

Stratigraphic Evolution of Linked Basins within the Brazos-Trinity Slope System: Western Gulf of Mexico

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ABSTRACT

The Brazos-Trinity depositional system consists of four linked intraslope basins (I-IV) located on the upper slope, offshore Texas. Conceptual understanding of the fill history in these basins includes “fill and spill” models where basins fill sequentially in the seaward direction, to models which invoke coeval basin filling with the coarse fraction retained preferentially in the updip basins and synchronous early bypass of the fine fraction to downdip basins. Integration of recent coring results with nearly complete 3-D seismic coverage has improved age dating and reconstruction of infill history. Initially flows bypassed the upper basins, forming the basal deposits in Basin IV. Deposition of high net/gross sands in Basin II resulted from stripping of muds suspended high within the flows entering the basin. These mud-prone flows exited Basin II through a tributary-like flow-gathering zone near the basin exit point and ponded in the lower part of Basin IV. The upper fill in Basin IV comprises a submarine apron that is sourced by a continuous channel system directly from a lowstand delta located in Basin I. Within this apron, the observed seaward tapering is controlled by lower-efficiency sandy sediment gravity flows of relatively low volume with respect to basin size. Although high amplitude sea-level fluctuations during the last glacial-interglacial cycle have modified the accumulation of sediment in Basin IV, the newly acquired data from Basins IV and II show that basin tectonics and flow dynamics also exerted a strong influence in sediment fill distribution through space and time.