
Sequence Stratigraphic Framework and Depositional History of Oligocene Frio Slope-Fan, Lowstand Prograding Wedge, and Shallow-Marine Transgressive-Regressive Deposits in the Lavaca Bay Area, Texas

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ABSTRACT

The Frio Formation in Lavaca Bay, Texas, provides an excellent example of a stratigraphic succession of third-order lowstand slope fans overlain by lowstand progradational wedges capped by high-frequency transgressive-regressive cycles. Frio reservoir compartments are controlled by narrow sandstone-body geometry, wedging, and pinchouts of sandstones on the crest of rollover structures, deep shale mounding, and structural complexity from syndepositional growth faults and closely-spaced antithetic faults. The lower Frio Formation contains three 800- to 1,000-ft (240- to 330-m), third-order slope-fan sequences composed of amalgamated channel and lobate fan deposits. Slope-channel axes are commonly deflected along the strike of growth faults, suggesting syndepositional fault movement that locally modified slope bathymetry. The upper and middle Frio Formation contains a lowstand prograding-wedge sequence with low-angle (<5°) clinofolds that downlap onto a prominent angular unconformity (29.0 Ma) at the top of geopressure. In contrast, the upper Frio Formation contains high-frequency, shallow-marine fourth- and fifth-order transgressive-regressive cycles in an overall third-order transgressive systems tract. These transgressive-regressive cycles exhibit continuous sandstone-body geometries, are structurally simple, and therefore have less potential than the lower and upper Frio Formation for reservoir compartmentalization.