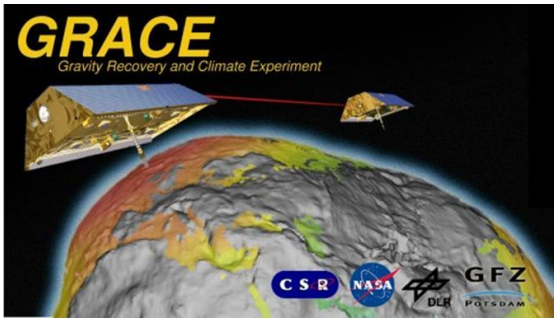
GRACE Science Data System Monthly Report March 2011



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Highlights:

- CSR has generated and delivered RL04 Level-2 products for February 2011.
- Since January 1, 2011, satellite related events have delayed the release of the GRACE data. To accommodate the requests for access to the GRACE data for studies related to the M9 earthquake off the coast of Sendai, Japan, the project has prepared a limited set of early release Level-1B data covering the earthquake epoch. Therefore, the GRACE L1B data from 01 March, 2011 till 14 April, 2011 are now available at PODAAC and also at ISDC. As for past events, the project would appreciate being informed of any conclusions reached using this data.
- The GRACE satellite operations status depends on the health of the battery and the duration within each orbit when the battery is in use. A new info page has been set up at CSR where the conditions are from now on updated on a weekly basis: http://www.csr.utexas.edu/grace/operations/mission_status/
- The next GRACE Science Team Meeting will be held in Austin, Texas, from August 8-10, 2011. Please visit http://www.csr.utexas.edu/grace/GSTM/ site regularly for further details.

Satellite Science Relevant Events:

- Operations in Science Mode throughout the month except for the periods highlighted in the L1B Data Processing section below.

- The GRACE-1 Brouwer mean orbital elements on April 1, 2011 00:00:00 are as follows:

  A [m] = 6834263.645
  E [-] = 0.001753
  I [º] = 89.000799
- The satellites separation was 217 km on April 1, 2011 with a rate of 0.64 km/d. Next orbit maintenance maneuver will be necessary in about 3-4 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 2011-03-02 the GRACE-A IPU (Instrument Processing Unit) experienced an anomaly at 10:10 causing a coarse attitude mode resulting in KBR data loss. Nominal operations were restored at 10:37. The KBR1B data during this period are lost.
  - On 2011-03-05 the GRACE-A IPU experienced 6 reboots during the software upload to the GRACE-A IPU.
  - On 2011-03-06 the GRACE-A IPU experienced 4 reboots during the software upload to the GRACE-A IPU.
  - On 2011-03-07 the GRACE-A IPU experienced 10 reboots during the software upload to the GRACE-A IPU.
  - On 2011-03-08 the GRACE-A IPU experienced 5 reboots during the software upload to the GRACE-A IPU. At 8:07 the GRACE-A X-SRF angular ACC measurement became anomalous after an IPU reboot. Nominal GRACE-A ACC data were restored after an ACC power cycle at 18:40. GRACE-A ACC1B data may be degraded during this interval and caution should be used when incorporating this data in the gravity field solution. At 8:00 the GRACE-A Y-SRF linear ACC bias started to drift, because GRACE entered the full sun orbit, which means the ACC is no longer under thermal regulation. The drift in the Y-SRF linear ACC axis needs to be accommodated in the gravity field determination process. The ACC Y-SRF bias stabilized 2011-03-18

00:00:00. The maximum number of GPS satellites tracked on GRACE-A was lowered from 10 to 8 at 10:40 to reduce the number of IPU reboots. The maximum number of satellites tracked was returned to 10 for GRACE-A on 2011-03-18 14:42. During this period the GRACE-A orbits are degraded, which is reflected in the KBR-GPS statistics. At 21:51 GRACE-A experienced an attitude hold mode after an IPU flash corruption. Science attitude mode was restored on 2011-03-09 06:50. During this interval the KBR1B data may be degraded.

- On 2011-03-09: See notes 2011-03-08 (GRACE-A Y-SRF ACC drift and GRACE-A attitude hold mode).
- On 2011-03-10 GRACE-A experienced attitude hold mode at 00:11 because of an IPU flash clearing. Returned to science attitude mode at 04:50. During this interval the KBR1B data may be degraded. See also notes 2011-03-08 (GRACE-A Y-SRF ACC drift).
- For 2011-03-11 till 2011-03-18 see notes 2011-03-08
- On 2011-03-20 the maximum number of GPS satellites tracked on GRACE-B was lowered from 10 to 8 at 10:40 to reduce the number of IPU reboots. The maximum number of satellites tracked was returned to 10 for GRACE-B on 2011-03-28 07:45. During this period the GRACE-B orbits are degraded, which is reflected in the KBR-GPS statistics.
- On 2011-03-21 GRACE-A and GRACE-B executed a 90 deg yaw turn to discharge the batteries during the full sun period. The turns started 02:20 and ended at 02:50. The KBR1B data is missing in during this interval.
- On 2011-03-24 GRACE-A executed a 90 deg yaw turn to discharge the batteries during the full sun period. The turns started 21:11 and ended at 21:40. The KBR1B data is missing in during this interval.
- On 2011-03-28 GRACE-A executed a 90 deg yaw turn to discharge the batteries during the full sun period. The turns started 13:06 and ended at 14:02. The KBR1B data is missing in during this interval.

