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Sediment distribution and evolution of tidal deltas along a tide-dominated shoreline, Wachapreague, Virginia

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Abstract

Borings from the barrier island/lagoon system of the Eastern Shore of Virginia penetrated an unconformity which separates Pleistocene barrier island and offshore marine sediments from the overlying Holocene tidal delta and barrier island sediments. Offshore marine sediments and deposits within the flood-tidal delta (marsh, tidal flat-bay, inlet-mouth bar complex) are recognized on the basis of sediment color, composition, grain-size changes in the vertical sequence, presence of organic matter, and faunal suite. Subsurface data, historical records, and morphology of lateral accretion on barrier islands suggest that major inlets in the vicinity of Wachapreague have been relatively stable throughout Holocene time; they appear to be located where Pleistocene stream valleys previously existed. Holocene barrier islands apparently developed on drainage divide areas following post-Wisconsin transgression of the sea.

The initial phase of tidal delta development was characterized by vertically accreting, fan-shaped, inlet-mouth bars; tidal channels stabilized after bar crests had shoaled sufficiently for marsh to form. With landward progradation across the lagoon, sand-rich deposits graded laterally away from the inlets and vertically into clayey sand and silty clay of the tidal flat-bay and marsh environments.

Ebb inlet-mouth bars developed asymmetrically southward in response to littoral drift. Flood tidal deltas also built preferentially toward the south as indicated by: (1) sand distribution of the inlet-mouth bar complex; and (2) greater development of marsh south of the inlets.



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