

***Kepler Data Release 9 Notes***

KSCI-19049-001

Data Analysis Working Group (DAWG)

*Jessie Christiansen (Editor)*

*Pavel Machalek (Editor)*

Data Release 9 for Quarter Q6

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Q.m |  | First Cadence MJD midTime | Last Cadence MJD midTime | First Cadence UT midTime | Last Cadence UT midTime | Num CINs | Start CIN | End CIN |
| 0 | LC |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| 0 | SC | 54953.028 | 54962.754 | 5/2/09 0:40 | 5/11/09 18:05 | 14280 |  |  |
| 0 | LC | 54953.038 | 54962.744 | 5/2/09 0:54 | 5/11/09 17:51 | 476 |  |  |
| 1 | SC | 54964.001 | 54997.491 | 5/13/09 0:01 | 6/15/09 11:47 | 49170 |  |  |
| 1 | LC | 54964.011 | 54997.481 | 5/13/09 0:15 | 6/15/09 11:32 | 1639 |  |  |
|  |  |  |  |  |  |  |  |  |
| 2.1 | SC | 55002.008 | 55032.800 | 6/20/09 0:10 | 7/20/09 19:12 | 45210 |  |  |
| 2.2 | SC | 55032.822 | 55062.797 | 7/20/09 19:42 | 8/19/09 19:07 | 44010 |  |  |
| 2.3 | SC | 55063.860 | 55090.975 | 8/20/09 20:38 | 9/16/09 23:23 | 39810 |  |  |
| 2 | LC | 55002.018 | 55090.965 | 6/20/09 0:25 | 9/16/09 23:09 | 4354 |  |  |
| 3 | LC | 55092.7222 | 55181.9966 | 9/18/09 17:19 | 12/16/09 23:55 | 4370 |  |  |
| 3.1 | SC | 55092.7123 | 55123.0555 | 9/18/09 17:05 | 10/19/09 1:19 | 44550 |  |  |
| 3.2 | SC | 55123.9144 | 55153.9511 | 10/19/09 21:56 | 11/18/09 22:49 | 44100 |  |  |
| 3.3 | SC | 55156.0156 | 55182.0065 | 11/21/09 0:22 | 12/17/09 0:09 | 38160 |  |  |
|  |  |  |  |  |  |  |  |  |
| 0 | LC | 54953.038 | 54962.744 | 5/2/09 0:54 | 5/11/09 17:51 | 476 |  |  |
| 0 | SC | 54953.028 | 54962.754 | 5/2/09 0:40 | 5/11/09 18:05 | 14280 |  |  |
| 1 | LC | 54964.011 | 54997.481 | 5/13/09 0:15 | 6/15/09 11:32 | 1639 |  |  |
| 1 | SC | 54964.001 | 54997.491 | 5/13/09 0:01 | 6/15/09 11:47 | 49170 |  |  |
| 6 | LC | 55371.9473 | 55461.7939 | 06/24/10 22:44 | 09/22/10 19:03 | 4397 | 21069 | 25466 |
| 6.1 | SC | 55371.9375 | 55399.0317 | 06/24/10 22:29 | 07/22/10 00:45 | 39779 | 620530 | 660309 |
| 6.2 | SC | 55399.8702 | 55430.7855 | 07/22/10 20:53 | 08/22/10 18:51 | 45389 | 661540 | 706929 |
| 6.3 | SC | 55431.6853 | 55461.8037 | 08/23/10 16:26 | 09/22/10 19:17 | 44219 | 708250 | 752469 |

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Approved by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_

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# *Prefatory Admonition to Users*

The corrected light-curve product generated by the PDC (Pre-search Data Conditioning) pipeline module is designed to enable the Kepler planetary transit search. Although significant effort has been expended to preserve the natural variability of targets in the corrected light curves in order to enable astrophysical exploitation of the Kepler data, it is not possible to perfectly preserve general stellar variability on long timescales with amplitudes comparable to or smaller than the instrumental systematics, and PDC currently is known to remove or distort astrophysical features in a subset of the corrected light curves. In those cases where PDC fails, or where the requirements of an astrophysical investigation are in conflict with those for transit planet search, the investigator should use the ‘raw’ light-curve product, for which basic calibration has been performed but correction for instrumental systematics has not, instead of the PDC (‘corrected’) light-curve product. Where appropriate, the investigator can then use the ancillary engineering data and image motion time series provided in the relevant Data Release Notes Supplement/s for systematic error correction. Investigators are strongly encouraged to study the Data Characteristics Handbook and Data Release Notes for any data sets they intend to use. The Science Office advises against publication of results based on Kepler light curves without careful consideration and due diligence by the end user, and dialog with the Science Office or Guest Observer Office where appropriate.

