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[PS]Lithology-Based, Sequence Stratigraphic Framework of Lower Cretaceous-Jurassic, Mixed Carbonate-Siliciclastic Sediments, Atlantic Coastal Plain: Analogs for Offshore Exploration along the Eastern United States*

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Abstract

A lithology-based sequence stratigraphic framework was developed for the Lower Cretaceous-Upper Jurassic mixed carbonate-siliciclastic sediments of the subsurface Albemarle Basin, eastern North Carolina. These strata comprise the updip equivalents to coeval offshore exploration targets in the adjacent Carolina Trough, so characterization of depositional facies, stacking patterns, and diagenetic modification of the sediments provides valuable insight into the development and distribution of reservoir, seal, and source-prone lithologies offshore. Thin sectioned well cuttings were analyzed to characterize lithology, depositional facies, and diagenetic events, because the study interval is confined to the deep subsurface in a basin lacking core control. Integration of lithologic data with wireline logs, 2D seismic, and biostratigraphic control allowed regional correlation of major transgressive-regressive events between wells, resulting in the generation of a sequence stratigraphic framework for the onshore portion of the basin.

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Lower Cretaceous strata are dominated by admixed siliciclastic-carbonate strata that were deposited in a wave-dominated, nearshore setting. Lowermost Cretaceous to Upper Jurassic strata also consist of mixed carbonate-siliciclastic material, but contain a greater proportion of carbonate sands (shoals) and peritidal carbonates that have undergone partial dolomitization. Some of the dolomitized carbonate intervals appear to have moderate liquid hydrocarbon staining of between particle and between-crystal pore spaces in thin section. Comparison of observed facies with cores and wireline logs from the Baltimore Canyon and SE Georgia Embayment confirms that updip sequences consist of upward-shoaling siliciclastic shoreface successions.

Basin-scale depositional trends in the Lower Cretaceous (Aptian-Albian) interval indicate greater accumulation of carbonate facies in the southern portion of the Albemarle Basin, with increased fine siliciclastic material to the north. This trend may reflect a major siliciclastic point-source in the vicinity of the ancestral Chesapeake region; regional analysis of samples from the Lowermost Cretaceous-Upper Jurassic interval has not been completed. The depositional models generated provide insight into the facies and reservoir properties in coeval offshore units comprising frontier exploration targets along the Western Atlantic margin of the U.S. and Canada.