

Sedimentological and Petrological Characterization of a Passive Continental Margin Slope Channel Complex, Neoproterozoic Isaac Formation, Windermere Supergroup, British Columbia, Canada

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ABSTRACT

Along the base of passive continental margins, like the Gulf of Mexico, extensive deep-water clastic turbidite systems are present, which have been recognized to be prolific petroleum reservoirs representing 20-30% of global production. In spite of their excellent resource potential, deep-marine turbidite systems also come with many uncertainties, leading geologists to investigate ancient analogues in order to reduce their economic risk.

The aim of my research is to characterize the stratigraphic architecture of a submarine channel complex in the Windermere Supergroup, southern Canadian Cordillera. This submarine channel complex crops out for over 450 meters and comprises two general units: a lower, highly-amalgamated portion up to 15 meters thick, consisting of clean coarse-grained sandstone to pebble conglomerate, and an upper, heterolithic portion up to 13 meters thick, composed of mostly medium- to fine-grained sandstone interstratified with siltstone or mudstone. In relation to the lower portion, the upper unit exhibits a drastic decrease in the sand/mud ratio. Based on detailed centimeter-scale logging, mapping and bed-by-bed correlation in outcrop, and petrographic facies analysis, both vertical and lateral macroscopic and microscopic trends in lithology, sedimentary structures, and facies will be assessed. The results of this work will be vital for understanding the contrasting types of channel filling due to variations in the sediment source and depositional processes. This study has direct application to reservoir modelling as it will give insight about the predictable vertical and lateral changes in lithology that affect reservoir quality and performance, and impact the fluid flow pathways.