



GRACE Follow-On

Science Data System Newsletter

Report: Dec 2020 – Mar 2021 (No. 17)

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GRACE Follow-On Science Data System: Highlights & Updates

- The GRACE-FO satellites celebrated their 3rd launch anniversary on May-22, 2021! We are on track to extend the GRACE data record by 3 years (by May-2021), and the combined GRACE/GRACE-FO Mass Change data record is now entering its 20th year. All data collection and processing has been stable – see Mission Events below for details.
- The **2021 GRACE/GRACE-FO Science Team Meeting** is scheduled to take place from Oct 5-8, 2021. While the current COVID-2019 situation has improved in some regions, it is still volatile and evolving, making planning challenging. We are still hopeful to have a limited in-person option, but remote participation will of course be set up. The in-person meeting location will be in the US, likely in Pasadena, CA. Stay tuned for updates (visit <https://grace.jpl.nasa.gov/events/> for more information).
- The following **Level1 & 2 SDS data products** are now available at NASA's Physical Oceanography Distributed Active Archive Center ([PO.DAAC](#)) and GFZ's Information System and Data Center ([ISDC](#)):
 - **Level-1** SDS data products through **Apr 2021**.
 - **Level-2** data products through **Mar 2021**.
- The following corresponding **Level-3 data** products (global, land, ocean, ice) are available:
 - JPL Tellus global mascon products:
https://grace.jpl.nasa.gov/data/get-data/jpl_global_mascons/
 - GFZ GravIS land, ocean and ice products:
<http://gravis.gfz-potsdam.de/>
 - UT-CSR global mascon solutions:
http://www2.csr.utexas.edu/grace/RL06_mascons.html
- Do you have exciting new GRACE-FO results, a conference presentation or paper publication you would like to share? Please send a copy of your GRACE and GRACE-FO



related publications to landerer@jpl.nasa.gov and flechtne@gfz-potsdam.de (please also consider a 1-slide highlight summary of the main findings).

- GRACE-FO Mission reference paper:
Landerer, F.W., Flechtner, F., et al., 2020, Extending the global mass change data record: GRACE Follow-On instrument and science data performance, *Geophys. Res. Lett.*, <https://doi.org/10.1029/2020GL088306>.

Calendar & Upcoming Events:

- **GRACE / GRACE-FO Science Team Meeting 2021** will take place in Oct 5-8, 2021; as the current Covid-2019 situation is still evolving, we plan for in-person as well as remote participation options. Visit <https://grace.jpl.nasa.gov/events/> for current status.
- **AGU Fall Meeting 2021 (13-17 Dec, 2020 – mixed in-person / online event)**
 - **Abstract submission deadline: 04 Aug, 2021!**
 - See <https://www.agu.org/Fall-Meeting> for session descriptions

GRACE Follow-On: Mission Status

GRACE Follow-On: Orbit

The GRACE Follow-On orbital parameters on 20210118 (day 018) were as follows:

Sun Beta (deg)	56
Absolute Distance (km)	197.9
Drift (km/d)	0.08
Mean Altitude (>6378.1 km)	489.9
Decay Rate (GF1/GF2) (7d mean, m/d)	3.4 / 3.3

Science-relevant Mission Events & Plans:

- Both accelerometers (ACCs) are operating and collecting observations in their nominal mode, Normal Range Mode (NRM). GF1 ACC data are used to generate an ACC transplant data product which is provided as the ACT1B product and should be used to substitute the GF2 ACC measurements (please check the ACT-Readme document for details at PO.DAAC).
- Center-of-Mass offset determinations are performed approx. every 6 months.



- Additional calibration periods, spacecraft activities and events are highlighted in the Level-1 v04 notes and event log below.

Level-1, Level-2, Level-3 Data Products and Processing

Level-1 Data Processing & Delivery

- [2020-07-10]: JPL SDS Level-1 has updated the v04 LRI data processing to (1) improve the removal of LRI phase jumps, and to (2) reduce the noise of the time-of-flight (TOF) correction for range-acceleration to the level of 1 nm/s^2 ;

Please see Level-1 Release Notes for details.

- Level-1 data products (current version: v04), which are available at NASA's Physical Oceanography Distributed Active Archive Center (PO.DAAC) and GFZ's Information System and Data Center (ISDC), are continuously updated approximately every 7 days. The Level-1 data includes all data required for the generation of Level-2 gravity field products. Please refer to Level-1 release notes, documentation, as well as to the Sequence-of-Events (SOE) logfile for important updates, comments and detailed description of the data, file formats, and conventions (PO.DAAC / ISDC).

