

Lateral Heterogeneity of Basin-Plain Turbidites of the Cloridorme Formation, Quebec, Canada: Implications for Horizontal Well Prediction

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Abstract

Facies models for basin-plain turbidite systems often depict very simplistic, tabular event-bed geometries, but recent studies have demonstrated more complex facies architecture, including rapid changes in event-bed thickness and facies composition. This lateral event-bed heterogeneity can have a significant impact on reservoir heterogeneity and recovery efficiency in petroleum reservoirs developed in basin-plain turbidite systems. The Middle Ordovician Cloridorme Formation is a siliciclastic turbidite system interpreted to occupy a basin-floor position. Excellent coastal exposures of the Cloridorme Formation on the Gaspé Peninsula, Quebec, Canada provides an opportunity to characterize turbidite and hybrid-event-bed architecture in great detail. We utilized drone image modeling, centimeter-scale measured sections, and gamma-ray scintillometry to characterize the lateral event-bed heterogeneity of this basin-plain turbidite system. Outcrops of the Cloridorme Formation display significant lateral complexity, including changes in mean grain size, sedimentary structures, matrix clay content, abundance of rip-up clasts, and individual bed thickness. The quantification of these lateral changes in the Cloridorme Formation has applications in both conventional and unconventional systems, through reservoir model parameterization and prediction of heterogeneity in horizontal wells, respectively.