# GRACE Science Data System Monthly Report
# June 2004


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**Reminder:** The GRACE mission is still in validation phase. Therefore this newsletter, as well as the GRACE data products, is for the Science Team´s use only.

**Satellite Science Relevant Events**:

- In June, July, and August, a set of images is being taken by from the secondary SCA. The images are being taken when the Sun is inside the currently defined region where straylight from the Sun saturates the camera and dual star camera operation is not possible. (There is only a small chance that some of the images might reduce the amount of dual-star-camera available). The ultimate objective is to use these images to facilitate development and test of SCA software that would increase the time that GRACE produces dual 1Hz SCA data. On June 5th, there was a simultaneous return to normalcy in the top-side panel currents on GRACE-1, and in the KBR-GPS statistics. After concurrent slow degradation of top-side panel currents & KBR-GPS rms numbers**,** both suddenly returned the normal values. All the while, the POD & clock alignment requirements were being met, so that gravity field or Level-1 products are not adversely affected. For further details see also “Level-1 Data Processing” section.
- In order to avoid an autonomous reboot of the onboard computer (OBDH) after approximately 280 days a warm boot was commanded on GRACE-1 on June 30.
- The GRACE-1 Brower mean orbital elements on July 01, 2004 00:00:00 were as follows:

  A [m] = 471095.64

  E [-] = 0.001581

  I [°] = 89.021265

  The satellites separation is 216 km (June 30) with a rate of -0.59 km/d. The next orbit maintenance manoeuvre will be necessary in about two months.

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

| | |
|---|---|
| GRACE-1 Housekeeping: | 99.4 % |
| GRACE-1 Science: | 99.3 % |
| GRACE-2 Housekeeping: | 99.7 % |
| GRACE-2 Science: | 100.0 % |

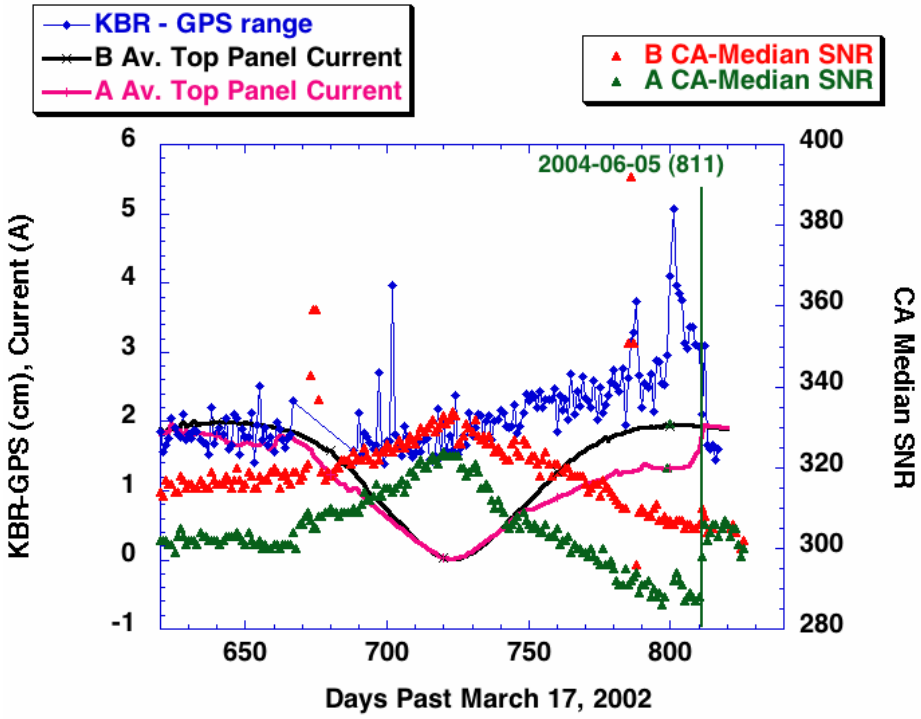
**Level-1 Data Processing:**

- Level-1B instrument data have been processed at JPL and archived at GRACE-ISDC and JPL PO.DAAC.

