



Pedogenic modification of magnetic susceptibility recording paleoclimatic signals – an explanation of regional changes to Alaskan, Chinese and Siberian loess

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The magnetic susceptibility of Chinese loess showing a general positive relationship to pedogenic development, which was strongly controlled by climatic condition, has been widely recognized and used for reconstruction of paleoclimate by Quaternary scientists. The *in-situ* pedogenic enhancement of ferrimagnetic content is normally believed to be the main reason for the increase of susceptibility in soil units. However, this pattern of high magnetic susceptibility in palaeosols, and lower values in loess, is not replicated in some loess deposits. Alaskan and Siberian loess deposits display a completely opposite susceptibility behavior: high values in loess and low values in palaeosols. This inverse relationship has been explained by the idea that magnetic susceptibility is reflecting the magnitude of an aeolian ferrimagnetic component of consistent mineralogy, the grain size of which is related to average wind velocity. Our magnetic study of Siberian samples in this paper suggests that there are notable differences in magnetic properties between loess and developed palaeosols from high cold and high latitude regions, their difference is not only in magnetic grain-size and concentration but also in magnetic mineralogy. This evidence implies that the low magnetic susceptibility values in Alaskan/Siberian paleosol units are a reflection of the alteration of the ferrimagnetic content by post-depositional processes. The Loess Plateau is a very arid area where evaporating amount there is normally about a few times higher than their precipitations. Pedogenic process there is under dry oxidation condition. Alaska/Siberia locates in tundra or edge of tundra where is always mois-

ture, high moisture there will lead to a reducing pedogenic environment. Ferrimagnetic minerals under such reducing condition will be gradually destroyed, resulting lower magnetic susceptibility. Therefore, great care should be taken when using susceptibility values for paleoclimatic reconstruction.