KBR Performance Statistics

- [see Appendix 1A (p. 5)]

Level-1 Data Product Availability

- [see Appendix 1B (p. 8) for GRACE-FO Level-1 data]
- [see Appendix 1C (p. 8) for de-aliasing AOD1B model data]

Level-1 Release Notes & Sequence of Events

- [see Appendix 1D (p. 8)]

Level-2 Data Processing & Delivery

Level-2 Data availability

- Level-2 Release 06 data have been processed at JPL, GFZ and CSR and are archived at JPL PO.DAAC and GFZ ISDC. The Level-2 products include the monthly gravity fields from the three mission Science Data System centers (JPL, GFZ, CSR), as well as the corresponding atmosphere and ocean dealiasing (AOD) background model data.
- Please refer to the Level-2 Release Notes and documentation description of the data for file formats, updates, conventions, as well as important processing recommendations (PO.DAAC / ISDC).
- [see Appendix 2A (p. 12) for overview tables on data availability].



Level-2 Ancillary Products and Comments

- TN-14 contains C20 & C30 estimates derived from SLR and using Level-2 RL06 standards, updated in synch with Level-2 monthly releases. It is recommended to replace the native GRACE & GRACE-FO C20 & C30 coefficients with this product (Loomis et al., 2019).
- TN-13[a,b,c] contains geocenter estimates using the methods of Swenson et al. (2010) and Sun et al. (2016), and is updated in synch with Level-2 monthly releases. It is recommended to augment the GRACE / GRACE-FO geocenter with this product for surface mass change estimation.

Level-3 Data Processing & Delivery

- SDS Level-3 monthly global grids of mass changes are generated by JPL and available at PO.DAAC.

Resources and Links:

Data Archives (Level 1-3):

- JPL/NASA PO.DAAC (<http://podaac.jpl.nasa.gov>)
- GFZ ISDC (<https://isdc.gfz-potsdam.de/grace-fo-isdc>)

Miscellaneous Links:

- For GRACE Follow-On mission updates and news, please visit <https://gracefo.jpl.nasa.gov> and <http://gfz-potsdam.de/en/grace-fo>.
- The proceedings of previous GRACE / GRACE-FO Science Team Meetings are available at <https://www.gfz-potsdam.de/en/grace/>.
- **GRACE and GRACE-FO related publications** are available via searchable databases:
 - http://www-app2.gfz-potsdam.de/pb1/op/grace/references/sort_date.html
 - <https://grace.jpl.nasa.gov/publications/>
 - If you are missing a publication please send an e-mail to Frank Flechtner (flechtne@gfz-potsdam.de) and contact the JPL team via <https://grace.jpl.nasa.gov/about/feedback/>.



Appendix

1.A - KBR Performance Statistics

KBR QUALITY ASSESSMENT

Key to columns in the table below

- 1) KBR1B product name
- 2) Total arc length with data (hours)
- 3) Number of observations used in KBR-GPS range residual calculation
- 4) KBR-GPS range residual RMS (mm)
- 5) Minimum KBR-GPS range residual (mm)
- 6) Maximum KBR-GPS range residual (mm)
- 7) Number of continuous segments in the KBR product

