
EUROPEAN SPACE AGENCY
DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL
Mission report

INT-MOC-SYS-RP-1001-OPS-OAI

No. 410
01.07.2012

Routine Phase

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1 General

The Flight Control Team at MOC has compiled this report with some input provided by the Flight Dynamics Team, ISOC and ISDC. Nominal science operations were performed according to the planning inputs from ISOC combined with some manual commanding by MOC.

This report addresses the activities from June and covers the revolutions 1176 until 1186 (inclusive). The targets of these revolutions can be found on the ISOC web: <http://integral.esac.esa.int/isocweb/schedule.html?action=intro> .

Summary of the main activities during the reporting period

- Nominal science operations
- Eclipse season
- SPI annealing #19: 05.-24.06.2012
- Leap second 30th June
- E3.5 Testing

Summary of the overall status and performance of S/C

- Nominal for platform and payload apart from ESAM entry on 07/06/2012 (LCL RWDE4 SEU - Integral ESAM Entry #3)
- IREM Anomaly: Reset of IREM_CSCI S/W #130 (11/06/2012)
- IREM Anomaly: Reset of IREM_CSCI S/W #131 (17/06/2012)
- IREM Anomaly: Reset of IREM_CSCI S/W #132 (18/06/2012)
- IREM Anomaly: Reset of IREM_CSCI S/W #133 (26/06/2012)
- IREM Anomaly: Reset of IREM_CSCI S/W #134 (30/06/2012)

Summary of the overall status and performance of the ground segment

- Ongoing occasional RFI at Redu, some sources identified, filter installed for testing
- Ongoing occasional interruptions to ISDS-ISDC link
- CEV disabled in stacks (replacing EENTRY & EEXIT during SPI annealing & eclipse) caused commands to fail
- Lost TM/TC due to crash of front end controller from REDU
- FDS platform problems

The previous weekly and monthly reports are available at the XMM-INTEGRAL website: <http://xmm.esoc.esa.int/documentation/documentation.php> .

2 Satellite status

2.1 Platform

2.1.1 AOCS

The AOCS operations were performed from the timeline during this period.

44 slews were missed from the Timeline.

The fuel consumption over the reporting period was 0.9928 Kg. The remaining propellant is in the order of 111.9925 Kg.

Note: Some more information concerning the AOCS operations and the fuel budget is provided in the Appendix 6.1.

2.1.2 Power

All units of the EPS are working nominally. A battery reconditioning was successfully performed this month.

2.1.3 Thermal

The thermal control of the satellite is working well. The temperatures are currently all within the specified operational limits.

2.1.4 OBDH

The OBDH subsystem is working flawlessly. No on-board communications problem has been identified.

The PST was over-subscribed by 3 packets, which were allocated to SPI during the Instrument window for the entire reporting period.

2.1.5 RFS

The RF subsystem is working properly. The link margin is sufficient to ensure proper TM reception and execution of commands with the ranging channel enabled.

2.2 Payload

2.2.1 SPI

Following the 18th SPI annealing, which ended on 09/12/2011, the overall status of the gamma-ray spectrometer is nominal, except for detector #2 (failed since 06/12/2003), detector #17 (failed since 17/07/2004), detector #5 (failed since 19/02/2009) and detector #1 (failed since 27/05/2010).

The Germanium detectors' temperature was kept in the range 80K $\pm$ 1K until the start of the 19th SPI annealing on 05/06/2012 at 17:03Z. Operations for the SPI annealing #19 were performed according to OCR 324 but shifted to rev. 1177-1184, since the annealing operations during eclipse season was more difficult to plan than originally assumed. SPI annealing #19 was performed without the

outgassing of the cold box, i.e., the cold box temperature was maintained at -65 degC during the annealing cycle. The 19th SPI ended on 22/06/2012.

The times for the main activities for SPI annealing #19 were as following.

Note: The whole SPI annealing #19 was performed during the eclipse season. Therefore, the SPI annealing had to be planned carefully. Instead of the EDs EENTRY03 and EEXIT03, the SPI configuration pre and post eclipse was performed via commanding stacks. The switch on of the annealing heaters was performed via stacks as well. No outgassing of the cold box was done. The ESAM on 07/06/2012 did not have any impact on the SPI annealing operations.

Date/Time	Activity
2012-06-05 17:07:43Z	Configure SPI for start of Annealing and stop SPI active cooling
2012-06-05 18:32:00Z	Annealing Heater Main ON
2012-06-05 20:32:00Z	Annealing Heater Redundant ON
2012-06-07 07:34:41Z	Cold plate temperature reached 373K (100degC)
2012-06-15 12:00:00Z	Stop SPI Annealing: Annealing Heater Main and Redundant OFF
2012-06-15 12:30:00Z	ACS switch-on and start of ACS calibration (also FEE#57 and FEE#81 ON)
2012-06-17 05:36:52Z	End of ACS Calibration
2012-06-18 03:04:36Z	Thermal braids temperature TM EU0398A reached 308K
2012-06-18 05:45:13Z	Start of Cryocooler switch-on
2012-06-18 06:41:19Z	Cyrocooler switch-on complete and stroke set to 4x45
2012-06-21 14:00:28Z	Cold plate temperature TM EU0392A reached 127K
2012-06-21 14:15:19Z	Selected narrow range cold plate temperature acquisition and restored PSD nominal threshold
2012-06-22 10:03:00Z	Cold plate temperature TM E0392 reached 100K
2012-06-22 14:33:00Z	Camera switch-on start; HV of all GeD increased in 500V steps to 0.5kV; 1kV; 1.5kV; 2kV; 2.5kV; 3kV; 3.5kV with acquisitions in PHOTON mode from 2kV onwards
2012-06-22 13:06:18Z	Thermal braid temperature TM E0398 reached 86K
2012-06-22 13:21:00Z	Start of reduction of Cryocooler stroke for 80K target (FCP_SPI1_0072)
2012-06-22 16:00:00Z	Camera switch-on end: SPI in PHOTON mode with all GeD HV at 2.5kV
2012-06-22 17:25:00Z	Set nominal GeD HV back to 2.5kV and restore nominal ACS configuration (FEE#57 and FEE#81 OFF).
2012-06-23 09:10:00Z	End of reduction of Cryocooler stroke for 80K target: Stroke set to 4x37
2012-06-23 09:17:00Z	Set nominal IASW parameters (Cold Plate Monitoring temperature)
2012-06-24 07:15:00Z	Cold plate temperature TM E0392 reached 80.9K

SPI was operated in photon-by-photon mode with spectra TM enabled during science observations. The assigned TM bandwidth in the science observation windows was 99 packets/cycle, except from 2012-06-06T01:27:17Z to 2012-06-21T00:16:36Z (SPI annealing #19), when it was 30 packets/cycle. The average telemetry occupation when the allocation was 99 packets/cycle was 73.9 packets/cycle.

