Song Hong (Red River) delta evolution related to millennium-scale Holocene sea-level changes

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Abstract: The Song Hong (Red River) delta occurs on the northwest coast of the South China Sea. Its evolution in response to Holocene sea-level changes was clarified on the basis of sedimentary facies and 14 radiocarbon dates from the 40 m long Duy Tien core from the delta plain, and using previously reported geological, geomorphological, and archaeological data. The delta prograded into the drowned valley as a result of early Holocene inundation from 9 to 6 cal. kyr BP, as sea-level rise decelerated. The sea-level highstand at +2-3 m from 6 to 4 cal. kyr BP allowed widespread mangrove development on the delta plain and the formation of marine notches in the Ha Long Bay and Ninh Binh areas. During sea-level lowering after 4 cal. kyr BP, the former delta plain emerged as a marine terrace, and the delta changed into the present tide- and wave-influenced delta with accompanying beach ridges. Delta morphology, depositional pattern, and sedimentary facies are closely related to Holocene sea-level changes. In particular, falling sea level at 4 cal. kyr BP had a major impact on the evolution of the Song Hong delta, and is considered to be linked to climate changes.

Index Keywords: Climate change; Oceanography; Sea level; Delta morphology; Geology; delta; facies; Holocene; landform evolution; paleoceanography; sea level change; Asia; Eurasia; Red River Delta; Southeast Asia; Viet Nam

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