Geophysical Research Abstracts
Vol. 14, EGU2012-9876, 2012
EGU General Assembly 2012
© Author(s) 2012

Grids of GOCE gravity gradients by the space-wise approach

A. Gatti (1), F. Migliaccio (2), M. Reguzzoni (2), and F. Sansò (1)

(1) DIIAR, Politecnico di Milano - Polo Territoriale di Como, Como, Italy, (2) DIIAR, Politecnico di Milano, Milan, Italy (mirko@geomatica.como.polimi.it)

The main objective of the GOCE mission is to estimate the Earth gravity field from satellite data with high accuracy and resolution. This estimate is expressed by a truncated series of spherical harmonics, providing users with the series coefficients and their full error covariance matrix. This model, projecting the unknown potential on a finite global basis and inevitably introducing a certain level of regularization, could be less informative than the original observations in some specific areas. On the other hand the observations along the orbit are more complicated to be used, mainly because they are not filtered, they are acquired at different altitudes and they do not have a regular spatial distribution. A compromise between these two data types could be the estimation of data grids at mean satellite altitude.

The space-wise approach is one of the three methods originally supported by the European Space Agency for the GOCE data analysis. One of its main characteristics is to apply the collocation principle for computing spherical grids of potential and its second order radial derivatives at satellite altitude. Therefore this method seems to be well qualified for the purpose of providing users with data grids.

In this work the necessary modifications to make the space-wise approach more grid-oriented are described, including the fact that not only second order radial derivatives of the potential have to be estimated on the grid but also other components of the gravity gradient tensor are required to better represent the original observations. Moreover, horizontal components of the gravity gradient tensor can be more informative on specific geophysical features. The resulting grids, computed on a testing data period, are compared with the corresponding spherical harmonic model and filtered data along the orbit in order to evaluate the information content of the different data types.