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# Early and late Holocene paleoenvironmental reconstruction of the Pearl River estuary, South China Sea

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Proxy reconstructions of estuarine evolution provide perspectives on regional to global environmental changes, including relative sea-level changes, climatic changes, and agricultural developments. Although there are studies of the Holocene sedimentary processes in the Pearl River estuary, the understanding of early Holocene sedimentation in unknown due to limited preservation.

Here, we present a new record of lithological, benthic foraminiferal, and geochemical ($\delta^{13}C$ and C/N) change from a sediment core in the west shoal of the modern Lingding Bay along a paleo-valley. The lithologic and foraminiferal record reveal the transgressive evolution from fluvial, inner estuary to middle estuary in the early Holocene between 11300 and 8100 cal a BP in response to rapid sea-level rise. $\delta^{13}C$ and C/N data indicate high freshwater discharge from 10500 to 8100 cal a BP driven by a strong Asian monsoon. The middle Holocene (8100 - 3300 cal a BP) sediment is absent in this core and others in the northward of the Lingding Bay. Seismic profiles reveal a tidal ravinement surface across Lingding Bay, which contributed to subaqueous erosion on the mid-Holocene sedimentation hiatus, might be resulted from unique geomorphology of the Pearl River Delta. In the late Holocene (3300 cal a BP to the present), the lithology and foraminiferal assemblages suggest further regressive evolution from outer estuary, middle estuary channel, to middle estuary shoal due to deltaic progradation under stable relative sea levels. In the last 2000 years, $\delta^{13}C$ and C/N values reveal the intensive development of agriculture coupled with the reduction of freshwater input derived from a weakening Asian monsoon. Our study illustrates the interaction of Asian monsoon and sea-level changes within the Pearl River estuary landform and their impact on Holocene sedimentary processes.