

## **Insights from Recent Geologic Mapping of the South-central Sagavanirktok Quadrangle, North Slope, Alaska**

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For over two decades, the Alaska Division of Geological & Geophysical Surveys (DGGS) has integrated detailed 1:63,360-scale geologic mapping with a variety of topical studies in northern Alaska, all aimed at improving our understanding of the regional geology and petroleum system. However, these efforts have generally been restricted to the better exposed southern periphery of the Colville basin, often limiting our interpretations of Brookian stratigraphy to only the more proximal facies belts. More recently we've extended our mapping and related studies into the east-central North Slope where nearly the entire Brookian megasequence is intermittently exposed between the Ivishak and Toolik rivers. In collaboration with the Alaska Division of Oil and Gas, we were able to integrate our surface mapping with available subsurface data, greatly improving our understanding of the stratigraphic and structural evolution of the region.

The stratigraphy in the map area, in ascending order, includes: 1) Albian-Turonian slope and basinal facies of the Torok and Seabee formations, 2) Santonian-Campanian slope deposits of the Canning Formation, 3) Campanian-Maastrichtian shelfal facies of the Schrader Bluff Formation, and 4) Maastrichtian-Paleocene fluvial and associated overbank facies of the Prince Creek and Sagavanirktok formations. Considered together, these units elegantly demonstrate the time-transgressive northeastward progradation of facies tracts that filled this sector of the Colville basin during mid to Late Cretaceous time. Major sequence stratigraphic surfaces separate many of the units within the map area. For example, the Seabee Formation terminates at an abrupt transgressive flooding surface recorded by a thin tongue of condense Hue Shale facies. Similarly, the middle and upper members of the Schrader Bluff Formation are separated by a regional Campanian flooding surface marked by a recessive mudstone interval recognized across the map area. In addition, the contact between the Prince Creek and Sagavanirktok formations appears to be a sequence bounding unconformity, likely reflecting a major Paleocene tectonic reorganization of the basin.

Shortening of the Brookian megasequence throughout most of the map area progressed and decayed northward, although NE-trending structures deforming Paleocene and younger stratigraphy in the northernmost regions may suggest a shift in the regional stress field at that time. The principal detachment horizon occurs well within Kingak Formation shales toward the hinterland, and appears to shallow basinward to the base of the Kemik Sandstone. Consequently the structural relief decreases basinward as well. Deformation was chiefly accommodated by co-axial, singly- and doubly-plunging fault bend and fault propagation folding- some with beaching thrusts, and thus exhibit geometries conducive to hydrocarbon accumulation.