Re-Os isotopic composition of loess from the Yili Basin, China

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Geochemical and isotopic characters of loess are valuable tools for estimating chemical and isotopic composition of average upper continental crust and for tracing material transport processes on the Earth's surface. Little Re-Os isotopic data of upper crustal materials including loess have been reported because of very low Os abundance of them. Re-Os isotopic characters of loess may provide new information on source and sedimentary processes because differentiation between Re and Os during partial melting or fractional crystallization is clearly larger than that between Rb and Sr or Sm and Nd.

Aims of this study are to examine whether Re-Os isotopic composition of loess represents that of the average upper continental crust and to examine which process (e.g., weathering or variation in source) best correlates to Re-Os isotopic compositional variation of loess. In order to achieve these aims, we measure Re-Os isotopic composition of loess and paleosol samples which was systematically collected in the Yili Basin, northwestern China, at a varying depth (1.0-16.6m).

The obtained 187Os/188Os ratio of loess and paleosol samples range from 1.214 to 1.308 and the difference among them are almost within errors (2sigma). Variations in Re (167-851ppt) and Os (59-50ppt) is relatively larger in the lower part (7.8-16.6m depth) than in the upper part (1.0-5.0m depth). Therefore, Re and Os abundance may be more sensitive to source materials or pedogenesis of loess than 187Os/188Os ratios.

The 187Os/188Os ratio of loesses and paleosols from the Yili Basin is higher than those of loess from the Loess Plateau (0.875-1.209; average 1.04) reported by Peucker-Ehrenbrink and Jahn (2001). This difference may be resulted from the local difference in 187Os/188Os ratios among sources of Chinese loess. On the other hand, the Os isotopic composition may be a valuable tool for tracing aeolian dust released from loess and desert areas in China.