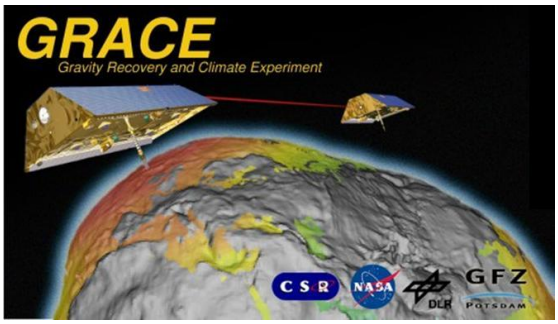
GRACE Science Data System Monthly Report
June 2014



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Highlights:

- CSR, GFZ and JPL have generated and delivered RL05 Level-2 products for June 2014.
- The next GRACE Science Team Meeting will take place at GFZ in Potsdam between September 29 and **October 1**, 2014. Registration (till September 15) and abstract submission (till September 7) is already possible. After registration you will also get access to housing information. Further information such as the session description is available at http://gstm2014.gfz-potsdam.de.
- The V02 Level-1 data for the following days in the table below have been redelivered to PO-DAAC and ISDC. The reasons for redelivery of these days are:
  - Day was skipped due to amount of work accommodating spacecraft anomalies
  - Day was was missing telemetry data due to raw telemetry file corruption
  - Improved missed interrupt detection
  - Improved orbit accuracy
  - Recovery of KBR data previously deemed lost due to an unexplained KBR anomaly

  The redelivered data are the same as the standard V02 data and are meant to replace the existing V02 data for these days. Many of the redelivered files will be the same as before but with new processing time tags. The processing time tag can be found in the header of each file. This will be the only way to distinguish this redelivered data from the original V02 data. It is also recommended to replace all V02 Level-1 data products for a given day.

  The redelivered days fall into two categories:
  - Significant recovery of science data
  - Recovery of mostly housekeeping telemetry or small science data recovery

The SDS Level-1 processing team recommends that V02 Level-1 data users download the days for category 1 given the significant improvement/recovery of the data. The category 2 data will not give much improvement in the science processing, but this category serves more the purpose of providing a complete data to the data users.

Category 1: Sizable Science Data Recovery

2002-04-22 Improved Orbit accuracy for GRACE-A & B
2003-01-30 Improved Orbit accuracy for GRACE-A & B
2004-06-21 Missing science telemetry data added for GRACE-A
2004-12-20 Missing science telemetry data added for GRACE-A & B
2006-01-18 Missing ACC data added for GRACE-B
2007-06-27 Improved orbit accuracy for GRACE-A
2007-09-30 KBR1B product corrected for undetected GRACE-A KA missed interrupt
2007-10-01 KBR1B product corrected for undetected GRACE-A KA missed interrupt
2007-10-02 KBR1B product corrected for undetected GRACE-A KA missed interrupt
2007-10-03 KBR1B product corrected for undetected GRACE-A KA missed interrupt
2008-03-17 Missing science telemetry data added for GRACE-A & B
2008-03-18 Missing science telemetry data added for GRACE-A & B
2008-08-29 Improved orbit accuracy for GRACE-A
2009-03-18 KBR1B product corrected for GRACE-A KBR time tag linearly running off
2010-10-06 KBR1B product corrected for GRACE-B KBR time tag linearly running off
2010-10-07 KBR1B product corrected for GRACE-B KBR time tag linearly running off
2011-01-02 KBR1B product corrected for GRACE-A KBR time tag linearly running off
2011-01-03 KBR1B product corrected for GRACE-A KBR time tag linearly running off
2011-01-14 KBR1B product corrected for GRACE-A KBR time tag linearly running off
2011-01-15 KBR1B product corrected for GRACE-A KBR time tag linearly running off

Category 2: House Keeping Data Recovery or Only Small Science Data Recovery

2006-01-30 Missing House Keeping telemetry data added for GRACE-A & B
2006-01-31 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-01 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-02 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-03 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-04 Missing House Keeping telemetry data added for GRACE-A & B

2006-02-05 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-06 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-07 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-08 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-09 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-10 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-11 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-12 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-13 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-14 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-15 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-16 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-21 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-22 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-23 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-24 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-25 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-26 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-27 Missing House Keeping telemetry data added for GRACE-A & B
2006-02-28 Missing House Keeping telemetry data added for GRACE-A & B
2006-03-01 Missing House Keeping telemetry data added for GRACE-A & B
2006-03-02 Missing House Keeping telemetry data added for GRACE-A & B
2006-03-03 Missing House Keeping telemetry data added for GRACE-A & B
2006-03-04 Missing House Keeping telemetry data added for GRACE-A & B
2006-03-05 Missing House Keeping telemetry data added for GRACE-A & B
2006-12-24 GRACE-B GPS tracking data anomaly resulted in reduced orbit accuracy
2006-12-25 GRACE-B GPS tracking data anomaly resulted in reduced orbit accuracy
2006-12-26 GRACE-B GPS tracking data anomaly resulted in reduced orbit accuracy
2006-12-27 GRACE-B GPS tracking data anomaly resulted in reduced orbit accuracy

Satellite Science Relevant Events:

- Operations in Science Mode till June 24 when the GRACE-B Microwave Assembly and both satellites accelerometers have been switched off consecutively. More details are 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 30, 2014 00:00:00 are as follows:

  A [m] = 6791967.084 0.001295

  E [-] = 0.001295

  I [º] = 89.012171
- The satellites separation was 181 km on June 30, 2014 with a rate of -1.52 km/d. The next orbit maneuver will be needed about beginning of July 2014.

