

KEMIK SANDSTONE: INNER SHELF SAND FROM NORTHEAST ALASKA*

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ABSTRACT

The upper Neocomian Kemik Sandstone crops out in and around Ignek Valley in northeast Alaska. It lies unconformably on the Jurassic to Lower Cretaceous Kingak Shale, and is overlain by the Hauterivian to Barremian pebble shale. It is a fine-grained, glauconitic quartzose sandstone, up to 120 feet (37 m) thick. Four lithofacies are recognized: (1) a basal, moderately well-sorted pebble conglomerate; (2) fine to very fine grained, laminated and bioturbated sandstone; (3) a poorly sorted conglomerate; and (4) low-angle to hummocky cross-stratified fine-grained sandstones. Facies relationships suggest that the basal conglomerate represents a transgressive lag deposit. It is overlain by a sequence comprising laminated and bioturbated sandstones with interbedded, poorly sorted conglomerates. The sandstones exhibit a mixed assemblage of ichnofossils, including *Gyrochorte*, *Muensteria*, *Ophiomorpha*, *Planolites*, *Skolithos*, and (?) *Conichnus*. In places, they grade upward from low-angle laminations to symmetrical ripple forms to silty laminated deposits. Their upper parts are bioturbated, but to varying extent. These sandstones and the conglomerates were deposited abruptly but sporadically below storm wave base by storm-generated currents. The sandstones were subsequently modified by strong but waning oscillating storm waves. The hummocky cross-stratified sediment comprises an upper sequence that was probably deposited under the influence of storm-induced conditions between fair-weather and storm wave base. The Kemik Sandstone represents a storm-deposited inner shelf sand with regressive characteristics, deposited within an overall transgressive setting.

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REFINED NAMES FOR BROOKIAN AGE ELEMENTS IN NORTHERN ALASKA

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ABSTRACT

The major negative element of the North Slope has been called the Colville Geosyncline, Colville Trough, Colville Foredeep, or Colville Basin while the positive element coupled to the north has been universally called the Barrow Arch. The name Colville Basin is most consistent with the apparently compound nature of this foreland successor element. We also recommend that the term Barrow Inflection be substituted for Barrow Arch as the name of the positive element or structural hinge which formed between mid-Cretaceous deposits in the basin and those along the continental margin. Inflection aptly describes the weak reversals in regional dip that mark this feature and it constrains the sense of either active uplift or a pre-existing high, which has evolved with current usage of arch.

The markedly asymmetric Colville Basin consists of: deformed and thickened mid-Cretaceous flyschoid deposits lying on earlier Cretaceous allochthons of the ancestral Brooks Range; a >10-kilometer thick belt of deposits that are incoherent on seismic records but are floored by poor, presumably earliest Cretaceous and older reflectors; and a foreland flank that slopes gently from within a kilometer of the surface at Point Barrow, about 60 miles (200 km) to the north. Seismic profiles show this flank to have been an abyssal-like plain after Barrovia, the northern provenance of Ellesmerian deposition, had been replaced by the Arctic Ocean early in Cretaceous time. It was nearly a mile (>1 km) deep and stretched broadly south from the new continental edge that now seems to be about 20 mile (30 km) north-northeast of Barrow. The plain was progressively loaded and depressed, first by the downlapped distal edge of the flysch prism in the south and then by the shelf of molassoid deposits that prograded from the Brookian orogen during the mid-Cretaceous.

The Barrow Inflection denotes reversals in regional dips from less than two degrees to the south to approximately one degree to the north. The axes of reversals subparallel the present coastline between Barrow and the Arctic National Wildlife Refuge and plunge eastward at a rate of about 50 feet/mile (1/100 km). Inflections on successive stratigraphic horizons do not stack vertically as in parallel folds; dip reversals in the lowest Brookian strata, for example, occur several kilometers south of the inflection on the basement surface. The structure appears to have formed as the prograding mid-Cretaceous deposits (Nanushuk Group) made the foundation for the present continental terrace; subsidence of the continental margin beneath that load reversed dips along the former north edge of the Colville Basin. Minor and relatively passive upward bowing likely occurred along this hinge between the negative (depressed) elements. The Barrow positive feature clearly is neither an arch in the sense of a broad anticlinal fold nor in the sense of a high such as the Cincinnati Arch. It had no north flank before the Late Cretaceous and it could not have been an element of pre-Brookian (Ellesmerian) geology.