
7-18 - COMPARING LITHOLOGIES AND GEOCHEMICAL SIGNALS OF THE MIDDLE DEVONIAN THUNDER BAY FORMATION (MICHIGAN BASIN) IN CORE AND AT THE TYPE SECTION



Sunday, 21 April 2024



1:30 PM - 5:30 PM



Grand Ballroom, Oasis CC (Oasis Hotel & CC)

Booth No. 23

Abstract

Lithologic correlation of the Middle Devonian Traverse Group in the Michigan Basin is challenging due to a paucity of outcrops and the difficulty in correlating shallow water marine facies across the basin. This study correlates strata in the State Chester Welch #18 core (SCW-18) to outcrop exposures at the type sections of the Thunder Bay Formation and neighboring units using litho- and chemostratigraphy. Lithologically, the texture, grain sizes, and fossil assemblages found in the SCW-18 core match the outcrop samples and type section description of the Thunder Bay Formation. Both successions are gray calcareous shale and limestone with abundant fossils and stylolites. $\delta^{13}\text{C}$ isotopes reveal a shift to more negative isotopic values through time for both bulk-rock and drilled micrite powders from the SCW-18 core, but a trend toward more positive values with relative stratigraphic position for the outcrop sample. This suggests that Thunder Bay strata in the core and outcrop are not chronostratigraphically equivalent even though they appear similar lithologically. The core data also revealed two groupings based on relationships between $\delta^{18}\text{O}$ vs $\delta^{13}\text{C}$ values that correspond to differences in lithology. The lower samples in the core that are situated in shaley limestone illustrate a linear trend than the upper portion which was more crystalline and isotopic values noisier. This variation might suggest differences in diagenetic processes affecting the subsurface Thunder Bay Formation as $\delta^{18}\text{O}$ values in carbonates are often altered to some extent. This study improves our lithologic and isotope geochemistry understanding of the Thunder Bay Formation in the subsurface. Future work will incorporate elemental data from the core and outcrop to better understand diagenetic processes.

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