
Geochemical Analysis of Parasequences within the Productive Middle Member of the Eagle Ford Formation at Lozier Canyon near Del Rio, Texas

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GCAGS Explore & Discover Article #00037*

http://www.gcags.org/exploreanddiscover/2016/00037_shane.pdf

Posted September 13, 2016.

*Abstract extracted from a full paper published in the *GCAGS Transactions* (see footnote reference below), which is available as part of the entire 2016 *GCAGS Transactions* volume via the GCAGS Bookstore at the Bureau of Economic Geology (www.beg.utexas.edu) or as an individual document via AAPG Datapages, Inc. (www.datapages.com), and delivered as a poster presentation at the 66th Annual GCAGS Convention and 63rd Annual GCSSEPM Meeting in Corpus Christi, Texas, September 18–20, 2016.

ABSTRACT

The middle member of the Eagle Ford formation is a heterogeneous, carbonate-shale unit that is a focus of unconventional oil and gas exploration in southern Texas. Exploration results have been mixed because of the apparent heterogeneity of the member. In this study, the extent of heterogeneities in the Eagle Ford on the “bedding-scale” were examined by evaluating changes in organic and inorganic geochemistry. Samples were collected vertically in outcrop covering four non-consecutive parasequences. These samples were analyzed using a Rock Eval 6 Analyzer™ to determine source rock generative potential and a Niton™ XRF to evaluate inorganic geochemistry to identify changes in paleoredox conditions, paleoproductivity, and clastic influx. From pyrolysis data, it is determined that parasequence 1 potentially displays an increase in source rock potential, parasequence 2 potentially displays a constant source rock potential, and parasequences 3 and 4 potentially display overall decreases in source rock potential during deposition. From the inferred paleoredox conditions, paleoproductivity, and clastic influx, it is determined that parasequence 1 experienced a potential increase in oxygen abundance, parasequence 2 experienced a potential decrease in oxygen abundance, and parasequences 3 and 4 potentially experienced increases in oxygen abundance during deposition. It is concluded that geochemical heterogeneities do exist on a bedding scale within the parasequences of the middle member of the Eagle Ford. Additional comprehensive sampling and analysis is recommended in the future in order to tie these data to subsurface data for economic application.

Originally published as: Shane, T., 2016, Geochemical analysis of parasequences within the productive middle member of the Eagle Ford Formation at Lozier Canyon near Del Rio, Texas: Gulf Coast Association of Geological Societies Transactions, v. 66, p. 517–532.