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Progress Towards GFZ EIGEN-GRACE06S Gravity Field Time Series

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GFZ Potsdam as part of the GRACE Science Data System is routinely processing EIGEN-GRACE05S (or RL04 in the SDS nomenclature) monthly gravity field solutions. This 7.5 years time series clearly depicts various time-varying mass variation signals in the system Earth such as the continental hydrological cycle or ice mass change in Antarctica and Greenland.

Unfortunately, the error level of EIGEN-GRACE05S is still about a factor of 15 above the pre-launch simulated baseline accuracy, and the models are affected by spurious striping artefacts and still have to be filtered by the users for further analysis. To overcome this situation, we have implemented improved background models and processing standards. This includes enhanced GPS data processing, shorter arc lengths, or updated static gravity field or ocean tide models. These modifications would apparently improve the current RL04 time series, but not as much as would rectify a complete reprocessing of the complete mission data.

Therefore we have also started to implement and test a dedicated decorrelation filter within our standard processing scheme. The filter modifies the system response in such a way that the observed error amplification for higher frequencies (geopotential orders) is surpressed by the inverse derivation theorem. Tests with simulated data have shown a large potential which could bring a RL05 time series closer to the predicted GRACE baseline. The presentation will focus on RL05 test results and improvements when compared to RL04.