits and thin distal deposits that resemble, using marine terminology, an undathem-clinothem-fondothem morphology. This morphology also appears to be internally consistent and may enable a determination of grain size variations and desert migration at a high-resolution (1000s of years). Multiple peaks of grain size in thick loess beds near the source, however, appear to merge into a single peak in thin beds distal from the source. This merging of the grain size peaks suggests that distal loess deposition represents a 'condensed' bed of loess.

Results from geological and General Circulation Model analyses suggest that variations in soil moisture is a key factor influencing desert migration, and the distribution of loess in the Loess Plateau of China. During the last glacial period a reduction in soil moisture led to dune de-stabilization and a southward expansion of the desert (the source of loess) toward the Loess Plateau. Changes in soil moisture in East Asia may have been influenced by the size and extent of the Fennoscandian ice sheet, and the atmospheric circulation pattern that it induced downstream. These results suggest that both regional factors (i.e. changes in soil moisture and the position of the desert margin) and hemispherical factors (i.e. changes in the size and extent of the Eurasian ice sheets) have influenced loess deposition on the Loess Plateau of China.