



## Evolution of a Northern Cordilleran Foreland Basin Inferred from Cretaceous Stratigraphy, Seismic Sections, and Detrital Zircons, Mackenzie Mountains, NWT

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### Summary

Adjacent to northern Mackenzie Mountains (Fig. 1), Cretaceous foreland basin subsidence and relative sea level rise was concurrent with Cordilleran deformation and plutonism. During this transgression, sandstones of the Middle Albian Martin House Formation record nearshore marine processes that reworked available sediment in a basin that deepened westward. Detrital zircon age populations from the basal sandstone are characteristic of Laurentian basement and do not reflect a significant Late Proterozoic or Paleozoic source, so the earliest deposited sediment was likely derived from the craton farther to the east (Fig. 2). Martin House Formation and lower Arctic Red Formation onlap the Keele Arch, which indicates that the Keele Arch was a positive topographic feature during the Albian. Maximum transgression culminated in an extensive Upper Albian shale basin.

A significant unconformity separates Albian strata from the Cenomanian-Turonian Slater River and Trevor formations. Relative sea level fall that produced the unconformity was probably due to basin uplift, possibly caused by decreased shortening of, and therefore less loading by, the orogen to the west.

During Cenomanian time, rapid relative sea level rise resulted in renewed deposition of shale to form the Slater River Formation. East-prograding clinoforms within the lower part of the Turonian Trevor Formation indicate that a new basin configuration was established in which sediment was supplied from the west. Detrital zircon populations are consistent with derivation from Proterozoic and Paleozoic siliciclastic rocks that were probably uplifted and eroded in mountains to the west during regional shortening (Fig. 2).

Shoreface sandstones of the correlative Trevor and Little Bear formations prograded eastward across the entire study area completing an accommodation creation and infill cycle.

