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Sequence Stratigraphy of the Late Cretaceous to Early Miocene Overthrust Giant Fields of Eastern Venezuela

The El Furrial-Carito-Santa Barbara trend of Eastern Venezuela is host to one of the world's largest overthrust hydrocarbon accumulations. Collectively, these fields contain recoverable reserves of nearly 9100 MM barrels of light oil, and are currently subjected to detailed studies for secondary recovery, pressure maintenance, and possible lateral and vertical extensions. Reservoirs occur in Late Cretaceous to Early Miocene sandstones, originally deposited on a passive margin to distal foreland setting which was later involved in compressional deformation and thrusting.

Ten unconformity-bounded sequences, interpreted from the analysis of numerous well logs, cores, and extensive biostratigraphic data, form the basis for a sub-regional geological integration of the three fields. These sequences record the transition from a predominantly low-accommodation setting to a regime of increasing accommodation, resulting from greater tectonic subsidence during Miocene thrusting. Tectonically-modulated sequences on the cratonward side of the incipient foreland basin, are believed to be the consequence of intermittent loading ahead of the advancing thrust front.

The sequence framework allowed unification of the stratigraphic nomenclature, mapping of depositional systems, and the description of potential seals, stratigraphic compartments, and heterogeneity for reservoir models. Production is mostly derived from tide- and wave-modified deltas in the TST and HST. Stratigraphic heterogeneity is related to marine and continental floodplain shales, cemented zones in the late TST, extensive paleosols, pinchouts against the edges of incised valleys, and to changes in sand body geometry and mineralogy across sequence boundaries. Reservoir quality and heterogeneity are adequately predicted by the model.