Geophysical Research Abstracts
Vol. 19, EGU2017-12122, 2017
EGU General Assembly 2017

Unravelling the complexities of a high-grade Paleoarchean terrane: Saglek Block, Labrador, Canada

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The Nain Province of Labrador is on the western edge of the Archean North Atlantic Craton, and includes the Saglek Block, where >3.6 Ga Uivak orthogneisses were intercalated with a variety of supracrustals during Neoarchean granulite-grade metamorphism. In order to unravel the complex magmatic and metamorphic history of this terrane, samples of grey orthogneiss mapped as Uivak Gneiss were taken from Tigigakyuk Inlet, where previous studies have suggested the preservation of >3.9 Ga zircons [1]. Samples vary from fine, equigranular felsic-intermediate gneiss, through slightly porphyroblastic metagranitoids to metagabbros. Felsic orthogneises are mostly composed of oligoclase, quartz, biotite and K-feldspar, whereas more mafic samples contain hornblende and augite, with the latter being largely altered to pargasite during post-granulite hydration and lower-grade metamorphism. Geochemically, all samples follow a calc-alkaline differentiation trend, and are metaluminous to slightly peraluminous. Based on the normative albite–anorthite–orthoclase diagram, samples plot within the tonalite and trondhjemite fields; however, according to the normative QAPF classification, they are granodioritic to quartz-monzodioritic. Following the criteria of Moyen and Martin (2012), only one granodioritic sample represents typical Archean TTG gneiss, while the other samples are slightly more K-rich. Although bulk compositions may have been affected by K-enrichment during granulite-facies metamorphism, these samples mostly belong to the "TTG-like" suite. Concordant SIMS U-Pb age data obtained from the zircon cores with characteristic igneous growth textures from TTG-like and quartz monzodioritic gneiss fall within the interval 3.70-3.75 Ga, consistent with previous age estimates for the protoliths of Uivak I gneisses [3,4]. Some quartz monzodioritic gneisses are significantly younger (3.55 Ga), showing that the gneisses at Tigigakyuk Inlet are not of a simple magmatic suite, but are instead composite. Inheritance of ∼3.7 Ga zircons in 3.55 Ga quartz monzodioritic gneiss is evidence that the younger magmatism is not from an exotic terrane, but is produced at least partially through the recycling of Uivak I gneissic crust during later magmatism, prior to orogenic reworking at ∼2.7 Ga. Although pre-3.8 Ga zircons was not found in this study, the geochemistry of Uivak I gneisses may suggest a degree of crustal reworking at ∼3.7 Ga.

References:
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