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Crustal study of the Northern Scandinavian Mountains from receiver functions analysis and surface wave ambient noise

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The Scandinavian Mountains are a topographic anomaly on the North-East Atlantic passive margin. With heights above 1 km adjacent to the low-lying Baltic Shield (average altitude of 500 m), this mountain range has undergone a rejuvenation by an uplift event during the Neogene. The absence of a crustal root expected from Airy isostasy calculations , the variation of gravity anomaly and the possibility of a low velocity zone in the upper crust suggest variations in density within the crust. This mechanism will explain the (isostatic) equilibrium of the mountain range. With this perspective two passive seismic experiments were deployed in 2007-2009 (SCANLIPS2) and 2013-2014 (SCANLIPS3D) across the Northern Scandinavian Mountains. These 2 experiments allow a better characterization of the crust in terms of Moho depth, Poissons ratio and shear wave velocity. Here we will show a new Moho map compiled from our new results together with previous studies (LAPNET-POLNET, SNSN and NORSAR network) in this region. This map shows a crustal thickening from West to East (40 km to 50 km) without any obvious influence of the transition from the Scandinavian Mountains to the Baltic Shield. From our receiver functions only, inverse modelling does not confirm the presence of a low velocity zone in the upper crust as suggested in previous work in the area using P receiver functions and controlled source experiments. We therefore use Rayleigh waves ambient seismic noise to better constrain the shear wave velocity at the short periods (3- 30 s). Finally a joint inversion of the P-receiver functions and surface wave ambient noise used to build a new 2D crustal model across the Northern Scandinavian Mountains. This new crustal model confirms the assumption of the variation densities within the crust like the source of this topographic anomaly on this passive margin.

キーワード: Scandinavian Mountains, Neogene uplift, variation density, P-Receiver Functions, Rayleigh waves dispersion curve, joint inversion
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