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Crustal structure of the East Greenland volcanic margin - II: alongstrike variations between the Jan Mayen and Greenland fracture zones

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Beside wide-angle seismic data acquired for the EUROMARGINS project, two additional seismic refraction profiles were gathered further north across the East Greenland rifted margin during an expedition in 2003. This dataset provides new insights into the formation of the entire continental margin segment between the Jan Mayen and the Greenland fracture zones.

A total of 25 ocean bottom seismometers (OBS) were deployed from the Greenland shelf into the Greenland basin along the 330 km long northernmost profile, AWI-20030200. The transect near the Greenland Fracture Zone crosses an area with very thick sedimentary basins. These continental sediments on the shelf show uniformly high seismic velocities in the upper layers (2.2 km/s), which is the result of glacial compaction. The occurrence of low velocity zones and a large basin thickness leads to the absence of seismic signals from the crystalline continental crust. Typical seismic velocities and thicknesses were found for deep sea sediments (1.6 – 2.4 km/s, 1 – 1.5 km) and oceanic crust (4.8 – 7.0 km/s, 6 km) further offshore. In contrast to the southern profiles, no evidence for massive underplating could be found.

The second profile, AWI-20030300, was acquired in the prolongation of the Ardencaple Fjord south of Shannon Island with 25 OBS and six REFTEK landstations. P-wave modelling reveals a slightly different crustal structure than that on the two southern profiles. While the 30 km thick continental crust shows strong structural variations, a diffuse ($\sim$70 km wide) transition zone leaves the lower crust ambiguous. The middle crust of the continent-ocean transition (COT) is characterised by an in-

creased velocity gradient compared to normal continental crust. In the ∼100 km wide region, between magnetic spreading anomalies C24 and C22, the lower oceanic crust has high velocities of 7.0 – 7.3 km/s. The oceanic crust consists of a thin layer 2A (4.3 km/s), a layer 2B (4.7-6.7 km/s) and a layer 3A/B (6.8 – 7.3 km/s) whose thickness increases from 5 km at the eastern end of the profile to almost 16 km near the COT. Seaward dipping reflectors (SDRs) can be inferred from multi channel seismic (MCS) data and from slow p-wave velocities in the upper oceanic crust between anomalies C24 and C23.

An overall view of all four seismic refraction profiles shows significant variations in the crustal structure along the margin. These include a decrease in the thicknesses of the magmatic underplate towards the north, and a widening of the COT in the south. These variations may indicate variable rift processes along the rifted continental margin between the Jan Mayen and the Greenland fracture zones.