Users are encouraged to notice and document artifacts, either in the raw or processed data, and report them to the Science Office at [kepler-scienceoffice@lists.nasa.gov](mailto:kepler-scienceoffice@lists.nasa.gov).

**

*Users who neglect this Admonition risk seeing their works crumble into ruin before their time.*

# Introduction

These Data Release Notes provide information specific to the quarter of data currently being released. They have been drastically shortened relative to previous versions. The companion text has been moved to the Kepler Data Characterization Handbook (KSCI-19040). The section numbers and titles are identical in these Notes and that Handbook to assist the reader.

## Dates, Cadence numbers, and units

Table : Contents of Release 9. CIN is the cadence interval number. All Release 9 cadence data were processed under KSOP-652 with SOC Pipeline 6.2, revision number r40414.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Q.m |  | First Cadence MJD midTime | Last Cadence MJD midTime | First Cadence UT midTime | Last Cadence UT midTime | Num CINs | Start CIN | End CIN |
| 0 | LC |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| 0 | SC | 54953.028 | 54962.754 | 5/2/09 0:40 | 5/11/09 18:05 | 14280 |  |  |
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| 1 | SC | 54964.001 | 54997.491 | 5/13/09 0:01 | 6/15/09 11:47 | 49170 |  |  |
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|  |  |  |  |  |  |  |  |  |
| 0 | LC | 54953.038 | 54962.744 | 5/2/09 0:54 | 5/11/09 17:51 | 476 |  |  |
| 0 | SC | 54953.028 | 54962.754 | 5/2/09 0:40 | 5/11/09 18:05 | 14280 |  |  |
| 1 | LC | 54964.011 | 54997.481 | 5/13/09 0:15 | 6/15/09 11:32 | 1639 |  |  |
| 1 | SC | 54964.001 | 54997.491 | 5/13/09 0:01 | 6/15/09 11:47 | 49170 |  |  |
| 6 | LC | 55371.9473 | 55461.7939 | 06/24/10 22:44 | 09/22/10 19:03 | 4397 | 21069 | 25466 |
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| 6.3 | SC | 55431.6853 | 55461.8037 | 08/23/10 16:26 | 09/22/10 19:17 | 44219 | 708250 | 752469 |

# Release Description

No changes from the Data Characteristics Handbook.

# Evaluation of Performance

## Overall

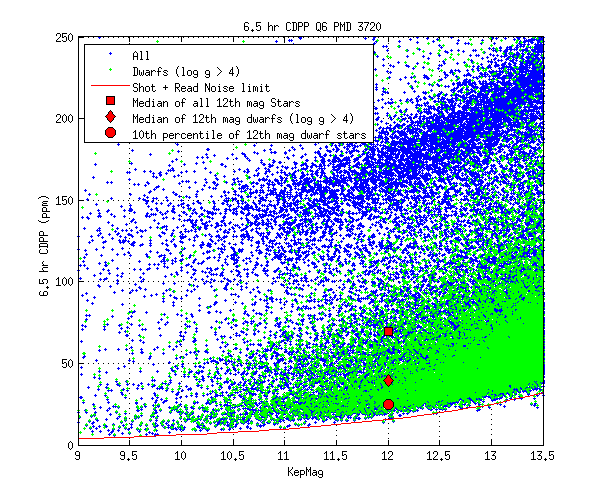


Figure : 6.5 hr Temporal Median (TM) of the Quarter 6 CDPP time series calculated by the TPS pipeline module for stars between 9th and 13.5th magnitude. The 6 hr TMCDPPs have been divided by sqrt(13/12) = 1.041 to approximate 6.5 hr TMCDPPs. Stars on the planetary target list with Kepler Magnitude < 13.5 and log g > 4, which are almost certainly dwarf stars, are shown as green +'s; other stars are marked with blue +'s.

