

# The Road River Group of northern Yukon, Canada: Early Paleozoic deep-water sedimentation within the Great American Carbonate Bank

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## Summary

The Road River Group of the Richardson Mountains, Yukon, Canada, records basin interior to slope sedimentation in an intra-platform depocenter at the northwesternmost edge of the Great American Carbonate Bank (GACB). New data from the upper canyon of the Peel River, including sedimentological observations, stratigraphic and facies subdivisions, paleontological collections, and carbonate and organic carbon isotope chemostratigraphy enable the following significant conclusions:

- (1) The newly defined upper Cambrian (Paibian–Furongian) Cronin Formation overlies the middle Cambrian Slats Creek Formation and consists of fine-grained carbonate and siliciclastic strata deposited in the interior of the Richardson trough or on the seaward edge of a late Cambrian carbonate ramp system that originated along the Yukon block or Mackenzie/Peel platform. New  $\delta^{13}\text{C}_{\text{carb}}$  and  $\delta^{13}\text{C}_{\text{org}}$  isotopic data from the Cronin Formation suggest it records the global SPICE event.
- (2) The overlying newly formalized Mount Hare Formation of the Road River Group records diverse Lower Ordovician (Tremadocian)–Silurian (Wenlock) deep-water lithofacies that reflect basin interior to lower slope depositional environments. These strata host the newly

defined Middle Ordovician (Darrivilian) Aberdeen Member, which records a discrete episode of debris-flow and/or mass-transport sedimentation associated with regional base level fall at the Sauk-Tippecanoe megasequence boundary. Carbon isotope chemostratigraphic data from the Mount Hare Formation record the Tremadocian TR1 and TR2 events, the Katian GICE event, and multiple Llandovery positive  $\delta^{13}\text{C}_{\text{org}}$  excursions (e.g., early and late Aeronian, Valgu, and Ireviken).

- (3) The newly defined Silurian (Wenlock–Ludlow) Tetlit Formation of the Road River Group records a sharp transition to coarser-grained carbonate and siliciclastic slope deposits that may reflect broad shoaling within the Richardson trough or progradation of a deep-water channel and levee system over the Peel River study area. These strata are distinguished by their decameter-scale alternation between yellow-weathering dolomitic dolosiltite/dolograinstone and recessive mudstone strata. New  $\delta^{13}\text{C}_{\text{org}}$  data from the Tetlit Formation most likely record the Homeric Mulde and Ludfordian Lau positive carbon isotope excursions.
- (4) The overlying newly formalized Silurian (Pridoli)–Middle Devonian (Givetian) Vittrekwa Formation of the Road River Group records a return to deep-water carbonate-dominated basin interior to slope sedimentation within the Richardson trough. New  $\delta^{13}\text{C}_{\text{org}}$  data from the Vittrekwa Formation record the Lochkovian Klouk positive excursion, as well as a distinct Pragian-Emsian positive to negative carbon isotopic trend.
- (5) Regional stratigraphic correlations of the Road River Group (Tables 2–5, Fig. 10) suggest the widespread development of deep-water depocenters within and along the edge of the GACB of Alaska, Yukon, and Northwest Territories. Our paleoenvironmental and paleogeographic reconstructions suggest this part of Laurentia was similar to the modern Great Bahamas Bank, with the Road River Group recording analogous deep-water sedimentation within intra-platformal basins, such as the TOTO or Exhuma Sound, or along the fringes of the bank system such as the Straits of Florida.

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