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 GFZ ISDC and JPL PO.DAAC. Please refer to the statistics below.
- RL02 Notes:
  - On 2014-06-24 at 17:41:54 the GRACE-B KBR was powered off to reduce the battery load, which resulted in the interruption of the KBR1B data. The KBR1B data will resume once both KBR systems are powered back on early August 2014.
  - On 2014-06-26 the GRACE-B ACC was powered off to reduce the battery load. GRACE-B ACC is anticipated to be powered on early August 2014
  - On 2014-06-27 the GRACE-A ACC was powered off to reduce the battery load. GRACE-A ACC is anticipated to be powered on early August 2014
  - On 2014-06-30 GRACE-B performed an orbital maneuver from 12:24:59 to 12:29:13 to start the satellite swap
  - 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_2014-06-01_X_02.dat	24.0	17280	0.34	-1.5	1.1	1	
KBR1B_2014-06-02_X_02.dat	24.0	17252	0.32	-1.2	1.1	3	
KBR1B_2014-06-03_X_02.dat	23.7	17100	0.33	-1.4	1.4	4	

KBR1B_2014-06-04_X_02.dat	24.0	17258	0.36	-2.4	0.9	2
KBR1B_2014-06-05_X_02.dat	24.0	17260	0.29	-1.6	0.9	2
KBR1B_2014-06-06_X_02.dat	24.0	17280	0.27	-0.8	1.1	1
KBR1B_2014-06-07_X_02.dat	23.8	17145	0.46	-1.8	2.0	2
KBR1B_2014-06-08_X_02.dat	24.0	17280	0.91	-3.6	5.3	1
KBR1B_2014-06-09_X_02.dat	24.0	17280	0.34	-1.2	1.1	1
KBR1B_2014-06-10_X_02.dat	24.0	17280	0.33	-2.2	1.1	1
KBR1B_2014-06-11_X_02.dat	24.0	17280	0.43	-2.4	1.6	1
KBR1B_2014-06-12_X_02.dat	24.0	17266	0.42	-1.7	2.1	2
KBR1B_2014-06-13_X_02.dat	24.0	17256	0.46	-2.3	1.4	2
KBR1B_2014-06-14_X_02.dat	24.0	17280	0.39	-1.8	1.9	1
KBR1B_2014-06-15_X_02.dat	23.8	17145	0.43	-1.4	1.5	2
KBR1B_2014-06-16_X_02.dat	24.0	17280	0.39	-1.1	1.7	1
KBR1B_2014-06-17_X_02.dat	23.8	17145	0.59	-2.5	3.1	2
KBR1B_2014-06-18_X_02.dat	24.0	17280	0.50	-2.1	2.8	1
KBR1B_2014-06-19_X_02.dat	24.0	17280	0.43	-1.0	2.8	1
KBR1B_2014-06-20_X_02.dat	24.0	17280	0.38	-2.2	1.2	1
KBR1B_2014-06-21_X_02.dat	24.0	17266	0.32	-1.2	1.5	2
KBR1B_2014-06-22_X_02.dat	23.9	17227	0.49	-3.5	1.2	4
KBR1B_2014-06-23_X_02.dat	24.0	17280	0.41	-2.3	1.2	1
KBR1B_2014-06-24_X_02.dat	17.5	12577	0.36	-1.3	1.2	3
KBR1B_2014-06-25_X_02.dat	0.0	0	0.00	0.0	0.0	0
KBR1B_2014-06-26_X_02.dat	0.0	0	0.00	0.0	0.0	0
KBR1B_2014-06-27_X_02.dat	0.0	0	0.00	0.0	0.0	0
KBR1B_2014-06-28_X_02.dat	0.0	0	0.00	0.0	0.0	0
KBR1B_2014-06-29_X_02.dat	0.0	0	0.00	0.0	0.0	0
KBR1B_2014-06-30_X_02.dat	0.0	0	0.00	0.0	0.0	0

Following JPL RL02 L1B products are publicly available (green). June and July 2002 and June 2003 (red) are not provided due to accelerometer problems. For several months a significant number of Level-1 data is not available (blue): January and June 2011 (accelerometer data), May and October 2012, March and August 2013 (accelerometer and K-Band data), and January and February 2014 (K-Band data). RL00 and RL01 production has stopped with December 2004 and April 2012, respectively. See also corresponding newsletters.

