MULTI-SCALE ANALYSIS OF FLUVIAL ARCHITECTURE AND FACIES OF THE BURRO CANYON-DAKOTA FORMATIONS USING UAV-BASED OUTCROP PHOTOGRAMMETRY AND MODELING - IMPLICATIONS FOR RESERVOIR PERFORMANCE, RATTLESNAKE CANYON, PICEANCE BASIN, COLORADO

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ABSTRACT

The stratigraphic variability of architectural elements and their internal facies heterogeneity affect the reservoir-quality distribution and connectivity of fluvial deposits. The Cretaceous Burro Canyon Formation in the southern Piceance Basin, Colorado, consists conglomerates, sandstones, and mudstones that have been interpreted to represent braided-river deposits. The well-exposed outcrops of the Burro Canyon Formation in Rattlesnake Canyon, Colorado provide access to characterize the geometry, stacking, and internal heterogeneities of fluvial elements for information to condition static geologic models and dynamic fluid-flow simulation experiments. To analyze the internal heterogeneity and dynamic connectivity of the fluvial sandstones, conventional stratigraphic measurements (measured sections), thin-section analysis, and unmanned aerial vehicle- (UAV-) based photogrammetry are combined with both static and dynamic outcrop modeling. Measured sections and thin-section analyses capture the internal sedimentology and stratigraphic variability of fluvial sandstones and provide insight regarding the environment of deposition. UAV-based photogrammetry is used to characterize and measure architectural elements and their bounding surfaces and extract dimensional data. Static geologic models and dynamic experiments are used to explore the significance of depositional heterogeneity on reservoir performance. The lateral variation and heterogeneity typical of fluvial deposits are difficult to resolve and correlate using only subsurface data; therefore, analogous outcrop models are especially useful in fluvial systems.

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