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Integrated Lithofacies and Ichnofacies of the Aklavik Formation, Mackenzie Delta and Northern Richardson Mountains, NWT, Canada: An Outcrop Study from a Frontier Basin

The southeastern basin-margin of the Brooks-Mackenzie Basin includes rocks of the dominantly arenaceous facies of the Jurassic Bug Creek Group (Sinemurian through early Oxfordian). These rocks are found in the subsurface in the southwestern region of the modern day Mackenzie Delta, Northwest Territories, and in outcrop to the west in the Richardson Mountains. Facies identified from outcrop exposures of the Aklavik, the uppermost formation of the Bug Creek Group, suggest that the strata may signify a complex wave-dominated, prograding, siliciclastic shoreface environment. This fits with the interpreted extensional tectonic regime, which was the result of rifting of the cratonic crust along the Arctic Rim. This active rifting environment created the subsiding shelf system necessary for the thick sands of the Aklavik Formation to be deposited.

Previous investigators of the Bug Creek Group have described the ichnology of the rocks using general, non-descript terms. After detailed examination of different burrow types, the identified trace fossil assemblages can be used to demarcate key stratal surfaces. As well, the ichnological character of sedimentary rocks can be a powerful tool in the delineation and interpretation of paleo-environments.

With the renewed interest in the frontier region of the Mackenzie Delta as a hydrocarbon rich basin, a significant demand is present for the advance of geological knowledge. An integrated approach using sedimentology and ichnology of the Aklavik Formation can provide the foundation that is necessary for environmental reconstruction.