geoconvention
Calgary • Canada • May 11-13 2026

Towards a bentonite-constrained fluvial stratigraphic framework for the Dinosaur Park Formation, Alberta

Paul R. Durkin[1]
Mira G.W. Thompson[1]
Alfredo Camacho[1]
Caleb Brown[2]
Kirstin S. Brink[1]

[1]*Department of Earth Sciences, University of Manitoba*

[2]*Royal Tyrrell Museum of Palaeontology, Highway 838 Midland Provincial Park*

Summary

Fluvial systems preserved in the sedimentary record often lack geochronological constraints, which can preclude accurate stratigraphic correlations, sedimentation rate calculations, and autogenic process timescale estimates (e.g., avulsion frequency). Recently dated bentonites from the Upper Cretaceous Dinosaur Park Formation (DPFm) provide the rare opportunity to integrate geochronological data with fluvial sedimentology to produce a stratigraphic framework within which these concepts can be explored. Exposed in the badlands of Dinosaur Provincial Park (DPP), the DPFm is characterized by stacked fluvial channel-belt and floodplain deposits that record a Late Cretaceous river system flowing from the Cordilleran in the west to the intracontinental seaway in the east, during an overall transgressive period. Over the past decade, our field work at DPP has yielded 100's of meters of measured section, and 1000's of paleoflow and lateral accretion measurements, which have contributed to detailed reconstructions of depositional environments. Here, we add to this dataset the geochemical fingerprints of bentonite phenocrysts sampled from 14 locations across DPP. Five samples were collected from exact locations of a recent zircon U-PB geochronology effort, which act as type localities. We rely on feldspar and biotite mineral chemistry (i.e. geochemical fingerprint), as well as dGPS and stratigraphic position, to match and correlate samples with type localities or classify as a new bentonite. Resulting long-distance correlations of bentonites constrain a new stratigraphic framework for the DPFm. We demonstrate that the Plateau Tuff (75.64 +/- 0.025 Ma) is preserved across much of DPP and is a crucial chronostratigraphic marker bed that divides the DPFm into an informal lower and upper unit. With the identification and stratigraphic position of at least seven unique bentonites, we calculate refined sedimentation rates for the DPFm and discuss the novel integration of ages and sedimentological data in fluvial settings. The new stratigraphic framework also has significant implications for dinosaur biostratigraphy, as bentonites provide a new and more accurate datum for fossil stratigraphic placement.