Correlating Carbonate Platform Sequences of the Trenton Group to Basinal Mudstones of the Utica Shale.

Andrew Jacobus
Binghamton University

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Abstract

The Appalachian Basin had a long depositional history that led to the accumulation of world class energy resources including coal, natural gas, and oil. The formation of these resources is directly linked to the complex tectonic events that formed the basin. For example, the Ordovician Taconic Orogeny and Devonian Acadian Orogeny lead to deposition of the Utica Shale and Marcellus Shale, respectively, which are two of primary oil and gas source rocks in the basin. During the Early Ordovician, the proto-Appalachian Basin was a stable passive margin along the present-day eastern edge of Laurentia. Due to an equatorial position, the environment was favorable for carbonate production along the gentle dipping cratonic flank. During the Middle to Upper Ordovician the basin evolved from a passive margin to a foreland basin due to collision of the Taconic arc and subsequent flexural loading on the present-day eastern side of the basin. The goal of this study is to better understand the lateral and vertical transition from the carbonate shelf system of the Trenton Group to the basin floor deposits of the Utica Shale. While the sequence stratigraphic record is relatively well documented for the Trenton carbonate shelf in the Mohawk Valley of New York State, correlation to basinal mudstone facies has been hampered by limited outcrops and the highly weathered nature of the Utica Shale. However, due to the availability of slabbed cores collected throughout the Mohawk Valley outcrop belt, new insight can be gained into the formation and evolution of the northern portion of the Appalachian Basin. Of particular interest are defining depositional packages in the Utica Shale that may relate to changing sea level or

basin slope, testing the lateral extent of these packages, and using bulk rock geochemical data to investigate changes in sediment provenance and bottom-water redox conditions. Four cores have been described in detail, and XRF-based bulk rock elemental chemistry data has been collected. They lie along a depositional dip transect and provide a direct correlation between the carbonate shelf and deeper water deposits. This high resolution, but local, core-based interpretation can be correlated into the lower resolution, but regional, well database across New York State.

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