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Late-stage rifting of Rodinia and Cambrian-Ordovician subduction recorded in the metamorphic sole of the Mont Albert ophiolite complex, Québec, Canada

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Metamorphic soles form in subduction zones through the accretion of slices of the subducted plate beneath the lithospheric mantle of the overriding plate. Reconstructing the protolith history of soles using detrital zircon geochronology and geochemistry provides insight into the evolution of lower plate from its formation to subduction and collision. The Mont Albert ophiolite complex (Gaspé Peninsula, Québec) accreted during the Taconic orogeny and overlies the Shickshock Group, interpreted as the Neoproterozoic rifted continental margin of Laurentia. The Mont Albert metamorphic sole represents one of the few preserved remnants of the subducted lithosphere that bordered the Laurentian margin.

The Mont Albert sole consists of intercalated metabasic and metasedimentary rocks, subdivided into lower and upper units based on lithological and metamorphic criteria. Whole-rock and trace element geochemical analyses show that mafic samples from the lower unit display E-MORB signatures similar to metabasalt of the Shickshock Group. Upper unit samples yield N-MORB compositions consistent with an oceanic spreading centre. Detrital zircon U-Pb LA-ICP-MS dates from eight metasedimentary samples across both units and one Shickshock Group sample range from the Archean to the Ordovician. All samples show a prominent ~1000 Ma peak, attributed to Grenvillian sources from Laurentia. The lower unit detrital zircon spectra match that of the Shickshock Group, and with the E-MORB signature, indicate that the lower sole preserves fragments of this Group. Zircon from upper sole metasediments yield ~500 Ma dates interpreted to be derived from volcanic arcs formed above subduction zones near the Laurentian margin. These samples contain the youngest dates (~450-460 Ma), interpreted as metamorphic zircon growth, consistent with 456-465 Ma $^{40}Ar/^{39}Ar$ cooling ages [1], which record collision-related metamorphism. Collectively, the data demonstrate the Mont Albert metamorphic sole protoliths formed during the late-stage rifting of Rodinia (~550 Ma), and the development of the Laurentian passive margin; the lower and upper units capture the shift from continental rifting to early oceanic lithosphere formation. This lithosphere was later subducted in an ocean-ward dipping, short-lived subduction zone which initiated close to the Laurentian margin near the Cambrian-Ordovician boundary and culminating in Middle Ordovician collision.

[1] Malo et al. (2008), *Tectonics* 27.