Geophysical Research Abstracts
Vol. 12, EGU2010-4376, 2010
EGU General Assembly 2010

Spatial correlation between the Earth's gravity field and glacier change signals in the Eurasian Arctic

Daniel Rieser (1), Florian Heuberger (1), Christoph Gisinger (1), Roland Pail (3), and Aleksey Sharov (2)

(1) Graz University of Technology, Institute of Navigation and Satellite Geodesy, Graz, Austria (daniel.rieser@tugraz.at), (2) Joanneum Research Forschungsgesellschaft mbH, Institute of Digital Image Processing, Remote Sensing Group, Graz, Austria (aleksey.sharov@joanneum.at), (3) Technische Universität München, Institute for Astronomy and Physical Geodesy, Munich, Germany (pail@bv.tum.de)

The main objective of the research project ICEAGE is to determine, interprete and map the present state of snow and ice cover as well as its variations in the Eurasian Arctic Sector about 31° to 81° East and 73° to 82° North. The investigations are based on terrestrial, space-borne interferometric, altimetric, and gravity field data. Special emphasis is given to the impact of ESA's satellite gravity gradiometry mission GOCE, launched on March 17th 2009, on regional gravity field maps for cryospheric studies. This project is jointly performed by the Institute of Navigation and Satellite Geodesy (INAS), Graz University of Technology and the Institute of Digital Image Processing, Remote Sensing Group, Joanneum Research Forschungsgesellschaft mbH (JR).
In order to produce cryogravic models, regional gravity field solutions for the study area are calculated by Least Squares Collocation (LSC) which is capable of combining long wavelength constituents from the Gravity Recovery and Climate Experiment (GRACE) satellite mission, medium wavelength information from gravity gradients observed by GOCE, and high-frequency gravity anomaly data derived from the most recent EGM2008-WGS84 version. In order to use GOCE gravity gradients, which are affected by coloured noise and thus prominent long-wavelength errors, within LSC adequate filtering steps have to be applied to the observation data. In particular, a suitable methodology is developed to cope with the issue of covariance propagation between various reference frames, in which the input and output data, respectively, are given. Results show the potential of improvement when including GOCE gradients in the gravity field solution products.
Furthermore the outcome of remote sensing based (INSAR, altimetry) determination of detailed geometric and rheological models will be presented for particular regions in the arctic. Finally, a recent glacier change model resulting from the comparison with former geometric and rheological models will be opposed to the geopotential maps in order to detect correlations between gravity and ice mass variations.