

M.S. Thesis Proposal Abstract

Depositional Controls and Sequence Stratigraphy of Initial Marine Transgressive Deposits in an Active Rift Basin, Cretaceous Bluff Mesa, West Texas

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Successful hydrocarbon exploration in former rift basins of the South Atlantic pre-salt has generated interest in understanding depositional, diagenetic, and stratigraphic controls on pre-salt deposits. However, most studies to date have focused on attributes and controls on pre-salt lacustrine carbonate reservoir systems and little work has been done on the overlying marine sealing facies. This study aims to provide a direct outcrop analogue of pre-salt trap seal systems that is equivalent in age, tectonic regime, and climatic setting. The study will document the petrographic characteristics, depositional fabrics and geometries, and the stratal architecture of the Lower Cretaceous Bluff Mesa Formation, located in the Indio Mountains, West Texas. The Bluff Mesa is thought to be deposited during the initial marine transgression over rift-related carbonate lacustrine facies within the Chihuahua Trough. The mixed carbonate-siliciclastic system contains transitional oyster-rich estuarine (?) deposits at its base directly overlying lacustrine carbonate strata. The majority of the formation consists of interbedded open marine ooid grainstones and fine-grained siliciclastics indicative of fluctuating depositional controls on the shallow marine environment until the demise of the carbonate ramp marking the top of the formation.

Currently our standard sequence stratigraphic model of marine transgression involves marine flooding of fluvially incised valleys resulting in back-stepping of fluvial and estuarine siliciclastic facies within an incised valley capped by a regionally extensive shoreface erosional transgressive surface. However, the pre-salt systems of the South Atlantic involve deep alkaline lakes containing microbial carbonate facies that were deposited on rift basin geomorphologic surfaces. We contend that depositional controls such as tectonism, basin physiography, water chemistry, and sediment input during initial marine transgression may cause the facies and stratal architecture of the pre-salt systems to deviate from the standard sequence stratigraphic transgressive model generated for lowstand fluvial incision along passive margins.