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# Lithospheric structure and topography in Central-Eastern Greenland

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We present models of the seismic structure of the crust and upper mantle in the interior of Greenland based on new seismological data from the TopoGreenland experiment. Until this experiment, all seismic data in Greenland was acquired close to the coast, where the crustal structure is affected by oceanic break-up. The TopoGreenland data acquisition programme in central-eastern Greenland included the first controlled source seismic experiment in interior Greenland and deployment of 24 broadband (BB) onshore stations for 3 years, partly on the ice cap. The 320 km long seismic refraction/wide-angle reflection profile was acquired on the ice cap by a team of six people during two-months in summer of 2011.

We present a 2D velocity model of the crust based on tomographic inversion and forward ray tracing modelling of the controlled source data. It shows a decrease of crustal thickness from 47 km below the centre of Greenland in the western to 40 km in its eastern part of the profile. High lower crustal velocities (Vp 6.8 – 7.3 km/s) below central Greenland may result from past collision tectonics or be related to the passage of the Iceland mantle plume. Crustal receiver functions in the surrounding area demonstrate constant structure along the coast and pronounced, relatively sharp variation in crustal thickness around the mountains at the edge of the ice cap. Surprisingly the thickest crust is observed below the lowest topography under the ice cap, whereas the crust is thin below the high mountains at its edge, and thins further below elevated topography out to the coast. Receiver Function interpretation of the mantle and transition zone structure shows a complicated mosaic variation that cannot be correlated to the variation in topography.

The origin of the pronounced mountain ranges around the North Atlantic Ocean with average elevation above 1500 m and peak elevations of more than 3.5 km near Scoresby Sund in Eastern Greenland, is unknown. Our new results demonstrate that crustal isostasy alone cannot explain the topographic variation in central-eastern Greenland, and other phenomena, including possible dynamic processes must be active in the area, although the mantle structure identified so cannot explain the topographic variation either.