

# **CARBONATE STABLE ISOTOPE GEOCHEMISTRY: IMPLICATIONS FOR BASIN WIDE CORRELATIONS IN THE WOLFCAMP D FORMATION IN THE MIDLAND BASIN**

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## **ABSTRACT**

Understanding how dolomite forms in the rock record has been a long standing problem in geology. In deep water anoxic basins, such as the late Pennsylvanian/early Permian Midland basin, numerous dolomite layers are observed interbedded with mudstones and calcium Carbonates. Several dolomite formation models, dependent on the paleo-environmental and basin history of the system, have been suggested. This study hypothesizes that a relationship exists between the dolomitization mechanism and stratigraphic conditions of the system.

The two most likely dolomitization mechanisms are burial diagenesis and clay-derived dolomite. The mechanisms each tell a different story about the evolution of Midland Basin sediments post-deposition. Burial diagenesis can preserve some of the original seawater signal, allowing for interpretations of syndepositional conditions. Clay derived dolomitization does not preserve the seawater signal, however, it requires significantly more magnesium enriched waters to dolomitize massive carbonate units such as those seen in parts of the Midland Basin. The Mgenriched waters are the result of clay diagenesis in the clays surrounding the carbonate layers. The higher porosity carbonates act as a funnel for the magnesium enriched pore waters during compaction, creating the potential to track fluid flow within the basin.

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