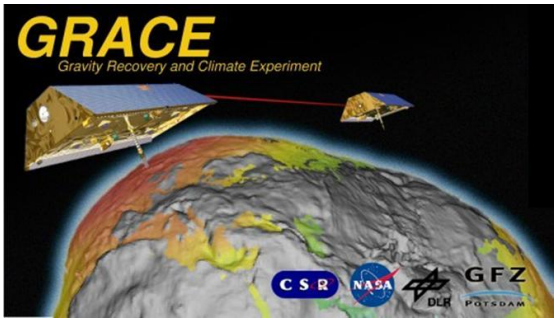
GRACE Science Data System Monthly Report
May 2012



Prepared by:
Frank Flechtner GFZ flechtne@gfz-potsdam.de

Contributions by:
Srinivas Bettadpur UTCSR srinivas@csr.utexas.edu
Mike Watkins JPL michael.m.watkins@jpl.nasa.gov
Gerhard Kruizinga JPL gerhard.kruizinga@jpl.nasa.gov

Approved by:
Byron Tapley UTCSR tapley@csr.utexas.edu

Highlights:

- GFZ has generated and delivered RL04 Level-2 products for April 2012.
- RL05 will substitute RL04 Level-2 and RL02 will substitute RL01 Level-1 data starting from May 2012.
- Missing Level-2 RL04 products from JPL (February till April 2012) as well as missing Level-2 RL05 products (see table below) will be provided soon. Please refer to the upcoming newsletters.
- Registration and abstract submission for the next GRACE Science Team Meeting (GSTM) combined with the Final Colloquium of the DFG Special Priority Program "Mass Transport and Mass Distribution in System Earth" (17.-19.9.2012) and followed by a Sea Level Workshop on 20 September 2012 (both at GFZ in Potsdam) is now possible. Note that the **registration and abstract submission deadline is Sunday, August 5**. For more information please visit http://www.gfz-potsdam.de/portal/gfz/Neuestes/Veranstaltungen/ Tagungen+und +Konferenzen/2012/GRACE+Meeting.

  Important Note: As in mid September 2012 there are several large trade fares taking place in Berlin (e.g. ILA (Berlin Air Show) and Innotrans (International Trade Fair for Transport Technology)) with many hotels in Berlin and Potsdam being blocked for a long time already we couldn't arrange block reservations in our favorite hotels. **Therefore we strongly recommend that you organize your travel arrangements quickly!**

Satellite Science Relevant Events:

- Operations in Science Mode throughout the month except for the periods highlighted in the L1B Data Processing section below.
- The actual mission status can be monitored at http://www.csr.utexas.edu/grace/operations/mission_status/.
- The GRACE-1 Brouwer mean orbital elements on June 1, 2012 00:00:00 are as follows:

  A [m] = 6823087.728
  E [-] = 0. 001323
  I [º] = 89.020338
- The satellites separation was 200 km on June 1, 2012 with a rate of -0.60 km/d. An orbit maneuver will be needed mid July 2012.

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 02 instrument data have been processed at JPL and archived at GRACE-ISDC and JPL PO.DAAC. Please refer to the statistics below.
- RL02 Notes:
  - On 2012-04-19 at 12:17 the GRACE-A ACC was powered off to reduce the battery load
  - On 2012-04-20 at 11:42 the GRACE-B ACC was powered off to reduce the battery load. See note for 2012-04-19
  - On 2012-04-30 the GRACE-A MWA was powered off at 22:36 to reduce the battery load. From this time no KBR1B measurements are available until the MWA power on (2012-05-18 10:45)
  - For 2012-05-01 till 2012-05-18 see notes 2012-04-19, 2012-04-20 and 2012-04-30
  - For 2012-05-19 and 2012-05-20 see notes 2012-04-19 and 2012-04-20
  - On 2012-05-21 GRACE-B ACC was powered on at 08:57:10.00. Large ACC bias variations occurred for about 3 days after power on. See note for 2012-04-19
  - For 2012-05-22 and 2012-05-23 see notes 2012-04-19 and 2012-04-21
  - On 2012-05-24 GRACE-A ACC was powered on at 08:44:28. Large ACC bias variations

occurred for about 3 days after power on.

