Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10048, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10048
EGU General Assembly 2008

The influence of GNSS model changes on gravity field recovery using spaceborne GPS

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We derive gravity field parameters using a two step procedure: In a first step a kinematic trajectory of a LEO satellite is computed using the GPS data from the on-board receiver. In this procedure the orbits and clock corrections of the GPS satellites as well as the Earth orientation parameters are introduced as known. In the second step this kinematic orbit is represented by a gravitational force model and orbit parameters. The gravity field model AIUB-CHAMP01S based on one year of CHAMP data from 2002/2003 was generated by AIUB using this approach.

The GPS satellite orbits and clock corrections, which have been used for the generation of the kinematic trajectory of CHAMP, were taken from the official contribution of the CODE analysis center to the IGS. Since 2003 many improvements have taken place in the GNSS data processing, e.g., implementation of absolute antenna phase center modeling. These are good reasons to initiate a reprocessing of the GPS data to obtain state-of-the-art GPS satellite orbits and clock corrections. Furthermore, the reprocessing offers the opportunity to densify the GPS satellite clock corrections from 30s to 10s, thus improving the sampling-rate for the LEO POD.

From this newly generated GPS products new kinematic orbits of the CHAMP satellite are derived for the same time interval covered by the gravity field model AIUB-CHAMP01S. From the updated LEO trajectories gravity field parameters are determined in exactly the same way as for the original LEO orbit. This allows us to study the impact of the improved LEO orbits and the benefit from the increased sampling of

the kinematic LEO trajectory on the derived gravity field parameters.