

## **New petrological and age data from the eclogite province in the central segment of the Greenlandic Caledonides**

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The Caledonian orogen in northeastern Greenland is a 1200 km long, west-vergent nappe pile mirroring the much better explored Caledonides in Scandinavia. The Greenlandic orogen has traditionally been viewed as the retro-wedge of the Scandinavian Caledonides, which is generally accepted to be the result of west-directed subduction of the Iapetus oceanic realm and the Baltic continental margin. This concept, however, is challenged by the finding of widely distributed high-pressure metamorphism as well as the large amount of horizontal shortening accommodated in the Greenlandic nappe pile (Gasser 2014, and references therein). While eclogites in Liverpool Land in the very south have been interpreted to belong to a window into Baltica, the vast domains of eclogite-bearing basement in the central segment of the orogen are attributed to the Laurentian continental margin. Existing ages for high-pressure metamorphism in this area using U-Pb-zircon and Sm-Nd-garnet dating scatter at 420-390 Ma with an exceptionally young age of 370-330 Ma found for the so far only ultrahigh-pressure location in a very internal position of the orogen (e.g. Gilotti et al. 2004). Eclogite-facies metamorphism in Greenland seems thus coeval to or even younger than the main Scandian orogeny in Scandinavia. However, the relatively high temperatures of metamorphism leave room for the interpretation of the Sm-Nd ages as cooling ages. We present petrologic and Lu-Hf-garnet-age data from three locations in the central eclogite province in Greenland and discuss the implications for tectonic scenarios. Investigated rocks are high-temperature eclogites/high-pressure mafic granulites, and garnet pyroxenites. Samples from the well-known location Danmarkshavn record ultrahigh-pressure metamorphic conditions by means of SiO<sub>2</sub>-exsolutions in clinopyroxene and thermobarometric results. An eclogite yielded a Lu-Hf garnet-whole-rock age of 360 Ma thus confirming the existing young age for ultrahigh-pressure metamorphism obtained 140 kilometers away. Samples from the two other locations (Sondre Mellemland and Store Koldewey) preserve the typical high-temperature eclogite-facies conditions and yield ages of 385 Ma and 400 Ma, respectively. Our results suggest that ultrahigh-pressure rocks in northeastern Greenland may be much wider distributed than presently known and corroborate the existence of very young isotopic ages in these rocks. They also confirm the existing Sm-Nd ages around 400 Ma in the majority of eclogites leaving us with the puzzling conclusion that the Laurentian and Baltic margins were apparently subducted at the same time in opposite directions.

Gasser D (2014): The Caledonides of Greenland, Svalbard and other Arctic areas: status of research and open questions. In Corfu F et al. (2014): *New Perspectives on the Caledonides of Scandinavia and Related Areas*. *GSL SP*, 390, 93–129.

Gilotti JA, et al. (2004): Devonian to Carboniferous collision in the Greenland Caledonides: U-Pb zircon and Sm-Nd ages of high-pressure and ultrahigh-pressure metamorphism. *CMP*, 148, 216 – 235.