KBR1B_2021-01-01_Y_04.dat	24.0	17280	3.11	-12.4	12.8	1
KBR1B_2021-01-02_Y_04.dat	24.0	17280	3.64	-17.6	15.5	1
KBR1B_2021-01-03_Y_04.dat	24.0	17280	4.04	-23.1	16.0	1
KBR1B_2021-01-04_Y_04.dat	24.0	17280	3.27	-9.6	16.6	1
KBR1B_2021-01-05_Y_04.dat	24.0	17280	4.08	-16.4	15.9	1
KBR1B_2021-01-06_Y_04.dat	24.0	17280	4.28	-28.9	13.1	1
KBR1B_2021-01-07_Y_04.dat	24.0	17280	3.84	-17.3	14.8	1
KBR1B_2021-01-08_Y_04.dat	24.0	17280	3.37	-14.3	16.8	1
KBR1B_2021-01-09_Y_04.dat	24.0	17280	3.90	-12.8	23.5	1
KBR1B_2021-01-10_Y_04.dat	24.0	17280	3.17	-9.7	13.6	1
KBR1B_2021-01-11_Y_04.dat	24.0	16971	2.52	-7.9	10.6	2
KBR1B_2021-01-12_Y_04.dat	24.0	17280	3.38	-10.6	15.4	1
KBR1B_2021-01-13_Y_04.dat	24.0	17280	3.48	-19.0	13.5	1
KBR1B_2021-01-14_Y_04.dat	24.0	17280	3.63	-19.6	22.3	1
KBR1B_2021-01-15_Y_04.dat	24.0	17280	3.82	-18.0	14.9	1
KBR1B_2021-01-16_Y_04.dat	24.0	17280	3.39	-25.3	8.6	1
KBR1B_2021-01-17_Y_04.dat	24.0	17280	2.67	-9.7	11.4	1
KBR1B_2021-01-18_Y_04.dat	24.0	17280	3.63	-15.8	17.8	1
KBR1B_2021-01-19_Y_04.dat	24.0	17280	3.44	-18.0	16.4	1
KBR1B_2021-01-20_Y_04.dat	24.0	17280	2.68	-7.9	10.4	1
KBR1B_2021-01-21_Y_04.dat	24.0	17280	2.87	-7.2	17.1	1
KBR1B_2021-01-22_Y_04.dat	24.0	17187	3.09	-15.0	11.5	2
KBR1B_2021-01-23_Y_04.dat	24.0	17193	3.11	-13.6	10.3	2
KBR1B_2021-01-24_Y_04.dat	24.0	17280	3.81	-21.5	13.2	1
KBR1B_2021-01-25_Y_04.dat	24.0	17280	2.99	-19.8	12.5	1
KBR1B_2021-01-26_Y_04.dat	24.0	17280	2.79	-11.8	9.8	1
KBR1B_2021-01-27_Y_04.dat	24.0	17280	3.64	-21.8	13.6	1
KBR1B_2021-01-28_Y_04.dat	24.0	17280	3.07	-10.1	15.5	1
KBR1B_2021-01-29_Y_04.dat	24.0	17280	4.56	-22.0	18.9	1
KBR1B_2021-01-30_Y_04.dat	24.0	17280	3.35	-15.5	14.6	1
KBR1B_2021-01-31_Y_04.dat	24.0	17035	3.61	-11.8	17.1	2

GRAVITY RECOVERY AND CLIMATE EXPERIMENT *Follow-On*



KBR1B_2021-02-01_Y_04.dat	24.0	17280	3.26	-12.7	20.5	1
KBR1B_2021-02-02_Y_04.dat	24.0	17280	2.80	-12.1	8.5	1
KBR1B_2021-02-03_Y_04.dat	24.0	17280	2.52	-13.2	8.2	1
KBR1B_2021-02-04_Y_04.dat	24.0	17280	2.33	-8.8	8.9	1
KBR1B_2021-02-05_Y_04.dat	24.0	16958	2.71	-7.3	10.4	2
KBR1B_2021-02-06_Y_04.dat	24.0	17280	4.45	-19.5	22.3	1
KBR1B_2021-02-07_Y_04.dat	24.0	17280	2.87	-8.3	12.6	1
