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P-wave residuals and preliminary results of P-wave tomography in southern Scandinavia

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The aim of the present study is to investigate upper mantle structures and possible lithospheric transition zones in southern Scandinavia. Results of P-wave residuals together with preliminary results of P-wave tomography are presented.
The Tor project reveals a sharp lithospheric transition coinsiding with the Sorgenfrei-Tornquist Zone between the Baltic Shield area in southern Sweden and the Danish Basin. The northward prolongation of this transition has not yet been identified. Previous P-wave residual, surface wave and global tomography studies including this area seem to indicate a thinning lithosphere westwards from the center of the Baltic Shield to the Norwegian westcoast. However, resolution is limited by low number of stations. The timing and processes of formation of the Scandinavian mountains, including the high topography in southern Norway, remain an unsolved problem. Among the open questions is the potential buoyancy from the uppermost mantle. To address these problems we present new results obtained by using data from 35 temporary stations in addition to selected Tor-stations and permanent stations available. Temporary stations were deployed in different time intervals, for periods of about one year. They were deployed in southern Norway across the highest topography, and southward into northern Denmark across the Sorgenfrei-Tornquist Zone.
After crustal corrections relative P-wave residuals in the area are generally within +-0.7s. Late arrivals are observed in southern Norway and the Danish area, getting earlier towards the north-east. Azimuthal dependence increases towards the Oslo Graben. Both P-wave residuals and preliminary tomography indicate the presence of a north-south oriented lithospheric transition extending from the Sorgenfrei-Tornquist Zone in the south, between Denmark and Sweden, to the area around the Oslo Graben. Lowest mantle velocities are found to the west, in southern Norway and the Danish Basin. Higher velocities are to the east in the Baltic Shield area. This velocity distribution

indicates that in addition to significant crustal buoyancy also some buoyancy beneath the south Norwegian highlands originate from the uppermost mantle.