Table : Aggregate Statistics for the TMCDPPs plotted in Figure 1: 6.5 hr Temporal Median (TM) of the Quarter 6 CDPP time series calculated by the TPS pipeline module for stars between 9th and 13.5th magnitude. The 6 hr TMCDPPs have been divided by sqrt(13/12) = 1.041 to approximate 6.5 hr TMCDPPs. Stars on the planetary target list with Kepler Magnitude < 13.5 and log g > 4, which are almost certainly dwarf stars, are shown as green +'s; other stars are marked with blue +'s.. Column Definitions: (1) Kepler Magnitude at center of bin. Bins are +/- 0.25 mag, for a bin of width 0.5 mag centered on this value. (2) Number of dwarfs (log g > 4) in bin. (3) 10th percentile TMCDPP for dwarfs in bin. (4) Median TMCDPP for dwarfs in bin. (5) Number of all stars in bin. (6) 10th percentile TMCDPP of all observed stars in bin. (7) Median TMCDPP for all stars in bin. (8) Simplified noise model CDPP.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Kepler mag at bin center | Number of dwarfs in bin | 10th percentile CDPP, dwarfs | Median CDPP, dwarfs | Number of all stars in bin | 10th percentile CDPP, all stars | Median CDPP, all stars | Lower envelope of model CDPP |
| 9 | 31 | 9.8 | 37 | 180 | 13.2 | 89.5 | 3.8 |
| 10 | 160 | 12.1 | 34.6 | 567 | 14.7 | 100.3 | 6 |
| 11 | 607 | 18.5 | 33.8 | 1707 | 21.4 | 94.2 | 9.5 |
| 12 | 2169 | 24.9 | 39.2 | 4385 | 27 | 69.5 | 15.2 |
| 13 | 6767 | 36.4 | 50.9 | 10645 | 38.2 | 64.7 | 24.4 |

# Historical Events

In this Section, we discuss cadences that may be lost to high-precision photometry due to planned or unplanned spacecraft events.

## Kepler mission timeline to date

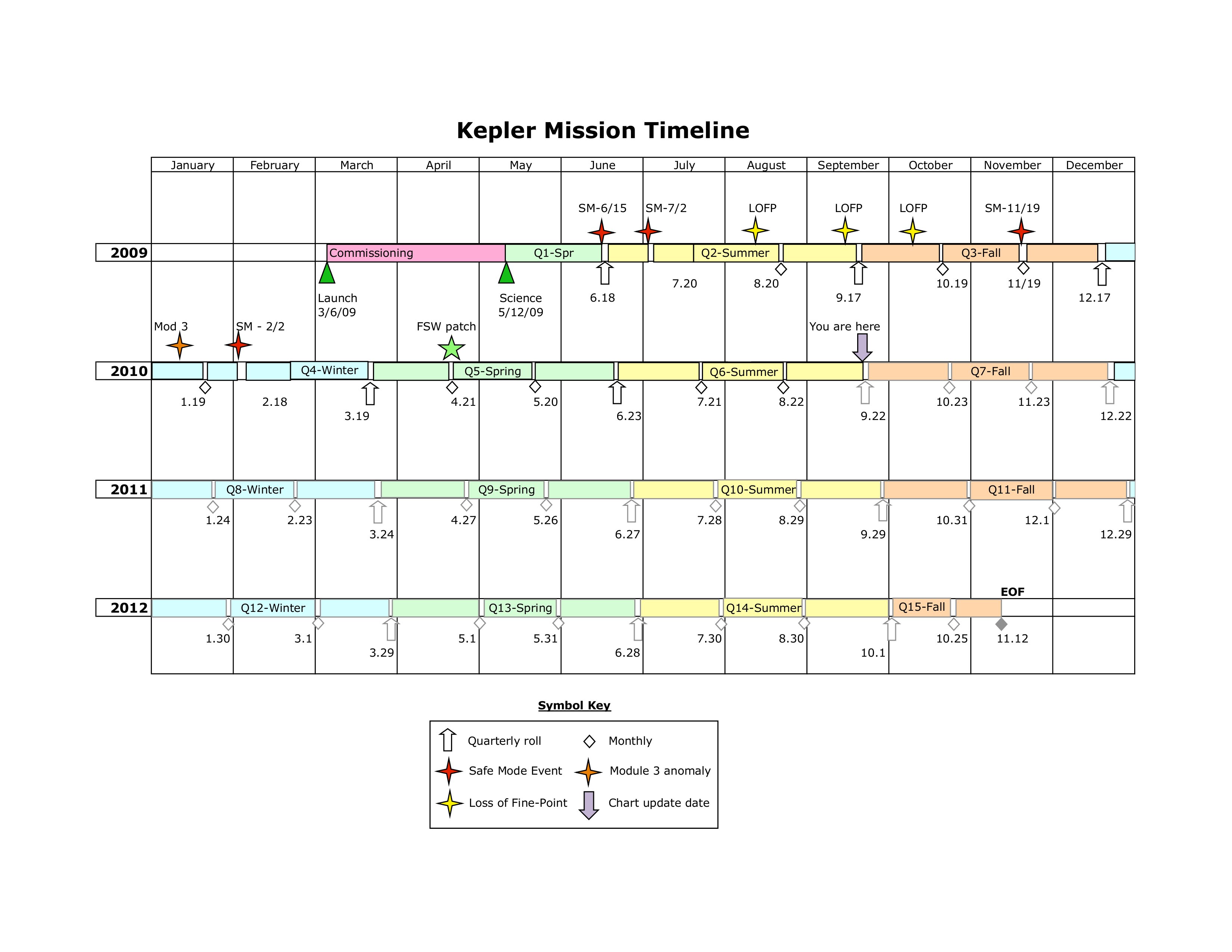


Figure 2: Kepler Mission Timeline as of end of Q6.

