

EVIDENCE FOR ULTRA-HIGH PRESSURE (UHP) METAMORPHISM WITHIN PROTEROZOIC BASEMENT ROCKS ON OTRØY, WESTERN GNEISS REGION, NORWAY

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Vestiges of Scandian ultra-high pressure (UHP) metamorphism have been increasingly recognized in recent years within coastal rocks of the Western Gneiss Region (WGR) north of Nordfjord, western Norway (TERRY et al., 2000; VAN ROERMUND et al., 2002; ROOT et al., 2003). Here we present new field-, mineral-chemical- and microstructural evidence from the northern part of Otrøy island indicating that the Proterozoic basement rocks on Otrøy also underwent UHP metamorphism.

The Proterozoic Baltica basement rocks on northern Otrøy consist of E-W to NNE-SSW trending belts that consist of interlayered augen orthogneiss (often migmatitic) and well-layered (migmatitic) dioritic-granodioritic gneiss with abundant eclogites and subordinate garnet peridotites. The dominant foliation is subvertical, often with a well developed subhorizontal E-W amphibolite facies lineation. Previous studies (CARSWELL et al., 1985; KROGH & CARSWELL, 1995) concluded that incorporation of the garnet peridotite into the Caledonian basement rocks during the Scandian occurred within the β -quartz stability field. In addition it is well known that the garnet peridotites contain Proterozoic (M1) and Caledonian (M2) mineral assemblages but microstructural criteria can easily be used to distinguish between both age generations. We have applied standard geothermobarometric techniques on newly discovered and old (re-studied) occurrences of external Opx eclogites. These results were subsequently compared with similar M2 rock-types (garnet websterite) occurring within garnet peridotites. Previous studies also concluded that Al_2O_3 wt% values in Opx ≥ 0.6 roughly corresponding to 750 – 800 °C and 18 - 20 Kbar. This is in strong contrast to the results of this study in which for the external Opx eclogites values as low as 0.5 and for the internal (and recrystallised) garnet websterites values as low as 0.25 could easily be identified within EMP-cross sections across Opx grains adjacent to Grt. In combination with various established thermometers this corresponded in all cases to P-T estimates above the β -quartz / coesite phase boundary line indicating UHP metamorphic conditions. A supplementary search for the presence of other UHP index minerals that ought to be present in other rock types have so far been unsuccessful. In our opinion this can be explained by the severe amphibolite facies retrograde metamorphic overprint that characterises most of the rocks.

We conclude that based on the internal and external orthopyroxene eclogites/pyroxenites results the basement rocks on Otrøy can be classified as UHP.

References

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