The eclipse season started on 24/05/2012 and ends on the 17/07/2012. Eclipse operations for SPI are progressing nominally.

The following plot shows the TM bandwidth allocation and occupation during the reporting period. The period of the SPI annealing #19 can clearly be seen from the change in TM allocation and usage.

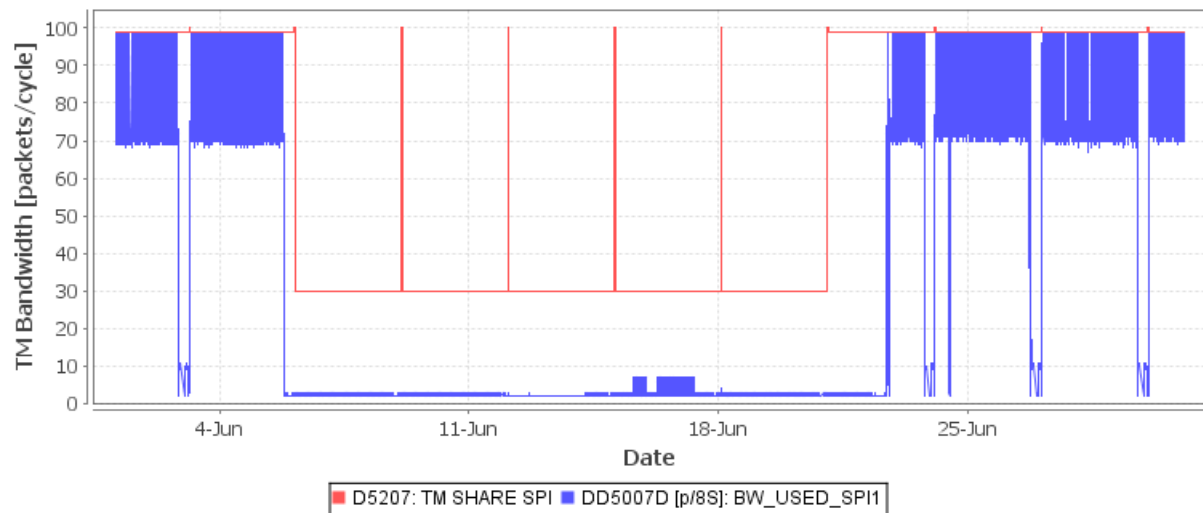


Figure 1: SPI TM bandwidth utilisation

The following plot illustrates the DPE CPU load during the reporting period.

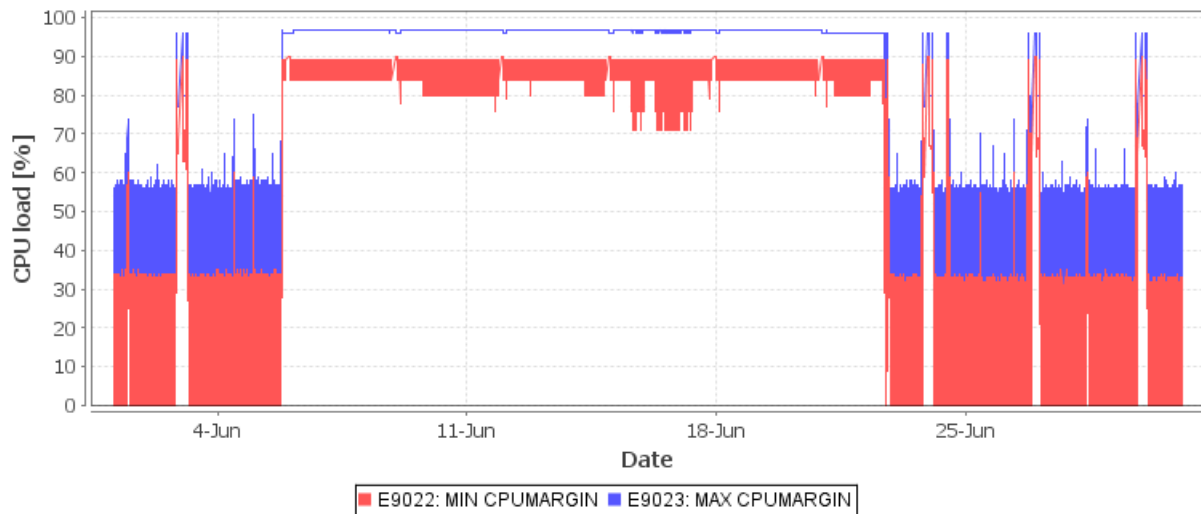


Figure 2: SPI IASW Performance

The following plot shows the evolution of the assigned and the average occupation of the SPI TM bandwidth since May 2005.

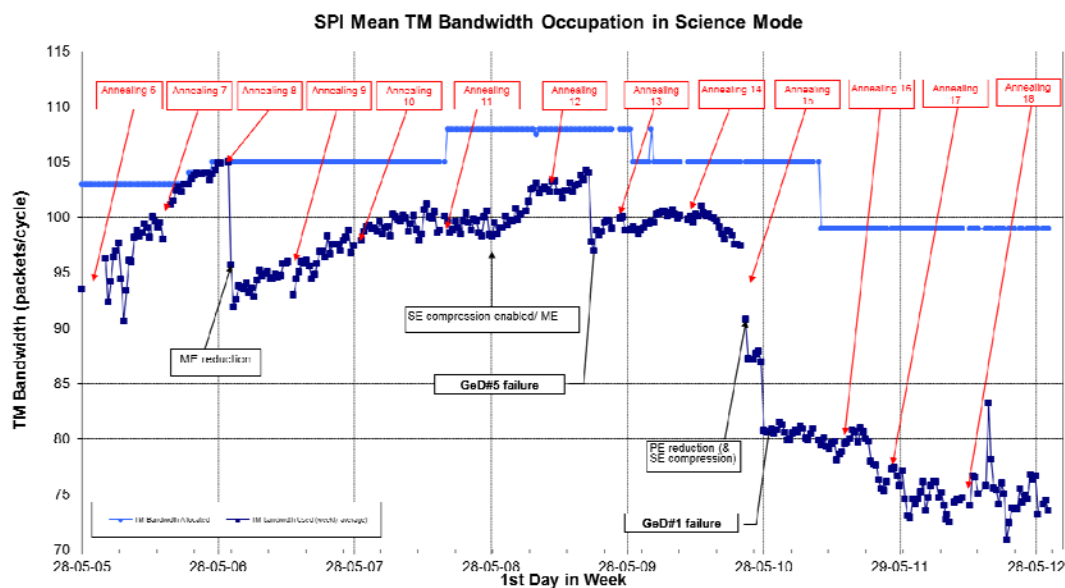


Figure 3: SPI TM bandwidth usage evolution since May 2005

Note: More information concerning the SPI operations is provided in Appendix 0.

