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Controls on the Depositional Patterns in the Santonian Emery Sandstone Member and Surrounding Strata, Wasatch Plateau, Utah

Turonian to Campanian aged rocks in East Central Utah record the progradation of clastic wedges into the Western Interior retro-arc foreland basin from the Sevier orogenic belt to the west. The Emery Sandstone comprises 14 aggradational storm/wave dominated parasequences exposed along the Wasatch Plateau. The unit lies between the well-studied shoreline deposits of the underlying Ferron Sandstone (Turonian) and the overlying Star Point Sandstone (early Campanian). Stratigraphic architecture and limited paleocurrent information indicate that the Emery was composed of two main shoreface complexes. Progradation was to the ENE. River dominated systems of underlying and overlying shoreface successions prograded parallel to the structural strike, towards the north and south respectively. The storm/wave systems of the Emery and overlying Blackhawk show a dominant progradation direction perpendicular to the structural strike indicating less structural influence. Additionally, complexity is revealed in the isopach of the interval from the base of the Mancos Shale to the base Castlegate Sandstone. This interval thins markedly from >2000m to <1000m over a distance of just 50 km in a west-to-east transect.

We ascribe the geometry and internal stacking pattern of the Emery Sandstone to very high subsidence rates in a narrow band in front of the thrust front. The distribution and orientation of the encasing river dominated units is a function of basin physiography in the area of the present-day San Rafael Swell, here interpreted to have undergone an early phase of uplift. Campanian Blackhawk Formation shorefaces prograded in a more easterly direction, once the depositional systems had buried the bathymetric topography. The San Rafael Swell is one of several Late Cretaceous intra-basinal uplifts reported from the Western Interior basin. Complex, syndepositional basement features may be more common in retro-arc foreland basins than previously considered, the recognition of which is imperative for understanding shoreface geometry and hence reservoir architecture.