## Safe Mode

No changes from the Data Characteristics Handbook.

## Loss of Fine Point

No changes from the Data Characteristics Handbook.

## Attitude Tweaks

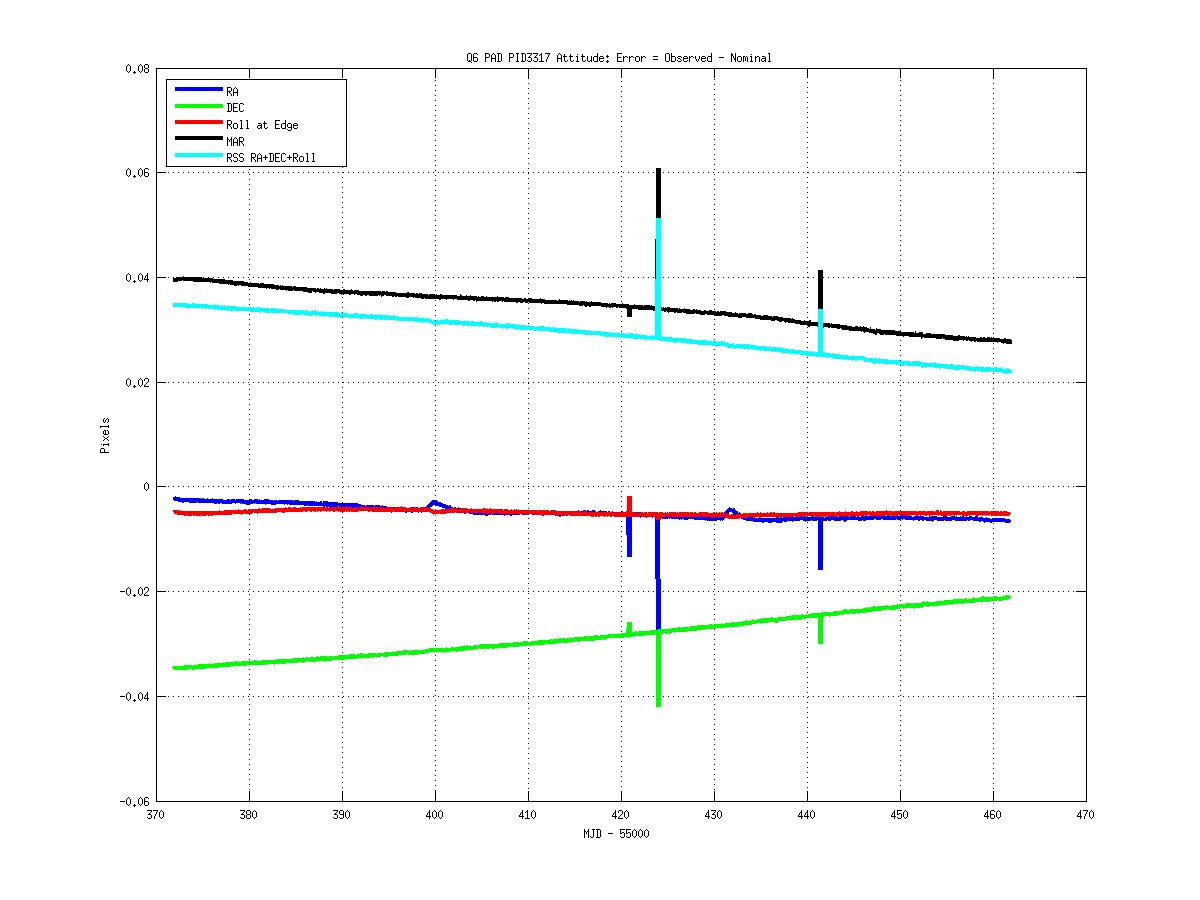


Figure 3: Attitude Error in Quarter 6, calculated by PAD using Long Cadence data.

## Variable FGS Guide Stars

No changes from the Data Characteristics Handbook.

## Module 3 Failure

No changes from the Data Characteristics Handbook.

