

Basin 4 of the Brazos-Trinity Slope System: Anatomy of the Terminal Portion of an Intra-Slope Lowstand Systems Tract

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ABSTRACT

Understanding of deep-water reservoirs within the petroleum industry have primarily relied on interpretation of subsurface systems with conventional exploration data (deep seismic, well logs, cores) and descriptions of outcrops of ancient systems as analogs. More recently, data from late Pleistocene systems are being used in industry as analogs for subsurface reservoirs. We have acquired an ultra-high resolution 3-D survey and large piston cores that allow investigation of the stratigraphy and basin fill history of a 200 km², Quaternary intra-slope basin at near outcrop-scale resolution. This basin represents the terminal portion of a system of 4 basins linked by submarine channels (Basin 4). The depositional system is located downdip of the paleo-Brazos and Trinity fluvio-deltaic complexes; the source of sediment delivered to this portion of the slope. Basin 4 was filled during the stepped sea-level fall of the latest Pleistocene. During its filling the basin received sediment from two different feeder channels as well as material derived locally through slumping and mass wasting. The fill history records two major stages of sedimentation resulting in reservoir-prone intervals with distinctly different geometry: ponded and perched fill units. The ponded units were deposited during a falling stage of level while the perched unit was deposited during the maximum lowstand and is very sand-rich. These phases of deposition were superimposed on a basin history that included salt withdrawal, loading and differential compaction of substrate, oversteepening of basin margins, slumping and development of large fluid escape structures (volcanoes).