Geophysical Research Abstracts
Vol. 19, EGU2017-10136, 2017
EGU General Assembly 2017

GRACE AOD1B Product Release 06: Long-Term Consistency and the Treatment of Atmospheric Tides

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The GRACE satellites orbiting the Earth at very low altitudes are affected by rapid changes in the Earth's gravity field caused by mass redistribution in atmosphere and oceans. To avoid temporal aliasing of such high-frequency variability into the final monthly-mean gravity fields, those effects are typically modelled during the numerical orbit integration by appling the 6-hourly GRACE Atmosphere and Ocean De-Aliasing Level-1B (AOD1B) a priori model.

In preparation of the next GRACE gravity field re-processing currently performed by the GRACE Science Data System, a new version of AOD1B has been calculated. The data-set is based on 3-hourly surface pressure anomalies from ECMWF that have been mapped to a common reference orography by means of ECMWF's mean sea-level pressure diagnostic. Atmospheric tides as well as the corresponding oceanic response at the S1, S2, S3, and L2 frequencies and its annual modulations have been fitted and removed in order to retain the non-tidal variability only. The data-set is expanded into spherical harmonics complete up to degree and order 180.

In this contribution, we will demonstrate that AOD1B RL06 is now free from spurious jumps in the time-series related to occasional changes in ECMWF's operational numerical weather prediction system. We will also highlight the rationale for separating tidal signals from the AOD1B coefficients, and will finally discuss the current quality of the AOD1B forecasts that have been introduced very recently for GRACE quicklook or near-realtime applications.