- On June 5 the KBR-GPS residual suddenly dropped back to about 1.6 cm level after a two month steady increase in the KBR-GPS residuals to about 3.3 cm. Our current hypothesis is that on GRACE-A a piece of MLI that surrounded the GPS antenna did come loose and caused multi-path on the GPS data. This is corroborated by the fact that the CESS near the GPS antenna experienced shadows from an unknown object as well as the current from the top solar panel was reduced because of a shadow on the top panel.

  On 2004-06-06 the shadows disappeared causing the solar panel current to be nominal. Another piece of evidence is that when the median CA SNR is computed over all PRN-s or 30 hour arcs we see on the exact same day (MEL=811) a jump in the median SNR for GRACE-A as if some obstruction disappeared.

  A plot is attached below showing the KBR-GPS residuals, top solar panel currents (GRACE A&B) and the median CA SNR (GRACE A&B). From this plot it is clear that things changed is a discontinuous manner on MEL=811.




We will try to tune the orbit determination process for this period during the reprocessing of L1B data in November.

Finally, during days 2004-05-24 till 2005-05-28 the IPU Build 149 software was uploaded to GRACE-A, which requires many IPU reboots and the maximum number of tracked GPS satellite was set to 6. This caused additional weakness in the orbit solutions for GRACE-A which is reflected in the higher KBR-GPS residuals.

We would like to thank Christian Belle (Astrium) for the top solar panel current data.

The following table gives a statistics of the available KBR1B products. The columns in the table are:

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_2004-05-15_X_00.dat | 24.0 | 17280 | 2.21 | -5.8 | 6.1 | 1 |
| KBR1B_2004-05-16_X_00.dat | 23.9 | 17181 | 2.55 | -7.2 | 5.6 | 2 |
| KBR1B_2004-05-17_X_00.dat | 24.0 | 17280 | 2.49 | -8.6 | 7.1 | 1 |
| KBR1B_2004-05-18_X_00.dat | 23.8 | 17145 | 2.68 | -9.1 | 6.9 | 2 |
| KBR1B_2004-05-19_X_00.dat | 24.0 | 17280 | 2.14 | -6.6 | 5.7 | 1 |
| KBR1B_2004-05-20_X_00.dat | 23.8 | 17145 | 2.89 | -8.1 | 7.9 | 2 |
| KBR1B_2004-05-21_X_00.dat | 24.0 | 17280 | 2.86 | -7.3 | 7.1 | 1 |
| KBR1B_2004-05-22_X_00.dat | 24.0 | 17280 | 2.56 | -7.0 | 6.4 | 1 |
| KBR1B_2004-05-23_X_00.dat | 23.9 | 17205 | 2.53 | -6.1 | 6.2 | 2 |
| KBR1B_2004-05-24_X_00.dat | 21.7 | 15648 | 2.95 | -8.3 | 6.8 | 3 |
| KBR1B_2004-05-24_X_00.dat | 21.8 | 15643 | 5.31 | -13.1 | 14.3 | 2 |
| KBR1B_2004-05-25_X_00.dat | 23.2 | 16693 | 4.09 | -11.9 | 10.4 | 4 |
| KBR1B_2004-05-26_X_00.dat | 23.8 | 17077 | 5.01 | -11.6 | 18.2 | 4 |
| KBR1B_2004-05-27_X_00.dat | 23.5 | 16899 | 3.85 | -20.4 | 13.0 | 6 |
| KBR1B_2004-05-28_X_00.dat | 24.0 | 16990 | 3.85 | -14.1 | 12.5 | 2 |
| KBR1B_2004-05-29_X_00.dat | 24.0 | 17260 | 3.76 | -12.3 | 10.9 | 1 |
| KBR1B_2004-05-30_X_00.dat | 24.0 | 17241 | 3.13 | -7.2 | 6.6 | 1 |
| KBR1B_2004-05-31_X_00.dat | 23.8 | 17105 | 3.05 | -9.9 | 7.2 | 2 |
| KBR1B_2004-06-01_X_00.dat | 23.8 | 17145 | 3.36 | -9.4 | 8.4 | 2 |
| KBR1B_2004-06-02_X_00.dat | 24.0 | 17280 | 3.37 | -10.6 | 8.5 | 1 |
| KBR1B_2004-06-03_X_00.dat | 24.0 | 17250 | 3.12 | -8.9 | 8.2 | 3 |
| KBR1B_2004-06-04_X_00.dat | 24.0 | 17280 | 3.07 | -6.8 | 8.4 | 1 |
| KBR1B_2004-06-05_X_00.dat | 23.9 | 17179 | 2.04 | -5.1 | 5.6 | 6 |
| KBR1B_2004-06-06_X_00.dat | 23.8 | 17145 | 1.57 | -3.6 | 5.2 | 2 |
| KBR1B_2004-06-07_X_00.dat | 23.7 | 17032 | 1.66 | -5.7 | 4.0 | 1 |
| KBR1B_2004-06-08_X_00.dat | 24.0 | 17280 | 1.61 | -3.9 | 5.2 | 1 |
| KBR1B_2004-06-09_X_00.dat | 24.0 | 17280 | 1.65 | -5.6 | 5.0 | 1 |
| KBR1B_2004-06-10_X_00.dat | 24.0 | 17280 | 1.45 | -2.9 | 5.2 | 1 |
| KBR1B_2004-06-11_X_00.dat | 24.0 | 17280 | 1.60 | -3.3 | 4.6 | 1 |
| KBR1B_2004-06-12_X_00.dat | 23.9 | 17205 | 1.66 | -3.7 | 4.7 | 2 |
| KBR1B_2004-06-13_X_00.dat | 24.0 | 17280 | 1.55 | -4.5 | 4.7 | 1 |
| KBR1B_2004-06-14_X_00.dat | 23.9 | 17205 | 1.65 | -3.9 | 4.8 | 2 |
| KBR1B_2004-06-15_X_00.dat | 24.0 | 17280 | 1.66 | -4.3 | 4.5 | 1 |
| KBR1B_2004-06-16_X_00.dat | 24.0 | 17280 | 1.56 | -4.0 | 5.2 | 1 |

