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Spatial and temporal distributions of clay minerals in mud deposits on the inner shelf of the East China Sea: Implications for paleoenvironmental changes in the Holocene

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We present a paleoclimatic reconstruction for the Holocene by clay mineral analyses of sediments from core MZ02 retrieved from the mud area of the inner continental shelf of the East China Sea (ECS). The clay minerals mainly consist of illite (66%-79%) and chlorite (12%-19%), with minor kaolinite (7%-13%) and smectite (0-6%). Provenance analysis suggests that the illite-dominated clay minerals were derived mainly from the detrital outputs of the Changjiang, Minjiang, and small rivers from Taiwan Island. Our study indicates that the sea level rise since the last glacial, the strength of the Taiwan Warm Current (TWC) and Chinese Coastal Current (CCC) have controlled the dispersal and deposition of clay minerals on the ECS, that in turn determined the clay mineral compositions in the core sediments. During 13,000-9500 BP, due to the lower sea level and shorter distance between these three estuaries and core MZ02, fine sediments on the inner shelf of the ECS were primarily supplied by mixed provenances from the Changjiang, Taiwanese, and Minjiang rivers. During the early Holocene (9500-6200 BP), stronger sediment reworking and erosion at the shelf edge was responsible for the increased lateral transport of fine sediments in the ECS, which lead to a dominance of the sediment source from the Changjiang, while the Taiwanese and Minjiang rivers only provided minor components of detrital sediment to the shelf. Increased strength of TWC might have played an important role in the sediment dispersal and deposition on the inner shelf of the ECS during 6200-2400 BP, with a dominance of more than 60% sediments transported from Taiwanese rivers. Furthermore, our study implies that the Asian monsoon and the weakening of TWC were linked to the abrupt increase of Changjiang and Minjiang derived terrigenous detritus materials since 2400 BP.

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