

Hf-Nd isotope and platinum group element patterns of >3.8 Ga mantle peridotites from SW Greenland

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The 3.6-3.9 Ga Itsaq Gneiss Complex (IGC) of southern West Greenland hosts the three localities known worldwide that had been identified as potential candidates for preserving relics of Early Archean mantle [1,2]. In order to gain new insights into the evolution and isotopic composition of the Eoarchean mantle, a new, carefully collected sample set from two of those localities were investigated in terms of their petrology and geochemistry. The samples have included well preserved peridotites from the region south of the Isua Supracrustal belt and from the Narssaq ultramafic body, south of Nuuk.

Combined petrological and geochemical investigations, including platinum group element and Re-Os isotope data, provide evidence that indeed remnants of > 3.8 Ga mantle peridotites occur at the two investigated localities in the IGC. Importantly, these mantle peridotites display a clear vestige of a chondritic late veneer signature, with compositions similar to present-day mantle rocks, thereby showing that a chondritic late veneer was mixed efficiently into the sampled mantle domain by Eoarchean time.

The first Lu-Hf and Sm-Nd isotope analyses of whole rock and mineral separates (olivine, orthopyroxene and amphibole) indicate minor disturbance of those isotope systems in some of the peridotites. The well preserved peridotites, including mantle rocks have positive $\epsilon_{\text{Hf}}(3.85)$ and $\epsilon_{\text{Nd}}(3.85)$ from +4.0 to +6.3 and +1.9 to +5.0 respectively and display Eoarchean ages. In $\epsilon_{\text{Hf}}(t)$ - $\epsilon_{\text{Nd}}(t)$ space, the initial ϵ_{Hf} and ϵ_{Nd} values suggest decoupling of Hf-Nd isotope compositions in the Eoarchean mantle source of Isua rocks as also reported for tholeiitic metabasalts and TTGs from the Isua region [3]. This decoupling is possibly inherited from early recycling processes.

[1] Friend, C.R.L., Bennett, V.C., Nutman, A.P. (2002): *CMP*, 143, 71–92. [2] Nutman, A. P., Friend, C., Horie, K., Hidaka, H. in *The Earth's Oldest Rocks* (eds Van Kranendonk, M. J., Smithies, R. H. & Bennett, V. C.) 1013–1035 (Elsevier, 2007). [3] Hoffmann, J.E., Münker, C., Polat A., Rosing M.T., Schulz, T. (2011); *GCA* 75(21), 6610-6628.