KBR1B_2021-02-08_Y_04.dat	24.0	17280	3.74	-19.3	15.9	1
KBR1B_2021-02-09_Y_04.dat	24.0	17280	3.03	-13.0	14.4	1
KBR1B_2021-02-10_Y_04.dat	24.0	17280	3.24	-15.7	11.8	1
KBR1B_2021-02-11_Y_04.dat	24.0	17280	3.36	-19.6	12.3	1
KBR1B_2021-02-12_Y_04.dat	24.0	17280	2.38	-9.9	7.4	1
KBR1B_2021-02-13_Y_04.dat	24.0	17280	4.55	-33.5	15.9	1
KBR1B_2021-02-14_Y_04.dat	24.0	17194	3.58	-23.7	9.1	2
KBR1B_2021-02-15_Y_04.dat	24.0	17280	3.04	-10.4	15.3	1
KBR1B_2021-02-16_Y_04.dat	24.0	17280	4.08	-18.6	14.2	1
KBR1B_2021-02-17_Y_04.dat	24.0	17280	3.06	-8.7	13.1	1
KBR1B_2021-02-18_Y_04.dat	24.0	17280	3.43	-14.9	10.3	1
KBR1B_2021-02-19_Y_04.dat	24.0	17030	4.95	-20.0	24.2	2
KBR1B_2021-02-20_Y_04.dat	24.0	17280	5.01	-26.8	17.9	1
KBR1B_2021-02-21_Y_04.dat	24.0	17280	4.36	-25.5	8.7	1
KBR1B_2021-02-22_Y_04.dat	24.0	17280	3.54	-16.6	16.3	1
KBR1B_2021-02-23_Y_04.dat	24.0	16972	3.01	-9.3	18.5	3
KBR1B_2021-02-24_Y_04.dat	24.0	17280	3.69	-24.6	10.0	1
KBR1B_2021-02-25_Y_04.dat	24.0	17280	2.70	-7.3	15.3	1
KBR1B_2021-02-26_Y_04.dat	24.0	17185	3.32	-15.7	13.0	2
KBR1B_2021-02-27_Y_04.dat	24.0	17194	4.01	-15.1	19.3	2
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KBR1B_2021-03-01_Y_04.dat	24.0	17280	3.63	-10.4	23.4	1
KBR1B_2021-03-02_Y_04.dat	24.0	17280	3.35	-17.3	11.5	1
KBR1B_2021-03-03_Y_04.dat	24.0	16883	3.51	-14.8	7.8	3
KBR1B_2021-03-04_Y_04.dat	24.0	17280	3.21	-7.5	19.1	1
KBR1B_2021-03-05_Y_04.dat	24.0	17280	3.37	-21.3	8.7	1
KBR1B_2021-03-06_Y_04.dat	24.0	17280	2.57	-7.5	9.9	1
KBR1B_2021-03-07_Y_04.dat	24.0	17280	3.64	-7.6	26.4	1
KBR1B_2021-03-08_Y_04.dat	24.0	17280	2.67	-6.6	12.4	1
KBR1B_2021-03-09_Y_04.dat	24.0	17280	3.56	-13.6	20.5	1
KBR1B_2021-03-10_Y_04.dat	24.0	17280	2.21	-10.0	7.8	1
KBR1B_2021-03-11_Y_04.dat	24.0	17280	3.16	-11.1	12.4	1
KBR1B_2021-03-12_Y_04.dat	24.0	17134	3.58	-8.9	26.3	2
KBR1B_2021-03-13_Y_04.dat	24.0	17280	2.81	-9.7	10.9	1
KBR1B_2021-03-14_Y_04.dat	24.0	17134	3.49	-9.1	14.3	2
KBR1B_2021-03-15_Y_04.dat	24.0	17280	2.31	-9.8	10.7	1
KBR1B_2021-03-16_Y_04.dat	24.0	17280	2.37	-8.0	7.2	1
KBR1B_2021-03-17_Y_04.dat	24.0	17280	3.30	-17.0	13.3	1
KBR1B_2021-03-18_Y_04.dat	24.0	17280	3.20	-12.5	15.5	1
KBR1B_2021-03-19_Y_04.dat	24.0	17147	2.79	-12.1	12.9	2