L1B data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												

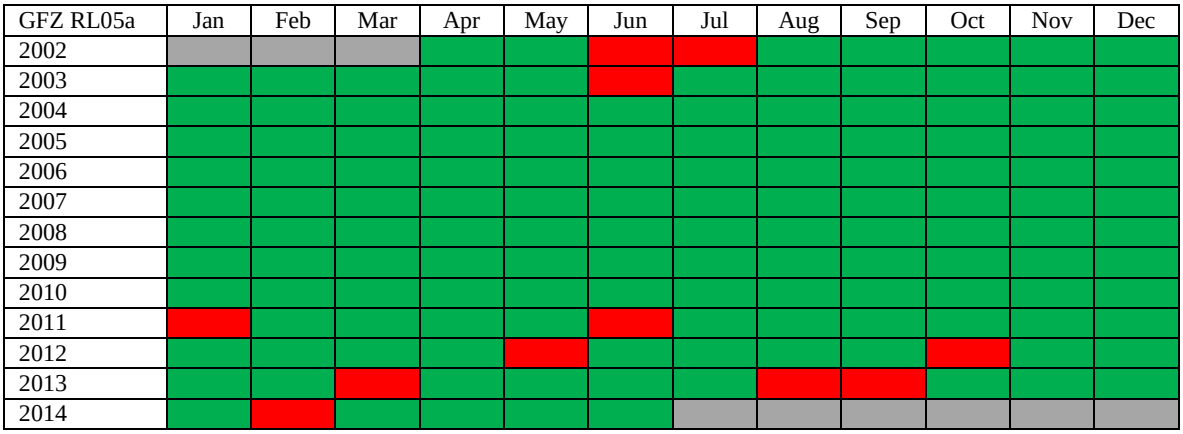
- The L1B Read software has been updated to accommodate 64-bit machines but the software will also work on 32 bit machines. Please change RELEASE_2008-03-20 to RELEASE_2010-03-31 available at ftp://podaac.jpl.nasa.gov/allData/grace/sw/.
- Level-1B Release 01 generation has stopped with 30 April 2012.
- 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). Generation has been stopped April 30, 2012.
    - Release 05: Generated for 1 January 2001 till 27 July 2014. Further information is available at http://www.gfz-potsdam.de/AOD1B.
    - 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	x	x	x	x	x	x
2013	x	x	x	x	x	x	x	x	x	x	x	x
2014	x	x	x	x	x	x	x					

Level-2 Product Generation and Distribution:

Besides historical RL00 till RL04 and GFZ's RL05 time-series (see below) the following RL05 L2 products are presently available to the public (green: available, yellow: in preparation; red: missing due to accelerometer data or accelerometer and K-band data problems):

- **GFZ RL05a:** GSM solutions are available for April 2002 until June 2014. 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 RL05a	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												

  Additionally to the standard monthly solutions, GFZ also provides weekly RL05a solutions (aligned to GPS weeks) which contain spherical harmonic coefficients complete up to degree and order 30. Currently, available weekly solutions cover the time span from 2003/01/05 till 2013/07/28. The weekly Level-2 products (GSM + GAx files) can be downloaded at ISDC and PO.DAAC. When making your request at the ISDC retrieval pages, please choose "GFZ Potsdam weekly" as "Processing Facility" to obtain these products. At the PO.DAAC archive, they can be found in the directory "allData/grace/L2/GFZ/RL05_WEEKLY". Weekly products can be identified by the string "GW30" instead of "G---" in the product name.

- **CSR RL05:** GSM solutions for maximum degree and order 60 (incl. calibrated errors GSM*.txt) and 96 along with the GAC and GAD background model files are available for the period April 2002 until June 2014. Details are listed in the CSR L2 Release Notes. Ongoing updates on CSR RL05 are provided at http://www.csr.utexas.edu/grace/RL05.html.

CSR RL05	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												

- **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 April 2002 until June 2014. Details are listed in the JPL L2 Release Notes.

JPL RL05	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002												
2003												
2004												
2005												
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												

- GFZ has stopped RL05 processing end of July 2013 (now substituted by RL05a). For further details see Newsletter October 2013.
- GFZ and CSR have stopped RL04 processing end of April 2012
- JPL has stopped RL04 processing end of January 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/TN07 containing C20 estimates derived from SLR and using GRACE RL04/RL05 standards is periodically updated.

Miscellaneous:

- The GRACE Science Team Meeting 2013 has taken place 23-25 October 2013 at UTCSR. Proceedings are available at http://www.csr.utexas.edu/grace/GSTM/proceedings.html.
- 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 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/en/research/organizational-units/departments-of-the-gfz/department-1/global-geomonitoring-and-gravity-field/topics/development-operation-and-analysis-of-gravity-field-satellite-missions/grace/grace-related-publications/, alternatively the list can be accessed via http://www.gfz-potsdam.de/en/grace and one further click on 'GRACE related publications' in the left column. The current status is 1228 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.