AAPG Datapages/Search and Discovery Article #90285 © 2016 AAPG Gulf Coast Association Geological Society, Corpus Christi, Texas, September 18-20, 2016

Biostratigraphy for Understanding Stratal Surfaces and Facies Variability in the Eagle Ford Group of South and West Texas

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ABSTRACT

As recent oil and gas interests have promoted geologic study of the Eagle Ford Group, biostratigraphic data and interpretations have improved to provide constraints on regional and sub-regional sequence correlations in South Texas. Within complexgeologic sections, sequence-based correlations using only seismic, petrophysical curves, and elemental geochemistry profiles ultimately breakdown into non-unique solutions. These correlative solutions for wells involve either lateral, lithologic facies changes within coeval units or the erosion of strata along sequence boundaries to juxtapose rocks of different rock properties and apparent thicknesses. As Eagle Ford stratigraphy has proven to be more complicated than initially thought, microfossil biostratigraphy offers additional input to help refine sequence stratigraphic and petrophysical log based correlations.

Several significant sequence boundaries and flooding surfaces were correlated using calcareous nannoplankton abundance data collected from Eagle Ford rocks at Lozier and Antonio canyons of Terrell County, Texas, and Hot Springs and Ojinaga sections of Brewster and Hudspeth counties, Texas. Interpretations from these regional outcrops were integrated with recent subsurface data to create, a simple, reproducible, and age-restricted criterion for classifying the 3rd to 4th order sequences of the Eagle Ford Group. This nannoplankton-based framework, supplemented with foraminifers and palynomorphs, has allowed for both the duration of erosion along some of the most significant sequence boundaries to be quantified and a regional composite section for the upper Eagle Ford to be constructed.

These biostratigraphic results have implications to exploration and production activities of the Eagle Ford within the region. By understanding the timing of sequence boundaries and the spatial variation of these stratal surfaces, a clear differentiation of eustatic versus sub-regional uplift controls on sedimentation within the play can be achieved. Within this context, the controversial Eagle Ford to Austin Formation boundary and importance of the Langtry Member of the Upper Eagle Ford is also discussed.