GRAVITY RECOVERY AND CLIMATE EXPERIMENT *Follow-On*

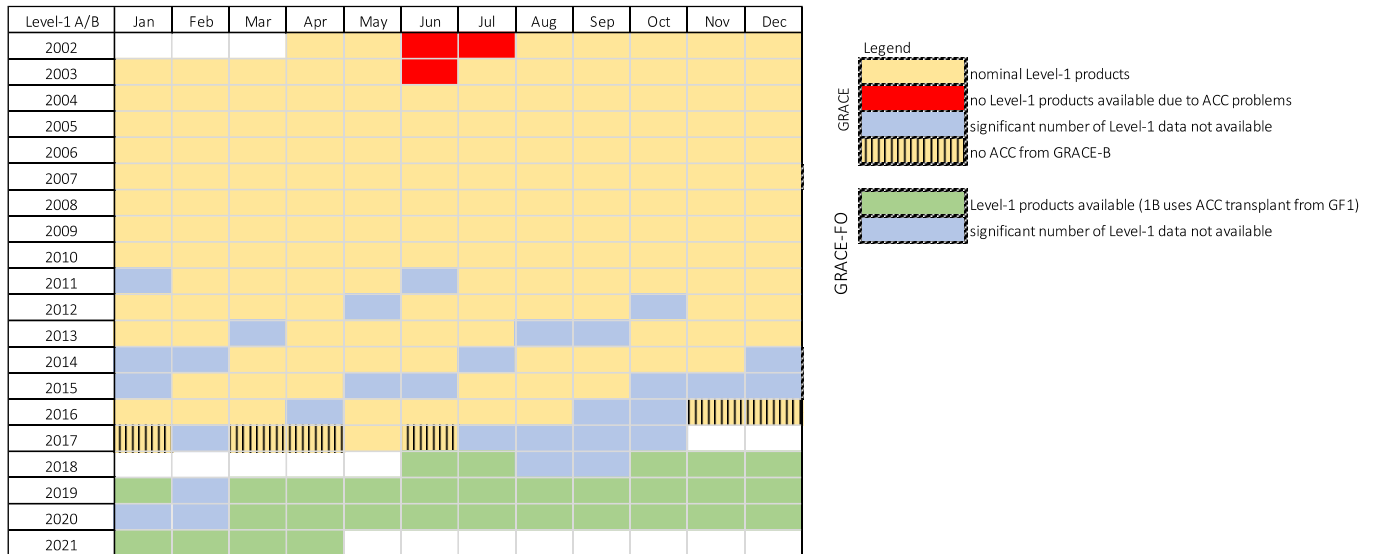


KBR1B_2021-03-20_Y_04.dat	24.0	17280	2.96	-14.5	8.9	1
KBR1B_2021-03-21_Y_04.dat	24.0	17280	2.68	-6.0	10.3	1
KBR1B_2021-03-22_Y_04.dat	24.0	17280	3.68	-20.2	14.1	1
KBR1B_2021-03-23_Y_04.dat	24.0	17185	3.47	-12.0	15.7	2
KBR1B_2021-03-24_Y_04.dat	24.0	17171	2.49	-9.7	8.4	2
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KBR1B_2021-03-26_Y_04.dat	24.0	17280	2.78	-15.1	7.4	1
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KBR1B_2021-03-28_Y_04.dat	24.0	17280	2.40	-7.5	11.3	1
KBR1B_2021-03-29_Y_04.dat	24.0	17280	2.95	-9.5	13.5	1
KBR1B_2021-03-30_Y_04.dat	24.0	17280	2.92	-12.3	10.9	1
KBR1B_2021-03-31_Y_04.dat	24.0	17280	2.45	-7.7	9.6	1
KBR1B_2021-04-01_Y_04.dat	24.0	17088	3.62	-12.8	13.2	2
KBR1B_2021-04-02_Y_04.dat	24.0	17173	4.20	-22.0	13.3	2
KBR1B_2021-04-03_Y_04.dat	24.0	17280	2.79	-9.8	12.4	1
KBR1B_2021-04-04_Y_04.dat	24.0	17280	2.31	-8.4	10.2	1
KBR1B_2021-04-05_Y_04.dat	24.0	17280	2.84	-12.2	12.2	1
KBR1B_2021-04-06_Y_04.dat	24.0	17131	3.36	-21.0	10.9	2
KBR1B_2021-04-07_Y_04.dat	24.0	17280	4.03	-25.1	8.6	1
KBR1B_2021-04-08_Y_04.dat	24.0	17280	4.01	-27.3	10.2	1
KBR1B_2021-04-09_Y_04.dat	24.0	17143	3.06	-9.1	17.8	2
KBR1B_2021-04-10_Y_04.dat	24.0	17280	3.54	-9.4	19.1	1
KBR1B_2021-04-11_Y_04.dat	24.0	17280	2.58	-13.1	5.9	1
KBR1B_2021-04-12_Y_04.dat	24.0	17280	3.10	-11.5	11.2	1
KBR1B_2021-04-13_Y_04.dat	24.0	17280	3.28	-12.4	10.5	1
KBR1B_2021-04-14_Y_04.dat	24.0	17143	2.94	-11.3	13.2	2
KBR1B_2021-04-15_Y_04.dat	24.0	17280	3.25	-15.8	16.7	1
KBR1B_2021-04-16_Y_04.dat	24.0	17280	2.40	-7.5	11.7	1
KBR1B_2021-04-17_Y_04.dat	24.0	17280	3.78	-17.4	11.4	1
KBR1B_2021-04-18_Y_04.dat	24.0	17093	2.95	-12.5	13.6	2
KBR1B_2021-04-19_Y_04.dat	24.0	17280	3.06	-11.3	12.0	1
KBR1B_2021-04-20_Y_04.dat	24.0	17212	2.60	-7.8	11.3	2
KBR1B_2021-04-21_Y_04.dat	24.0	17280	2.94	-8.9	11.5	1
KBR1B_2021-04-22_Y_04.dat	24.0	17280	2.86	-10.2	10.2	1
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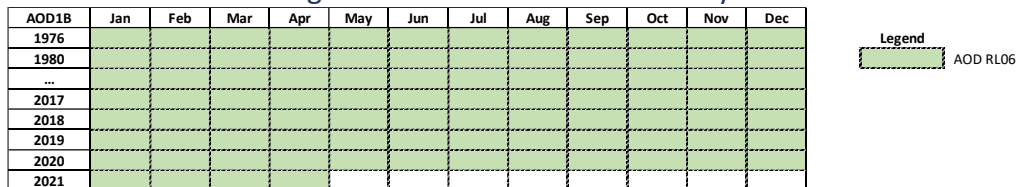


1.B – Level-1 GRACE-FO Data Availability

Table 1: Current version: Level-1 v04.



