



Seminario

Evidence for transition from a continental forearc to a collisional pro-foreland basin in the Labrador Trough, Canada: petrography, geochemistry, detrital zircon provenance and Nd systematics

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Abstract:

The New Quebec Orogen (NQO) is the best preserved supracrustal belt of the deeply eroded Paleoproterozoic Trans-Hudson Orogen and thus constitutes an exceptional window to investigate one of the most ancient Wilson cycle sedimentary records within the Manikewan paleo-ocean. It consists of a Paleoproterozoic supracrustal belt that underwent reworking when the Superior Craton collided with an Archean to Paleoproterozoic microcontinent (Core Zone terrane), during the Trans-Hudsonian orogeny. Within the NQO, the western and central parts of the Labrador Trough comprise greenschist-facies sedimentary and volcanic sequences (Kaniapiskau Supergroup) inferred to represent the rifted margin of the Superior Craton, whereas the Laporte Group (eastern part), composed of similar successions but metamorphosed to higher grades, remains of unclear origin. Competing models purport that the Laporte Group is either a deeper, higher-grade exposure of the Kaniapiskau Supergroup, or an exotic terrane. Large-scale sampling, petrography and SHRIMP U-Pb detrital zircon geochronology provide insights to elucidate the sedimentary provenance and depositional environments for both zones. Kaniapiskau Supergroup detrital zircons yield ages older than 2.5 Ga, showing a signature typical of the Archean Superior Craton with a main peak at ~ 2.72 Ga. There is a gap of more than 150 Ma between detrital zircon ages and the interpreted depositional age, suggesting a divergent environment like a rift and passive margin. In contrast, detrital zircons from the Laporte Group yield ages as young as 1834 ± 2.4 Ma and a dominant age peak at 1.84 Ma. The presence of age peaks at 2.2–2.4 Ga suggests that the Core Zone exotic terrane is the main source area, and the metamorphic monazite ages previously dated at 1793 ± 2 Ma point to a relative short depositional time. The presence of an Andean-type magmatic arc in the western part of the Core Zone terrane supports the interpretation of an eastward subduction at 1860–1830 Ma. Furthermore, a lag time between crystallization and deposition ages within the Laporte Group points to convergent and collisional settings, with a 40 Ma transition from continental forearc basin to collisional pro-foreland basin, marking the consolidation of the Columbia Supercontinent in northeastern Laurentia.

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