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L. Frank Brown, Robert G. Loucks, and Ramón H. Treviño, The University of Texas at Austin, Austin, TX

Using S5 Benchmark Wireline Logs to Characterize the Sequence Stratigraphy of Depositional Systems in Growth-Faulted Intraslope Basins

Wireline logs penetrating growth-faulted intraslope subbasins were integrated to produce site-specific, sequence stratigraphic section benchmark logs (S5). A composite format displays a maximum cyclic record of a site (e.g., subbasin). S5 logs support correlation and reservoir prediction. Techniques were tested with Oligocene rocks, Corpus Christi region, Texas. Focus was application of well logs in analyzing lowstand systems. Ultimately, S5 logs will link intraslope basins where lowstand reservoirs offer potential for additional reserves.

Log interpretation documented second- to fifth-order (~0 my–10 ky) sequences, systems tracts, and timing of associated syntectonics. Wireline-log correlations were tested with coincident 3-D seismic profiles. S5 logs exhibit type 1 unconformities, maximum-flooding surfaces, and transgressive surfaces bounding systems tracts. Chronology was calibrated with current internationally accepted ages (Ma). Limited, but contradictory microfossil data were available.

Seven Oligocene chronostratigraphic, third-order sequences (~32.0–23.6 Ma) and myriad higher frequency sequences or parasequence sets were inferred from well logs. Except for incised valley fills, lowstand systems were deposited within active, growth-faulted, intraslope subbasins. Temporally unique highstand and transgressive deposition dominated shelves.

Seaward, lowstand sedimentary wedges and superposed shelves become younger, documented by S5 logs. Sediment supplied by entrenched rivers overloaded lowstand depocenters, initiated gravity faulting, and mobilized mud, producing younger subbasins. Diminished faulting permitted lowstand deltas to extend shelf edges until deltaic ramps were anchored at basinward margins of buried, shale-ridge buttresses. During a later cycle, prograding highstand shorelines stalled by increasing accommodation space near the shelf edge. Another lowstand depocenter and intraslope subbasin were created.