1.C – Level-1 De-aliasing Model AOD1B Data Availability



- For more information on the AOD de-aliasing AOD1B model please visit <https://www.gfz-potsdam.de/en/aod1b/>.

1.D - Level-1 Release Notes & Sequence of Events

See table below for current release period. All times in UTC:

2021-01-01 GRACE-C LRI diagnostic data collection started on 01-Jan and ended on 11-Jan. During this period the LRI is commanded to the Diagnostic Mode and high rate data is collected daily for two orbits. For the data collection time, the sampling rate of TM packet 14002 is increased from 4sec to 1sec. -
 GRACE-D Possible micrometeoroid impact at 15:26:37. There are notable signatures in all 6 accelerometer axes and a spike in the LRI data (as confirmed by Vitali). Note that this impact appears to be quite small. -

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- 2021-01-04 GRACE-D Possible micrometeoroid impact at 12:48:59. There are notable signatures in all 6 accelerometer axes and a spike in the LRI data (as confirmed by Vitali). Note that this impact appears to be quite small. -
- 2021-01-08 GRACE-D Anomalous behavior of the LRI during sun blindings necessitated some special handling of the LRI data. -
- 2021-01-09 GRACE-D Anomalous behavior of the LRI during sun blindings necessitated some special handling of the LRI data. Note that the span from 10:08 to 10:18, may have a suspect time bias value (this data may have to be edited at Level-2). -
- 2021-01-11 GRACE-C The last part of the LRI diagnostic data collection (01/11-Jan) was finished at 12:31. -
GRACE-D The IPU PPS time incorrectly jumped by 1024 sec (similar to the time jump on 18-Jan-2020). Thanks to the modified FDIR response to such an event the on-board time synchronization to GPS was disabled and the satellite maintained the NOM-FP mode. As a result of the time jump, the IPU was unable to acquire new GPS satellites and it rebooted at 16:48 (south-east Indian Ocean). A short time later, it rebooted again at 17:03 (Laos).
- GRACE-D IPU reboot (spontaneous) at 16:48:50
GRACE-D IPU reboot (spontaneous) at 17:04:00 -
- 2021-01-12 GRACE-D The on-board time synchronization to GPS was re-enabled at 09:16. -
- 2021-01-22 GRACE-D IPU reboot (commanded) at 03:45:40
GRACE-C IPU reboot (commanded) at 03:49:40 -
- 2021-01-23 GRACE-C IPU reboot (spontaneous) at 04:02:30 -
- 2021-01-31 GRACE-C IPU reboot (spontaneous) at 04:27:10 -
- 2021-02-05 GRACE-D IPU reboot (commanded) at 07:35:20
GRACE-C IPU reboot (commanded) at 07:41:10
GRACE-C At 23:45:10, Ka/K Trackers restarted autonomously after a Missed Interrupt was detected on-board.
- GPS PRN#08 was disabled in the IPU's from 2021-02-04 18:00 to 2021-02-05 07:35 due to an announced period of unavailability. The IPU's on both satellites were restarted at 07:35 (South Pacific Ocean).
- 2021-02-14 GRACE-C IPU reboot (spontaneous) at 13:26:20
- 2021-02-19 GRACE-C IPU reboot (commanded) at 09:14:40
GRACE-D IPU reboot (commanded) at 09:10:40
IPU reboots were commanded to ensure tracking was re-enabled to all available satellites after GPS PRN#12 was disabled in the IPU's (2021-02-18 19:35 to 2021-02-19 09:05) due to an announced period of unavailability
- GRACE-C IPU reboot (spontaneous) at 23:54:20
- 2021-02-23 GRACE-D The IPU S/W was restarted at 13:23 (Drake Passage/OHG) in order to resume the nominal output of DSP channels 27, 28 and 29.
GRACE-D IPU reboot (commanded) at 13:23:10
GRACE-C IPU reboot (spontaneous) at 15:40:30



2021-02-26 GPS PRN#04 was disabled in the IPU from 2021-02-25 10:30 to 2021-02-26 00:00 due to an announced period of unavailability.
GRACE-D IPU reboot (commanded) at 03:05:40
GRACE-C IPU reboot (commanded) at 03:09:30

2021-02-27 GRACE-C GPS PRN#18 was disabled in the IPU from 2021-02-26 08:35 to 2021-02-27 04:01.
GRACE-D GPS PRN#18 was disabled in the IPU from 2021-02-06 16:00 to 2021-02-27 04:01.

