GRACE Science Data System Monthly Report
September 2006

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Highlights:

- CSR RL01 and GFZ RL03 L2 products for August 2006 have been provided to the archives.
- GRACE Science Team Meeting registration is now open: http://www.csr.utexas.edu/grace/GSTM.

Satellite Science Relevant Events:

- Nominal operation in Science Mode throughout the month, except for an accelerometer bias jump on GRACE-B on August 31, an anomaly experienced by the main accelerometer Instrument Control Unit of GRACE-B on September 12, some anomalous Ka Missed Interrupt events on GRACE-A and GRACE-B throughout the month, and 2 long IPU reboots on September 26. Caution is advised for using some of the ACC1B or KBR1B data as mentioned in the Level-1 Data Processing section below. All events are matter of still ongoing investigations.
- The GRACE-1 Brouwer mean orbital elements on October 01, 2006 00:00:00 are as follows:

  A [m] = 6841914.718

  E [-] = 0.001645

  I [º] = 89.021836

  The satellites separation was 239 km on October 1, 2006 with a rate of -0.46 km/d. Orbit maintenance maneuver won't be needed for a few months.

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

GRACE-1 Housekeeping:	99.7 %
GRACE-1 Science:	100.0 %
GRACE-2 Housekeeping:	99.7 %
GRACE-2 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.
- Notes:
    - On 2006-08-31 the X-SRF Accelerometer bias jumped on GRACE-B at 13:04:58. The nominal X-SRF bias was restored after a power cycle of the ICU (Instrument Control Unit) at 2006-09-01 21:05:28. From 00:00:00 till 21:05:28 a bias correction of 58984.25236915914 nm/sec^2 was applied to make the X-SRF Accelerometer consistent over the whole day. Caution is advised for using the GRACE-B ACC1B data from 2006-09-01 00:00:00 till 21:05:28.
    - On 2006-09-10 two anomalous Ka Missed Interrupts (MI) occurred on GRACE-A. Therefore data from 13:41:21 till 18:52:15 are deemed unreliable. Data during previous anomalous MI intervals was withheld or significantly down weighted in the gravity field solution.
    - On 2006-09-12 the main ACC-ICU of GRACE-B experienced an anomaly at 13:11 and no telemetry was received until a power cycle at 20:21:40. After the power cycle the main ACC-ICU returned only safe mode data until 21:57 when ACC-ICU redundant was turned on. The ACC data is nominal after 21:57. Overall, about 8 hours of ACC1B data are lost on GRACE-B.
    - On 2006-09-17 GRACE-A experienced an anomalous missed interrupt at 02:08:48.15 which was cleared by a restart tracker command at 09:37.15. The KBR1B data from 02:08:48 till 09:37.15 are deemed unreliable and caution should when using this data in the gravity field solution.
    - On 2006-09-19 GRACE-A experienced an anomalous missed interrupt at 08:01:12 followed by another anomalous MI at 08:04:22. The anomalous MI was cleared on 2006-09-20 08:06:00 by a restart tracker command. The KBR1B data from 2006-09-

19 08:01:01 till 2006-09-20 08:06:00 are deemed unreliable and caution should when using this data in the gravity field solution.

- On 2006-09-20 an anomalous missed interrupt was cleared at 08:06 (see 2006-09-19 for more details). At approximately 8:20 the GRACE-B IPU stopped excepting commands and delivering GPS and SCA data to the Attitude Control System. This resulted in a mode drop to Coarse Pointing Mode. In order to recover KBR1B data, the formal error cutoff was raised to 15 cm formal clock error for CLK1B on GRACE-B. Total KBR1B data loss of 1.75 hours.
- On 2006-09-26 GRACE-A experienced two IPU reboots at 11:32 and 11:45 followed by an IPU reboot on GRACE-B at 11:52. In total 31 minutes of KBR1B data was lost during this episode. Another long IPU reboot on GRACE-B at 16:59 resulted in another 16 minutes of KBR1B data loss. Total KBR1B data loss is 49 minutes.

- 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_2006-09-01_X_01.dat	23.8	17145	1.42	-4.3	5.3	2
KBR1B_2006-09-02_X_01.dat	24.0	17280	1.27	-3.3	5.5	1
KBR1B_2006-09-03_X_01.dat	23.8	17145	1.67	-5.4	4.4	2
KBR1B_2006-09-04_X_01.dat	23.9	17244	1.26	-3.4	3.0	3
KBR1B_2006-09-05_X_01.dat	24.0	17280	1.56	-2.8	4.7	1
KBR1B_2006-09-06_X_01.dat	24.0	17280	1.32	-4.2	4.9	1
KBR1B_2006-09-07_X_01.dat	23.8	17116	1.45	-4.0	4.1	4
KBR1B_2006-09-08_X_01.dat	24.0	17229	1.34	-3.5	5.0	2
KBR1B_2006-09-09_X_01.dat	24.0	17260	1.76	-6.1	4.8	1
KBR1B_2006-09-10_X_01.dat	23.8	17092	1.84	-7.7	6.6	4
KBR1B_2006-09-11_X_01.dat	24.0	17260	1.55	-4.6	4.0	1
KBR1B_2006-09-12_X_01.dat	24.0	17280	1.32	-3.2	3.6	1
KBR1B_2006-09-13_X_01.dat	23.9	17205	1.87	-9.0	4.9	2
KBR1B_2006-09-14_X_01.dat	23.9	17190	1.91	-5.7	7.7	3