2.2.2 IBIS

The overall status of IBIS is nominal.

During the reporting period, IBIS was operated in Science Standard mode during science observations. The TM bandwidth statistics were as follows:

- PST allocation to IBIS above radiation belts: 129 packets/cycle, except from 2012-06-06T01:27:17Z to 2012-06-21T00:16:36Z (SPI annealing #19), when it was 180 packets/cycle
- IBIS mean bandwidth utilisation in science mode: 103.15 packets/cycle

The plot below shows the IBIS TM utilisation during the reporting period.

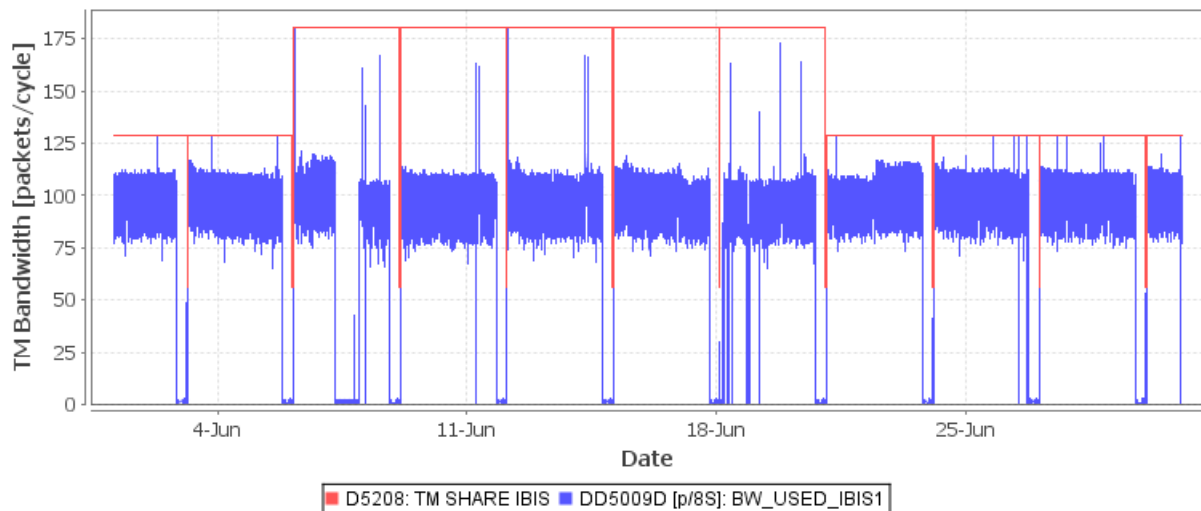


Figure 4: IBIS TM bandwidth utilisation

A plot of the IBIS weekly bandwidth utilisation since May 2005 is shown below.

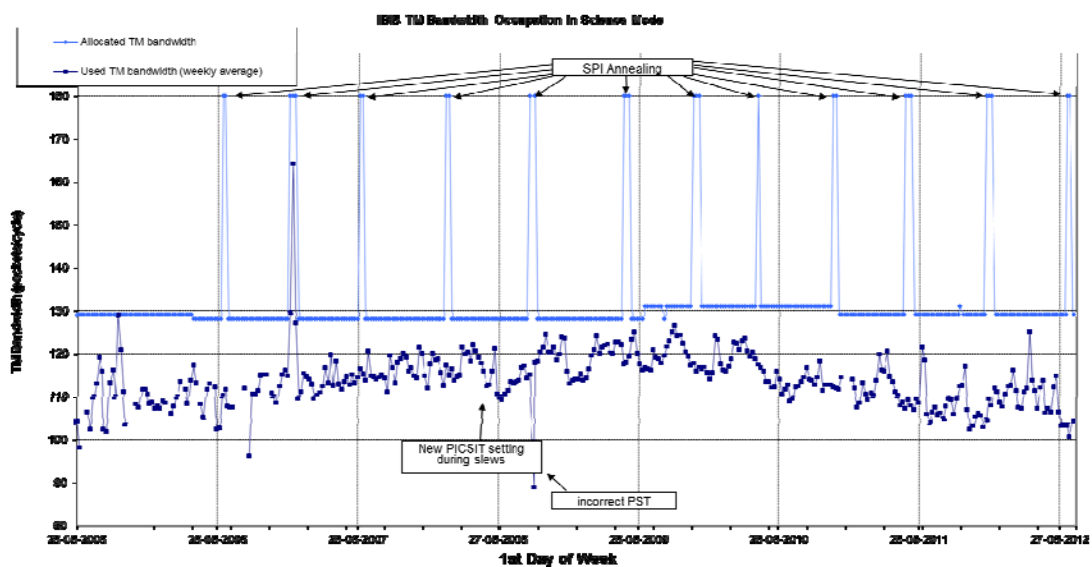


Figure 5: IBIS TM bandwidth usage evolution since May 2005

Note: More information concerning the IBIS operations is provided in Appendix 6.3.

2.2.3 JEM-X

The status of both JEM-X units is nominal:

- JEM-X1 & 2 were operated in Data Taking mode with a TM allocation of 8 packets/cycle, except from 2012-06-06T01:27:17Z to 2012-06-21T00:16:36Z during the SPI annealing, when it was 15 packets/cycle each.

Note: Some more information concerning the JEM-X operations is provided in Appendix 6.4.

2.2.4 OMC

The status of OMC is nominal.

OMC was operated in Science Normal mode during science observations, with a TM allocation of 5 packets/cycle, except from 2012-06-06T01:27:17Z to 2012-06-21T00:16:36Z during the SPI annealing when it was 9 packets per cycle.

During this reporting period, 684 of the 734 planned science pointings and a Flat Field calibration were executed nominally. 31 pointings were lost and 1 interrupted due to an ESAM. 7 pointings were lost to FD problems. 1 pointing was lost and 4 interrupted due to IREM SEUs. 2 pointings were lost to AOCS trouble. 1 was executed at a different attitude owing to a sparse star field. 1 pointing was lost to a FEC crash. 1 was lost to a verifier crash. 1 pointing was lost to an operator error.

