Sr–Nd isotopic and geochemical constraints on terrigenous sediment provenances and paleoenvironment revolution in the East China Sea during the Holocene

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The East China Sea (ECS) as a typical river-dominated marginal sea in the west Pacific, has received huge sediment inputs from one of the largest rivers in the world, the Changjiang (Yangtze River), and thus developed a unique muddy sedimentary system on the inner shelf, which provides an ideal archive for the reconstruction of river-sea interaction during the Holocene. This study presents high-resolution geochemical and Sr–Nd isotopic data of the Calypso core MD06-3040 (27°43.4′N, 121°46.9′E, water depth 46 m and core length 19.22 m) retrieved from the mud wedge on the inner shelf, aiming to reconstruct the paleoenvironmental changes as well as sediment source-to-sink transport over the last 10 ka.

Large variations in $^{87}Sr/^{86}Sr$ ratios and εNd values in the silicate fractions occur at 7.0–1.5 ka, suggesting a significant change in sediment provenances. Early in 10 ka, the Changjiang-derived fine sediments might have reached the study area, while since ca. 7.0 ka the homogeneous mud sedimentation began to form with the coastal current being developed and terrigenous sediments continuously supplied by the Changjiang River. Abrupt changes in isotopic and geochemical compositions at about 1.5 ka might be caused by increasing sediment contribution from local small rivers in response to monsoon evolution and human activities. The elemental compositions in the acid-soluble fractions of the core sediments suggest the weakening East Asian summer monsoon and the evolution of shelf circulation in the Holocene, which consequently determined the sediment source-to-sink transport from the rivers to the ECS continental shelf. Our study provides new insight on the complicated river-sea interaction in the river-dominated marginal sea.