

Complex Land-Ocean Interplay in Marginal-Marine Deposits: Transitions of Shallow-Marine Star Point Formation to Coastal-Plain Blackhawk Formation, Wasatch Plateau, Utah

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This outcrop study aims to investigate the complex interaction of depositional environments in shoreline successions, where fully-marine strata transition stratigraphically upward into fully-continental strata. The marine Star Point and the coastal-plain Blackhawk Formations, Cretaceous in age, crop out in the eastern Wasatch Plateau of central Utah. The transition of Star Point strata to Blackhawk strata was documented in detail at two outcrops along the Wasatch Plateau cliff: Wattis Road and Cottonwood Canyon sections. The Spring Canyon Member, the youngest sand body (i.e. parasequence) of the Star Point Formation (this member is assigned to the Blackhawk Formation in the nearby Book Cliffs), constitutes an overall wave-dominated, shoreface environment with hummocky to swaley cross-stratification, dune cross-bedding, and marine trace fossils (Thalassinoides, Ophiomorpha, Asterosoma, etc.). The lower Blackhawk Formation strata constitute an overall coastal-fluvial environment, which contains a number of facies that belongs to various distinct sub-environments, including: (1) thin to thick coal beds with Teredolites burrows, (2) small-scale fluvial channel deposits with dune cross-bedding and lateral-accretion surfaces, (3) tidal channel deposits with inclined heterolithic stratification, (4) coastal to bay mudstones.

Outcrops at Cottonwood Canyon show a gradual upward transition from shallow-marine strata to coastal-plain strata. However, this transition is quite complex at the Wattis Road section with inter-tonguing of marine and coastal-plain strata. Here, a depositional dip-oriented section shows up-dip pinch-outs of shallow-marine sandstones (Aberdeen Member?) in the coastal-plain Blackhawk deposits. A prominent incised valley (~10 m thick) was also observed that eroded the upper part of this shallow-marine sandstone. GPR data were collected from a fluvial channel deposit of Blackhawk Formation, just above the Star Point, to identify bedding characteristics. Our results illustrate a complex land-ocean interaction in the marginal-marine setting.