Metamorphic evolution of relict eclogite-facies rocks in the Nagssugtoqidian Orogen, south-east Greenland

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The Nagssugtoqidian Orogen (NO) is a deeply eroded, Palaeoproterozoic collision orogen in South-East Greenland [1]. It consists of a variety of Archaean and Palaeoproterozoic rocks, most notably TTG gneisses, sheets of mafic and felsic supracrustal rocks and Palaeoproterozoic mafic dykes that contain relict eclogite facies mineral assemblages [1]. This study aims at providing new insight into the geodynamic processes and subduction depth of this Palaeoproterozoic orogen by investigating the metamorphic evolution of the high-pressure rocks during deformation. Relics of and pseudomorphs after high-pressure mineral assemblages are frequently found within garnet pyroxenite and retrogressed eclogite. Garnet and rutile in retrogressed eclogite can either be pristine or variably pseudomorphed by coronas of quartz + hornblende + plagioclase (for garnet) and titanite + ilmenite (for rutile). Omphacite instead is complety replaced by worm-like plagioclase + hornblende + diopside symplectites. Although the degree of replacement and resulting mineral assemblage after retrogression are highly variable depending on bulk rock composition, the replacement textures are typical of exhumed eclogites, in which the high-pressure mineral assemblages became unstable during decompression. Conventional geothermobarometry combined with pseudosection modelling reveal eclogite facies PT-conditions of 740-830°C and 24-27 kbar (garnet-pyroxenite) around 1867 ± 28 Ma [1], followed by near-isothermal decompression to high-pressure amphibolite facies conditions of 700-800°C and 9-12 kbar (retrogressed eclogite) at 1817 ± 22 Ma [1]. The peak PT-conditions are consistent with the presence of UHP-rocks in the NO of West Greenland [2] and correspond to subduction depths of about 80-90 km.

[1] Nutman et al. (2008) *American Journal of Science* **308**, 529-572. [2] Glassley et al. (2014) *American Mineralogist* **99**, 1315-1334.