Geophysical Research Abstracts
Vol. 20, EGU2018-11945, 2018
EGU General Assembly 2018

Stochastic model validation of GRACE gravity data

Saniya Behzadpour (1,2), Torsten Mayer-Guerr (2), Matthias Weigelt (1), Jakob Flury (1), and Sujata Goswami (1)

(1) Leibniz University of Hanover, Institute of Geodesy, Hanover, Germany, (2) Graz University of Technology, Institute of Geodesy, Graz, Austria

To continue and improve the gravity field time series using GRACE and in the near future GRACE-FO data, it is necessary to overcome the limiting factors for the quality of the current gravity field models. A specific challenge in the case of GRACE gravity field estimation is how to achieve an accurate stochastic model of each group of observations, i.e. kinematic orbits and range-rate data. A proper accuracy description is also needed for a combination of these different data types.

Generally, the variance and covariance component estimation (VCE) techniques, such as minimum norm quadratic unbiased estimation (MINQUE), Helmert's estimates, and general maximum likelihood estimation (MLE), have been investigated for all kinds of data combination. It is shown that these methods are identical if the errors have a normal distribution, but the deviation from normal (as in case of GRACE) can lead to different results.

For the ITSG-Grace2016 gravity field solutions, the varying precision of spectral bands in each data set of observation and the relative precision between the groups are derived from postfit residuals PSDs by means of best invariant quadratic unbiased estimation (BIQUE) VCE. The covariance information of the observations is then used as weighting matrix in the least squares adjustment. This leads to improved results as imprecise parts of the data are down-weighted and the influence of precise parts of the observations are better exploited.

This study aims at the validation and ideally improvement of the mentioned stochastic model by (a) improving noise power estimation at each frequency, e.g. considering phase information, and (b) using different VCE techniques to find the optimal weighting approach between observations. The results will be presented and discussed in comparison to the ITSG-Grace2016 model.