Note: Some more information concerning the OMC operations is provided in Appendix 6.5.

2.2.5 IREM

The status of IREM is nominal.

On DoY 163 (11/06/2012), the 130th IREM SEU occurred.

On DoY 169 (17/06/2012), the 131st IREM SEU occurred.

On DoY 170 (18/06/2012), the 132nd IREM SEU occurred.

On DoY 178 (26/06/2012), the 133rd IREM SEU occurred.

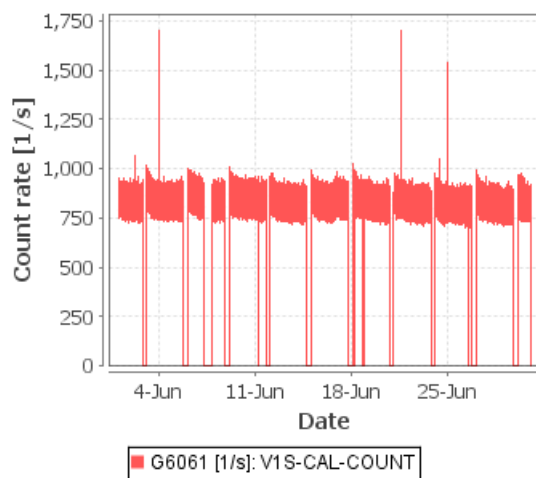
On DoY 182 (30/06/2012), the 134th IREM SEU occurred.

Note: Some more information concerning the IREM operations is provided in Appendix 6.6.

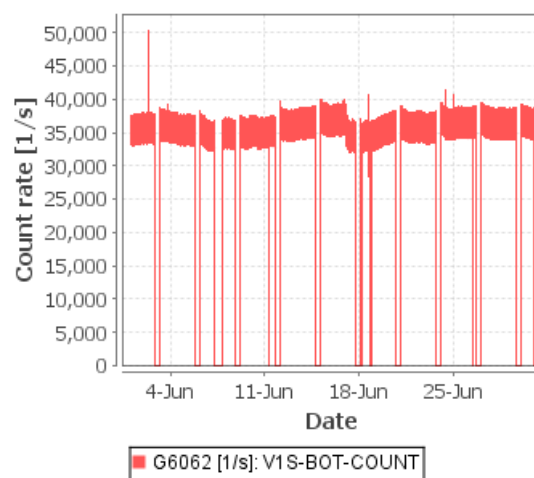
Radiation background

The background radiation level as measured by the instrument counters was low during the reporting period. The following plots show the SPI ACS, IBIS VETO, JEM-X Triggers and IREM count rates over the reporting period:

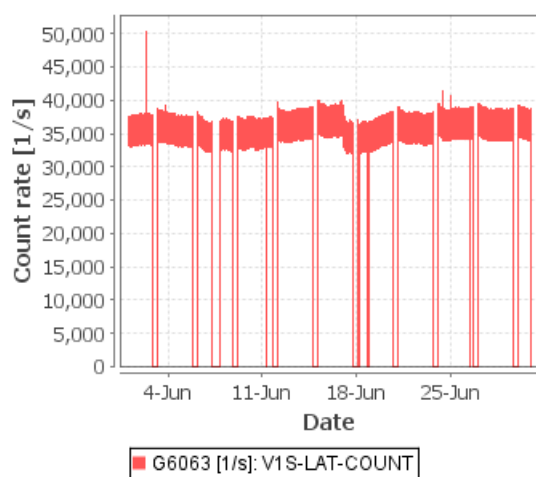
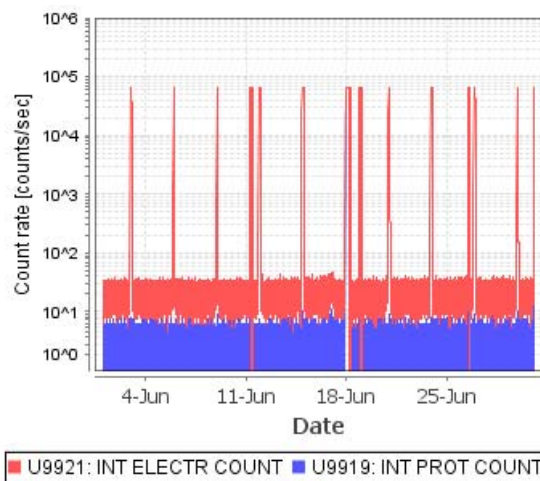
VETO Calibration Source Count Rate



VETO Bottom Count Rate



VETO Lateral Count Rate

IREM Proton & Electron Counters¹

ACS Below 100MeV

ACS Above 100MeV

¹ Note that the scale used in this plot is logarithmic.

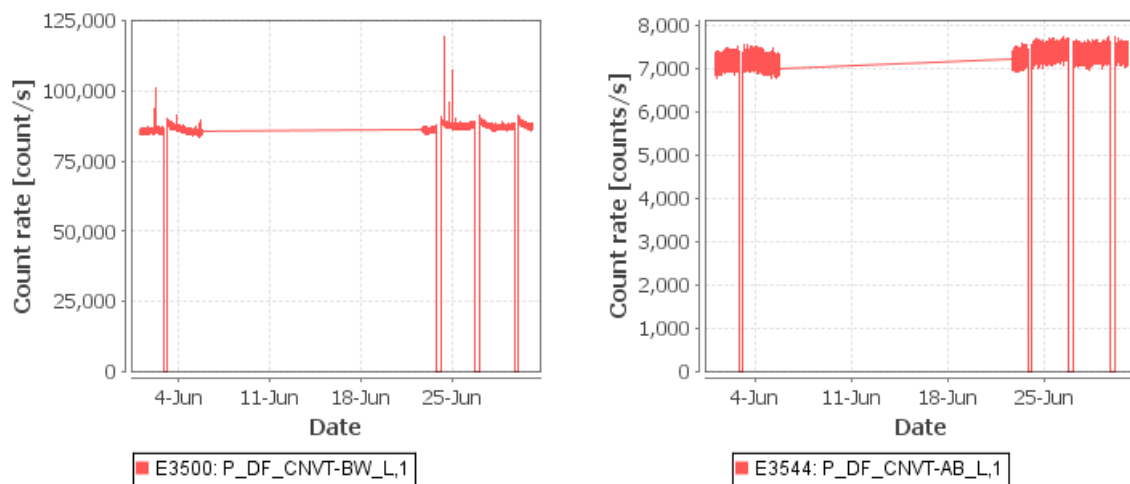


Figure 6: Instrument Count Rates

The JEM-X count rates are plotted for both JEM-X units, the data is sampled every 8th packet (64sec).

