

## **Late Cretaceous High Latitude Paleoenvironments at the Kikak-Tegoseak Dinosaur Site, Prince Creek Formation, North Slope, Alaska**

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The Late Cretaceous (Campanian-Maastrichtian) Prince Creek Formation is the most dinosaur-rich high latitude formation in the world, but there is little detailed work that integrates paleontological sites with sedimentology, paleopedology and palynology. Facies associations of the Prince Creek Formation near the Kikak-Tegoseak dinosaur site, indicate that, overall, the depositional environment was a low-energy, swampy alluvial/coastal plain. Facies associations include fine-grained lakes, lake margins, levees, crevasse splays and paleosols on floodplains, and coarser-grained, ripple cross-laminated, non-migrating channel deposits. Rare, multi-story, sheet sandstones are present in nearby areas. Organic-rich siltstones and thin coaly shales are common. Overbank mudstones and siltstones contain root traces, drab colors, blocky structures, Fe-oxide mottles and siderite nodules indicating the presence of abundant, poorly drained paleosols. Redoximorphic features, such as ferruginous void and grain coatings, mottled soil aggregates, depletion features and Fe-oxide nodules, together with weakly developed illuvial clay coatings on voids, suggest phases of soil wetting and drying. Bioturbation is abundant. Characteristics of the paleosols, together with associated palynological data, suggest that these floodplains were wet, but that water levels probably fluctuated seasonally from shallow, standing water to dry and subaerially exposed. Mean annual temperatures, although significantly warmer than present, were probably near 5 °C based on paleobotanical evidence and abundant redoximorphic features in paleosols. There is no evidence of ground ice or cryoturbation signatures in sediments or paleosols but occasional winter freezes may still have occurred during long periods of winter darkness. The Kikak-Tegoseak bonebed is dominated by the associated skeletal remains of the horned dinosaur, *Pachyrhinosaurus*. The quarry also contains skeletal remains of osteichthyan fishes, dromaeosaurs, troodontids, tyrannosaurids, ornithomimids, and hadrosaurs. Multiple paleoenvironmental proxies suggest that these dinosaurs thrived in a rapidly aggrading, seasonally wet, cool temperate coastal plain environment high above the Late Cretaceous Arctic Circle.