Geophysical Research Abstracts, Vol. 8, 03689, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03689

Filtering of the GOCE mission observations

M. Reguzzoni (1) and **N. Tselfes** (2)

(1) Italian National Institute of Oceanography and Applied Geophysics (OGS)
c/o Politecnico di Milano, Polo Regionale di Como, Italy (mirko@geomatica.como.polimi.it)

(2) Politecnico di Milano, Polo Regionale di Como, Italy (nikos@geomatica.como.polimi.it)

The GOCE mission will be the first satellite mission applying the technique of satellite gravity gradiometry. Besides, the orbit of GOCE will be continuously observed by the GPS system and will provide estimates of the gravitational potential. The on-board gradiometer will measure the second derivatives of the potential. In order to transform this information into spherical harmonic coefficients of the geopotential model three methods have been developed, one of which is the space-wise approach.

This approach exploits the spatial correlation between data, by producing a grid of second order derivatives and potential on a boundary sphere at mean satellite altitude. A preprocessing of the data is necessary, due to the heavily colored noise of the gradients and to the lack of reliable prior information regarding the covariance function of this noise. Therefore the observations are filtered in time by a Wiener filter. This provides a new data set where the estimation error covariance function is approximated. A complementary filter must also be iteratively applied to make up for any signal loss.

In this work the Wiener filter application is extended to all the available data and optimal filtering conditions are identified. In particular the performance of the Wiener filter has been tested on the basis of two scenarios of realistic end-to-end simulated data, provided by ESA. It is seen that filtering many sets of data together, in multi-dimensional filters, causes numerical problems, therefore special care has to be taken. Four out of six derivatives are estimated with high accuracy and are useful for the subsequent processing. It is also seen that any choice of optimal filtering parameters should depend on the results of the complementary filtering, since this defines the final accuracy of the used observations. A discussion on the effect of homogenizing the data to obtain a closer agreement with prior hypothesis of the Wiener filter is presented.