Formation of the Holocene mud belt in the inner shelf of the East China Sea: controlled by changes in sea level and climate

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Mud sediments deposited on the shelf of the East China Sea (ECS) during the Holocene have been widely linked to sea-level and climatic changes. Previous studies on the geochemical compositions and geophysical properties of such mud sediments from the gravity cores drilled off the coast of Zhejiang-Fujian, China, suggested that these fine-grained sediments in the ESC deposited continuously with high sedimentation rates from the mid- to late Holocene. High-resolution paleoclimatic records have been reconstructed based on multi-proxies, however the interpretation of these proxies are different from site to site. For example, the changes in grain size of fine sediments, located in the north (Core PC-6; 29º 34.92'N, 122º37.92'E) and south (Core MZ01; 26º32.82'N, 120º50.94'E) of the mud belt have been used to indicate the strength of the coastal currents that mainly controlled by the intensity of the East Asian Winter Monsoon (EAWM); while the variation in the similar signals occurred in Core MD06-3040(27º 43.36'N, 121º46.88'E), located in the central zone, has been applied to demonstrate the fluctuations in the intensity of East Asian Summer Monsoon (EASM). These ambiguities also been represented by the discrepancy in sedimentary provenance: rare earth element signals of Core EC2005 (27˚25.0036'N, 121˚ 20.0036'E) indicate that the mud sediments were dominantly transported by coastal currents (related to the EAWM) and derived from the Yangtze River since ~10 ka; whereas clay mineral records from Core MZ02 (28º10.13'N, 121º53.40'E) indicate Taiwanese rivers contributed 60% sediments during 6.2-2.4 ka via Taiwan currents (related to the EASM). In spite of these disputes, the mud deposits occurred during the highstand in sea level when a low energy shelf environment developed since ~7 ka. Furthermore, when we compare the sedimentation rates of these mentioned sediment cores, we find that the depocenter located in the central part of the mud belt (close to Core EC2005), thus we proposed that the development of such mud belt is in response to the Zhejiang-Fujian coastal currents combined with Taiwan currents. In summary, the formation of the Holocene mud belt in the ECS is more complex than expected and future work on the sediment patterns of the modern and Holocene mud belt is in progress.

Keywords: Monsoon, East China Sea, Holocene, Mud belt

