Geophysical Research Abstracts
Vol. 16, EGU2014-3737, 2014
EGU General Assembly 2014

A Least Squares Collocation Approach with GOCE gravity gradients for regional Moho-estimation

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The depth of the Moho discontinuity is commonly derived by either seismic observations, gravity measurements or combinations of both. In this study, we aim to use the gravity gradient measurements of the GOCE satellite mission in a Least Squares Collocation (LSC) approach for the estimation of the Moho depth on regional scale. Due to its mission configuration and measurement setup, GOCE is able to contribute valuable information in particular in the medium wavelengths of the gravity field spectrum, which is also of special interest for the crust-mantle boundary. In contrast to other studies we use the full information of the gradient tensor in all three dimensions.
The problem outline is formulated as isostatically compensated topography according to the Airy-Heiskanen model. By using a topography model in spherical harmonics representation the topographic influences can be reduced from the gradient observations. Under the assumption of constant mantle and crustal densities, surface densities are directly derived by LSC on regional scale, which in turn are converted in Moho depths.
First investigations proofed the ability of this method to resolve the gravity inversion problem already with a small amount of GOCE data and comparisons with other seismic and gravitmetric Moho models for the European region show promising results. With the recently reprocessed GOCE gradients, an improved data set shall be used for the derivation of the Moho depth. In this contribution the processing strategy will be introduced and the most recent developments and results using the currently available GOCE data shall be presented.