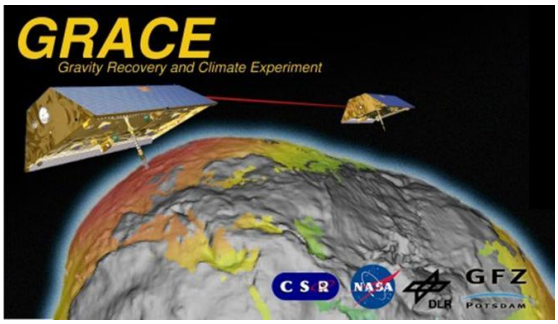
GRACE Science Data System Monthly Report October 2010



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Highlights:

- CSR and JPL have generated and delivered RL04 Level-2 products for September 2010.
- GFZ has generated and delivered RL04 Level-2 products for August 2010.
- The Grace Science Team Meeting took place at GFZ in Potsdam on 11/12 November 2010 with more than 140 registrants! Meeting proceedings will be made available shortly.

Satellite Science Relevant Events:

- Operations in Science Mode throughout the month except for the periods highlighted in the L1B Data Processing section below. Main problems are due to recent changes in thermal configurations on both satellites which have an impact on the accelerometer data and respective processing strategies.
- The GRACE-1 Brouwer mean orbital elements on November 1, 2010 00:00:00 are as follows:

  A [m] = 6835714.764
  E [-] = 0.001434
  I [º] = 89.004209
- The satellites separation was 233 km on November 1, 2010 with a rate of -0.17 km/d. Next orbit maintenance maneuver will be necessary in about three months.

Level-0 raw data dump reception statistics at DLR ground stations Weilheim and Neustrelitz:

GRACE-A Housekeeping:	100.0 %	GRACE-B Housekeeping:	100.0 %
GRACE-A Science:	100.0 %	GRACE-B Science:	100.0 %

Level-1 Data Processing:

- Level-1B Release 01 instrument data have been processed at JPL and archived at GRACE-ISDC and JPL PO.DAAC. Please refer to the statistics below.
- Notes:
    - On 2010-10-03 the GRACE-B accelerometer Sensor Unit (SU) was no longer under thermal regulation due to a lower temperature set point of the SU heater. The temperature set point on the heater was lowered as part of a new battery management strategy. After entering the full sun orbit the temperature started to rise and the SU temperature started to drift freely. As a consequence the ACC SRF linear Y-bias started to drift over one day. The SRF linear X and Z bias showed small drifts over one day as well. The nominal gravity field determination process assumes a constant ACC bias over one day. Therefore the ACC1B data can not be used in the nominal gravity field determination process. It is recommended to accommodate the drift in the SRF Y-bias over one day. Initial tests by CSR and JPL suggest promising results when estimating a linear ACC SRF Y-bias over one day. A careful evaluation of the gravity field results is needed to assess if any degradation has occurred during the period where the SU is not under thermal regulation. The SU returned to thermal regulation on 2010-11-08. The GRACE-A ACC1B data is nominal during this period.
    - For 2010-10-04 see note 2010-10-03
    - For 2010-10-05 see note 2010-10-03
    - For 2010-10-06 see note 2010-10-03. At 18:26:44.5500 the GRACE-A KBR phase data was anomalous after an IPU reboot. The KBR phase data was nominal after restart tracker command on 2010-10-07 18:03. All KBR1B during this period was lost.
    - For 2010-10-07 see notes 2010-10-03 and 2010-10-06
    - For 2010-10-08 till 2010-10-11 see note 2010-10-03
    - For 2010-10-12 see note 2010-10-03. GRACE A&B performed Center of Mass calibration maneuvers. Both spacecraft were in non-science mode from 21:45 to 2010-10-13 09:45. Data in this interval may be degraded and caution should be used when using this data in the gravity field determination process.