# Ongoing Phenomena

## Image Motion

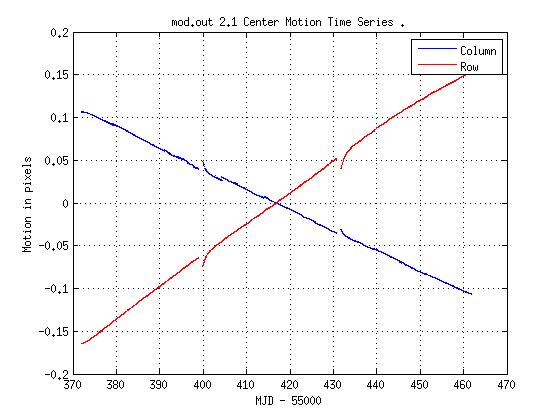


Figure 4: Mod out 2.1 Center motion time series. The gaps are monthly Earth contacts.

## Focus Drift and Jitter

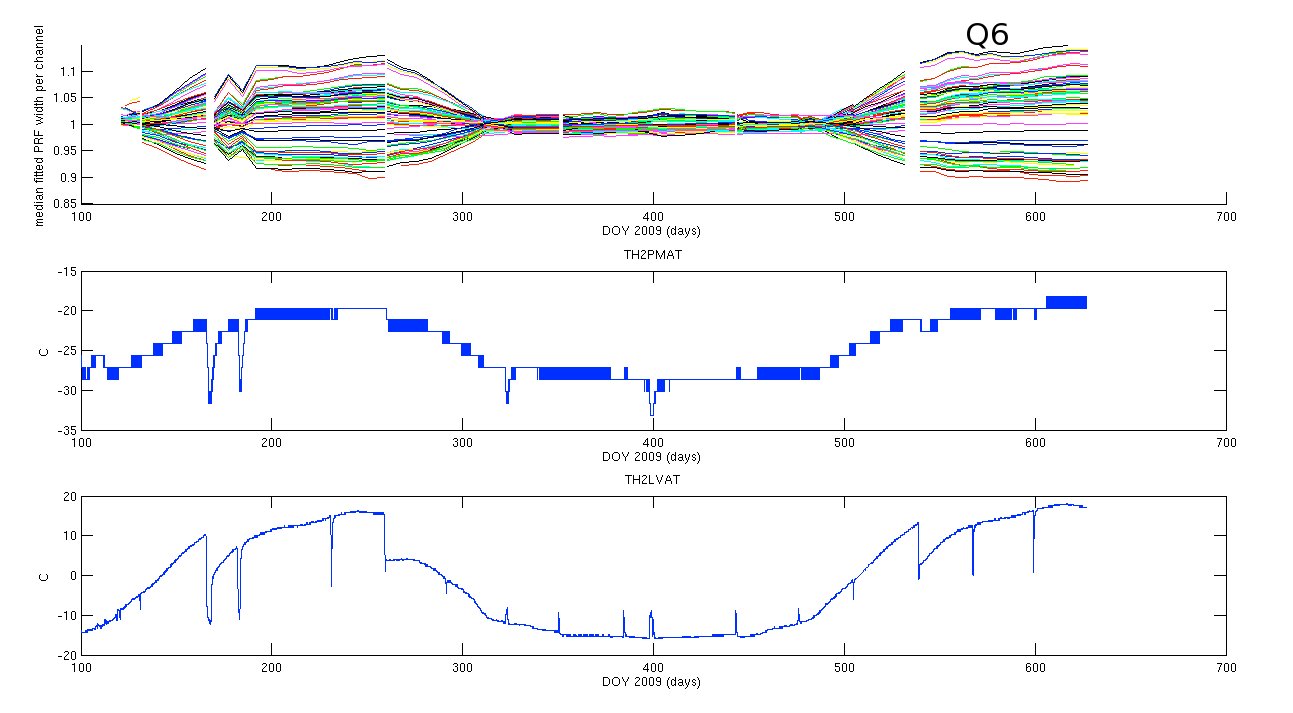


Figure 5: Correlation of variation in PRF width with various spacecraft temperatures, demonstrating the seasonal nature of focus and PRF changes.

## Momentum Desaturation

Table : Momentum dumps in Q6 and the corresponding Long and Short Cadences. CIN = cadence interval number, RCI = relative cadence index.

LC

CIN RCI Date(MJD)



21150 82 55373.60245

21296 228 55376.58576

21442 374 55379.56906

21588 520 55382.55237

21734 666 55385.53567

21880 812 55388.51898

22026 958 55391.50229

22172 1104 55394.48559

22318 1250 55397.46890

22393 1325 55399.00142

22538 1470 55401.96429

22684 1616 55404.94760

22830 1762 55407.93090

22976 1908 55410.91421

23122 2054 55413.89752

23268 2200 55416.88082

23414 2346 55419.86413

23560 2492 55422.84743

23706 2638 55425.83074

23852 2784 55428.81405

23947 2879 55430.75524

24093 3025 55433.73852

24239 3171 55436.72183

24385 3317 55439.70514

24531 3463 55442.68844

24677 3609 55445.67175

24822 3754 55448.63462

24968 3900 55451.61793

25114 4046 55454.60123

25260 4192 55457.58454

25406 4338 55460.56784

25465 4397 55461.77343

SC

CIN RCI Date(MJD)



