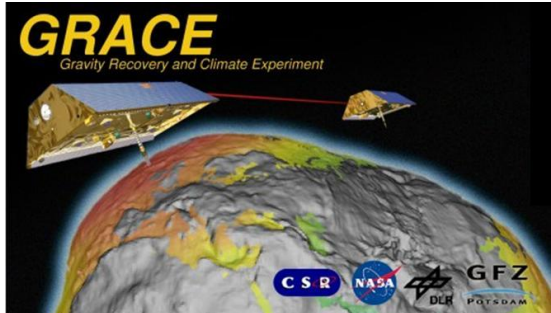


GRACE Science Data System Monthly Report

September 2013



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Highlights:

- GFZ has generated and delivered RL05 Level-2 products for July 2013.
- Due to the switch-off of GRACE ICUs (Instrument Control Units) and MWA (Microwave Assemblies) between August 5 and September 24 in order to reduce the load on the batteries (see L1B Data Processing Section below) the SDS centers have not generated and delivered RL05 Level-2 products for August and September 2013 as just 5 days of data in August and 7 days of data in September don't allow a meaningful monthly estimate for these two calendar months. Therefore, the SDS has decided to provide the next Level-2 data product for the calendar month of October 2013. The GFZ weekly solutions and the CSR QL solutions are not affected by this unfortunate phasing of the outage. All available Level-1B data will be distributed for the months of August and September.
- Still missing Level-2 RL05 products for 2002 of the three centers will be provided soon. Please refer to the upcoming newsletters.
- The GRACE Science Team Meeting 2013 has taken place 23-25 October 2013 at UTCSR. Proceedings will soon be available at <http://www.csr.utexas.edu/grace/GSTM>.
- Next GRACE Science Team Meeting is planned at GFZ in Potsdam between September 29 and October 2, 2014. Further information will follow next summer.

Satellite Science Relevant Events:

- Operations in Science Mode suffered from switch-off of ICUs and MWAs (see above and 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 September 30, 2013 00:00:00 are as follows:
A [m] = 6808321.411
E [-] = 0.001464
I [°] = 89.023466
- The satellites separation was 178 km on September 30, 2013 with a rate of 1.88 km/d. The next orbit maneuver will be needed in about 6 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 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 2013-08-05 at 13:40 the GRACE-A 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 late September 2013.
 - On 2013-08-07 at 13:40 the GRACE-A ACC was powered off to reduce the battery load. ACC1B data will be missing until the ACC is powered back on late September 2013
 - On 2013-08-08 at 11:38 the GRACE-B ACC was powered off to reduce the battery load. ACC1B data will be missing until the ACC is powered back on late September 2013
 - On 2013-09-13 at 10:35:39 the GRACE-A ACC was powered on. The GRACE-A ACC biases stabilized on 2013-04-17 00:00:00.
 - On 2013-09-16 at 08:33:39 the GRACE-B ACC was powered on. The GRACE-B ACC biases stabilized on 2013-04-20 00:00:00.
 - On 2013-09-24 GRACE-A and GRACE-B Microwave Wave Assemblies were powered back on resuming the nominal science data production including KBR1B data.
 - On 2013-08-28 the maximum GPS satellites to be tracked was commanded to 8 instead of the nominal 10 on GRACE-A. This resulted in less GPS satellites tracked and a minor degradation in the GRACE-A orbit accuracy which is reflected in the higher KBR-GPS RMS statistics since the return of the KBR1B data on 2013-09-24. On 2013-10-18 the

maximum satellites to be tracked was commanded back to 10 on GRACE-A.

- 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_2013-09-01_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-02_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-03_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-04_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-05_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-06_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-07_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-08_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-08_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-09_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-10_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-11_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-12_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-13_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-14_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-15_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-16_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-17_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-18_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-19_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-20_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-21_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-22_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-23_X_02.dat	0.0	0	0.00	0.0	0.0	0	
KBR1B_2013-09-24_X_02.dat	14.0	10072	1.03	-3.0	4.6	1	
KBR1B_2013-09-25_X_02.dat	24.0	17280	1.22	-3.4	7.5	1	

KBR1B_2013-09-26_X_02.dat	23.9	17242	0.67	-2.7	1.9	3
KBR1B_2013-09-27_X_02.dat	24.0	17280	0.71	-2.8	2.2	1
KBR1B_2013-09-28_X_02.dat	24.0	17251	0.66	-2.5	2.2	2
KBR1B_2013-09-29_X_02.dat	24.0	17280	0.93	-3.7	3.3	1
KBR1B_2013-09-30_X_02.dat	24.0	17280	0.82	-1.8	3.3	1

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 and March and August 2013 (accelerometer and 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												

- 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 6 October 2013. 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			

Level-2 Product Generation and Distribution:

Besides historical RL00 till RL04 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 RL05:** GSM solutions are available for January 2003 until July 2013. 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												
2013												

Additionally to the standard monthly solutions, GFZ now also provides weekly RL05 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 GFZ's ISDC archive. When making your request at the ISDC retrieval pages, please choose “GFZ Potsdam weekly” as “Processing Facility” to obtain these products.

- **CSR RL05:** GSM solutions along with the GAC and GAD background model files are available for the period January 2003 until July 2013. 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.

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												

- **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 2003 until July 2013. 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												

- 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 Joint GRACE Science Team Meeting 2012 and Final Colloquium of the DFG Special Priority Program SPP1257 "Mass Transport and Mass Distribution in System Earth" took place at the German Research Centre for Geosciences in Potsdam between September 17 and 19, 2012. The proceedings and further information can be found at <http://www.gfz-potsdam.de/portal/gfz/Neuestes/Veranstaltungen/Tagungen+und+Konferenzen/2012/GRACE+Meeting>.
- 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/portal/gfz/Struktur/Departments/Department+1/sec12/projects/grace/grace_publications (current status: 1094 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>.