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Paleoenvironmental Variability Across the Cretaceous-Tertiary

The integration of sedimentological, paleotectonic and paleopedogenic data across the Cretaceous-Tertiary (KT) boundary in the Red Deer River valley of south-central Alberta indicates variability of fluvial depositional styles and paleosol morphology in response to foreland orogenesis. The depositional history records an evolution from amalgamated, multi-story, braided sand bodies to accretionary, single-story, overbank-prone meandering deposits. The distribution of paleosols throughout the section is also cyclic: immature, well-drained paleosols are associated with the braided deposits, whereas mature, poorly-drained paleosols are interbedded with the meandering deposits.

Two large-scale aggradational fluvial cycles are observed within the study interval and are interpreted to record variations in sediment supply and terrestrial accommodation space in response to orogen-side foreland tectonism. Orogenic pulses are reflected in outcrop by amalgamated fluvial deposits interbedded with immature paleosols, whereas rogenic quiescence is associated with accretionary fluvial styles and poorly-drained, gleyed, coal-capped paleosols.

Workers investigating paleoenvironmental variability across the KT boundary often interpret increasingly cool and wet conditions associated with the Cretaceous-paleocene transition to be the result of a combination of influences, including sea level change, extraterrestrial impact, and global climate change. The KT boundary, however, is located three meters above a tectonically-induced transition from amalgamated, braided fluvial deposits with well-drained paleosols to accretionary, meandering fluvial deposits with poorly-drained paleosols. The direct influence of foreland tectonism has not, as of yet, been considered to be an agent of terrestrial paleoenvironmental change at the close of the Cretaceous. This study introduces evidence suggesting late Cretaceous and early Tertiary terrestrial paleoenvironmental cyclicity in central Alberta was likely a direct response to active foreland tectonism.