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Late-and-post Caledonian tectonic exhumation of middle- and lower-crustal rocks exposed in the region between Bodø and the Lofoten Islands, north Norway (Latitudes 67.5-69o N)

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Isotopic age data combine with structural and petrological information to allow insights into the timing and style of Caledonian tectonic burial and later exhumation of middle- and lower crustal rocks now exposed in the region between Bodø and the Lofoten Islands, north Norway (Latitudes 67.5-69o N). Our current understanding of the Devonian detachment system in the central and northern parts of Scandinavia lags far behind that established in western Norway, partly because the absence of exposed or submerged Devonian sedimentary basins makes distinguishing and tracing exhumation features a time-and-money intensive (mapping and thermochronology) effort. In the region around Bodø, the Fjær-Osvika/Steigtinden shear zone is a tops-west low-angle normal fault (LANF) that cuts structurally downward through the Rödingsfjället and Heggmo nappes, juxtaposing greenschist-facies Bodø Nappe units upon amphibolite-facies rocks. This LANF cuts the Scandian (S2) schistosity/gneissosity and map-scale, post-metamorphic (F3) folds. Isotopic dates do not yet precisely date the timing of extensional movement but bracket it between ∼409 and 355 Ma. Farther north in the Ofoten-Lofoten region, the Eidsfjord detachment is a late-stage tops-west LANF that has emplaced anorthosite/migmatitic gneiss in the upper plate upon mangerite in the lower plate. 40Ar/39Ar isotopic dates on recrystallized muscovite from mylonites defining the Eidsfjord shear zone indicate an age of ∼403 for deformation and recrystallization while lower plate cooling dates are ∼380-370 Ma. 40Ar/39Ar analysis for muscovite from mylonitized rocks of the Fiskefjord shear zone, a nearby tops-east Caledonian thrust that was reactivated as a tops-west normal fault, document upper-plate cooling through the ∼350° C isotherm at ∼457 Ma. Together with Middle Ordovician eclogites found farther west in Lofoten, tops-west normal-slip movement on these extensional shear zones explains maintenance of high-crustal levels throughout the Siluro-Devonian Scandian event. Potassium feldspar 40Ar/39Ar data document pulses of uplift and cooling between ca. 235 Ma and 185 Ma, consistent with formation of Triassic-Jurassic rift basins flanking the Lofoten Ridge. We interpret the Eidsfjord detachment to mark the northern terminus of the Early Devonian detachment system. The timing, geometry, kinematics, and rheological development of Eidsfjord detachment are grossly similar to the Nordfjord-Sogn detachment but the former contrasts in that it appears to lack associated Devonian basins, has smaller magnitudes of displacement, a more prolonged exhumation history, is severely chopped by later high-angle normal faults related to rifting and final Eocene continental separation, and it has abundant pseudotachylite occurrences in the upper plate. We further speculate on correlations to detachments of roughly the same age on the conjugate side of the orogen in East Greenland.