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Eustatic Controls on Incised Valley Shape and Geometry: La Pascua Formation, Eastern Venezuela

Ten Fourth-order sequences in the Lower Oligocene La Pascua Formation were identified and mapped using over 700 wells in a 3500 km² study area in eastern Venezuela. One third-order sequence (OR-2) and elements of another were identified on the basis of aggregate stacking patterns.

Net sand maps for incised valleys for each sequence showed variations in geometry, width and thickness dimensions, and were related to their position on the constructed relative sea level curve.

Unique incised valley geometries were common to each third-order sequence-set. V-shaped, coalesced and elongate-straight valleys were most often found in the lowstand sequence-set where they were widest (7.3 kilometers average.), and had highest width-to-thickness ratios of between 220-277.

Elongate-slightly-sinuuous and elongate-sinuuous geometries were most commonly found in transgressive sequence-sets. These contained narrowest valleys (2.2 kilometers average) for the entire sequence, with width-to-thickness ratios of between 76-150. The fourth-order sequence associated with maximum retrogradation showed no evidence of erosion or bypass.

Third-order highstand sequence-sets were composed of elongate-slightly-sinuuous to elongate-sinuuous valley systems, that often coalesced as they became laterally incorporated by erosion, especially along the upper third-order sequence boundary. Average valley widths were 2.7 kilometers with width-to-thickness ratios of between 82-136.

Incised valleys are an extremely important high-quality shelf reservoir. Therefore, Accommodation control on incised valley geometry and dimensions identified in this study provides a most useful reservoir prediction tool for development and exploration geoscientists.