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Towards a new ITSG-Grace release: improvements within the processing chain

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Compared to the official ITSG-Grace2016 release, multiple improvements within the processing chain have been implemented: updated background models, co-estimation of tides and stochastic modeling of satellite orientation measurements.

The ITSG-Grace2018 release will be based on Level-1B Release 03 data and the AOD1B Release 06 dealiasing product. It will include unconstrained monthly and Kalman smoothed daily solutions, as well as a static gravity field, covering the complete GRACE observation period. Inaccuracies in background models contribute a significant amount of noise towards the overall error budget of this solution. We mitigate this effect by co-estimating unmodeled signals at various tidal frequencies, and high-frequency temporal variations in the background models through constrained daily gravity field solutions. The constraints used for the combined estimation of daily gravity field variations are now based on improved error estimates for the dealiasing models.

In an effort to better model all known error sources, we propagate orientation uncertainties derived from star camera/angular acceleration sensor fusion to the antenna offset correction for the K/Ka-Band observation. This enables the disentanglement of the stationary noise of the K-Band system and the non-stationary noise of the antenna offset correction.

First investigations indicate a noise reduction within the monthly solutions of about 20-30 percent. The re-processed release is presented and selected parts of the processing chain, as well as their effect on the estimated gravity field solutions, are discussed.