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Vertical and lateral facies heterogeneities within the Montney Formation of NE BC: Implications for fluid mapping

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Summary

Within individual stratigraphic units, understanding vertical and lateral heterogeneities are key in mapping and predicting fluid distributions. The regional stratigraphy of the Lower Triassic Montney Formation has been well established as three 3rd order sequences, the Lower, Middle, and Upper (e.g. Crombez et al., 2016; Davies et al., 2018; Henderson et al., 2018; Zonneveld and Moslow, 2018). Within each of the three Montney members, locally high concentrations of hydrogen sulfide (H_2S) are present, however, there are few published studies on the origin and distribution of H_2S in the Montney (Desrocher et al., 2004). Preveous studies placed data within each Montney member but did not account for multiple high permeability zones with variable H_2S concentration within each member (Chalmers et al., 2019). Recent petrographic and isotopic analyses by Liseroudi et al. (2020, 2021), have shown part of sulfate-rich fluids that led to formation of Montney's H_2S to be sourced from underlying Devonian evaporites, implying fluid migration through fracture systems. Thus, the mapping of structures and fracture systems and understanding stratigraphic permeability distributions is crucial for predicting elevated H_2S occurrence within the Montney Formation.

This study investigates the vertical and lateral facies variations within the Dawson – Parkland area of northeastern British Columbia at a local scale. By connecting facies identified in core to wireline log responses, facies can be mapped throughout a study area. Detailed facies mapping allows for a better understanding of the vertical and lateral heterogeneities present within an individual Montney member. A refined understanding of the facies variations present within a single Montney member allows for more accurate fluid distribution mapping. Improved fluid mapping is key in understanding the geologic processes that create areas of elevated H_2S within the Montney Formation.

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