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Unravelling the crustal structure beneath Greenland from 3D density modelling using EIGEN-6C4 gravity data

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The crustal structure beneath Greenland is mostly hidden by the large Greenland Ice Sheet. The ice sheet not only makes geological mapping very difficult, it also impedes the gathering of reflection and refraction seismic data, which are usually used to help unravelling the structure of the crust. However, crustal structure can also be identified from gravity field modelling, which in addition to any available ground measurements can incorporate data from airborne campaigns as well as from satellite missions. Here, we use the modelling software IGMAS+ to develop a new three-dimensional (3D) density model of Greenland. IGMAS+ uses forward modelling to interpret potential field data (gravity and magnetic data). The distribution of bodies with different sizes and densities is implemented on two-dimensional (2D) sections. Those 2D sections are transformed by triangulation into a 3D model, which is used to calculate the gravity signal. The starting model for Greenland is defined using information from geological maps and the Moho boundary, which is also obtained from gravity data. The 3D model is based on EIGEN-6C4 gravity data and results from seismic campaigns as well as seismological models are used as boundary conditions. The model will help to obtain a clearer image of the tectonics of Greenland and to understand the geodynamic history and assemblage of Greenland.