The Regional Character of the Lower Tuscaloosa Sandstone Depositional Systems (Late Cretaceous) and Implications for the Influence of Basement Structure on the Depositional Trends

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ABSTRACT

The lower Tuscaloosa Sandstone is a fluvial/deltaic, major hydrocarbon bearing clastic unit, located in the central and eastern Gulf Coast region. Although the underlying Gulf of Mexico basement structure was formed during Triassic-age rifting, its affect on the overlying stratigraphy is a recognized but poorly documented and often ignored or minimalized point. The growing importance of pre-Neogene Gulf of Mexico exploration plays suggests a need to revisit the various influences on Tuscaloosa's sequence framework and controls on its fairways, accommodation sinks, and probability for deep marine reservoirs in more distal locations. Also, many questions exist regarding the origin of porosity preserving chlorite in the formation. A database of over 2,500 well log suites, three cores, and regional seismic data were utilized, to examine the lower Tuscaloosa across a study area of 45,000 km^2 in Mississippi and Alabama. Correlation panels and isopach maps show that the units increase in thickness to the south and west with a decrease in sand percent. Marine and deltaic facies become thicker and more abundant in the southern portions of the study area indicating increasing marine influence in accommodation areas of the paleo-Cretaceous shelf margin. Core from southwest Alabama indicates a high energy fluvial system deposited the lowermost section of the lower Tuscaloosa. Correlation panels show a single large cycle in the lower Tuscaloosa composed of a regressive and a transgressive limb. This cycle is composed of three parasequences dominated by transgressive limbs. These parasequences transition from stacked, blocky (coarse-grained fluvial) log motifs and core intervals to the north to stacked prograding, coarsening up log motifs (shelf and shelf-edge deltas) southward. Major structures of the Cretaceous appear to have had an affect on lower Tuscaloosa depositional patterns. The Wiggins Arch dammed fluvial deposits to the north of it, as well as possibly influencing the development of two thicks trending north-northwestward and north-northeastward. Future work will examine variations in petrographic character associated with the northeastward versus the northwestward sourced system.

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