Scandian Ultra-High Pressure Metamorphism in the Western Gneiss Region of Norway

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An updated review is presented of the distribution and characterisation of UHP rocks within the WGR based on recent studies which have documented an increased number of scattered localities which preserve mineralogical evidences that they witnessed a late Palaeozoic UHP event. Petrographic features in eclogites, such as the presence or absence of coesite (or its polycrystalline quartz pseudomorph) and of prograde zoning in garnet, match the thermobarometric evaluations in indicating a regional gradient in both P and T from 500°C and 1.6 GPa at Sunnfjord to >800°C and 3.2 GPa in the Nordøyene area. Determined P-T conditions define a field gradient corresponding to an increase of ca. 5°C/km towards the NW, in line with the currently favoured model of increased depths of NW subduction of the Baltic Plate rocks of the WGR beneath the overriding Laurentian Plate. However, in detail the WGR is a composite terrane comprising several different tectonic units and it largely remains to be established whether these various lithological units (including mantle-derived peridotite bodies) were juxtaposed during subduction or the ensuing exhumation.

On current evidence the UHP part of the WGR may only cover a NW coastal strip of some 5000 km^2 and passes to the SE into rocks which only experienced HP eclogite-facies conditions. The boundary between these two areas is marked by a 5-10 km wide mixed zone of HP (quartz-stable) and UHP (coesite-stable) eclogites. Despite pressure differences of typically 0.3-0.5 Gpa between nearby HP and UHP eclogites, recorded temperatures overlap and obvious tectonic breaks are lacking. Explanation of this zone and other enigmatic features of the WGR may lie in kinetic control on the highly variable mineral reactivity displayed by the rocks in response to both prograde and retrograde metamorphic conditions during a rapid cycle of subduction and exhumation.