Middle and Lower Miocene Middle Slope Systems of the Outer West Louisiana Shelf: An Unexplored Play between Historical Paradigms

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Abstract

The Middle and Lower Miocene of the outer west Louisiana Shelf sit midway between prolific petroleum systems of shelf margin deltas and basin floor fans. The 300 km wide interval between these two systems has been highly underexplored, despite 75 years of exploration in the area. By the mid 1980s when the shelf had already seen 95% of its original reserves discovered, the accepted paradigm was that there were no significant sand depo-systems outboard of the Miocene shelf margins. This paradigm was overturned in the late 1990s when prolific Lower and Middle Miocene basin floor fans were discovered in deepwater Green Canyon. The prior paradigm was replaced with the view that updip of the discovered basin floor fans, the depositional systems would be predominantly bypass slope settings with poor reservoir potential. Today the area between the data supporting the two paradigms remains highly underexplored. Recent mapping in this area using regionally merged 3D seismic surveys has revealed extensive linked mini-basins, which represent the transport fairways between the coeval shelf margins and basin floor fans. These middle slope basin are interpreted as having significant reservoir potential, based on their seismicstratigraphic signature and analogs of younger deposystems. Frequently these mini-basins have been inverted by younger flank salt withdrawal, resulting in large untested structural traps. Similarly, the perceived hydrocarbon type of the shelf is dominated by a paradigm based on existing exploration at shallower stratigraphic levels. Regional mapping of Mesozoic oil prone source rock and geothermal gradients indicate that the local distribution of hydrocarbons in discovered field and intermediate depth prospects can best be explained by local variations in the vertical extent of the oil and gas migration fronts, rather than regional thermal maturity. The resource potential of this play type has the potential to reset the discovery history of the Gulf of Mexico Basin.