

The Dezadeash Formation (Jura-Cretaceous), Yukon, Canada: An Outcrop Analog for Deepwater Reservoirs in Arc-Related Basins

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There has been a significant increase in the exploration and production of deepwater reservoirs during the last decade, and although modern deepwater depositional systems cannot be easily studied, outcrop analogues provide important insights into the petroleum prospectivity of these reservoirs. The Dezadeash Formation is a northwest trending belt of Jura-Cretaceous deepwater siliciclastic rocks in southwestern Yukon that was deposited in an arc-related, polyhistory basin involving backarc, transtensional and accretionary phases. It is up to 3000 m thick and represents a point source, mud/sand-rich turbidite system that records a single stage of fan growth as it prograded transversely from a volcano-plutonic arc into the basin. Based on 16,335 m of measured strata from 75 sections throughout the Dezadeash Formation, up to 29 lithofacies types are present and these are dominated by thin- to thick-bedded turbidites and medium- to thick-bedded massive sandstone. The various lithofacies are grouped into conglomerate, sandstone, sandstone-mudstone, and siltstone-mudstone lithofacies associations, which are interpreted as slide, channel-lobe transition, lobe, and overbank architectural elements, respectively. Stacked channel-lobe transition and lobe elements predominate. The channel-lobe transition element consist mainly of medium- to thick-bedded massive sandstone with minor amounts of conglomerate and thick- to medium-bedded sandstone-mudstone couplets that has a net:gross value of approximately 0.8. Massive sandstone within this depositional element would represent the best reservoir. The sandstone is fine- to medium-grained and massive to poorly horizontally laminated, with rare mudstone rip-up clasts and granules. It is commonly amalgamated into beds ranging up to 136.0 m in thickness, although the median thickness is 9.0 m and the mean thickness is 13.6 m. The aspect ratio of the amalgamated beds is estimated to be up to 250:1. Due to rapid tectonism of the collapsing basin, the depositional architecture of the Dezadeash Formation is spatially heterogeneous and displays no apparent, overall vertical trend. Similar arc-related basins may also be characterized by a lack of lateral continuity and vertical connectivity of submarine fan elements, which has important implications regarding prediction of lithofacies distribution and fluid flow in deepwater reservoirs during hydrocarbon exploration and production.