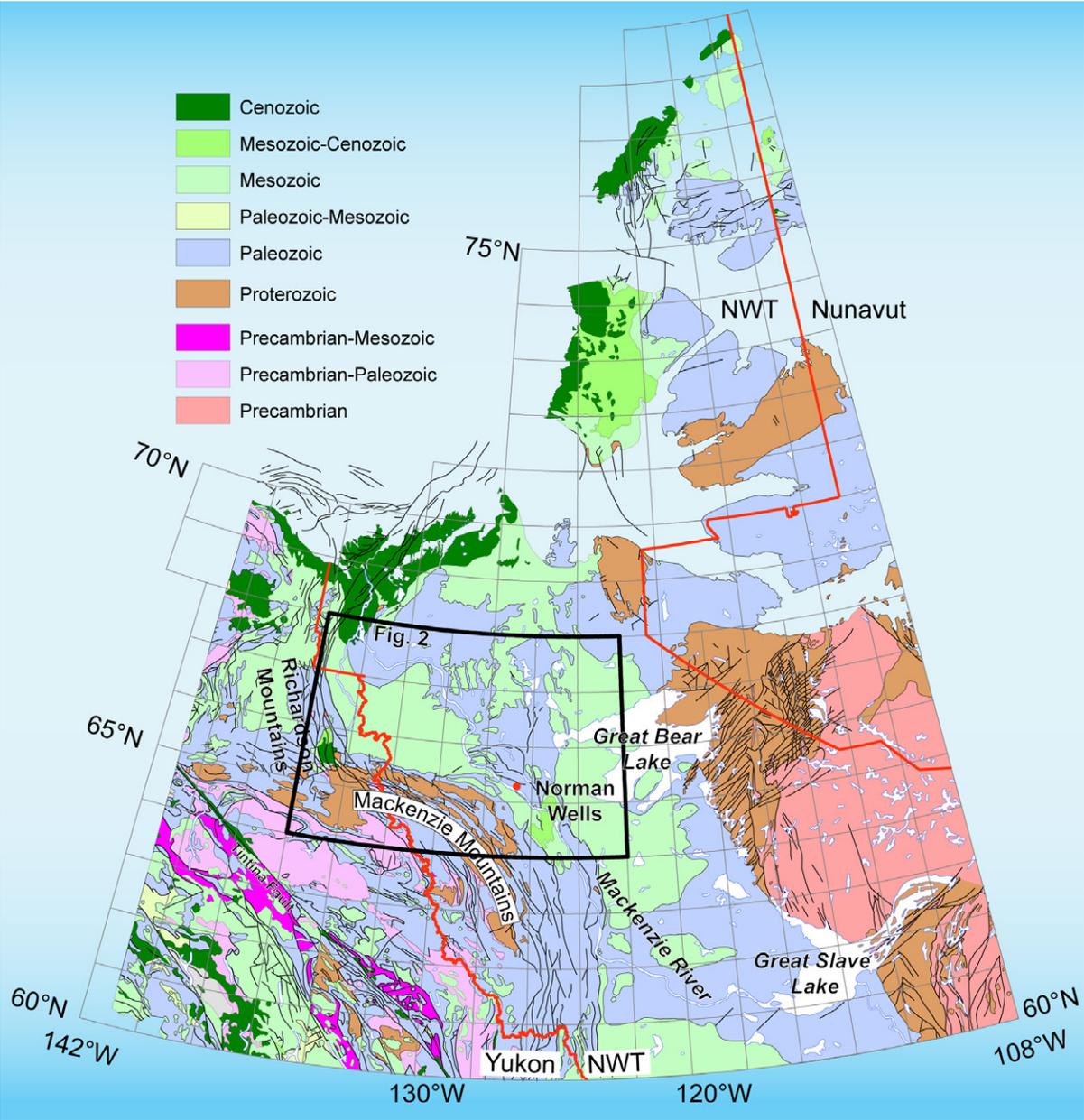


Figure 1: Location map showing Yukon – NWT geology and outline of study area. The Peel Plateau and Plain region is north of the Mackenzie Mountains and west of Norman Wells.

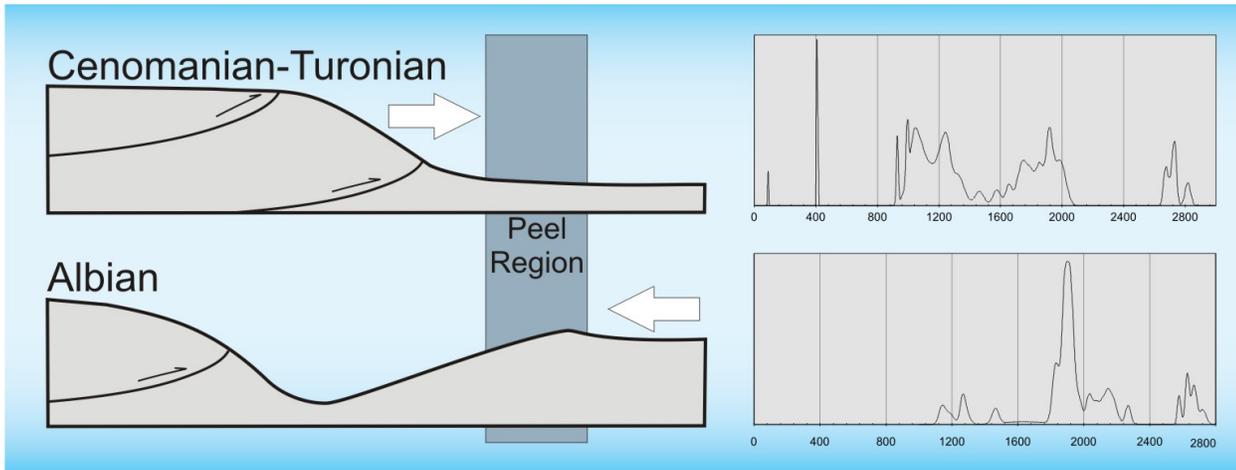


Figure 2: Summary diagram showing eastward migration of foredeep over time and the detrital zircon populations that record a shift in sediment source regions.

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