

# **Stratigraphic Evolution of a Paleopolar Topset-Clinoform System: Upper Cretaceous Schrader Bluff-Prince Creek Formations, Arctic Alaska, U.S.A.**

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## **Abstract**

Near horizontal (6 deg dipping) outcrop exposures of Upper Cretaceous (Santonian-Campanian) strata at Shivugak Bluffs along the Colville River of northern Alaska preserve a 542 m thick continuous record of an overall fining-upward topset-clinoform system. The Lower Schrader Bluff Formation (Fm) is best classified as recurring river-dominated deltas controlled by highwater discharge from upstream river floods with minor storm-reworking. This interpretation is based on (1) the association of well-sorted, subaqueous terminal distributary channel (TDC) deposits found in prodelta and interdistributary bay deposits; (2) hyperpycnite-dominated distal- and medial-proximal delta front deposits; (3) minor hummocky cross-stratified and swaley cross-stratified subaqueous TDC sandbodies and distributary mouth bar (DMB) complexes; and (4) up to 20 m thick amalgamated packages of DMB and subaqueous TDC complexes within proximal-delta front deposits. These deltas are rarely overlain by small low-sinuosity channels, small sinuous channels, and downstream-accretion-dominated channels along with associated floodplain and floodbasin deposits (paleosols, swamps, lakes, distal levees, and distal crevasse splays) found on the lower delta plains of the Prince Creek Fm. This investigation focuses on the sedimentology, ichnology, and stratal heterogeneity within a sequence stratigraphic framework to ascertain large-scale cyclical trends in these river-dominated deltaic systems. There is a stark contrast in grain size between two highstand systems tracts (HSTs) in this succession. The oldest HST has more abundant sand-rich, river-dominated deltas whereas the youngest HST contains dominantly mud-rich, river-dominated deltas. The youngest HST is one of the few prograding muddy, deltaic shorelines that have been documented in the rock record. These world-class outcrops are the best outcrop analogues for nearby shallow, viscous-to heavy-oil reservoirs on the central North Slope, Alaska found within the Prudhoe Bay, Kuparuk River, Milne Point, and Nikaitchuq fields.