

Millennial Scale Variability of the East Asian Winter Monsoon Before the Last Glacial-Interglacial Cycle

Grain size measurement on samples from a typical loess-palaeosol sequence on the central Chinese Loess Plateau are used to reconstruct the Pleistocene East Asian monsoon climate. The coarse-grained fraction, i.e. the weight percentage >30µm, of the bulk grain size distribution is used as a sensitive proxy for East Asian winter monsoon strength (Lu *et al.*, 1997). On the basis of an absolute time scale (Vandenberghe *et al.*, 1997; Huissteden *et al.*, 1997), time series variations of this proxy show that winter monsoon strength varied on millennial time scales during the periods 145–165, 240–280, 320–350, 390–440, 600–640, 860–890, 900–930 and 1330–1400 kyr BP (Fig. 1), these changes can not be explained by the orbital forcing. The wavelength of these climatic oscillations varied between 1.89 and 4.0 kyr, as is shown by spectral analysis using the multi-taper method. Although numerical simulation experiments show that high frequencies can also arise from measurement errors in the grainsize analysis, the frequencies prove to be stable when the spectral analysis is repeated with a different number of tapers. For the time being, we do not correlate these climatic oscillations with paleoclimatic records in the North Atlantic deep-sea sediments because both time scale require further improvement. However, our data certainly demonstrate that millennial scale East Asian winter monsoon variations in the last 1.4 million years can be detected from terrestrial loess records.

REFERENCE

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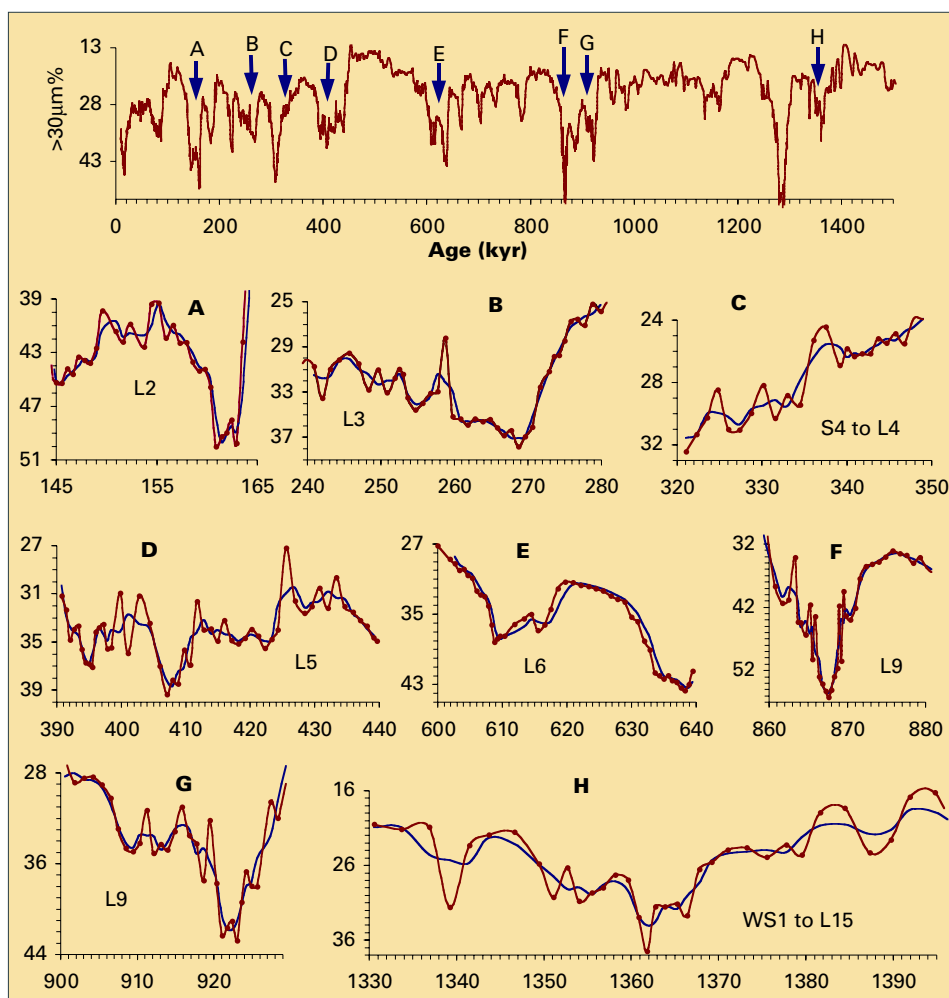


Figure 1: Changes in proxy indicator of winter monsoon strength over the past 1500 kyr. The lower plots are enlarged sections of the time series as indicated by capital letters.

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