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Crustal structure and composition beneath the Trøndelag Platform, mid-Norwegian margin, derived from wide-angle seismic and gravity data

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Two wide-angle Ocean Bottom Seismic profiles acquired from the Vøring Basin, across the Trøndelag Plattform and to the Norwegian mainland as part of the EU-ROMARGINS 2003 Experiment, have been modeled by use of P- and S-wave travel-time inversion / forward modeling, supported by gravity modeling. The modeling was based on interpretation of high-quality multi-channel seismic data acquired earlier, providing reliable constraints from the seafloor to top Triassic. The modeling indicates that the top of the crystalline crust dips downwards from the seafloor southeast of the main Border Fault Complex (BFC) to 12-13 km depths at the transition between the Halten/Dønna terraces and the Vøring Basin. The depth to the crystalline basement beneath the Trøndelag Platform is typically 7-8 km. Vp/Vs-ratios indicates that the crystalline crust consists dominantly of felsic, granulite facies rocks. The P-wave velocities in the uppermost crystalline basement southeast of the BFC, where basement outcrops on the seafloor at several locations, is as low as c. 5.6 km/s, indicative of the presence of cracks. Beneath this layer, the crystalline crust is divided in three layers with average felsic composition. The lower crustal high-velocity layer (7.2-7.6 km/s), which characterizes most of the Vøring Basin and is generally interpreted in terms of mafic intrusions related to the last phase of rifting/break-up, is not present beneath the Trøndelag Platform. Moho is shallowing westwards beneath the Trøndelag Platform from about 30 km at the BFC to about 23-25 km at the western edge of the Halten/Dønna terraces reflecting crustal thinning in response to Permian-early Triassic

extension and formation of the Froan Basin. The depth to Moho of 31-33 km beneath the coastal region of Trøndelag is slightly less than indicated by earlier studies. Velocity and density anomalies observed beneath Moho along the southeastern part of the profiles are interpreted in terms of eclogitized rocks formed during the Caledonian Orogeny. The BFC is interpreted as a remnant of the main Caledonian suture zone, reactivated as a normal fault during the post-Caledonian collapse and earliest basin formation.