

Sr–Nd isotopes constrain the Quaternary evolution of Huanghe (Yellow River) sediment routing system

YULONG GUO, SHOUYE YANG*, CHAO LI

State Key Laboratory of Marine Geology, Tongji University,
Shanghai 200092, China

Email: yguo@tongji.edu.cn

The late Quaternary siliciclastic sediments on the wide continental shelf of East China provide us an ideal archive for deciphering the interactive processes between neotectonics, monsoon climate and large river evolution. In this contribution, we present Sr–Nd isotopic compositions of sediment samples collected from the Huanghe (Yellow River) mainstream and from the core CSDP-1 in the South Yellow Sea, aiming to reveal the later Quaternary river-sea interaction in this epicontinental sea. To minimize the effect of grain size sorting, only <50 μm fraction was separated for the isotopic analysis. The non-detritic fractions such as carbonate, organic matter and Fe-Mn oxide phases were also removed before the isotopic measurement.

For the Huanghe river sediments, the ϵNd values increase downstream from -12.2 on average in the upper reaches to -11.3 in the middle reaches and then decrease to -11.9 in the lower reaches, whereas the $^{87}\text{Sr}/^{86}\text{Sr}$ ratios average at 0.7196 , 0.7177 and 0.7183 respectively in the upper, middle and lower reaches. The high ϵNd and low $^{87}\text{Sr}/^{86}\text{Sr}$ in the middle reaches suggest the sediment contributions from the Loess Plateau. The Huanghe sediments are overall derived from multiple sources including the Loess Plateau, Himalaya, Qinling Mountains and Ordos Plateau.

The upper 80 m sediments of core CSDP-1 has the Sr–Nd isotopes generally comparable to that of modern Huanghe sediments, with ϵNd and $^{87}\text{Sr}/^{86}\text{Sr}$ varying from -12.16 to -10.72 and 0.7171 to 0.7197 respectively. An abrupt increase of ϵNd and decrease of $^{87}\text{Sr}/^{86}\text{Sr}$ at the depth of 30 m (at about 0.26 Ma) possibly suggest a significant contribution of loess sediment. This increase of loess sediment contribution may be caused by enhanced erosion of the Loess Plateau and/or by the evolution of Huanghe river course. The change of sediment source-to-sink transport pattern was essentially triggered by the coupling processes of tectonics and monsoon climate.

Acknowledgement: This work was supported by National Science Foundation of China (Grant Nos. 41225020 and 41376049).