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# Towards improvement of the global Moho model using state-of-the-art models of the Earth's gravity field and additional information about the crust density structure

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Currently, a tremendous improvement is observed in the accuracy and spatial resolution of global Earth's gravity field models. This improvement is achieved due to using various new data, including those from satellite gravimetry missions (CHAMP, GRACE, and GOCE); terrestrial and airborne gravity data, as well as altimetry data. The new gravity field models can be applied, in particular, to improve our knowledge of the Earth's interior structure.
The aim of this study is to compile the global map of the Moho density interface using the global gravity model and additional available information about the crust density structure. In particular, we use the gravity field model EGM2008 and the global crustal model CRUST2.0. The CRUST2.0 model, derived using the seismic data, provides information about the global crust density structure and Moho depths with a 2x2 arc-deg spatial resolution. In addition, we also utilize the global crustal model developed by Meier and collective, which was derived based on the fully nonlinear inversion of fundamental mode surface waves.
The principle of gravimetric inverse methods for a recovery of the Moho depths is based on forward modeling and applying the topographical and crust density components stripping corrections to observed gravity field. This procedure provides the consolidated crust-stripped gravity field quantities. The recovery of the Moho geometry is then based on solving the system of linear observation equations which functionally relates the consolidated crust-stripped gravity field (represented in terms of spherical harmonic coefficients) and the geometry of the Moho interface (represented in terms of discrete values of Moho depths at an equiangular geographical grid). The estimated corrections to the a priori Moho configuration are then obtained solving the respective inverse problem. To minimize the contribution due to the anomalous density distribution within the mantle, the low-degree coefficients of the consolidated crust-stripped gravity field are not taken into consideration. Since the inverse problem under consideration is ill-posed, we apply and compare various regularization schemes. The variance component estimation method is used to estimate the optimum weight of each input data set. For optimum estimation of Moho depth we apply degree dependent weights to the gravity data. The results of our numerical realization are presented and compare validated using the high-resolution regional models of European Moho developed by Magdala et al. (EuCrust-07) and Marak Grad et al.