Combined Lu-Hf & Sm-Nd garnet constraints on Archean crustal growth at the SE-Greenland margin

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The area around Skjoldungen region in South East Greenland, part of the North Atlantic Craton, has preserved manifold metamorphic events since the late Archean, with the most penetrative overprint during the Skjoldungen Orogeny (2.7-2.8 Ga). Granitic melts form larger bodies in the basement or are emplaced as minor sheets within "supracrustal belts" (SB) and in most cases granulite facies overprint seems to pre-date the granite. U-Pb zircon ages overall suggest that the youngest granite intrusions (< ca. 2715 Ma) are undeformed, indicating that deformation occurred between 2.76 and 2.71 Ga.

Here we present Hf-Nd-isotope data for whole rocks and mineral from metamorphic and igneous rocks from one of the SB in the area, focusing on garnet-sillimanite schists. In low strain domains, this unit comprises undeformed leucocratic granite melt pockets. A combination of Lu-Hf garnet and U-Pb zircon geochronology dates peak metamorphic conditions to 2742 ± 26 Ma, followed by a second tectono-metamorphic and magmatic period (~2710 Ma). Sm-Nd garnet ages (2678.9 ± 4.8 Ma) can further constrain the metamorphic history, as opposed to Lu-Hf these rather reflect cooling ages. In support of this view, Ti in zircon thermometry of grains that have been U-Pb dated to 2701 ± 14 Ma yield temperatures of 780 ± 20 °C, in general agreement with the lower T_C of the Sm-Nd system compared to that of Lu-Hf [1].

[1] Scherer *et al*. (2000) *Geochim. et Cosmochim. Acta* **64**, 3413-3432.