Geophysical Research Abstracts, Vol. 8, 08902, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08902

Accuracy Assessment of the Monthly Geoid Variation based upon a GRACE Simulation

E.J.O. Schrama and P.N.A.M. Visser
Delft University of Technology, DEOS, (e.j.o.schrama@tudelft.nl)

Purpose of this contribution is to demonstrate the effect of geophysical background model errors that are known to alias into monthly GRACE geoids. The conventional view is that the quality of the monthly GRACE geoid models only depends on observation noise and the sensitivity of the GRACE tandem towards gravity field variations. Initial performance estimates provided by the GRACE team suggested a formal geoid rms better than 0.1 mm up to spherical harmonic degree 5. Now that the GRACE gravity models and data are available it becomes evident that the original expectations are too optimistic. Our hypothesis is that this phenomenon is partially explained by errors in geophysical background models that need to be applied in the GRACE data reduction. We conclude that such errors systematically affect monthly GRACE solutions and to verify this hypothesis we investigate different scenarios whereby geophysical signals and their errors are simulated for a one year long GRACE dataset. This paper focuses on the recovery of two scientifically interesting signals (ie. continental hydrology and ocean bottom pressures) that we modelled during a simulation with the help of satellite trajectory and parameter estimation software. We discuss a closed-loop experiment whereby the GRACE range-rate errors and GRACE orbit solutions from GPS are simulated as a result of differences between present day tide and atmospheric pressure correction models. In turn during recovery we show that these simulated errors appear on the 1 to 2 mm level in the annual amplitude of the estimated geoid. The simulated annual geoid hydrology signal stands out at a level of 7 to 8 mm maximally, the ECCO model ocean bottom pressure signal is about as large as the noise in the monthly GRACE geoids.