MONAZITE AND TITANITE U-PB DATING OF CALEDONIAN HIGH-GRADE METAMORPHISM IN THE MID-SCANDINAVIAN CALEDONIDES, NORWAY: A COMBINED SHRIMP AND ID-TIMS APPROACH

B. Bingen (1), W.J. Davis (2), M.A Hamilton, P.T. Osmundsen (1), Ø. Nordgulen (1)
(1) Geological Survey of Norway, 7491 Trondheim, Norway, (2) Geological Survey of Canada, K1A0E8 Ottawa, Canada (bernard.bingen@ngu.no, bdavis@gsc.nrcan.gc.ca)

Crystals of metamorphic monazite commonly display age domains related to distinct episodes of growth or secondary crystallization. SHRIMP analyses of monazite in metapelite samples from north-central Norway, demonstrate homogeneous monazite populations, with unimodal age distribution. ID-TIMS analyses of single-grain or small fractions give reliable and precise estimates for the timing of monazite growth. Monazite, titanite and zircon U-Pb data constrain the duration of high-grade Scandinavian metamorphism to be 25 m.y. in this part of the orogen (426-401 Ma) and underscore the importance of late-Scandian extensional detachments as tectonometamorphic breaks between the Central Norway Basement Window (CNBW) and overlying nappes of the Upper (Köli nappes) and Uppermost Allochthons (Helgeland nappes). The CNBW is a core complex-like culmination trending ENE-WSW, made of high-pressure amphibolite-facies (locally granulite-facies) Proterozoic gneisses and in-folded supracrustal rocks. Monazite from a garnet-kyanite gneiss yields an age of 426 +/- 1 Ma reflecting conspicuous migmatization in the rock. Monazite in two garnet +/- kyanite gneisses with minor staurolite yields ages of 420 +/-2 and 403 +/-5 Ma. A deformed garnet-bearing granitic dyke yields a zircon intrusion age of 417 +/-5 Ma. Titanite in four samples of calc-silicate gneiss and marble define a tight cluster between 403 and 401 +/-2 Ma. Titanite pre-dates top-WSW ductile extensional shearing along the Høybakken detachment in the SW of the CNBW and consequently constrains final exhumation of the window to be younger than 401 Ma. The Upper and
Uppermost allochthons overlying the CNBW are made of greenshist to amphibolite-facies supracrustal rocks and plutonic complexes intruded at ca. 495, 480, 460, 445 and 428 Ma. Scandian translation of these outboard nappes onto Baltica occurred after 428 Ma. In the eastern Helgeland nappes, monazite in mica gneiss and titanite in amphibole gneiss and marble range from 431 +/- 1 to 429 +/- 2 Ma. On the island of Hitra, titanite in a marble yields an age of 443 +/- 4 Ma. Analyzed monazite and titanite in these nappes are coeval with the last pulse of local plutonism. This implies that high grade metamorphism in these nappes relates to the pre-Scandian evolution and that these nappes remained at high crustal level during the Scandian event.