

Tidally-Influenced Sedimentation on a High-Latitude Cretaceous Coastal Plain: The Prince Creek Formation, North Slope, Alaska

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The late Cretaceous (Early Maastrichtian) Prince Creek Fm. on Alaska's North Slope records deposition on a high-latitude coastal plain within tidally-influenced first-order meandering trunk channels, second-order meandering distributary channels, third-order fixed (anastomosed?) distributary channels and vegetated floodplains. Regionally restricted suspended-load meandering trunk channels (13-17 m thick) include a basal conglomerate, a medium-grained multi-storey sandbody lacking roots that fines-upward into inclined heterolithic stratification (IHS) and 3-4 m of finer organic-rich sediments. Meandering distributaries (2-6 m thick) composed of a single-storey, fine-grained, rooted sandbody dominated by IHS and including abundant mud-filled channel plugs occur as laterally-extensive heterolithic sheets encased in organic-rich floodplain facies that appear lenticular along strike. Fixed (anastomosed?) distributary channels are composed of a fine-grained, single-storey, current rippled and rooted sandbody atop an arcuate erosive base with rare IHS and siltstone "wings" that extend laterally from the uppermost channel-fill. Numerous fixed (anastomosed?) channels occupy tiers at the same stratigraphic level, with fixed channels incised into meandering distributaries or floodplain facies. All channels are interbedded with drab-colored, organic-rich floodplain facies interpreted as the deposits of levees, splays, lakes, ponds, swamps, marshes, mires, paleosols, and ashfall. Spatial relationships between channel types, and between channels and floodplains indicate that most deposition took place adjacent to trunk channels on crevasse splay-complexes separated by organic-rich floodplain facies. The lateral migration of meandering distributaries driven by peat compaction and higher flow velocities and the vertical filling of fixed (anastomosed?) distributaries may have been contemporaneous. Alternatively fixed (anastomosed?) distributaries may record the initial or waning stages of flow during splay-complex formation or abandonment. IHS composed of rhythmically-repeating, coarse-to-fine couplets of current rippled sandstone/siltstone and mudstone is found within all channel-forms. The rhythmic and repetitive nature of IHS couplets together with relatively thick, muddy fine-grained members in the IHS suggest that flow within channels was likely influenced by tidal effects. Locally abundant jarosite lends credence an interpretation of marine-influenced sedimentation.