K5119/L5119 - JEM-X1/2 Software trigger, K5449/L5449 - JEM-X1/2 Hardware trigger

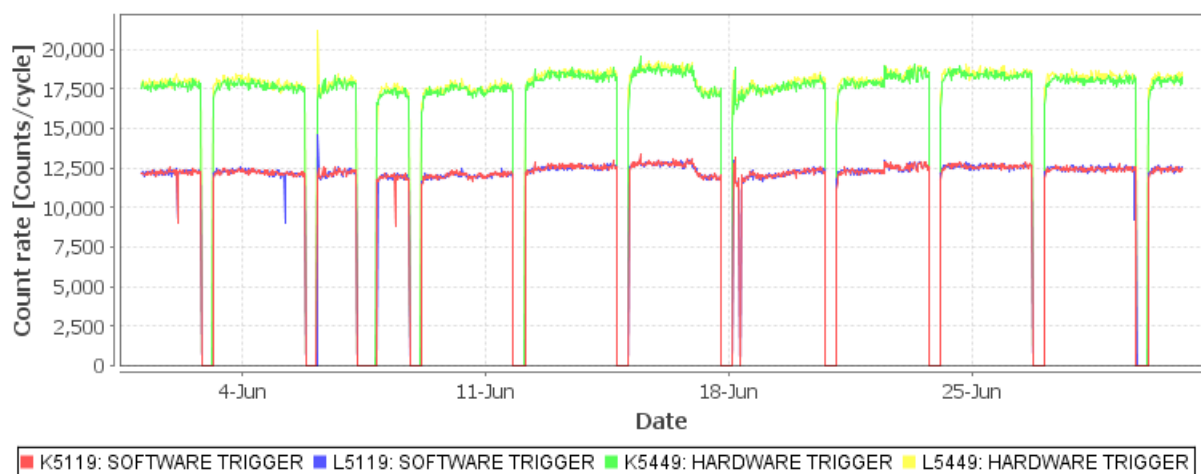


Figure 7: JEM-X Count rates. The smaller downward spikes in the figure are due to the slews of the spacecraft

Radiation Belts

Figure 8 gives a prediction of the trapped radiation environment sensed by the S/C when descending into perigee; the different areas crossed, the Radiation Belt entry/exit points, the shape of the Radiation Belt passage and a rough estimation of the trapped proton and electron fluxes.

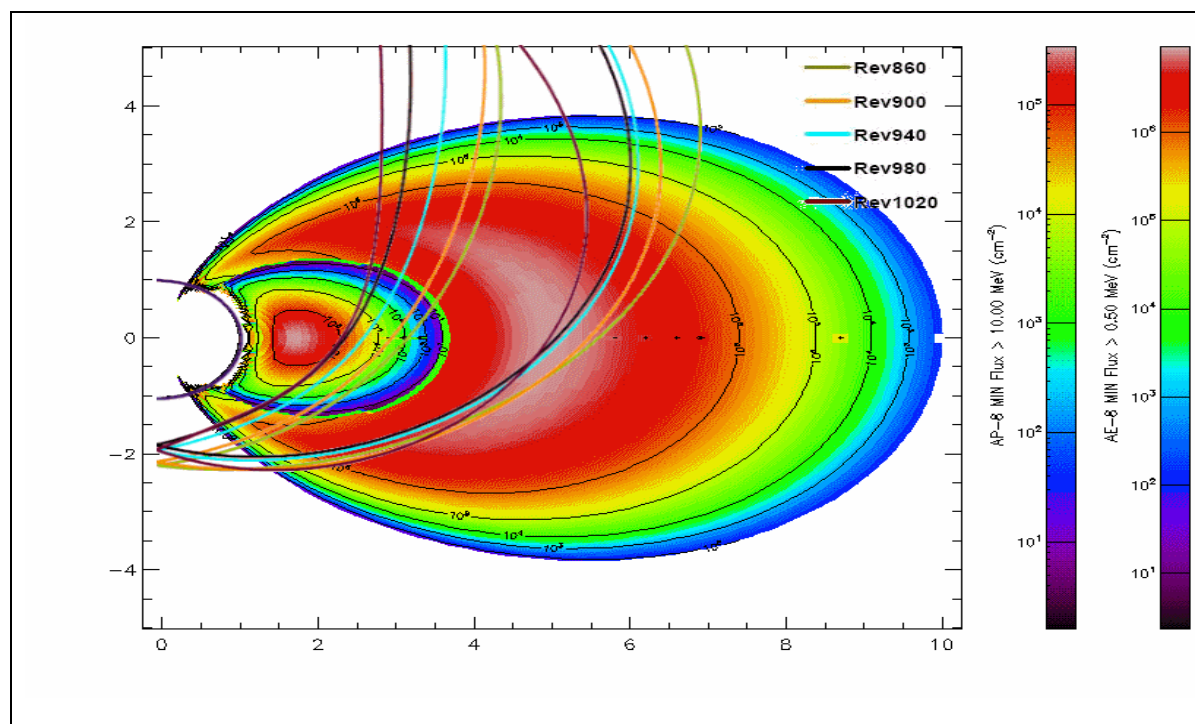


Figure 8: The predicted evolution of the orbit of Integral through the radiation belts

3 Ground Facilities

The Operational ground facilities performance was good this month. The overall performance was over the 95% requirement.

The following figure shows the number of slews executed and the number of slews missed per revolution. These numbers give a very good indication of the performance of the operational ground facilities, because it involves all the different elements of the ground facilities to complete all slews scheduled.

