

Union Island group, East Arm basin: A record of continental rifting prior to 1.9 Ga

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The Neoproterozoic supercontinent Kenorland experienced widespread extension, continental rifting, and enhanced production of continental mafic magmatism in the Paleoproterozoic. During this time the East Arm basin of Great Slave Lake was formed and now preserves a protracted sedimentary and volcanic record along the southeastern margin of the Slave craton. Previous stratigraphic interpretations set the ~1.9 Ga Wilson Island Group as the base of the East Arm basin; however new field observations indicate that the Union Island Group (UIG) is the lowest stratigraphic succession. The UIG is a package of dominantly mafic volcanic and subordinate carbonate/shale sedimentary rocks that were deposited directly on Archean granitic basement, considered to be derived from the Slave craton. Within UIG, two stratigraphically and geochemically distinct volcanic units are recognized: an alkaline to subalkaline basaltic lower assemblage with associated gabbroic feeder sills and dikes, and a subalkaline basaltic upper assemblage. The lower assemblage basalts are geochemically more variable, characterized by high TiO₂ (2.2–3.4 wt%) and Nb (24–62 ppm) contents and more fractionated LREE-enrichment (La/Lu_N=7.6). In contrast, the upper assemblage basalts have a much more restricted composition characterized by lower TiO₂ (1.6–1.7 wt%) and Nb (<4 ppm) contents, with a significant negative Nb–Ta anomaly. The high TiO₂ and Nb contents and low Th/Nb ratio (<0.2) of the lower volcanic assemblage is consistent with an asthenospheric origin with minimal crustal contamination.

We interpret the UIG to represent a pre-1.9 Ga aborted rift sequence that formed under continental extension during the initial formation of the East Arm basin. The results of ongoing magma evolution modeling will be presented.

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