Variations of $^{143}Nd/^{144}Nd$ and $^{87}Sr/^{86}Sr$ ratios of the Lingtai profile in the Chinese Loess Plateau during the past 7 Ma

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$^{143}Nd/^{144}Nd$ and $^{87}Sr/^{86}Sr$ ratios of the acid-insoluble residues from red clays and overlying loess-paleosols from the Lingtai profile of the Loess Plateau, China, were investigated. The results show that variations of the $^{87}Sr/^{86}Sr$ ratios of the Lingtai profile can be divided into two stages. From ~7 Ma B.P. to 2.5 Ma B.P., the acid-insoluble residues in the Red Clay (RC) Formation, are characterized by higher $^{87}Sr/^{86}Sr$ ratios with an average of 0.7230. From 2.5 Ma B.P. to the present, the acid-insoluble residues in the Wuchen Loess (WL4- WS1), Lishi Loess (L15-S1), Malan Loess (L1) and Holocene Loess (S0) have relative lower $^{87}Sr/^{86}Sr$ ratios and display a gradually descending trend from 0.7223 at ~2.5 Ma B.P. to 0.7182 at the present. This implies that the east Asian winter monsoon strength was weak and relatively stable from ~7 Ma B.P. to ~2.5 Ma B.P, but it got continuously enhanced from ~2.5 Ma B.P. to the present.

All the red clays and overlying loess-paleosols in the Lingtai profile have generally identical $\varepsilon_{Nd}(0)$. The $\varepsilon_{Nd}(0)$ values from 7 Ma B.P. to the present range from -8.3 to -10.6, with an average of -9.3,which supports that red clay and overlying loess-paleosols in the Loess Plateau have the same source areas over the past 7 Ma. The range and trend of the variations of the $\varepsilon_{Nd}(0)$ of the Lingtai red clays and loess-paleosols during the past 7 Ma are very similar to those of the central north Pacific Ocean reported(the $\varepsilon_{Nd}(0)$ ranging from -8.5 to -10.1, with a average of -9.1) by Pettke et al.〔1〕. This suggests that the eolian materials of the Chinese Loess Plateau could have been largely derived from nearly the same source regions as the sediments in central-northern Pacific Ocean.

References

〔1〕Pettke, T., Halliday, A.N., Hall, C.M., Rea, D.K. 2000. Earth Planet.Sci.Lett. ,178, 397-413.