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Paleoenvironmental and paleoclimatic record of core MD06-3040 from East China Sea Shelf
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The river-dominated ocean margins play a significant role in global environment system. One of the best examples is the epi-continental shelf of the East China Sea, which receives a large amount of terrigenous material from two of the largest rivers in the world, Yangtze and Yellow Rivers. An elongated subaqueous mud wedge extends from Yangtze River estuary to southward off the Zhejiang and Fujian coasts [1]. It is referred to as the mud belt deposit on the inner shelf of the East China Sea. Most of the sediments in the mud wedge came from Yangtze River. The southward flowing East China Sea Coastal Current on the inner shelf, the northward flowing Taiwan Warm Current on the outer shelf, and the Kuroshio Current have played crucial roles in transporting and trapping most of the Yangtze-derived material in the inner shelf, and preventing the sediments escape into the deep-sea.

IMAGES XIV 2006 Marco Polo II cruise recovered a high quality calypso core (MD06-3040, 27.43.3663 N, 121.46.8822 E, water depth 47m, core length 19.36m) from the mud wedge. Based on high resolution AMS14C dating, the core spans the time period from 10.6 ka to present off South China. We separated grain size distributions into three end-member components EM1, 2, 3 that reflect different transportation mechanisms closely related to the sea-level change and environmental changes using end-member modeling. We use EM3/(EM1+EM3) as a parameter to represent contribution of clay to fine silt fraction relative to coarse silt fraction and Fe/Ti ratio to represent semi-quantitatively Fe content of detrital materials supplied from Yangtze River, which were measured by XRF core canner. These two parameters show good correlation with d18O records of stalagmites from Dongge and Hengshan Cave in south China, which is believed to be a measure of summer monsoon intensity [2, 3], with larger fine population grain size, lower Fe/Ti ratio, and smaller EM3 (clay to fine silt fraction) contribution and larger EM1(coarse silt fraction) contribution corresponding to dry periods characterized by heavier d18O.

The increase in fine population grain size and decreases in EM3/(EM1+EM3) and Fe/Ti ratio coincide with weaker summer discharge events of Yangtze River detected at 9.3, 8.3, 7.3, 6.0, 4.8, 3.3, 2.3, 0.7, and 0.4 ka, which also agree well with weaker EASM precipitation events recorded in some of stalagmites and in northern East China Sea [2,3,4]. This indicates that the supply of the detrital materials to the inner shelf and their grain sizes is strongly affected by summer monsoon intensity. Thus, grain size and chemical composition of MD06-3040 core have a high potential to record EASM intensity changes during the Holocene with high resolution. Larger fine population grain size, lower Fe/Ti ratio, and smaller EM3(clay to fine silt fraction) contribution and larger EM1(coarse silt fraction) contribution suggest that EM3 decreases relative to EM1, representing less fine Fe-rich minerals and detrital materials supplied from Yangtze River be transported to ECS shelf during dry summer periods. The further analyses of core sediments indicate that the Zhejiang-Fujian Coastal Current has formed and kept stable since about 7 ka BP.

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