

## **Combined Autogenic and Allogenic Driven Facies and Stratal Architecture Change at the Transition Between the Schrader Bluff and Prince Creek Fms, Shivugak Bluffs, North Slope, Alaska**

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### **ABSTRACT**

Although the Prince Creek and Schrader Bluff fms (Campanian-Maastrichtian) together comprise a topset of a Brookian-age giant clinoform deposited in the Colville Basin on the North Slope of Alaska, the two formations are typically divided lithostratigraphically into shallow marine deposits (Schrader Bluff Fm) and continental distributive deposits (Prince Creek Fm). In outcrops at Shivugak Bluffs along the Colville River on Alaska's North Slope the transition from shallow marine deposits to continental deposits contains highly complex surfaces and fluctuating stratigraphic geometries likely driven by a combination of autogenic and allogenic processes. Employing the lithostratigraphic terminology, the uppermost Schrader Bluff Fm at Shivugak Bluffs comprises delta front deposits dominated by mouth bars and subaqueous terminal distributary channels. Sandbody geometries and sedimentary structures combined with marine to brackishwater trace fossils are evidence for marine deposition. The initial deposits of the Prince Creek Fm overlying the Schrader Bluff Fm contain no marine trace fossils and instead record deposits of highly sinuous distal distributaries (4-6 m thick) with common inclined heterolithic stratification that overlie and incise into the mouth bars. This progression of paleoenvironments reflects normal, autogenic deltaic processes found during delta progradation; however, the overlying stratigraphy and surfaces become much more complex. In portions of the outcrop belt, the basal sinuous distributary channel of the Prince Creek Fm is 'beheaded' so that the top of the fining-upward succession typical of Prince Creek Fm sinuous meandering channels is removed by an incision 2-4 m deep. A sandbody does not overly the incision, instead a coaly interval and an ~ 10 m thick succession of interbedded coals, carbonaceous shales, organic-rich paleosols, and relatively thin (1-2 m-thick) channel deposits that typically lack evidence of sinuosity (e.g. lateral accretion surfaces) overly the incision. A second, major incision surface, that is most likely the outcrop expression what has been termed the mid-Campanian unconformity, incises into the top of these interbedded sands and coals. Overlying this unconformity are anomalously coarse-grained channel systems 6-10 m thick that may contain basal conglomeratic lags with boulder-size clasts and additional conglomeratic lags on scours. Based on the abundance of downstream accretion and the outcrop geometries of these sandbodies the channel system is best classified as straight to braided. Although the overlying strata is lost to the modern erosion surface at Shivugak Bluffs the system is seen to transition stratigraphically upward into meandering channels and associated floodplain 5 km to the northeast at Uluksrak Bluffs. The incisions within the Prince Creek Fm are interpreted to reflect valley cutting during a significant basinward shift in facies, bypass of coarse grained material to the shelf, and subsequent valley filling, sometimes with relatively fine-grained material. The incisions are interpreted to reflect a compound unconformity, likely driven by allogenic forcings (e.g. tectonics, relative sea level fall) near the mid Campanian unconformity. The fill overlying these unconformities suggest that there may have been significant bypass of sand to the shelf, providing potential reservoirs down-dip of valley systems.