- For 2010-10-13 see notes 2010-10-03 and 2010-10-12
- For 2010-10-14 till 2010-10-18 see note 2010-10-03
- For 2010-10-19 see note 2010-10-03. GRACE-A performed a yaw turn to characterize battery performance. GRACE-A was in non-science mode from 12:11 to 12:50. KBR1B data should not be used during this period.
- For 2010-10-20 see note 2010-10-03
- For 2010-10-21 see note 2010-10-03. GRACE-B performed a yaw turn to characterize battery performance. GRACE-A was in non-science mode from 17:15 to 18:10. KBR1B data should not be used during this period.
- For 2010-10-22 till 2010-10-31 see note 2010-10-03

- **KBR statistics:**

A) KBR1B product name
B) Total arc length with data (hours)
C) Number of observations used in residual calculation
D) KBR-GPS range residual RMS (cm)
E) minimum KBR-GPS range residual (cm)
F) maximum KBR-GPS range residual (cm)
G) number of continuous segments in the KBR product

A	B	C	D	E	F	G
KBR1B_2010-10-01_X_01.dat	24.0	17256	0.33	-1.0	1.3	2
KBR1B_2010-10-02_X_01.dat	24.0	17250	0.52	-1.1	3.2	2
KBR1B_2010-10-03_X_01.dat	23.8	17145	0.28	-0.9	1.3	2
KBR1B_2010-10-04_X_01.dat	24.0	17249	0.27	-1.1	1.0	2
KBR1B_2010-10-05_X_01.dat	24.0	17280	0.28	-0.9	1.3	1
KBR1B_2010-10-06_X_01.dat	18.4	13270	0.36	-1.8	0.8	1
KBR1B_2010-10-07_X_01.dat	5.9	4235	0.24	-0.8	0.5	1
KBR1B_2010-10-08_X_01.dat	23.8	17145	0.45	-1.7	0.9	2
KBR1B_2010-10-09_X_01.dat	24.0	17280	0.43	-1.7	1.9	1
KBR1B_2010-10-10_X_01.dat	24.0	17280	0.33	-1.3	1.2	1
KBR1B_2010-10-11_X_01.dat	24.0	17280	0.29	-1.1	1.1	1
KBR1B_2010-10-12_X_01.dat	23.8	17145	0.61	-3.3	1.9	2
KBR1B_2010-10-13_X_01.dat	23.8	17145	0.47	-1.3	2.1	2
KBR1B_2010-10-14_X_01.dat	23.8	17105	0.38	-0.8	1.6	4
KBR1B_2010-10-15_X_01.dat	23.8	17119	0.60	-2.7	1.9	3
KBR1B_2010-10-16_X_01.dat	24.0	17280	0.51	-1.8	1.9	1
KBR1B_2010-10-17_X_01.dat	24.0	17259	0.63	-2.0	2.3	2

