Post Mesozoic events and processes on the western interior, or, "Why is Alberta so flat?"

Robert R. Young,
Earth and Environmental Sciences, UBC, Okanagan Campus, Robert.Young@ubc.ca

The Western Interior's landscape has a peaceful aspect that suggests little has happened for a very long time, but nothing could be further from the truth.

The region experienced nearly a kilometer of deposition after the Mesozoic extinction, and nearly as much fluvial erosion through the middle and latter Tertiary. Afterwards, the landscape was only slightly altered by Pleistocene glacial processes. The controls and chronology of Tertiary fluvial processes and events are only broadly understood, but hill-top fluvial gravel deposits on the Hand Hills of south central Alberta have yielded mammalian fossils, including Plesiogulo (NALMA Hemphillian, HH3) that provide good biochronologic bracketing ages for the deposit. The gravel and sand, deposited by the ancestral Bow River, became remnant as the river migrated south and eroded downward nearly 190 m, but rather than a narrow valley, formed an extremely wide plain. Hilltop gravel found in other locations rarely fossiliferous, but a few specimens found in the Cypress Hills to the southeast at higher elevations provide more dates, and show that erosion and planation rates likely accelerated through the latter Tertiary. Erosion rates, deduced by using reconstructed surfaces from river profiles, show increases of 2.5 X in the last 4 million years of the Tertiary, compared to the previous 10 million years. Those increases were possibly a positive feedback to isostatic rebound caused by crustal unloading. It seems unlikely that erosion was due to uplift caused by thrust sheet propagation to the west, as compression from those forces ended much earlier, in the Paleocene. A last incision during the Pleistocene was likely caused by steepened river gradients that resulted from the formation of Hudson Bay, when the rivers would have achieved base level after only flowing half the previous distance.