GRACE RL06 Reprocessing and Results from CSR

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GRACE RL06 from CSR– Summary

- GRACE data for the entire mission is being reprocessed with latest standards and processing improvements
- GRACE-FO data will be processed with the same standards as GRACE RL06
 - GRACE RL06 will provide a starting point for GRACE-FO processing
 - Harmonizing the GRACE and GRACE-FO time series
- The signal definition of RL06 GRACE solutions has *not* changed from RL05
 - The GSM-2 products will continue to represent primarily the Hydrology, Ocean Mass and Cryospheric variability; as well as errors in the tides, nontidal ocean variability, and atmospheric pressure variations.

CSCR

CSR RLO6 is ready for release

- CSR GRACE RL06 solutions for d/o 60x60 and 96x96 from Jan 2003 to Aug 2016 will be released early next week
- CSR RL06 solutions for 2002 will be available within the next two weeks
- Single ACC RL06 solutions from Nov 2016 to June 2017 will be available before GRACE-FO launch
- C20 time series from SLR for RL06 will be available next week
- CSR RL06 mascon solutions will be available within one month

Please visit <u>http://www.csr.utexas.edu/grace</u> for further details

Watch for new filenames and headers!

- The headers on the GSM, GAC, GAD files are changed to be compliant with GRACE-FO standards
 - Use of YAML headers on the GSM files
- The filename field definitions of the GSM, GAC, GAD files have changed slightly
 - *PID-2_YYYYDOY_YYYDOY_dddd_sssss_mmmm_rrvv*
 - *PID* is 3-character product identification mnemonic
 - -2 denotes a GRACE Level-2 product
 - YYYYDOY-YYYYDOY specifies the date range of the data used in creating this product
 - dddd specifies the gravity mission
 - sssss is an institution specific string
 - *mmmm* is a 4-character mnemonic used to identify the characteristics of the gravity solution *rrvv* is a 2-digit release number and 2-digit version number
- The format of the data lines has not changed
- Please refer to the accompanying L2 handbook for more details

Model changes for RL06

Model	RL05	RL06
Mean Gravity	GIF48 (360)	GGM05C (360)
3 rd Body Pert	DE 405	DE 430
Body Tides	IERS-2003	IERS-2010
Ocean Tides	GOT4.8 + SCEQ (d/o 180)	GOT4.8 + SCEQ (d/o 180)
Pole Tide (Solid+Ocean)	IERS-2010 (cubic mean-pole)	IERS-2010 (new linear mean-pole)
Atmosphere + non-tidal Oceans	AOD1B_RL05 (ECMWF + OMCT)	AOD1B_RL06 (ECMWF+MPIOM)

Data and parameterization changes for RL06

Changes	RL05	RL06
Level - 1 data	V02 for all products	V03 for SCA1B and KBR1B V02 for everything else
GPS data	IGS products for GPS orbits	JPL products for GPS orbits
ACC – bias parametrization	along-track: 1/day quadratic cross-track : 8/day quadratic radial : 1/day quadratic	along-track: 1/day linear cross-track : 8/day linear radial : 1/day linear
ACC – scale parametrization	Diagonal matrix - 1 per solution	Full matrix - 1 per arc [*]
Solution Strategy	Simultaneous estimation of gravity and non-gravity parameters	Estimating non-gravity and gravity parameters separately [*] ^{*manuscripts in preparation}

Solutions of uniform quality in RL06



Biggest improvement after 2015



Comparing degree variance scatter and error



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Std. dev. over 14 years @ 250 km (RL05 vs RL06)



At 250km smoothing, std. dev. over the mission is significantly reduced. Many signals hidden in the RL05 noise are now visible.

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C SA

Std. dev. over 14 years @ 200 km (RL05 vs RL06)



At 200km smoothing, signals in RL05 are overwhelmed by the noise in the solutions. Std. dev @ 200 km for RL06 has a comparable SNR to std. dev @ 300 km for RL05

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Comparing trends @ no smoothing



With the RLO6 solutions, we can now perform trend analysis over the entire globe without smoothing or filtering.

C SAR

Trend differences



The trend difference between the RL06 and RL05 GSM is mainly stripes overlaid on the difference between the two AODs. There will be small trend difference between RL05 and RL06 GSM on land if you don't correct for the jumps in the RL05 AOD.

CSR

Post-fit analysis: less than 6cpr (RL05 v RL06)



CSA

Post-fit analysis: 6 cpr to 60 cpr (RL05 v RL06)



Post-fit analysis: 60 cpr to 600 cpr (RL05 v RL06)



C20 from RL06





C21 & S21 - Change due to the mean-pole



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Basin average analysis

- Compare GSM from RL05 and RL06
- No de-striping or filtering is applied
- Only 300 km smoothing is applied to both
- No leakage correction is applied
- No scale factor is applied
- C20 is ignored
- Only to compare the two solutions



C SAR

GRACE reprocessing history at CSR (RL01 to RL06)



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Thank you

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Please visit <u>http://www.csr.utexas.edu/grace</u> for further details

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