

Lower Cretaceous Sequence Stratigraphy of the North Carolina Coastal Plain – An analogue for North Atlantic Basins

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Abstract

A lithology-based sequence stratigraphic framework for the Lower Cretaceous mixed carbonate-siliciclastic sediments of the subsurface North Carolina coastal plain is being generated using well cuttings from selected hydrocarbon exploration wells. Stained thin sections produced from cuttings with abundant carbonate material are analysed using petrographic methods to better characterize fossil components, facies, lithologies, and cements. Siliciclastic-prone intervals are described using binocular microscopy. Data is then used in conjunction with wireline logs to document the facies abundance, stacking patterns, and diagenetic events of the little studied Albemarle Basin. Correlation between wells is aided by the use of public domain seismic data sets and published biostratigraphic studies. Additional biostratigraphic and strontium isotopic analyses are being conducted. Preliminary results indicate the following lithofacies (listed in an approximate basin ward position of deposition): sandstone, skeletal sandstone; siltstone; unfossiliferous and diatomaceous shales; skeletal wackestone; quartzose and quartz-free mollusk skeletal packstone/grainstone; variably sandy (quartz and glauconite) lime mudstone, and marl. Comparison of observed facies with cores and wireline logs from offshore Mid and South Atlantic basins suggest the sequences consist of prograding siliciclastic shorefaces (highstand?) stacked with shelf skeletal carbonates (mollusk grainstones, marls; transgressive?).

Preliminary results of this study are compared with reference sections from the Scotian Shelf. The depositional and diagenetic models generated from this research provide insight into the distribution of potential hydrocarbon reservoir facies along frontier exploration areas offshore of the Atlantic coast of the U.S. and Canada.