Provenance change of eolian dust at Lingtai section in the Chinese Loess Plateau since 7.2Ma

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Eolian dust deposits in the Chinese Loess Plateau are considered as derived from the dry and semi-dry area of the windward direction. These eolian sediments consist of Quaternary loess-paleosol sequence and Tertiary Red Clay formation. It is generally considered that the extent of the desert area that becomes the source of eolian dust and the wind that transports the dust influence accumulation of these eolian sediments.

Deposition of the loess-paleosol sequence started from about 2.6 Ma. Previous study suggests that the eolian sediments are composed of two grain size components: the fine component and coarse component. The coarse component is considered as transported by near surface winter monsoonal wind, whereas most of the fine component is considered as transported by high altitude westerly jet. However, how the provenance of fine and coarse components changed over time in association with the two wind system remains unclear.

Deposition of the Red Clay formation started from about 7.0˜7.7Ma. So, it is thought that Red Clay formation records the evolutional history of East Asia monsoon. However, there is only a few previous studies that compare the origin of Red Clay with those of loess - paleosoil sequence.

In this study, we examined the provenance of eolian sediments at the Lingtai section of the central Chinese Loess Plateau. We separated loess, paleosoil, and red clay samples into two size fractions, 0-30 micro meter, and 30- micro meter, respectively, and measured the ESR (Electron Spin Resonance) signal intensity, crystallinity, and contents of quartz in each grain size fraction. With these three parameters, we try to specify the provenance of eolian quartz in each grain size fraction.

The results suggest that fine and coarse fractions of eolian sediments at Lingtai section have different provenances. The provenance changes in each fractions are associated with glacial-interglacial cycles as well as long-term trends. It is believed that these provenance shifts will provide important clues to resolve the evolution of East Asia monsoon, Asian interior aridity and development of western deserts, and their relation with a glacial-interglacial cycles and stepwise uplift of Himalayas-Tibetan Plateau.