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Antonio B. Rodriguez¹, John B. Anderson² (1) University of Alabama, Tuscaloosa, AL (2) Rice University, Houston, TX

Facies Architecture and Holocene Evolution of the Trinity Incised-Valley System, Texas

During the last transgression the Trinity incised valley backfilled with continuous fluvial deposits and discontinuous bay-head delta, middle-bay, and coastal (tidal delta complex and barrier facies) deposits. Approximately four packages of sediments bounded by flooding surfaces separating proximal coastal environments from overlying distal coastal environments have been previously identified within the incised valley. The modern Galveston Bay complex in northeastern Texas formed above the Trinity incised valley, and because of its protected waters, is an ideal area to examine incised valley fill in detail. Holocene coastal environment backstepping events have been identified from seismic, sedimentologic, and radiocarbon data collected from Galveston Bay. Flooding surfaces have been recognized and mapped regionally at ~-10 m and ~-14 m within the bay. The nearly flat flooding surfaces have recently been sampled at a variety of locations along the axis of the Trinity incised valley by rotary drill cores collected from a shallow draft barge. Maps of the paleoenvironments bound by the flooding surfaces and radiocarbon age dates indicate that at times, coeval bay-head delta and barrier shoreline environments were overstepped synchronously. At other times, however, barrier shoreline environments have been overstepped and submerged independent of the coeval bay-head delta. The interaction between Holocene sea-level rise and fluvial paleogeomorphology is an important control on the facies architecture and evolution of the Trinity Incised Valley. Specifically, fluvial terraces may act as thresholds to coastal environment backstepping during sea-level rise. Once sea level inundates the flat terrace top, rates of bayline and shoreline retreat increase.