Investigations of GNSS-derived baselines for gravity field recovery

Norbert Zehentner (1), Torsten Mayer-Gürr (1), Matthias Ellmer (1), Joao Teixeira da Encarnacao (2,3), Pieter Visser (2), Eelco Doornbos (2), Jose Van den IJssel (2), Xinyuan Mao (2), Elisabetta Iorfida (2), Daniel Arnold (4), Adrian Jäggi (4), Ulrich Meyer (4), Ales Bezdek (5), Josef Sebera (5), Jaroslav Klokocnik (5), Junyi Guo (6), and Ck Shum (6)

(1) Institute of Geodesy, Graz University of Technology, Graz, Austria (zehentner@tugraz.at), (2) Faculty of Aerospace Engineering of the Delft University of Technology, Delft, The Netherlands, (3) Center for Space Research, University of Texas at Austin, Austin, Texas, (4) Astronomical Institute of the University of Bern, Bern, Switzerland, (5) Astronomical Institute of the Czech Academy of Sciences, Prague, Czech Republic, (6) School of Earth Science of the Ohio State University, Columbus, Ohio

Gravity field recovery from GNSS observations of Low-Earth orbiting satellites is a well known approach. The most common method is to compute kinematic orbits and use the positions of the satellite as observations for the gravity field estimation. This is done with data from dedicated gravity field missions like GRACE or GOCE, but also other missions like Swarm, Jason or TerraSAR-X can be used. Some of these satellites are flying in a close formation, e.g. Swarm A and C or TerraSAR-X and TanDEM-X. This gives the opportunity to compute the baseline between the two satellites. We have analyzed the potential added value of such GNSS derived baselines for the gravity field recovery process. A possible advantage of the GNSS-derived baselines in contrast to using kinematic orbits is the fact that common errors cancel out in the baseline processing, a well known fact from ground based baseline processing. In our analysis we make use of GNSS data from Swarm A and C. For several test months we analyze the effect of the GNSS-derived baselines on the gravity field results.