(Month 1)

622970 2441 55373.59938

622971 2442 55373.60007

627350 6821 55376.58269

627351 6822 55376.58337

631730 11201 55379.56600

631731 11202 55379.56668

636110 15581 55382.54930

636111 15582 55382.54998

640490 19961 55385.53261

640491 19962 55385.53329

644870 24341 55388.51592

644871 24342 55388.51660

649250 28721 55391.49922

653630 33101 55394.48253

658010 37481 55397.46583

660260 39731 55398.99835

(Month 2)

664610 3071 55401.96123

668990 7451 55404.94453

673370 11831 55407.92784

677750 16211 55410.91115

682130 20591 55413.89445

686510 24971 55416.87776

690890 29351 55419.86106

695270 33731 55422.84437

699650 38111 55425.82768

704030 42491 55428.81098

706880 45341 55430.75217

(Month 3)

711260 3011 55433.73546

715640 7391 55436.71876

720020 11771 55439.70207

720021 11772 55439.70275

724400 16151 55442.68538

728780 20531 55445.66868

733130 24881 55448.63156

733131 24882 55448.63224

737510 29261 55451.61486

737511 29262 55451.61554

741890 33641 55454.59817

741891 33642 55454.59885

746270 38021 55457.58147

746271 38022 55457.58215

750650 42401 55460.56478

750651 42402 55460.56546

752420 44171 55461.77036

## Reaction Wheel Zero Crossings

Table : Zero crossing events in Q6, defined as the time from first to last zero crossing in the event, rounded to the nearest Cadence. The corresponding cadence numbers for SC are in the supplement.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Event# | MJD  Start | MJD  End | CIN  Start | CIN  End | RCI  Start | RCI  End | NumTLM  Samp |
| 1 | 55379.569 | 55379.957 | 21442 | 21461 | 374 | 393 | 280 |
| 2 | 55382.552 | 55382.695 | 21588 | 21595 | 520 | 527 | 103 |
| 3 | 55388.499 | 55388.601 | 21879 | 21884 | 811 | 816 | 55 |
| 4 | 55397.469 | 55397.510 | 22318 | 22320 | 1250 | 1252 | 29 |
| 5 | 55410.894 | 55410.935 | 22975 | 22977 | 1907 | 1909 | 16 |

## Downlink Earth Point

No changes from the Data Characteristics Handbook.

## Manually Excluded Cadences

No changes from the Data Characteristics Handbook.

## Incomplete Apertures Give Flux and Feature Discontinuities at Quarter Boundaries

No changes from the Data Characteristics Handbook.

## Argabrightening

Table : Q6 LC Argabrightening Events with amplitude TMAD > 10, and occurring on a number of channels TMCE > 10. The columns are (1) CIN = Cadence Interval Number for Argabrightening cadences, (2) RCI = relative cadence index for Argabrightening cadences, (3) Date = Arg cadence mid-Times, MJD, (4) Mean Argabrightening statistic over Channels of Arg Event <SArg>FPA (5) N\_chan = Channels exceeding threshold in Arg cadence, (6) N\_pipe = Channels exceeding default (pipeline) threshold in Arg cadence. MAD is calculated on a channel-by-channel basis.

