

Apatite Fission Track Results from the Northwestern Bowser Basin: Constraints on Latest Cretaceous Through Cenozoic Thermal History and Hydrocarbon Prospectivity

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Abstract

Apatite fission-track data from samples collected along the northwestern part of the Jura-Cretaceous Bowser Basin, British Columbia, help constrain the basin's latest Cretaceous through Cenozoic thermal history. Results from sedimentary rocks exposed near Tsatia Mountain, in the northern part of the study area, record two major episodes of rapid uplift and denudation during the Late Cretaceous to late Paleocene (70-55 Ma) and during the middle Eocene to early Oligocene (45-30 Ma). Southward along the western margin of the basin, results from within the Oweege Dome structure record a single episode of rapid uplift and denudation during the middle Eocene ($\sim 47 \pm 2$ Ma), whereas results from sedimentary rocks within the Mount Ritchie region record two episodes, during the middle Eocene to early Oligocene (45-30 Ma), and at sometime since the early Oligocene (< 30 Ma). Results from sedimentary rocks collected along the Cassiar Highway further to the south suggest that the post-early Oligocene episode of rapid uplift and denudation occurred during the late Oligocene at $\sim 25 \pm 2$ Ma. Samples from all areas experienced rapid cooling between ~ 10 -5 Ma. The uplift history of Bowser Basin is comparable to that in the nearby Coast Belt suggesting a linked tectonic history.

Hydrocarbon generation from potential source beds ceased with rapid uplift between latest Cretaceous and Paleocene times, and earlier in overmature regions. There may be considerable risk associated with petroleum preservation, considering both, the time elapsed since the termination of petroleum generation, and the potential negative affects, due to multiple rapid uplift events, on seal rock integrity.