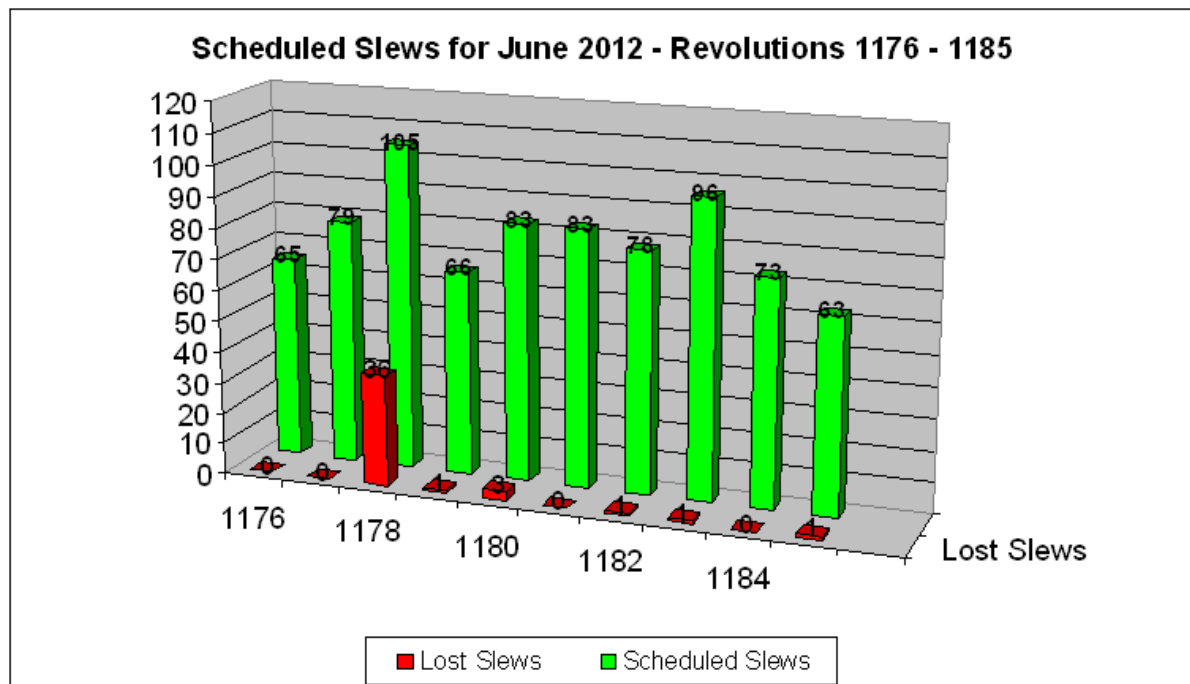


Figure 9: The number of slews scheduled compared to the number of slews lost

3.1 Mission Control System

IODB_3.1_0071 was installed on 05/06/2012 to fix an interlock problem in the EEXIT-03 sequence

3.2 Ground Stations and Network

The performance of the ground stations and Network was good this month.

List of INT G/S Issues – CW 23

The performance of the ground stations and Network was good this month.

List of INT G/S Issues – CW 23

DOY 157 (2012-06-05)

04:44:00 G/S: Data gaps from Redu

04:44:01 G/S: Bad Frames from Redu --> RFI (both chains) - SMOS

22:09:00 Test Command failed, problem with TMTCS at Redu - No TM links

22:20:00 ESTRACK configuring VIL2 as TMTCS at Redu not working

Feedback from the GS Team:

As soon as the spacon released his first command, both TMTCS's went inoperational

and could not reconfigure them. Any attempt to stop, abort or archive service instances failed. Restart TMTCS's failed as well. This is a reoccurrence of tmtcs#1200 TPS crash problem.

DOY 158 (2012-06-06)

15:32:00 G/S: Bad Frames from: REDU --> RFI (both chains)

DOY 159 (2012-06-07)

05:02:44 Intg Spacon reports esa mode for Integral

05:10:22 request by spacon to remain for ongoing integral emergency recovery @ redu ground station

05:30:53 automated schedule stops pass, restart track & uplink 2min TM lost

05:32:00 G/S: Track manually restarted by ECC. TM OK

05:43:47 remain tracking @ redu u.f.n. station staff informed

DOY 173 (2012-06-21)

17:07:05 G/S: Bad Frames

Network was informed and network told that G/S STC and Computer both nominal.

Nothing was seen on the STC log or charts. Possibly a comms glitch.

DOY 174 (2012-06-22)

05:07:00 G/S: Drop VC-0 & VC-7 from G/S: RED, duration: 2min

05:07:00 RED-1: The Stop Pass job was executed by the STC schedule at 05:07 instead of the scheduled 06:15. ECC restarted the track. STC support are investigating. A similar problem has been seen twice on NNO, but no reason has been found yet.

Feedback from the STC SW support - the incident below is a recurrence of stc#1413.

The issue is under investigation by STC SW support team

DOY 179 (2012-06-27)

At 15:37, a FEC crash at REDU interrupted the timeline, at 16:06, the links were re-established, but at 16:14, they briefly dropped again, being recovered at 16:38.

Figure 10 shows the quality of the ground station performance. The data received from the ground

stations is compared to the data that is expected to be received.

