

Geochemistry and petrology of a Middle Triassic source rock in the Canadian arctic

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Fine-grained, organic-rich, Middle Triassic strata extend throughout the Sverdrup Basin in the Canadian arctic islands. They are recognized as a major source for numerous conventional hydrocarbon pools in the basin. The results of geochemical and petrophysical investigation of the succession reveals that some zones may have potential for shale oil/gas exploitation.

Shales and siltstones from three localities across the basin (southern margin, basin centre, and northern margin) are examined using an integrated approach, in an effort to relate depositional conditions to organic matter distribution and accumulation. Both basin margin locations are thermally immature and have no potential as self-sourced hydrocarbon reservoirs. The upper interval of the basin centre location is within the oil window and contains abundant solid bitumen as well as free hydrocarbons. Preliminary results suggest that there may be a positive relationship between microscopic phosphate nodules and free oil accumulation in this zone.

Trace and rare earth element variations lend insights into redox conditions, clastic influx and nutrient supply at the time of deposition. In addition to differences in these parameters throughout the basin, smaller scale variations in conditions at each locality are resolved, indicating how conditions changed over time. By using a suite of elemental proxies in conjunction with organic petrology and scanning electron microscopy, we endeavour to filter the effects of diagenetic alterations on chemical composition.