CIN RCI Mid-Times(MJD) <SArg> N\_chan N\_pipe



21601 533 55382.81801 17.4 68 0

21724 656 55385.33134 7.2 18 0

21836 768 55387.61990 7.6 19 0

22014 946 55391.25708 8.5 26 0

22169 1101 55394.42429 8.2 23 0

22296 1228 55397.01936 7.8 21 0

23130 2062 55414.06099 8.3 27 0

23465 2397 55420.90624 62.4 69 13

23466 2398 55420.92668 15.4 27 1

23616 2548 55423.99172 100.0 80 36

23944 2876 55430.69394 4.9 11 0

23945 2877 55430.71437 7.4 18 0

23946 2878 55430.73481 10.5 30 0

23948 2880 55430.77567 18.9 59 0

24061 2993 55433.08465 14.0 56 0

24386 3318 55439.72557 7.8 16 0

24427 3359 55440.56335 36.9 79 0

24470 3402 55441.44199 66.3 80 13

24640 3572 55444.91570 6.8 22 0

24796 3728 55448.10335 3.3 13 0

24994 3926 55452.14920 7.4 12 0

25111 4043 55454.53993 10.0 34 0

25334 4266 55459.09662 18.2 67 0

Table : Q6 SC Argabrightening Events with amplitude TMAD > 10, and occurring on a number of channels TMCE > 10. The columns have the same meanings as Table 5: Q6 LC Argabrightening Events with amplitude TMAD > 10, and occurring on a number of channels TMCE > 10. The columns are (1) CIN = Cadence Interval Number for Argabrightening cadences, (2) RCI = relative cadence index for Argabrightening cadences, (3) Date = Arg cadence mid-Times, MJD, (4) Mean Argabrightening statistic over Channels of Arg Event <SArg>FPA (5) N\_chan = Channels exceeding threshold in Arg cadence, (6) N\_pipe = Channels exceeding default (pipeline) threshold in Arg cadence. MAD is calculated on a channel-by-channel basis. Note consecutive detections of the largest events. A horizontal line separates the 3 Months of the Quarter. The relative cadence index (RCI) is reset at the start of each Month.

CIN RCI Mid-Times(MJD) <SArg> N\_chan N\_pipe

636501 15972 55382.81562 17.6 69 0

640187 19658 55385.32623 8.4 23 0

648880 28351 55391.24721 9.3 30 0

665777 4238 55402.75609 7.1 15 0

692439 30900 55420.91612 71.1 66 42

692440 30901 55420.91680 15.7 22 6

696948 35409 55423.98729 44.0 76 16

696949 35410 55423.98797 66.0 69 37



710291 2042 55433.07545 8.3 21 0

720044 11795 55439.71842 6.0 12 2

721281 13032 55440.56096 33.8 77 3

722571 14322 55441.43961 12.7 43 0

722572 14323 55441.44029 17.2 56 1

722573 14324 55441.44097 29.3 73 4

727678 19429 55444.91809 6.3 20 0

748502 40253 55459.10173 9.7 32 0

## Background Time Series

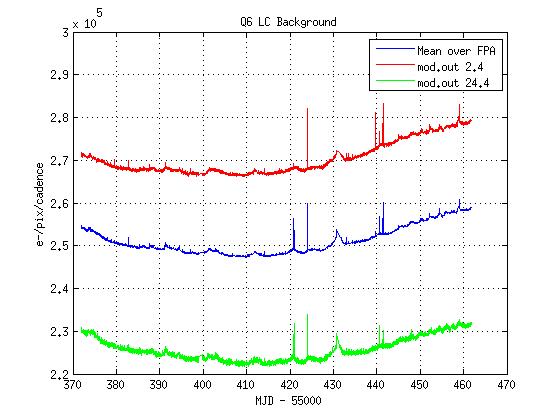


Figure 6: Background time series for Q6 showing the average over all the modules, and the modules furthest from (2.4) and nearest to (24.4) the Galactic plane. The narrow spikes are Argabrightening events.

## Pixel Sensitivity Dropouts

No changes from the Data Characteristics Handbook.

## Short Cadence Requantization Gaps

No changes from the Data Characteristics Handbook.

## Spurious Frequencies in SC Data

No changes from the Data Characteristics Handbook.

## Anomaly Summary Table

Machine readable CINs for the anomalies below are in the Data Supplement.

Table : Anomaly Summary Table for Long and Short Cadences

|  |  |  |  |
| --- | --- | --- | --- |
| **LC CIN** | |  |  |
| **Start** | **End** | **Anomaly Type** | **Note** |
| 21069 | 21069 | EARTH\_POINT | Monthly science data downlink |
| 22395 | 22436 | EARTH\_POINT | Monthly science data downlink |
| 23949 | 23992 | EARTH\_POINT | Monthly science data downlink |
| 23465 | 23466 | ARGABRIGHTENING | See Section 5.8. |
| 23616 | 23616 | ARGABRIGHTENING |  |
| 24470 | 24470 | ARGABRIGHTENING |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **SC CIN** |  |  |  |
| **Start** | **End** | **Anomaly Type** | **Note** |
| 622969 | 622980 | COARSE POINT | See Section 5.3 for Momentum desaturations. |
| 627349 | 627360 | COARSE POINT |  |
| 631729 | 631740 | COARSE POINT |  |
| 636109 | 636120 | COARSE POINT |  |
| 640489 | 640500 | COARSE POINT |  |
| 644869 | 644880 | COARSE POINT |  |
| 649249 | 649260 | COARSE POINT |  |
| 653629 | 653640 | COARSE POINT |  |
| 658009 | 658020 | COARSE POINT |  |
| 660259 | 660270 | COARSE POINT |  |
| 664609 | 664620 | COARSE POINT |  |
| 668989 | 669000 | COARSE POINT |  |
| 673369 | 673380 | COARSE POINT |  |
| 677749 | 677760 | COARSE POINT |  |
| 682129 | 682140 | COARSE POINT |  |
| 686509 | 686520 | COARSE POINT |  |
| 690889 | 690900 | COARSE POINT |  |
| 695269 | 695280 | COARSE POINT |  |
| 696949 | 696949 | COARSE POINT |  |
| 699649 | 699660 | COARSE POINT |  |
| 704029 | 704040 | COARSE POINT |  |
| 706879 | 706890 | COARSE POINT |  |
| 692439 | 692440 | ARGABRIGHTENING | See Section 5.8 |
| 696948 | 696949 | ARGABRIGHTENING |  |
| 711259 | 711270 | COARSE POINT | See Section 5.3 for Momentum desaturations. |
| 715639 | 715650 | COARSE POINT |  |
| 720019 | 720030 | COARSE POINT |  |
| 724399 | 724410 | COARSE POINT |  |
| 728779 | 728790 | COARSE POINT |  |
| 733129 | 733140 | COARSE POINT |  |
| 737509 | 737520 | COARSE POINT |  |
| 741889 | 741900 | COARSE POINT |  |
| 746269 | 746280 | COARSE POINT |  |
| 750649 | 750660 | COARSE POINT |  |
| 750970 | 751029 | COARSE POINT |  |
| 752419 | 752430 | COARSE POINT |  |

