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Towards a comprehensive model of the lithosphere-asthenosphere system below Southern Norway

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This presents a compilation of the results obtained up to now in the TopoScandiaDeep project, a component of TOPOEUROPE that addresses the question of the origin of the topography of Scandinavia.

The Scandinavian mountains form the second major element of the European topography, just after the active Mediterranean orogenic area. Its origin, away from any presently active plate margin, is however not understood. In particular, it is not clear if the mountains are sustained isostatically either by crustal thickening or by light upper mantle material. Focus is therefore put here on a refined model of crustal thickness and mantle structure for the area. Most of the results presented here are the outcome of the analysis of seismological data acquired with 31 broadband stations deployed in Southern Norway from summer 2006 to summer 2008, supplemented by 9 permanent stations. The data quality is overall excellent, with 98% data recovery, a good azimuthal coverage and events in a large span of epicentral distances.

Preliminary results of P-wave tomography show a sharp boundary between low mantle velocities below southern Norway and high velocities to the East. Low S-wave velocities are also imaged in the same area by surface wave phase velocity analysis. S-receiver functions are used to locate discontinuities in the mantle. A preliminary map of Moho depth obtained with P-receiver functions is compared with Moho depth obtained from 3 recent refraction lines and previous estimates of crustal thickness. One of the refraction line has been extended with OBS recordings on the continental margin and preliminary results of this data acquisition will be presented. Results of noise studies to constrain the upper part of the crust will also be summarized.