Geophysical Research Abstracts
Vol. 13, EGU2011-6869-1, 2011
EGU General Assembly 2011

Estimation of Earth rotation and gravity field parameters, separated excitation mechanisms and physical Earth parameters from geometric and gravimetric space observations

Florian Seitz (1), Hansjörg Kutterer (2), Michael Schmidt (3), Stephanie Kirschner (1), Andrea Heiker (2), and Franziska Göttl (3)

(1) ESPACE / TU Munich, Earth Oriented Space Science and Technology (ESPACE), Germany, (seitz@bv.tu-muenchen.de), (2) Geodätisches Institut, Universität Hannover, Germany, (3) Deutsches Geodätisches Forschungsinstitut, Munich, Germany

Dynamic processes in the Earth system lead to changes in the Earth's rotation, its gravity field and geometry. Their effects on respective geodetic parameters can be monitored by highly precise geometric and gravimetric observation techniques since several decades with increasing accuracy. However, various geodetic observation techniques feature an unequal sensitivity to specific processes in the Earth system. Therefore comprehensive conclusions with respect to contributions from individual Earth subsystems require the combined analysis of heterogeneous complimentary observation types as well as physical models.

A joint project within the German Research Unit on Earth Rotation and Global Dynamic Processes aims at the combined analysis and validation of Earth rotation observations and models. Within the project three main topics are addressed: (1) the determination and mutual validation of reliable consistent time series for Earth rotation parameters and 2nd degree gravity field coefficients via their physical connection in the Earth's tensor of inertia on the basis of a Gauss-Helmert-Model, (2) the separation of individual Earth rotation excitation mechanisms by merging all available relevant data from satellite gravimetry (GRACE), geometric space techniques (GNSS, SLR, VLBI, Jason-1/2,...) and physical models of atmosphere, ocean, and continental hydrology, (3) the estimation of fundamental physical Earth parameters in an inverse model approach using the improved observation time series from (1) and the separated excitations from (2) as constraints. The integrated approach followed in this project corresponds with the goals of the Global Geodetic Observing System (GGOS) and contributes to the field of Earth system science in general. In our poster we summarize the project goals and provide a discussion of recent results.