TECTONIC EVOLUTION OF TIIE NORTHERN CARIBBEAN/BAHAMAS/FLORIDA REGION: IMPLICATIONS FOR EXPLORATION

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ABSTRACT

The northern Caribbean/Florida/Bahamas region consists of (1) a major thrust belt striking from western Cuba to Puerto Rico and (2) a broad carbonate foreland to the north in Florida and the Bahamas. A major exploration problem in Florida and the Bahamas has been the interpretation of many anomalous vertical seismic features in the carbonate platform. Are they vertical faults or the effect of statics and paleokarst problems? If these features are true faults, uncertainties remain concerning fault geometry, timing, and trap potential.

In order to clarify these uncertainties the following tectonic scenario was developed by (1) analyzing regional structure and stratigraphy and (2) testing palinspastic interpretations on an interactive 3D computer graphics system.

Triassic/Jurassic. The study area serves as a transform zone in continental crust between the opening Central Atlantic and Gulf of Mexico basins. Continental crust is variably stretched between NW striking wrench faults and subsidiary NNE striking normal faults. By the latest Jurassic, the Gulf of Mexico stops opening and transform motion in the study area ceases.

Early Cretaceous. Seafloor spreading begins east of Yucatan in the proto-Caribbean ocean and the proto-Cuba, Bahamas, and Florida area develops into a young continental margin sequence characterized by rapid subsidence and deposition of pelagic limestone (good source rocks).

Mid Cretaceous. Changes in regional stresses surrounding the enlarging Atlantic Ocean disrupt the continental margin. Older rift and wrench-related structures in the basement reactivate and propagate into the overlying Neocomian section creating highs and lows at the surface.

Late Cretaceous-Tertiary. The Cuban arc collides with the continental margin and forms a south-dipping thrust stack. Traps form in thrust-related anticlines that are charged as continental margin source rocks are overthrust and matured. Convergent stresses reactivate rift- and wrench-related structures in the foreland causing a jostling of crustal blocks. New faults propagate upward into overlying carbonates creating low-amplitude anticlinal closures.

For explorationists, the tectonic scenario developed by this study suggests that in Florida/Bahamas, the anomalous seismic features in the carbonate platform are true vertical faults making this area more structurally complicated (but also more prospective) than previously recognized.

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