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Deltaic depositional processes, fluctuating relative sea-level and syndepositional tectonism: controls on the geometry and distribution of fine-grained reservoirs, Montney Formation, northeast British Columbia, northwest Alberta

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Summary

Both conventional and unconventional reservoirs in the Montney Formation of northeast BC and northwest Alberta occur at the scale of systems tracts within the depositional sequence stratigraphic paradigm. Detailed regional stratigraphic analysis, supplemented with integrated ichnological - sedimentological interpretation of selected cores, has revealed that the fine-grained reservoirs that characterize the Montney Formation accumulated in a prodeltaic setting, primarily in subenvironments associated with higher energy and more proximal conditions. The temporal and spatial distribution of these higher energy and more proximal components of the prodelta facies was controlled by fluctuations in relative sea-level.

Within the three depositional sequences that comprise the Montney Formation, reservoirs occur in each of the falling stage and lowstand systems tract, and variously within the transgressive and highstand systems tract. Detailed mapping of the systems tracts that straddles the Sequence 1 & 2 boundary (the lower Montney) reveals that syndepositional tectonism was the controlling factor affecting the ultimate geometry of the component reservoirs by directly influencing both the local basin physiography, as well as local accommodation. This work demonstrates that the distribution and geometry of the reservoirs that characterize the Montney Formation result from the dynamic interplay between syndepositional tectonism, fluctuating relative sea-level and the processes associated with deposition in a prodeltaic setting. Understanding and recognizing the integrated role of these controlling factors will ultimately result in improvements in our predictive capabilities that will enhance exploration and exploitation of the Montney Formation, as well as other, similar, fine-grained reservoirs elsewhere.