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Slow upper mantle beneath Southern Norway from surface waves

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A recent regional surface wave tomography for Northern Europe revealed unprecedented images of the upper mantle beneath the (Tertiary) North Atlantic and the bordering Fennoscandian craton of Archean-Proterozoic age. With respect to the circum-Atlantic regions of uplift, no common mantle pattern supporting the uplift of these regions is observed.

The western boundary of the thick cratonic lithosphere follows the trend of the continental margin offshore northern Norway (i.e. the northern Scandes are underlain by thick lithosphere) whereas further south the boundary of the craton is located further east beneath southwestern Sweden. SV shear wave velocities beneath southern Norway are 10% slower than ak135 (at 70-115 km depth) and these low-velocities are clearly connected to the North Atlantic low-velocity regime through a $\sim$ 400 km wide "channel". The low-velocity anomaly beneath Southern Norway coincides in geometry roughly with the dome-like high topography of the southern Scandes and may thus have a non-negligible contribution to the isostatic balance of the region.

The amplitude and depth-distribution of this anomaly are due to be further constrained by new data that were acquired during the MAGNUS experiment in 2006-2008. The temporary seismic network, consisting of 40 broadband seismometers covers to a large extent the location of the anomaly as imaged by the regional tomography. This enables us to get unique control on the tomographic model at improved lateral and vertical resolution. Preliminary analysis of surface wave phase velocities yields an average 1-D shear wave velocity profile for southern Norway as a first step to constrain the presence and depth extent of this low-velocity anomaly.