# Time and Time Stamps

No changes from the Data Characteristics Handbook.

# Contents of Supplement

The Supplement is available as a full package (DataReleaseNotes\_09\_SupplementFull.tar), which contains the files described below.

**Pipeline Instance Detail Reports**

Q6\_LC\_r6.2\_ksop652\_PA\_+PDC\_with\_mpe\_asrun\_Pipeline\_Instance\_Detail\_Report\_110104.txt

Q6\_SCM1\_r6.2\_ksop652\_with\_mpe\_as-run\_Pipeline\_Instance\_Detail\_Report\_110104.txt

Q6\_SCM2\_r6.2\_ksop652\_with\_mpe\_as-run\_Pipeline\_Instance\_Detail\_Report\_110104.txt

Q6\_SCM3\_r6.2\_ksop652\_with\_mpe\_as-run\_Pipeline\_Instance\_Detail\_Report\_110104.txt

**Data Anomaly Types**

DataAnomalyTypes\_Q6\_LC\_PID3197\_Summary.txt

DataAnomalyTypes\_Q6M1\_SC\_PID3217\_Summary.txt

DataAnomalyTypes\_Q6M2\_SC\_PID3237\_Summary.txt

DataAnomalyTypes\_Q6M3\_SC\_PID3277\_Summary.txt

**Mod.out Central Motion**

Q6\_central\_row\_motion.txt

Q6\_central\_column\_motion.txt

**Average LDE board Temperature**

Q6\_LDE\_averageBoardTemp.txt

Q6\_TH12LVAT\_MJD\_gap.txt

Q6\_TH1RW34T\_MJD\_gap.txt

**Background Time Series**

Q6\_SCM1\_background.txt

Q6\_SCM2\_background.txt

Q6\_SCM3\_background.txt

Q6\_LC\_background.txt

**Flight System Events**

**Argabrightening Detections**

ArgAgg\_Q6\_LC\_PID3197\_MADT010\_MCT10\_Summary.txt

ArgAgg\_Q6M1\_SC\_PID3557\_MADT010\_MCT10\_Summary.txt

ArgAgg\_Q6M2\_SC\_PID3577\_MADT010\_MCT10\_Summary.txt

ArgAgg\_Q6M3\_SC\_PID3597\_MADT010\_MCT10\_Summary.txt

**Out of Fine Point Cadence Lists**

Q6M1\_SC\_isNotFinePoint.txt

Q6M2\_SC\_isNotFinePoint.txt

Q6M3\_SC\_isNotFinePoint.txt

Q6\_LC\_isNotFinePoint.txt

**Zero Crossing Events**

Q6\_Dec21\_SC\_ZeroCrossings.txt

Q6\_Dec21\_LC\_ZeroCrossings.txt

**Short Supplement Package**

The Supplement also contains a short package suitable for emailing (DataReleaseNotes\_09\_SupplementSmall.tar). The small package does not contain the following files:

13Dec\_SC\_Q6M1\_background.txt

13Dec\_SC\_Q6M2\_background.txt

13Dec\_SC\_Q6M3\_background.txt

Dec13\_LC\_Q6\_background.txt

13Dec\_Q6\_LC\_central\_row\_motion.txt

13Dec\_Q6\_LC\_central\_column\_motion.txt

Q6\_TH12LVAT\_MJD\_gap.txt

Q6\_TH1RW34T\_MJD\_gap.txt

# References

No changes from Data Characteristics Handbook.