



Spatial variations of magnetic susceptibility of Chinese loess for the last 600 ka: implications for monsoon evolution

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The spatially correlativity of the Chinese Quaternary loess-soil sequences provides an opportunity to examine the changes of East Asia monsoon climate patterns. Here, we examine spatial variations of magnetic susceptibility (MS) during the last 600 ka over the Loess Plateau in China, based on the data from 29 newly measured sections and 21 sections in literature. Examined glacial times include L1LL1, L2LL1, L3LL1, L4LL1 and L5LL1 loess units, which correspond to marine oxygen isotope stage (MIS) 2, 6b, 8b, 10b and 12b, respectively. Interglacial times include S0, S1, S2SS1, S3SS2, S4 and S5SS1 soil units, correlative to MIS 1, 5, 7, 9, 11 and 13, respectively. Two representative interstadial stages, L1SS2 and L2SS2, corresponding to MIS MIS 3c and 6e, are selected to address the interstadial patterns.

The obtained contour maps of magnetic susceptibility indicate strong coherence between MS variations during the interglacial periods and present-day precipitation and temperature patterns. This suggests that the strength of the summer monsoon had a dominant influence on the MS signals in soils, through modulating pedogenic intensity. The distribution of MS during glacial periods is characterized by weak S-N gradients and rough W-E zonal patterns, indicating a negligible effect of the summer monsoon. Interstadial patterns are intermediate between the glacial and interglacial ones. Interglacial patterns for the last 600 ka are essentially similar, suggesting that the climate regime during these periods has not undergone significant changes, and that the East Asian summer monsoon has remained the main moisture carrier. Our estimates of the relative amplitudes of climate oscillations during these timeslices are consistent with earlier paleoclimate studies. These data, associated with the available

susceptibility-based climofunctions, may be used to estimate spatial changes of paleorainfall and paleo-temperature for these key periods, and hence to test climate models.

KEYWORDS: loess, magnetic susceptibility, East Asian monsoon, paleoclimate, spatial climate change