GRACE-D IPU reboot (commanded) at 04:05:40
GRACE-C IPU reboot (commanded) at 04:09:30

2021-03-02 GPS PRN #04 disabled from 10:30 to 2021-03-03 00:00, IPU to be rebooted at 2021-03-03 03:05

2021-03-03 GRACE-D IPU reboot (commanded) at 03:05:40 to reenale GSP PRN #04
GRACE-C IPU reboot (commanded) at 03:16:30 to reenale GSP PRN #04
GRACE-C IPU reboot (spontaneous) at 14:20:10
GRACE-C Yaw thruster test was performed from 05:27 to 07:55. The test was divided into four sequences with 20 x 50ms long thruster firings. The firings occurred every 10 seconds.
Sequence start times:
05:27:20 branch A Y+ thruster
06:14:20 branch A Y- thruster
07:01:20 branch B Y+ thruster
07:49:20 branch B Y- thruster
GRACE-C LRI diagnostic data was collected during the thruster test. The LRI was commanded to diagnostic mode at 05:27 and returned to science mode at 08:37.

2021-03-09 GRACE-D A spontaneous reboot of the LRI was experienced at 12:23 (over the Arctic Ocean).
GRACE-C LRI: short period in Reacquisition Mode due to LRI reboot on GF2.

2021-03-11 GRACE-C IMU-4 was switched on from 09:55 to 11:30.
GRACE-D IMU-4 was switched on from 11:30 to 13:05.

2021-03-12 GPS PRN#20 was disabled in the IPU from 2021-02-1202:45 to 2021-03-13 16:16 due to an announced period of unavailability.
GRACE-D IPU reboot (commanded) at 16:20:40
GRACE-C IPU reboot (commanded) at 16:27:30

2021-03-14 GRACE-D IPU reboot (spontaneous) at 21:48:00

2021-03-18 GPS PRN#24 was disabled in the IPU from 2021-03-18 16:45 to 2021-03-19 06:16 due to an announced period of unavailability.

2021-03-19 GRACE-D IPU reboot (commanded) at 06:20:40
GRACE-C IPU reboot (commanded) at 06:25:00

2021-03-20 GRACE-C possible micrometeoroid impact at 04:23:33 (delta-v of 0.476 microns/sec)

2021-03-22 GRACE-C Ongoing IPU S/W upload:
At 09:50 the maximal number of tracked GPS satellites was set to 10.
At 09:51 radio occultation measurements were disabled.

GRAVITY RECOVERY AND CLIMATE EXPERIMENT *Follow-On*



At 13:56 ClearFlashFile library was uploaded and installed (it will be activated at the next IPU restart, after all scheduled libraries have been installed).

2021-03-23 GRACE-C Ongoing IPU S/W upload:
At 12:00 TrackNPack library was uploaded and installed (it will be activated at the next IPU restart, after all scheduled libraries have been installed).
GRACE-D IPU reboot (spontaneous) at 22:46:40
GRACE-D possible micrometeoroid impact at 22:10:26 (delta-v of -0.183 microns/sec)

2021-03-24 GRACE-C IPU S/W was successfully updated to version V4.4:
At 10:01 TriG_MCP and GFODefaults libraries were installed.
At 11:50 FlashFile library was installed
At 12:23 the IPU was restarted and the new S/W was activated (over McMurdo/Antarctica).
At 12:25 the maximal number of tracked GPS satellites was set to 11.
IPU reboot (spontaneous) at 12:27:40 , efahnest

2021-03-26 GRACE-C Radio occultation measurements were enabled at 17:00.

2021-03-29 GRACE-C CMCAL maneuvers were executed yesterday and today:
Pitch: 20:50, 05:08, 06:43
Roll: 01:59, 03:34
Yaw: 23:04, 00:38
GRACE-D CMCAL maneuvers were executed today:
Pitch: 04:57, 06:31, 08:32
Roll: 01:48, 03:22
Yaw: 11:01, 12:36

2021-04-01 GRACE-D IPU reboot (spontaneous) at 12:23:10

2021-04-02 GRACE-D IPU reboot (commanded) at 03:05:40
GRACE-C IPU reboot (commanded) at 03:09:50
These reboots were to re-enable PRN #9 on both IPU's

2021-04-06 GRACE-D IPU reboot (spontaneous) at 02:29:48

2021-04-09 GPS PRN#28 was disabled in the IPU's from 2021-04-08 15:15 to 2021-04-09 04:46 today due to an announced period of unavailability.
GRACE-D IPU reboot (commanded) at 04:50:40
GRACE-C IPU reboot (commanded) at 04:54:30

2021-04-12 GPS PRN#24 was disabled in the IPU's at 14:15.

