Geophysical Research Abstracts
Vol. 16, EGU2014-12831, 2014
EGU General Assembly 2014

Adaptive topographic mass correction for satellite gravity and gravity gradient data

Nils Holzrichter, Wolfgang Szwillus, and Hans-Jürgen Götze
Christian-Albrechts-Universität (CAU), Geosciences, Geophysics, Kiel, Germany (holzrichter@geophysik.uni-kiel.de)

Subsurface modelling with gravity data includes a reliable topographic mass correction. Since decades, this mandatory step is a standard procedure. However, originally methods were developed for local terrestrial surveys. Therefore, these methods often include defaults like a limited correction area of 167 km around an observation point, resampling topography depending on the distance to the station or disregard the curvature of the earth.
New satellite gravity data (e.g. GOCE) can be used for large scale lithospheric modelling with gravity data. The investigation areas can include thousands of kilometres. In addition, measurements are located in the flight height of the satellite (e.g. $\sim$250 km for GOCE). The standard definition of the correction area and the specific grid spacing around an observation point was not developed for stations located in these heights and areas of these dimensions. This asks for a revaluation of the defaults used for topographic correction.
We developed an algorithm which resamples the topography based on an adaptive approach. Instead of resampling topography depending on the distance to the station, the grids will be resampled depending on its influence at the station. Therefore, the only value the user has to define is the desired accuracy of the topographic correction. It is not necessary to define the grid spacing and a limited correction area. Furthermore, the algorithm calculates the topographic mass response with a spherical shaped polyhedral body.
We show examples for local and global gravity datasets and compare the results of the topographic mass correction to existing approaches. We provide suggestions how satellite gravity and gradient data should be corrected.