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3D Seismic-Morphology and Sequence Stratigraphy of Middle Upper Miocene Siliciclastic Successions, Case Study, South March Island, Louisiana, Gulf of Mexico

A mix of 800 ft of incised valley fill and deltaic facies form the middle Upper Miocene successions of South March Island, Louisiana, Gulf of Mexico. Seismic surfaces flattened to the Amphistegina E zone and chronostratigraphic cross-sections reveal that there were at least two episodes of major scouring and flooding within the lower portion of this succession. 3D seismic attribute maps show the middle Upper Miocene paleoshelf was incised by networks of fluvial channel that cut up to a hundred feet into upper to outer shelf sediments (barrier island sand and offshore shale). These LST fluvial channels are oriented N-S and are commonly cut perpendicularly into the strike of the fault planes. During the early stage of the filling of the associated mini-basins, faults acted as paleotopographic highs that controlled the orientation of these LST channels and the gradient of the paleobase-level. 3D seismic attribute maps illustrate that reservoir sand units are commonly found within these LST/TST channels and close to fault escarpments. The nature and the geometry of these LST/TST channels control the lateral continuity and the special distribution of these reservoir units. High-resolution seismic data and their derivative seismic attributes helped to highlight stratigraphic traps within the middle Upper Miocene successions.