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KBR1B_2006-09-15_X_01.dat  24.0  17280  1.79    -6.2    3.7  1
KBR1B_2006-09-16_X_01.dat  24.0  17280  1.32    -3.9    4.0  1
KBR1B_2006-09-17_X_01.dat  23.8  17086  1.89    -6.2    5.0  3
KBR1B_2006-09-18_X_01.dat  23.8  17145  1.52    -3.6    4.3  2
KBR1B_2006-09-19_X_01.dat  24.0  17244  1.94    -5.0    4.5  1
KBR1B_2006-09-20_X_01.dat  22.2  16005  1.81    -4.9    5.2  2
KBR1B_2006-09-21_X_01.dat  24.0  17280  1.59    -4.0    3.9  1
KBR1B_2006-09-22_X_01.dat  23.8  17103  1.58    -5.1    5.3  3
KBR1B_2006-09-23_X_01.dat  24.0  17260  1.30    -4.5    3.2  1
KBR1B_2006-09-24_X_01.dat  23.9  17185  1.34    -3.7    4.0  2
KBR1B_2006-09-25_X_01.dat  24.0  17280  1.48    -5.4    3.9  1
KBR1B_2006-09-26_X_01.dat  23.2  16690  1.39    -4.0    3.1  3
KBR1B_2006-09-27_X_01.dat  23.9  17234  1.57    -3.8    3.9  3
KBR1B_2006-09-28_X_01.dat  23.9  17236  1.45    -6.3    3.4  3
KBR1B_2006-09-29_X_01.dat not yet distributed
KBR1B_2006-09-30_X_01.dat not yet distributed
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- Release 01 Level-1B barotropic sea level products (OCN1B) and de-aliasing products (AOD1B) were calculated by GFZ until September 30, 2006 and archived at GRACE-ISDC.
- Release 03 Level 1B de-aliasing products (AOD1B) based on OMCT (Ocean Model for Circulation and Tides) baroclinic ocean model for September 2006 generated and archived at GRACE-ISDC.
- Release 04 Level 1B de-aliasing products (AOD1B) based on improved OMCT (updated thermodynamic sea ice model and new data set for surface salinity relaxation), mass-conserving approach and harmonized land/water masks has been processed for January 2001 until July 2006 and made available to the SDS processing centers for L2 reprocessing (see below).

Level-2 Data Processing:

- All 3 L2 centers at CSR, JPL and GFZ continued processing of release 01 (CSR), release 02 (JPL) and release 03 (GFZ) products.
- TN05 containing C20 estimates derived from SLR is periodically updated (maybe used to substitute C20 values of CSR RL01 products).
- Spurious slopes over land, which are due to the non-mass-conserving OMCT model output in AOD1B RL03 (used in JPL RL02 and GFZ RL03 L2 products), can and have to be corrected

by re-adding the GAB product over land. A technical note TN04 was prepared and is available since May 10, 2006.

- All 3 L2 centers started tests for next round of reprocessing (improved background models (e.g. static gravity field, AOD1B RL04, FES2004, Ocean Pole Tide), more secular trends, full IERS2003 conventions, etc.). First results are expected at the next GSTM (see Section "Miscellaneous").

GRACE Product Distribution:

Besides more experimental releases which are only available to the GRACE Science Team the following L2 products are available to the public:

- GFZ RL03 L2 products are available for February 2003 until August 2006. Missing months are June 2003 and January 2004. July 2004 until October 2004 are also available as constrained solutions (*GK2-*). Corresponding background GAA, GAB and GAC products and calibrated errors (GSM*.txt) have been provided too. Details are listed in the GFZ L2 Release Notes.
- CSR RL01 unconstrained GSM solutions along with the GAC background model files and calibrated errors (GSM*.txt) are available for the period August 2002 – August 2006 (only June 2003 is missing due to accelerometer data problems). Details are listed in the CSR L2 Release Notes.
- JPL RL02 L2 products along with the GAB and GAC background model files and calibrated errors (GSM*.txt) are available for February 2003 until November 2005 except for June 2003 and August to October 2004. Details are listed in the JPL L2 Release Notes.

Miscellaneous:

- Next GRACE Science Team Meeting will be held in San Francisco at the Holiday Inn Golden Gateway on December 8/9, 2006. Meeting registration is now open.
- Last GRACE Science Team Meeting (GSTM) proceedings (October 2005) are available online (http://www.csr.utexas.edu/grace/GSTM).
- It was decided by the PI/Co-PI that papers from the Potsdam Joint CHAMP/GRACE Science Meeting in July 2004 shall be provided on the CHAMP and GRACE web pages if the authors agree. A corresponding questionnaire will be circulated.
- 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".

This list will be regularly updated and maybe incomplete. If you are missing a publication please send an e-mail to Frank Flechtner.

- 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.
- The announcement of opportunity for the exploitation of GOCE data is available since October 10. If you are interested in free of charge GOCE and Third Party ESA Mission data products you are requested to submit a proposal until December 8. More information can be found at http://eopi.esa.int/GOCE.