- For 2012-05-25 and 2012-05-26 see notes 2012-04-24
- On 2012-05-27 00:00:00 Nominal operations resumed
- 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_2012-05-01_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-02_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-03_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-04_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-05_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-06_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-07_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-08_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-09_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-10_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-11_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-12_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-13_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-14_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-15_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-16_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-17_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2012-05-18_X_02.dat	13.2	9517	0.31	-1.4	0.7	1	
KBR1B_2012-05-19_X_02.dat	24.0	17280	0.43	-2.5	1.2	1	
KBR1B_2012-05-20_X_02.dat	24.0	17280	0.37	-1.3	1.2	1	
KBR1B_2012-05-21_X_02.dat	24.0	17280	0.34	-1.0	1.4	1	
KBR1B_2012-05-22_X_02.dat	24.0	17280	0.28	-0.9	1.2	1	
KBR1B_2012-05-23_X_02.dat	24.0	17280	0.30	-0.9	1.0	1	
KBR1B_2012-05-24_X_02.dat	24.0	17280	0.28	-1.4	0.7	1	

```
KBR1B_2012-05-25_X_02.dat   24.0   17280   0.39     -1.4     1.8   1
KBR1B_2012-05-26_X_02.dat   24.0   17280   0.29     -0.9     1.0   1
KBR1B_2012-05-27_X_02.dat   23.8   17145   0.41     -1.9     2.2   2
KBR1B_2012-05-28_X_02.dat   24.0   17280   0.39     -2.0     1.0   1
KBR1B_2012-05-29_X_02.dat   24.0   17280   0.35     -1.3     1.3   1
KBR1B_2012-05-30_X_02.dat   24.0   17280   0.39     -2.4     1.1   1
KBR1B_2012-05-31_X_02.dat   23.8   17145   0.35     -1.3     1.1   2
```

Following JPL RL00 (yellow), RL01 (green) and RL02 ("x") L1B products are publicly available. June and July 2002 (red) are not provided due to accelerometer problems. See also comment in the Highlights Section. For several months a significant number of Level-1 data is not available (blue): January and June 2011 (accelerometer data), May 2012 (accelerometer and K-Band data). See also corresponding newsletters.

L1B data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004	x	x	x	x	x	x	x	x	x	x	x	x
2005	x	x	x	x	x	x	x	x	x	x	x	x
2006	x	x	x	x	x	x	x	x	x	x	x	x
2007	x	x	x	x	x	x	x	x	x	x	x	x
2008	x	x	x	x	x	x	x	x	x	x	x	x
2009	x	x	x	x	x	x	x	x	x	x	x	x
2010	x	x	x	x	x	x	x	x	x	x	x	x
2011	x	x	x	x	x	x	x	x	x	x	x	x
2012	x	x	x	x	x							

- 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 ftp://podaac.jpl.nasa.gov/allData/grace/sw/.
- Level-1B Release 01 generation has stopped with 30 April 2012.
- 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 30, 2012 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). Generation has been stopped April 30, 2012.
    - Release 05: Generated for 1 January 2001 till 21 June 2012. Updated documentation and web pages are still under construction.

- Following AOD1B products are publicly available (yellow: RL01, RL03 and RL04; green: RL01 and RL04, blue: RL04 only, 'x' RL05):

AOD1B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976												
…												
1999												
2000												
2001	x	x	x	x	x	x	x	x	x	x	x	x
2002	x	x	x	x	x	x	x	x	x	x	x	x
2003	x	x	x	x	x	x	x	x	x	x	x	x
2004	x	x	x	x	x	x	x	x	x	x	x	x
2005	x	x	x	x	x	x	x	x	x	x	x	x
2006	x	x	x	x	x	x	x	x	x	x	x	x
2007	x	x	x	x	x	x	x	x	x	x	x	x
2008	x	x	x	x	x	x	x	x	x	x	x	x
2009	x	x	x	x	x	x	x	x	x	x	x	x
2010	x	x	x	x	x	x	x	x	x	x	x	x
2011	x	x	x	x	x	x	x	x	x	x	x	x
2012	x	x	x	x	x	x						

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 and RL05 L2 products are presently available to the public (green: available, yellow: in preparation; red: missing due to accelerometer data problems):

- **GFZ RL04:** GSM solutions are available for August 2002 until March 2012. 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												
2012												

- **GFZ RL05:** GSM solutions are available for January 2005 until December 2010. 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 RL05	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												

- **CSR RL04:** GSM solutions along with the GAC and GAD background model files and calibrated errors (GSM*.txt) are available for the period April 2002 until April 2012. 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												
2012												

- **CSR RL05:** GSM solutions along with the GAC and GAD background model files are available for the period January 2004 until December 2010. So far no calibrated errors (GSM*.txt) are available, but will be provided later. Note that CSR has put zeroes in the GSM files in fields that contain the formal errors. 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												
2012												

- **JPL RL04:** 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 January 2012. 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												
2012												

- **JPL RL05:** GSM solutions along with the GAA, GAB, GAC and GAD background model files and calibrated errors (GSM*.txt) are available for the period January 2004 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												
2012												

- 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:

- Lecture material from the 2011 summer school of the DFG Special Priority Program "Mass transport and mass distribution in the system Earth" can be downloaded at www.massentransporte.de. Before using, please read the agreements on the cover page.
- The Proceedings of the 2011 Grace Science Team Meeting are online. See the Past Meetings link to the right at http://www.csr.utexas.edu/grace/GSTM/ .
- 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/portal/gfz/Struktur/Departments/Department+1/sec12/projects/grace/grace_publications (current status: 901 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.