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Construction of a 3D crustal velocity model for the greater Barents Sea region

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A new 3D geophysical model for the greater Barents Sea Region was developed by the University of Oslo, NORSAR and the U.S. Geological Survey. A considerable amount of continuous seismic velocity transects were compiled and deep-seismic multi-channel data in the SW was further used for density modeling and subsequent density-to-velocity conversion. The final velocity model consists of five crustal layers. The model compilation introduced in this study is based on geological provinces of different sizes, such as sedimentary basins, structural highs or volcanic provinces with individual sedimentary, tectonic and magmatic histories. Firstly, the layer velocities and thicknesses were laterally inter- and extrapolated. Within the provinces, linear relationships between the thickness of the sedimentary rocks and the thickness of the remaining crystalline crust are observed. We used therefore the additionally compiled (area-wide) depth-to-basement data to adjust the crystalline crustal thickness according to the sedimentary thickness where no data constraints are given. After the compilation, the p-wave velocity model was converted into a density model, in order to test the structure against independent gravity data and to model densities for each layer. Our model is completed by an upper mantle surface wave inversion model. The resultant model was subsequently verified in terms of traveltimes. In order to do so, we compiled a list of well-located reference events and arrival times not used to construct the model. Within the uncertainty limits, modeled traveltimes fit the available observations and qualitatively validate the model. An outstanding improvement compared to other (older) geophysical models is the high resolution of 50 km throughout the target region. Velocity transects through the 3D model and a new depth-to-Moho map exem-

plifies geological features of the European Arctic and the formerly unknown diversity of the crustal structure in the greater Barents Sea region.