

Sedimentary history of the eastern Bohai Sea, China since the deglacial and implications for paleo-tidal current

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Numerical simulation suggests that the Holocene sediments re-suspension and distribution in the Bohai Sea was mainly controlled by tidal current regime, which was closely related with sea-level change. Study on sediments in the Bohai Sea thus can provide insights into the evolution of tidal-influenced sedimentary environment and its links with sea-level change. Our understanding of this issue remains incomplete, however, owing to the lack of comprehensive study on sediment core with high-resolution proxies to test such inference. In this study, analyses of sedimentary facies, proxies (grain size, total organic carbon and total nitrogen, X-ray fluorescence scanning Sulfur and Chlorine ratio) and accelerator mass spectrometry ^{14}C dates of a sediment core recovered from the eastern Bohai Sea were carried out to clarify the Holocene sedimentary environment, tidal current change and its relation to the sea-level. The results indicate that the eastern Bohai Sea was dominated by fluvial-coastal environment prior to 12400 cal. a BP due to the sea-level lowstand and changed to tidal-influenced environment from 12400 to 6700 cal. a BP following the rapid sea-level rising. Thereafter shelf environment with minor tidal influence dominated the eastern Bohai Sea under the condition of a deceleration of sea-level rise. The significant change at ~ 6700 cal. a BP both in sedimentary environment and sediment proxies, indicating an environmental transition from strong tidal-influenced to less tidal-influenced setting. With the sea-level rising from the early Holocene to the mid-Holocene, tidal-current was much strong due to the low sea-level stand and became weak after the maximum transgression at ~ 6700 cal. a BP. These results are consistent with the numerical simulation, which suggested that less strong tidal current were the consequence of the most highstand sea-level since the mid-Holocene. Our study thus provides a sedimentary record to support the interpretation of numerical simulation-based tidal-influenced depositional process in the eastern Bohai Sea since the deglacial period.