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Temporal gravity field solutions at the AIUB

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The processing of CHAMP and GRACE tracking data at the AIUB resulted in the generation of static gravity field models such as AIUB-CHAMP03S and AIUB-GRACE03S, as well as a newly published time series of monthly snapshot solutions from GRACE that allow research of temporal gravity field variations.

The detection of gravity field changes with CHAMP hl-SST data is a challenging task. The long time series of 8 years of CHAMP GPS data processed at the AIUB allows us, however, to combine and solve the normal equations belonging to monthly solutions of different years - significantly reducing the error level. The resulting spherical harmonic coefficients of the mean monthly solutions contain information about gravity field changes repeating every year. The detected seasonal variations are statistically tested for significance. Insignificant variations are supressed to further reduce the noise level.

The GRACE K-band observable is by far more sensitive to time variable gravity signal, but even there sophisticated filtering techniques have to be applied to isolate the true signal. The large scale seasonal variations obtained from CHAMP and GRACE show good agreement. From GRACE data one can, moreover, estimate secular variations due to ice mass loss and global isostatic adjustment (GIA).