
Mesozoic-Cenozoic Structural Evolution of East Texas—Constraints and Insights from Interpretation of Regional 2D Seismic Lines and Structural Restoration

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ABSTRACT

The U.S. Geological Survey (USGS) is conducting an assessment of the undiscovered technically recoverable oil and gas resources in Jurassic and Cretaceous strata of the onshore coastal plain and State waters of the U.S. Gulf Coast. The assessment integrates characterizations of petroleum source rocks with an understanding of reservoir rocks and models of hydrocarbon traps. For the assessment, a structural restoration was built that shows the Jurassic to Holocene evolution of east Texas. The restoration is constrained by interpreted regional 2D seismic lines that extend from Delta County in the north to Galveston County in the south. Structural elements featured in the restoration include the Talco and Mt. Enterprise fault zones, the East Texas salt basin (ETSB), the Sabine uplift, the Angelina-Caldwell flexure, and the Houston diapir province.

The seismic interpretation and structural restoration suggest that unexplored structures may lie beneath the current drilling floor; the structures exhibit a wide variety of geometries that are similar to those currently being exploited in offshore Federal waters. Integrating the structural restoration with thermal models (incorporating kinetics and burial histories) for the region's two primary source rocks, the Oxfordian Smackover Formation and the Cenomanian-Turonian Eagle Ford Shale, suggests that these structures developed early enough to potentially receive hydrocarbon charge.