- **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_2011-03-01_X_01.dat	23.6	17010	0.45	-2.4	1.5	3
KBR1B_2011-03-02_X_01.dat	23.0	16591	0.80	-3.4	4.9	4
KBR1B_2011-03-03_X_01.dat	23.8	17145	0.33	-1.1	1.2	2
KBR1B_2011-03-04_X_01.dat	23.7	17066	0.27	-1.0	0.9	2
KBR1B_2011-03-05_X_01.dat	23.0	16597	0.48	-1.0	2.5	8
KBR1B_2011-03-06_X_01.dat	23.2	16707	0.46	-2.1	1.9	7
KBR1B_2011-03-07_X_01.dat	22.2	15963	0.47	-2.1	1.9	11
KBR1B_2011-03-08_X_01.dat	22.9	16470	0.42	-1.8	1.5	7
KBR1B_2011-03-09_X_01.dat	23.7	16991	0.53	-2.5	1.2	3
KBR1B_2011-03-10_X_01.dat	23.0	16582	0.64	-2.4	2.5	3
KBR1B_2011-03-11_X_01.dat	23.9	17238	1.08	-4.4	3.3	3
KBR1B_2011-03-12_X_01.dat	24.0	17280	0.77	-3.1	3.0	1
KBR1B_2011-03-13_X_01.dat	23.5	16926	0.44	-1.3	1.4	4
KBR1B_2011-03-14_X_01.dat	24.0	17280	0.55	-1.6	1.5	1
KBR1B_2011-03-15_X_01.dat	24.0	17280	0.67	-1.8	2.0	1
KBR1B_2011-03-16_X_01.dat	24.0	17280	1.15	-6.5	3.5	1
KBR1B_2011-03-17_X_01.dat	24.0	17280	0.99	-3.1	2.7	1
KBR1B_2011-03-18_X_01.dat	23.6	16990	0.35	-1.4	1.2	4
KBR1B_2011-03-19_X_01.dat	23.9	17201	0.29	-1.3	0.9	2
KBR1B_2011-03-20_X_01.dat	24.0	17255	0.31	-0.9	1.1	2
KBR1B_2011-03-21_X_01.dat	23.5	16915	0.82	-4.4	3.5	2
KBR1B_2011-03-22_X_01.dat	23.5	16950	0.78	-2.7	2.8	3
KBR1B_2011-03-23_X_01.dat	23.7	17070	0.57	-1.6	2.0	3
KBR1B_2011-03-24_X_01.dat	23.3	16803	0.59	-3.4	2.6	3
KBR1B_2011-03-25_X_01.dat	23.8	17145	0.51	-1.7	2.7	2
KBR1B_2011-03-26_X_01.dat	24.0	17280	0.48	-1.4	1.5	1
KBR1B_2011-03-27_X_01.dat	23.8	17145	0.73	-2.2	2.3	2
KBR1B_2011-03-28_X_01.dat	22.1	15911	0.54	-2.7	2.1	5
KBR1B_2011-03-29_X_01.dat	24.0	17280	0.31	-1.4	0.9	1
KBR1B_2011-03-30_X_01.dat	23.9	17233	0.30	-1.2	1.1	3
KBR1B_2011-03-31_X_01.dat	23.8	17145	0.76	-2.7	4.2	2

- Following JPL RL00 (yellow) and RL01 (green) L1B products are publicly available. June and July 2002 and January 2011 (red) are not provided due to accelerometer problems. See also comment in the Highlights Section.

L1B data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												

- 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 April 25, 2011 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												
2011												

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 December 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 September 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	M60			
2011												

  - **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 February 2011. 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												
2011												

- **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 December 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												
2011												

- 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 Proceedings of the Grace Science Team Meeting at GFZ in Potsdam on 11/12 November 2010 are online available at http://www.gfz-potsdam.de/portal/gfz/Neuestes/Veranstaltungen/Tagungen+und+Konferenzen/2010-Conferences/GSTM-2010/proceedings
- 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-app2.gfz-potsdam.de/pb1/op/grace/ under item "Publications" (current status: 740 papers). This list maybe still 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.