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Density structure of the Scandes lithosphere from surface to depth

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In our study, we demonstrate the importance of the near-surface density distribution (upper 5 km of the crust) in modelling of the density structure of the lithosphere. The Bouguer anomaly over the Norwegian mountains (Scandes) shows a gravity low along the entire Scandes mountain belt, which is indicating, at least partly, isostatic compensation. In contrast to this observation seismological studies have not imaged a pronounced crustal root along the entire mountain range, and for the southern Scandes a low-density upper mantle has been introduced by various authors to explain the gravity low and to achieve isostatic equlibrium. In a previous model we showed that the lower crust plays an important role in achieving isostatic equilibrium, but for the southern Scandes a pattern of +/-20 mGal of the gravity low remained unexplained, and appeared to be correlating to surface geology. Here, we make use of a newly established surface density distribution for mainland Norway. Using the variable surface density distribution instead of a constant density for Bouguer correction reduces parts of the remaining gravity residuals due to the variation of surface density (2600-2900 kg/m^3). The Jotun Nappe within the Caledonian Orogen in central southern Norway consists mainly of mafic high-density Precambrian rocks. Extension of the surface geology and measured density to 4 km depth produces a gravity signal that exceeds 40 mGal. Consideration of the gravity effect from the Caledonian nappes gives a gravity signal that more clearly shows a possible mantle component below the Southern Scandes.