

Variation in the Yangtze River discharge during the Holocene based on sedimentological records from the East China Sea

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The Yangtze River is the largest river in the Eurasian Continent originated from the Tibetan Plateau and flows out to the East China Sea. The River plays an important role in marine sedimentation in the East Asian marginal seas. The relationship between the discharge and the flux of the Yangtze River-derived sediment is of great significance to understand the source-to-sink pattern of terrigenous materials into the East China Sea. The mud belt of East China Sea inner shelf is one of the major sinks of the Yangtze River-derived sediments, which provides important constraints on the sediment budget on the shelf as well as paleoenvironmental changes due to monsoon variability in the drainage basin during the Holocene.

IMAGES XIV 2006 Marco Polo II cruise recovered a high quality calypso core (MD06-3040, 27°43.3663'N, 121°46.8822E, 47m water depth, core length 19.36m) from mud belt of the East China Sea inner shelf. The age model of core MD06-3040 was constructed based on ¹⁴C dating that reveals the core covered the whole Holocene. The grain size distribution and the major element composition of the MD06-3040 core sediment have been determined in order to examine the relationship between the changing provenances of fine-grained sediments and East Asian Monsoon variation during the Holocene. The grain size shows a multi-modal distribution that consists of more than 3 modes centered at clay, silt, and sand sizes. The grain size of silt fraction is finer around 7 ka, which suggests the sea-level control on sand delivery. Co-variation of $(\text{Clay}+\text{Silt})/\text{Clay}$, Ti/Fe, and K/Al indicates a millennial-scale variability of suspension transport of the Yangtze River-derived fine sediments. Intervals of minimum grain size correspond to the low Yangtze River discharge events recorded in the northern East China Sea core and weak monsoon events recorded in some of stalagmite records within the Yangtze River drainage at millennial-scale, suggesting high discharge could transport the coarser materials as suspension load.

The contribution of each grain size mode and major elements ratio are significantly controlled by the Yangtze River discharge though the previous studies have suggested that the source rock compositions and chemical weathering intensities in the drainage basin account for the compositional variations of the River sediments. The extensive alongshore mud belt represents the southward transport of Yangtze-derived sediment. Most of this mud has been transported southward in the past 6.5-7ky BP after sea level reached its mid-Holocene highstand, which is the interaction among summer monsoon, winter monsoon, tide, current and river discharge at different timescale. The signal of monsoon climate registered in the fine-grained sediments must be more carefully interpreted considering the sediment transport process, and more attention to high-resolution and reliable provenance proxies for each grain size fraction is required.