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KBR1B_2010-10-18_X_01.dat  23.9  17205  0.46    -1.7    1.4  2
KBR1B_2010-10-19_X_01.dat  23.6  16969  0.66    -3.8    1.8  2
KBR1B_2010-10-20_X_01.dat  24.0  17280  0.40    -1.0    2.3  1
KBR1B_2010-10-21_X_01.dat  23.5  16887  0.68    -1.9    4.5  2
KBR1B_2010-10-22_X_01.dat  24.0  17280  0.34    -1.4    1.0  1
KBR1B_2010-10-23_X_01.dat  24.0  17280  0.52    -2.1    2.7  1
KBR1B_2010-10-24_X_01.dat  24.0  17280  0.78    -3.6    2.1  1
KBR1B_2010-10-25_X_01.dat  24.0  17280  0.36    -1.4    1.0  1
KBR1B_2010-10-26_X_01.dat  24.0  17280  0.33    -1.2    1.3  1
KBR1B_2010-10-27_X_01.dat  24.0  17280  0.34    -1.2    1.2  1
KBR1B_2010-10-28_X_01.dat  24.0  17280  0.37    -1.9    1.0  1
KBR1B_2010-10-29_X_01.dat  24.0  17280  0.54    -2.6    1.1  1
KBR1B_2010-10-30_X_01.dat  24.0  17280  0.45    -1.2    2.6  1
KBR1B_2010-10-31_X_01.dat  24.0  17280  0.41    -1.6    1.6  1
```

- Following JPL RL00 (yellow) and RL01 (green) L1B products are publicly available. June and July 2002 (red) are not provided due to accelerometer problems.

L1B data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												

- The L1B Read software has been updated to accommodate 64-bit machines but the software will also work on 32 bit machines. Please change RELEASE_2008-03-20 to RELEASE_2010-03-31 available at http://podaac.jpl.nasa.gov/grace/data_access.html.
- L1B De-aliasing Products Status (for details see AOD1B Product Description Document):
    - Release 01: Generation has been stopped June 30, 2007.
    - Release 03: Generation has been stopped January 31, 2007.
    - Release 04: Generated until November 18, 2010 and extended to 1976-2000 (see newsletter for December 2008). Quality statistics for Release 04 products are online available at http://www-app2.gfz-potsdam.de/pb1/op/grace/results (follow link "GRACE Atmosphere and Ocean De-aliasing Statistics).
    - Following AOD1B products are publicly available (yellow: RL01, RL03 and RL04;

green: RL01 and RL04, blue: RL04 only):

AOD1B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976												
…												
1999												
2000												
2001												
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												

Level-2 Product Generation and Distribution:

- Besides historical CSR RL01, GFZ RL03 and JPL RL02 time-series (see below) and more experimental releases which are only available to the GRACE Science Team the following RL04 L2 products are presently available to the public (green: available, yellow: in preparation; red: missing due to accelerometer data problems):

  - **GFZ:** GSM solutions are available for August 2002 until August 2010. July 2004 until October 2004 and December 2006 are also available as constrained solutions (*GK2-*, reason is GRACE 4d repeat orbit and GPS anomaly on GRACE-B, respectively). October 2008 until August 2010 are also available as unconstrained solutions up to degree and order 60 (*GM60*, reason is GRACE 7d repeat orbit). Corresponding background GAA, GAB, GAC and GAD products and calibrated errors (GSM*.txt) have been provided too. Details are listed in the GFZ L2 Release Notes.

GFZ RL04	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004							**GK2**	**GK2**	**GK2**	**GK2**		
2005												
2006												**GK2**
2007												
2008										**M60**	**M60**	**M60**
2009	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**
2010	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**	**M60**				

- **CSR:** GSM solutions along with the GAC and GAD background model files and calibrated errors (GSM*.txt) are available for the period April 2002 until September 2010. Details are listed in the CSR L2 Release Notes.

CSR RL04	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												

- **JPL:** GSM version 4.1 labeled "*JPLEM_0001_0004" along with the GAA, GAB, GAC and GAD background model files and calibrated errors (GSM*.txt) are available for the period April 2002 until September 2010. Details are listed in the JPL L2 Release Notes.

JPL RL04	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												

- GFZ has stopped RL03 processing (Feb 2003 until Jan 2007 available at the archives. For further details refer to the GFZ RL03 release notes for Level-2 products).
- CSR has stopped RL01 processing. (Apr. 2002 until Dec 2006 available at the archives. For further details refer to the CSR RL01 release notes for Level-2 products).
- JPL has stopped RL02 processing (January 2003 until November 2005 available at the archives. For further details refer to the JPL RL02 release notes for Level-2 products).
- TN05 containing C20 estimates derived from SLR and using GRACE RL04 standards is periodically updated.

Miscellaneous:

- The following acknowledgement shall be added to any new GRACE related publication (paper, poster etc.): *Acknowledgement: We would like to thank the German Space Operations Center (GSOC) of the German Aerospace Center (DLR) for providing continuously and nearly 100% of the raw telemetry data of the twin GRACE satellites.*
- A list of GRACE related publications which can be sorted by author or date is available at http://www.gfz-potsdam.de/pb1/op/grace/index_GRACE.html under item "Publications" (current status: 542 papers). This list is regularly updated and maybe incomplete. If you are missing a publication please send an e-mail to Frank Flechtner (flechtne@gfz-potsdam.de).
- Science data users are encouraged to submit citations of their own and other works related with GRACE to the bibliography web page implemented at PO.DAAC: http://podaac.jpl.nasa.gov/grace/bibliography.html.