Generation of early continental crust: A billion year of TTG evolution from the Eoarchean Saglek Block, Canada

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The Tonalite-Trondhjemite-Granodiorite (TTG) igneous suite prevails in exposed Eo- to Mesoarchean terranes. Two of Earth's largest exposures of Eoarchean TTG suites occur in the North Atlantic Craton, comprising the Eoarchean (≥ 3.6 Ga) Uivak gneiss complex of the Saglek Block (Canada) and its broad equivalent, the Itsaq gneiss complex (Western-Greenland, [1]). Through a combined zircon U-Pb/Hf/O isotope study, we aim to further constrain both the chronology of the emplacement/reworking events of TTGs from the Eoarchean Saglek Block and the processes accounting for the early Earth crustal production.

Our zircon U–Pb analyses confirm that the evolution of the Saglek Block streches from the early Eoarchean, at *ca*. 3.9 Ga, to the late Neoarchean at *ca*. 2.8-2.7 Ga [2].

Zircon domains ≥ 3.6 Ga-old, which display homogeneous to oscillatory zoned internal texture, feature consistent and broadly chondritic Hf-isotope compositions. These chondritic Hf-signatures support the overall low proportion of radiogenic Hf compositions observed in the present-day worldwide dataset of ≥ 3.6 Ga-old zircon. The ≥ 3.6 Ga-old zircon domains from the Saglek Block have $\delta^{18}O_{zircon}$ values ranging from mantle-like signature of +4.9±0.2‰ to +6.8.0±0.2‰ (n=30), possibly reflecting the presence of a low-T altered protolith in the source magma of these samples [3]. Younger zircon domains of *ca*. 2.8-2.7 Ga occur as complexely zoned overgrowths sometimes transgressive into older domains. These *ca*. 2.8-2.7 Ga domains feature heterogeneous Hf-signature from -23 to -5 ε-units. Such large variations may reflect uneven mixing with a radiogenic component and strikingly contrast with the remarkably homogeneous O-isotope composition measured on these domains, yielding an average of +6.7±0.1‰ (n=7).

[1] Bridgwater *et al.* (1973) *Phil. Trans. R. Soc. London, Ser. A* **273**, 493-512. [2] Komiya *et al.* (2017) *Geosci. Front.* **8**, 355-385. [3] Valley *et al.* (2005) *Contrib. Mineral. Petrol.* **150**, 561-580.