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KBR1B_2004-06-17_X_00.dat   24.0   17280   1.88     -5.0     6.0   1
KBR1B_2004-06-18_X_00.dat   23.7   17085   1.78     -5.2     5.7   2
KBR1B_2004-06-19_X_00.dat    --- not yet processed ----
   …
KBR1B_2004-06-30_X_00.dat    --- not yet processed ----
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Additionally all level-1B barotropic sea level products (OCN1B) and de-aliasing products (AOD1B) until June 30 have been calculated by GFZ and archived at GRACE-ISDC.

**Level-2 Data Processing:**

- All 3 L2 centers at CSR, JPL and GFZ concentrated on improvements in the gravity model product quality and catching up on the remaining monthly fields data processing.

**GRACE Product Distribution:**

- CSR has provided 4 additional monthly gravity field solutions (GSM-2*0001) for January 2004 (70x70 only, 13 usable days due to KBR outage) and February to April 2004. For each new product a file containing the calibrated error standard deviations for the geopotential coefficients has been provided too (GSM-2*_0001.txt). These error estimates are preliminary and calibrated using standard methods including sub-set and inter-month comparisons. Further details are given in the corresponding L2 release notes available at both archives.
- GFZ has provided 7 additional monthly gravity field solutions (GSM-2*0001) developed up to degree and order 150 for the following months:
    - April/May 2002 (28 days)
    - November 2002 (19 days)
    - March 2003 (25 days)
    - April/May 2003 (42 days)
    - July 2003 (24 days)
    - October 2003 (24 days)
    - November 2003 (22 days)

  Corresponding GAA, GAB and GAC L2 products (non-tidal geopotential coefficients averaged over certain time span) are also provided. Further details are given in the corresponding L2 release notes available at both archives.

**Miscellaneous:**

- Joint CHAMP/GRACE Science Meeting will take place in Potsdam on July 6-8.
- A new bibliography web page has been implemented at PO.DAAC: http://podaac.jpl.nasa.gov/grace/bibliography.html. Science data users are encouraged to submit citations of their own and other works related with GRACE.