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The bimodal silt (Twin Peak) distribution of loess sediments – a new proxy to assess palaeoclimatic dynamics recorded in terrestrial aeolian dust archives

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Here we present particle size studies of several loess-palaeosol sequences across Eurasia (Middle Europe, SE-Europe, Middle Asia, Central Asia and the Chinese Loess Plateau) where a continuous and highly resolved grain size sampling has taken place.

Advances in measurement technologies as well as in sample collection and sample preparation have shown that the size distribution of the silt fraction of loess is much more complex than has been hitherto suspected. By definition loess is characterised by its particle size distribution with a polymodal distribution and a strong dominance of the middle and coarse silt fraction. We found that the silt mode appears to be in fact two silt modes, as there are two closely adjacent peaks in the particle size curve. One at approximately 20 μm and the other at approximately 40 μm, separated by a noticeable gap centered on 30 μm.

Both maxima vary significantly in height and area when comparing samples from different stratigraphic units of long loess sequences and reflect a signal that clearly correlates with the stratigraphic position and the palaeoclimatic features of the studied loess record. In particular the bimodal silt distribution (Eden effect) appears to be a major and significant phenomenon of loess sediments in general and we will discuss the relation of internal material controls in the quartz minerals and external climatic driving factors that are recorded in the aeolian dust record of loess sequences.