Geophysical Research Abstracts
Vol. 15, EGU2013-9401, 2013
EGU General Assembly 2013

Performance of the fourth generation GOCE time-wise Earth gravity field model

Jan Martin Brockmann (1), Eduard Höck (2), Ina Krasbutter (1), Torsten Mayer-Guerr (3), Roland Pail (4), Wolf-Dieter Schuh (1), and Norbert Zehentner (3)

(1) Intitute of Geodesy and Geoinformation, Theoretical Geodesy, University of Bonn, Bonn, Germany (brockmann@geod.uni-bonn.de), (2) Space Research Institute, Austrian Academy of Sciences, Graz, Austria, (3) Institute of Theoretical Geodesy and Satellite Geodesy, Graz University of Technology, Graz, Austria, (4) Institute of Astronomical and Physical Geodesy, TU München, Munic, Germany

After the launch of the European Space Agency's (ESA) Gravity field and Ocean Circulation Explorer (GOCE) satellite in 2009, the fourth generation of ESAs official Earth's gravity field models were computed within ESA funded High-level Processing Facility (HPF). From the time series of November 2009 to June 2012 effectively two years of 1HZ sampled gravity gradients and GPS tracking observations were used within the gravity field solutions. One of the three gravity field solutions is the so called time-wise solution, producing a standalone gravity field model from GOCE observations only. This gravity field is estimated from the kinematic orbit positions (long wavelengths) and from the gravity gradients (high wavelength) measured with the satellites core instrument the gradiometer. Within the processing of the time-wise solution a lot of effort is spend on the stochastic modeling of the observation errors.
Within this presentation the new model and its performance is presented. Compared to the third release, three major components improved the quality of the new model EGM_TIM_RL4. Firstly, more accurate Level 1b input data from a reprocessing were used. Secondly, the short arc method was used to estimate the long-wavelength part of the gravity field from the kinematic satellite orbits and thus replaced the energy balance method used before. Thirdly, the new solution is based on a longer time series (data volume approximately doubled w.r.t. last release).
In addition to the spherical harmonic coefficients, one part of the product is the consistently modeled full covariance matrix of the spherical harmonic coefficients providing a rigorous error description. Within the presentation an overview of the main characteristics of the model is given. The performance of model and the corresponding error information is validated via the comparison to existing complementary models. In addition partial solutions (sub solutions from parts of the time series) were computed and compared to the overall solution (i.e. more accurate) to demonstrate the quality of the error description.