

Isotopic Signatures of Mixed Carbonate-Siliciclastic Pennsylvanian-Permian Strata, Sverdrup Basin, Arctic Canada: Implications for Diagenetic Pathways and Reservoir Potential

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Abstract

Pennsylvanian to Lower Permian mixed carbonates and siliciclastics associated with shelf cyclothems can hold great interest as it is a unique depositional relationship that can yield good reservoirs. Porosity development in ancient shelf sediments is often attributed to meteoric diagenesis and subaerial exposure of coarse-grained carbonate and siliciclastic rocks associated with recurring drops in sea level. Excellent seals are brought on by reoccurring transgressions that deposit finer-grained material onto underlying coarser-grained material. Petrographic and isotope analysis of six stratigraphic sections measured in the Blind Fiord area of Ellesmere Island illustrate that there are dominant diagenetic features, associated with subaerial exposure and meteoric diagenesis, that are related to regressions and base level falls. It was found that these features associated with subaerial exposure and meteoric diagenesis have unique isotopic signatures that lend a better understanding to depositional history and environmental impacts during diagenesis.