COMPARATIVE TEST OF LATE CRETACEOUS ORGANIC CARBON AND CARBONATE CARBON ISOTOPE CHEMOSTRATIGRAPHIES IN DEVELOPING ROBUST BASINAL CHRONOSTRATIGRAPHIC FRAMEWORKS

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Abstract

On a global scale, carbon isotope chemostratigraphy serves as a beneficial exploration tool for petroleum geologists by identifying time intervals in Earth history when enhanced organic carbon burial led to source rock formation globally. Within individual basins, excursions in carbon isotope records can serve as correlative time horizons and significantly aid in the development of a subsurface chronostratigraphic framework to predict the occurrence of hydrocarbon resources (e.g. Appalachian Basin and Eagle Ford). Generally, a component of marine carbon isotope chemostratigraphic records preserve the isotopic composition of the global ocean's dissolved inorganic carbon at the time of deposition. However, carbonate carbon isotope chemostratigraphies are susceptible to diagenesis, while bulk organic carbon isotope chemostratigraphies are influenced by type of organic matter and additional factors.

The proposed research will test coherency between carbonate carbon isotope records and organic carbon isotope records, while also identifying diagnostic geochemical thresholds (i.e. %$CaCO_3$ and %TOC) that may indicate poor correlation potential for stratigraphic intervals. Cores with existing organic carbon isotope chemostratigraphies from the Western Interior Basin (United States) and Demerara Rise (Tropical North Atlantic) will be analyzed at Northwestern University for carbonate carbon isotope ratios precisely at previously sampled horizons. This project will assess the feasibility and limitations of applying carbon isotope chemostratigraphy in the development of hydrocarbon resources through enhanced chronostratigraphic frameworks. The project will also better constrain a global reference carbon isotope curve for correlation among disparate basins and refine calculation of global carbon burial fluxes during the deposition of prolific Late Cretaceous source rocks.

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