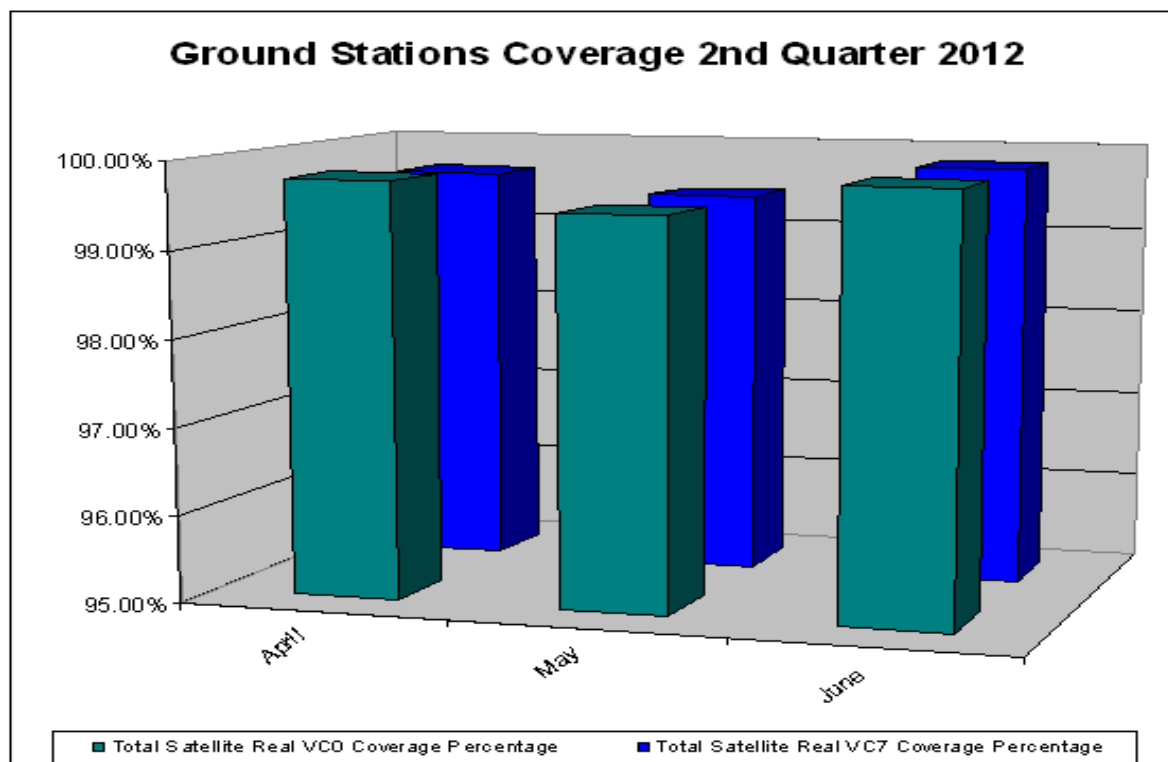


Figure 10: Comparison of VC0 to VC7 coverage

3.3 ISOC

3.3.1 Mission Planning

New or updated PSFs have been received for revolutions 1183 to 1192, corresponding to the time range 21 June to 20 July.

New observations have been planned for revolutions 1178 (6-8 June) to 1192 (17-20 July), including the SPI annealing period from 1178 to 1183. No TOOs were scheduled.

TSFs have been received for revolutions 1177 to 1191.

3.3.2 Observation Status

New ECS files have been for revolutions 1163 to 1169, covering observations up to 12 May.

3.3.3 ISOC Science Data Archive

Work is ongoing on the development of the new ISDA.

3.3.4 ISOC System

ISOC system V32.2 was released on 4 June, with minor changes.

3.3.5 Problems

No new problems.

4 Anomalies

Table 1 contains the anomalies that occurred in the reporting period:

Table 1: Anomalies reported

AR id	Date of occurrence	Subject	Segment	Status
INT-3280	2012-06-04	T1017 and T1048 NOT OOL after eclipse on DOY148	IMCS	Closed
INT-3281	2012-06-05	CEV disabled in stacks (replacing EENTRY & EEXIT during SPI annealing & eclipse) caused commands to fail	IMCS	Closed
INT-3282	2012-06-27	Lost TM/TC due to crash of front end controller from REDU	COMMS	Closed
INT-3283	2012-06-30	FDS platform problems	FDS	Closed
INT_SC-386	2012-06-07	LCL RWDE4 SEU - Integral ESAM Entry #3	Spacecraft	Closed
INT_SC-387	2012-06-11	IREM Anomaly: Reset of IREM_CSCI S/W #130, 11/06/2012	Payload	Closed
INT_SC-388	2012-06-17	IREM Anomaly: Reset of IREM_CSCI S/W #131, 17/06/2012	Payload	Pending
INT_SC-389	2012-06-18	IREM Anomaly: Reset of IREM_CSCI S/W #132, 18/06/2012	Payload	Closed
INT_SC-390	2012-06-26	IREM Anomaly: Reset of IREM_CSCI S/W #133, 26/06/2012	Payload	Closed
INT_SC-391	2012-06-30	IREM Anomaly: Reset of IREM_CSCI S/W #134, 30/06/2012	Payload	Testing

5 Special Events & Future Milestones

- IMCS E3.5.4 installation on A chain
- NCTRS S/W installation on B chain
- Eclipse season ends on 17/07/2012
- Decrease of radiation belt exit altitude from rev. 1193 (21/07/2012)
- Earth Observation 2.2 planned for the night of 1-2 August 2012.

- Earth Observation 2.3 planned for the night of 28-29 August 2012.

6 Appendix

The appendix contains some detailed information concerning the AOCS subsystem and the instruments.

6.1 AOCS operations

During this period, 420 Open Loop Slews, 342 Closed Loop Slews and 34 Momentum Biases were executed (as reported by ACC OEM).

44 slews were missed from the Timeline.

6.1.1 Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 01/07/2012 is reported in the following plot:

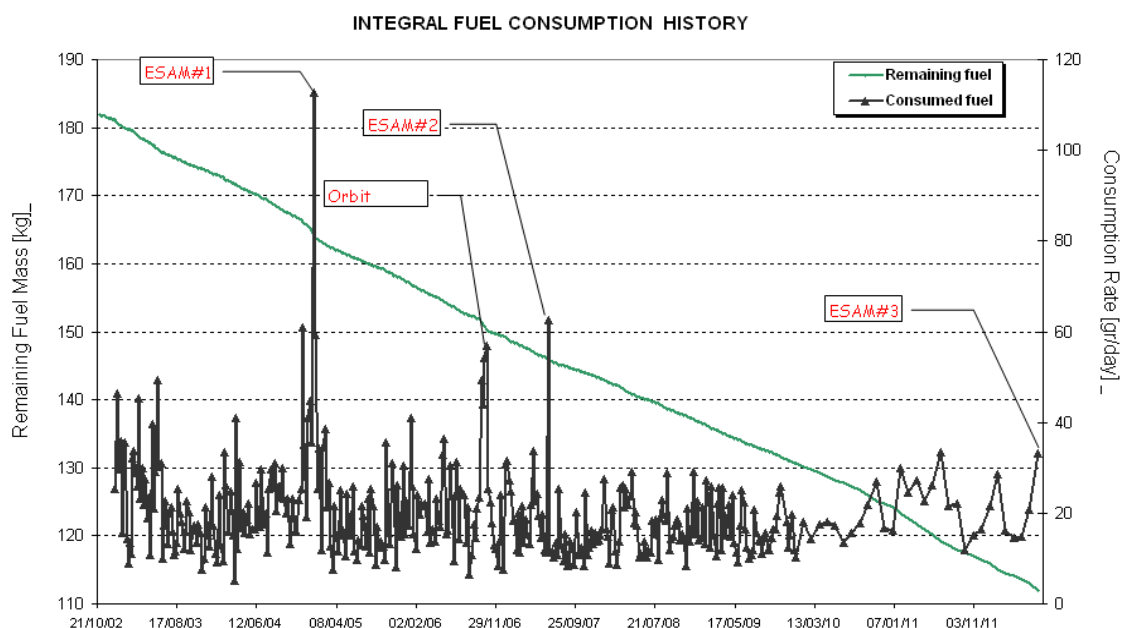


Figure 11: Fuel consumption. Note: ESAM fuel consumption is spread over period of ~1 week.

6.1.2 The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the last month are reported in the plot below. The evolution of the drift on yaw channel is under constant monitoring but the values are still well within the specs.