2021-04-14 GRACE-D IPU reboot (spontaneous) at 20:52:50

2021-04-18 GRACE-D IPU reboot (spontaneous) at 20:58:10

2021-04-20 GRACE-D IPU reboot (spontaneous) at 10:15:10

2021-04-22 GPS PRN#07 was disabled in the IPU's from 10:00 to 23:31 due to an announced period of unavailability

2021-04-23 GRACE-D IPU reboot (commanded) at 03:05:40
GRACE-C IPU reboot (commanded) at 03:10:20

2021-04-26 GRACE-D IPU reboot (commanded) at 15:50:40



GRACE-C IPU reboot (commanded) at 15:54:30

GPS PRN#24 was re-enabled in the IPU's at 15:46, disabled since 2021-04-12 14:15

2.A – Level-2 Product and Data Availability

JPL, GFZ & CSR

- Current Level-2 version: RL06
- All centers provide GSM solutions
 - Please check the Level-2 Release Notes for further details
- JPL and GFZ provide corresponding monthly de-aliasing models [GAA, GAB, GAC, GAD]; CSR provides [GAC, GAD].

Table 2: GRACE and GRACE-FO Level-2 product availability.

Level-2 (JPL)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002				1	2			3	4	5	6	7
2003	8	9	10	11	12		13	14	15	16	17	18
2004	19	20	21	22	23	24	25	26	27	28	29	30
2005	31	32	33	34	35	36	37	38	39	40	41	42
2006	43	44	45	46	47	48	49	50	51	52	53	54
2007	55	56	57	58	59	60	61	62	63	64	65	66
2008	67	68	69	70	71	72	73	74	75	76	77	78
2009	79	80	81	82	83	84	85	86	87	88	89	90
2010	91	92	93	94	95	96	97	98	99	100	101	102
2011		103	104	105	106		107	108	109	110	111	112
2012	113	114	115	116		117	118	119	120		121	122
2013	123	124		125	126	127	128		129	130	131	
2014	132		133	134	135	136		137	138	139	140	
2015	141	142	143	144	145		146	147	148			149
2016	150	151	152		153	154	155	156			157*	158*
2017	159*+		160*+	161*+	162*	163*+						
2018						1*+	2*+			3*+	4+	5+
2019	6+	7*+	8+	9+	10+	11+	12+	13+	14+	15+	16+	17+
2020	18*+	19*+	20+	21+	22+	23+	24+	25+	26+	27+	28+	29+
2021	30+	31+	32+									

GRACE
 Level-2 products
 no Level-2 products available

GRACE-FO
 Level-2 products available

Current Level-2 Release: RL06

+ Level-2 products (with ACC transplant)
 * partial / overlapping calendar-months

3.A – Level-3 Product and Data Availability

JPL, GFZ & CSR

- JPL provides Land (LND) and Ocean (OCN) global data grids for all three SDS centers (JPL, GFZ, CSR) via PO.DAAC.

GRAVITY RECOVERY AND CLIMATE EXPERIMENT *Follow-On*



Table 3: GRACE and GRACE-FO Level-3 product availability

Level-2 (JPL)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002				1	2							
2003	8	9	10	11	12		13	14	15	16	17	18
2004	19	20	21	22	23	24	25	26	27	28	29	30
2005	31	32	33	34	35	36	37	38	39	40	41	42
2006	43	44	45	46	47	48	49	50	51	52	53	54
2007	55	56	57	58	59	60	61	62	63	64	65	66
2008	67	68	69	70	71	72	73	74	75	76	77	78
2009	79	80	81	82	83	84	85	86	87	88	89	90
2010	91	92	93	94	95	96	97	98	99	100	101	102
2011		103	104	105	106		107	108	109	110	111	112
2012	113	114	115	116		117	118	119	120		121	122
2013	123	124		125	126	127	128			129	130	131
2014	132		133	134	135	136		137	138	139	140	
2015	141	142	143	144	145		146	147	148			149
2016	150	151	152		153	154	155	156			157+	158+
2017	159+		160+	161+	162*	163*						
2018						1*	2*			3*	4*	5*
2019	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+	16+	17+
2020	18+*	19+*	20+	21+	22+	23+	24+	25+	26+	27+	28+	29+
2021	30+	31+	32+									

- GRACE
 Level-3 products
 no Level-3 products available
- GRACE-FO
 Level-3 products available
- Current Level-2 Release: RL06
- + Level-3 products (with ACC transplant)
 * partial / overlapping cal-months