

Internal architecture of an ancient deep-water, passive margin, basin-floor fan system, Upper Kaza Group, Windermere Supergroup, Castle Creek, British Columbia, Canada

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Following the break-up of Rodinia and the initiation of the Pacific Ocean (~700 Ma), Windermere Supergroup (WSG) sedimentation took place along the rifted margin of western Canada. The WSG outcrops extensively within the Canadian Cordillera where the sediments have been transported structurally in a northeast direction from their original depositional location. Despite low-grade metamorphism in many areas of the southern Canadian Cordillera, there are exceptionally well-preserved sedimentary structures, including those at the Castle Creek locality in British Columbia, Canada. At this location, sand-rich, deep marine clastic deposits have been recognized in the Upper Kaza Group of the WSG.

Outcrops of the Upper Kaza Group at Castle Creek extend vertically ~500 meters and laterally over 800 meters with up to 100% exposure. Detailed stratigraphy and sedimentology of these deep-water deposits have not been attempted despite the exceptional exposure. The lithofacies, sandstone geometries and lateral bed correlations show a more distal basin floor sheet sandstone facies association at the base of the section. An increase in mudstone and thin-bedded turbidites characterize the upper section and suggest that deposition is no longer restricted to the axis of flow but rather to a more proximal or off-axis location.

The passive margin tectonic setting and comparable size of the WSG make it one of the few ancient turbidite outcrops analogous to modern turbidite systems such as those developed in the Gulf of Mexico and Atlantic Canada. Vertical stratigraphy and lateral facies correlations determined from the Upper Kaza Group at Castle Creek can be used to simulate and compare with these less-accessible, modern deep-water petroleum reservoirs.