EVALUATING PROCESS ORIGINS OF SAND-DOMINATED FLUVIAL STRATIGRAPHY

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Abstract

Sand-rich fluvial deposits are important petroleum reservoirs, but predicting their reservoir properties (including sediment partitioning) is complicated because multiple processes can generate sand-dominated fluvial stratigraphy. Sand-rich deposits can be generated from a fluvial system with a sand-rich sediment input and little mud supply. Conversely, a fluvial system with rapid channel mobility (from both lateral migration and channel avulsion) relative to subsidence can rework its deposits, removing fines from the system and ultimately generating sandy stratigraphy. I hypothesize that bar preservation and the grain size distribution of fines within the channel deposit can be used to differentiate between these two end-member processes. In this research, I propose to test this hypothesis using the Upper Cretaceous Blackhawk and Castlegate Formations of central Utah. These fluvial deposits go from mud-rich in the upper section of the Blackhawk Formation to sand-dominated in the lower Castlegate Formation. Provenance studies show this transition coincides with a tectonically driven increase in quartz sand input. I predict that in this case, the sand-dominated Castlegate Formation will have similar bar preservation and coarser fine-grained deposits within the channel compared to the mud-dominated underlying Blackhawk Formation. As a proxy for reworking, I will measure the bar preservation in both formations on terrestrial lidar data. Because bar forms have a predictable geometry, bars without top rollover will be considered truncated (poorly preserved). To analyze relative paleo-grain size distributions, I will quantify the grain size distribution in interbar fines, slackwater deposits that capture suspended sediments on the lee-side of bars.

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