3-D Geometry and Facies Architecture of Fluvial-dominated Mouth-bar Deposits, Ferron Notom Delta, Utah, USA

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Superb exposures of the Turonian Ferron Notom Delta in southern Utah allow reconstruction of the 3D geometry and facies architecture of fluvial-dominated, wave-influenced mouth-bar deposits within a recently developed high resolution sequence stratigraphic framework.

6 sequences, 18 parasequence sets and 42 parasequences have been identified. Mouth bars are well-developed and exposed in parasequence 6a and its overlying parasequence 5. In dip view these mouth bars show distinctive unidirectional clinoforms of 5°-8° and in strike direction they have mounded, bilateral dipping pattern. Field mapping shows that mouth bars from these two parasequences have no obvious difference in size and scale. Detailed field descriptions show that planar stratification, current ripple cross-lamination, aggradational ripple cross-lamination, and, when approaching bar tops, dune-scale cross stratification are common. The widespread of graded beds, soft-sediment deformation, and low abundance and diversity of bioturbation within delta-front to prodelta facies indicates fluvial-dominated settings. The occurrence of hummocky cross stratification, wave ripple cross-lamination, and combined-flow ripple cross-lamination, however, suggests storm/wave reworking of the moth bar and delta-front deposits in both of these two parasequences.

Despite these similarities, mouth bars and delta-front facies in parasequence 6a are sandier and consist of thicker, far more amalgamated, lobate sand bodies. In contrast, mouth bars in parasequence 5 are muddier, heterolithic, and are separated by significant proportions of muddy interdistributary bay-fill facies. These differences are interpreted to be controlled by shoreline trajectory. Under a negative shoreline trajectory during the progradation of parasequence 6a, muddy facies were much less developed immediately behind the shoreline and in the delta front. Most of the mud was, in fact, being partitioned to the prodelta and further basinward on the shelf. In contrast, prograding under a positive shoreline trajectory, a greater portion of mud was trapped behind the shoreline and the more proximal part of the delta in parasequence 5 as suggested by the well-development of muddy lagoon and bay-fill facies and the heterolithic mouth-bar facies within it.