

Middle - Upper Triassic Shublik Formation: Lateral and Vertical Facies Variability within a Revised Sequence Stratigraphic Framework.

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ABSTRACT

A revised stratigraphy for the Middle and Upper Triassic of northern Alaska has been developed, which facilitates the understanding of spatial and temporal variability of facies patterns within the Arctic Alaska Basin (AAB). The Shublik and partially age-correlative Otuk Formations can be broken into three units that illustrate lithologic changes from proximal (north in present-day coordinates) to distal (south in present-day coordinates) settings through time. The lower clastic (LC) unit consists of proximal sandstone, siltstone and interbedded mudstone, and distal mudstone with lesser amounts of calcareous mudstone. This unit contains relatively little carbonate or biogenic silica content across the basin. Proximal strata of the overlying middle carbonate-chert (MCC) unit are predominantly interbedded limestone and mudstone, whereas the more distal MCC strata consist of interbedded chert, limestone and mudstone. Deposition of this middle unit was mainly from biogenic accumulation of proximal calcareous and distal siliceous components. The upper clastic-carbonate (UCC) represents a return to mainly siliciclastic deposition in proximal strata, with mudstone overlain by sandstone. Distally, interbedded chert and mudstone are overlain by an interval of limestone and mudstone, which underlie another interval of interbedded chert and mudstone in the west. Late Triassic siliciclastic input seen in the proximal parts of the UCC unit did not significantly affect distal sedimentation. Overall bedding thicknesses in proximal strata are on the centimeter to decimeter scale, whereas bedding thicknesses in distal strata are on the centimeter scale. All three units have sections that possess measured total organic carbon in excess of 2 weight percent. These data imply that the depositional and diagenetic conditions for the production and preservation of organic matter occurred episodically within the AAB throughout the Middle and Late Triassic. Thus, the most promising unit for self-sourced reservoirs is the MCC unit, where organic-rich mudstone is interbedded with brittle, carbonate-rich and chert-rich intervals. The three lithologic units can be further subdivided into five stratal packages that are bounded by widespread transgressive surfaces. The transgressive surfaces are defined by both lithologic changes and changes in well log response. These five stratal packages are interpreted to represent five transgressive-regressive sequences that range in duration from 6 to 10 million years, based on the revised stratigraphic framework. Thus, the five sequences recognized in the Shublik Formation are likely 2nd order cycles.