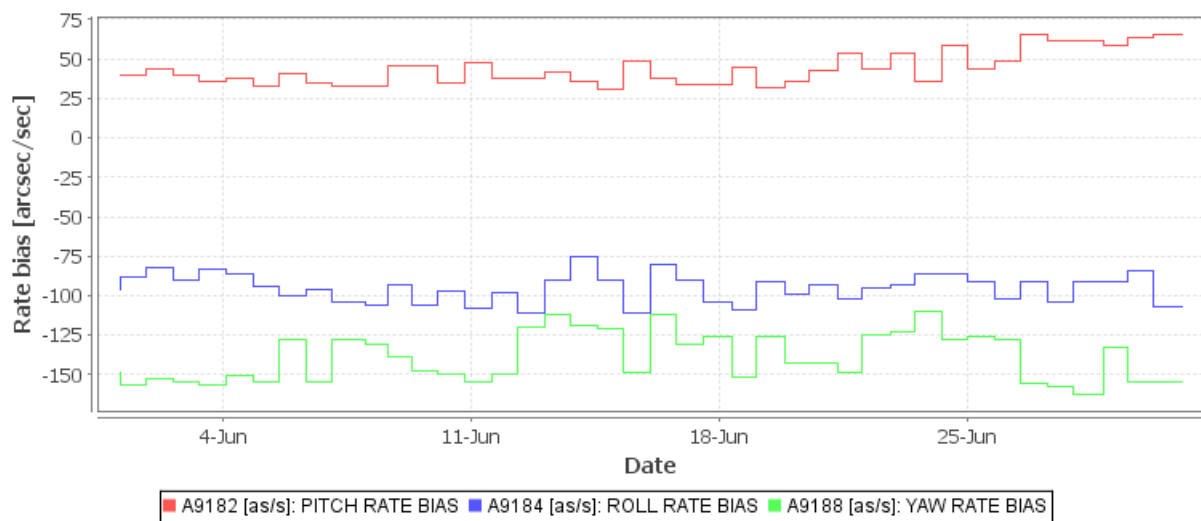


Figure 12: RMU pitch, roll and yaw. Historic data is available on request

6.1.3 Event log

06-06-2012 (Day of Year 158, Revolution 1178)

At 11:12 TC A3089 Start Sun Steer Law failed at CEV level completion. At 11:13:25, the IMU came on for 10 minutes. In response a manual mapping was performed, and the next slew (11780018) updated. There was no impact.

07-06-2012 (Day of Year 159, Revolution 1178)

At 04:42:49Z a SEU opened the Reaction Wheel Drive Electronics RWDE-4 LCL (P1136=OPEN), causing the power off and consequent de-spin of the Reaction Control Wheel 4.

A command was sent at 04:45:26Z to switch the wheel back ON.

At 04:46:32Z the guide star was lost and IMU powered ON.

The change of angular momentum could not be absorbed by the other 2 wheels and caused a drift in the S/C such that the sun left the SAS window.

The SAS 1A Y FDE criterion was violated at 04:49:52Z, triggering Emergency Sun Acquisition Mode (ESAM).

The recovery started at 07.51Z some key events during the recovery are listed below.

10:38:58 Recovery to SSA mode.

17:24:20 Recovery to STA mode.

17:44:30 Recovery to IPS mode.

00:13:00 Timeline recovered and AOCS enabled.

The impact was the loss of slews 11780050 to 11780081.

08-06-2012 (Day of Year 160, Revolution 1178)

At 08:34, a TPF update failure interrupted the timeline. At 11:17:01, after a recovery the timeline was restored. The impact was the loss of slews 11780092 to 11780095.

11-06-2012 (Day of Year 163, Revolution 1179)

At 04:30:01, a TPF failure forced an interruption to the timeline. The recovery was completed at 06:09, the impact was the loss of slew 11790054.

13-06-2012 (Day of Year 165, Revolution 1180)

At 00:14:00, a TPF failure forced another interruption to the timeline. The recovery was completed at 01:15, the impact was the loss of slew 1180033.

14-06-2012 (Day of Year 166, Revolution 1180)

At 03:39:00, a TPF failure forced yet another interruption to the timeline. The recovery necessitated a manual Reaction Wheel Bias, and was completed at 06:07. The impact was the loss of slews 11800064 & 11800065.

19-06-2012 (Day of Year 171, Revolution 1182)

At 16:06:00, a TPF failure again forced an interruption to the timeline. The recovery was completed at 17:18. The impact was the loss of slew 11820049.

21-06-2012 (Day of Year 173, Revolution 1183)

At 05:28:00, a TPF failure (sigh) forced an interruption to the timeline. The recovery was completed at 07:02. The impact was the loss of slew 11830010.

22-06-2012 (Day of Year 174, Revolution 1183)

At 05:07:00, a TM drop from Redu, this caused the subsequent TPF update to fail. A recovery was performed, and the subsequent slew updated, there was no impact.

27-06-2012 (Day of Year 179, Revolution 1185)

At 15:37:00, a FEC crash at Redu caused a drop in TM & TC. The links were recovered at 16:06, however, there was another drop at 16:14. The links were eventually recovered at 16:38. Subsequently a recovery was performed, and the timeline restored at 17:04. The impact was the loss of slew 11850018.

29-06-2012 (Day of Year 181, Revolution 1186)

At 23:22, the TC: A3085 'RC SUN STEER INI' CEV was unverified, there was no impact.

At 23:46, the TPF update for slew 11860003 failed, during the recovery, the FDS reported that next slew from TL could not be done as CSL, a manual OSL needed to be performed instead. This was then performed, and the timeline restored at 00:58 the following day. The impact was the loss of slew 11860003.

6.2 SPI

6.2.1 Operations

Stirling Compressors and Cryostat

The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K but for the SPI annealing #19.

The cryocooler had been put in standby at the start of annealing on 05/06/2012 and remained in Standby until the start of active cooling on 18/06/2012. After the cryocooler switch-on, all four compressors were operated at full stroke (45) until 22/06/2012 13:21:00Z, when the stroke reduction to achieve 80K on the cold plate was started. The final stroke of 37 was reached at 23/06/2012 09:10:00Z and the 80K range on the cold plate was reached at 24/06/2012 07:15:00. Since then the cold plate temperature was maintained in the range 80K +/- 1K. The cold box temperature was maintained at -65°C throughout the whole annealing cycle.

The following plot shows the evolution of the Cold Plate, thermal braids and Cold Box temperatures during the annealing cycle. The downward spikes in the cold plate temperature should be disregarded as these are zero values acquired when the AFEE is OFF during eclipse.

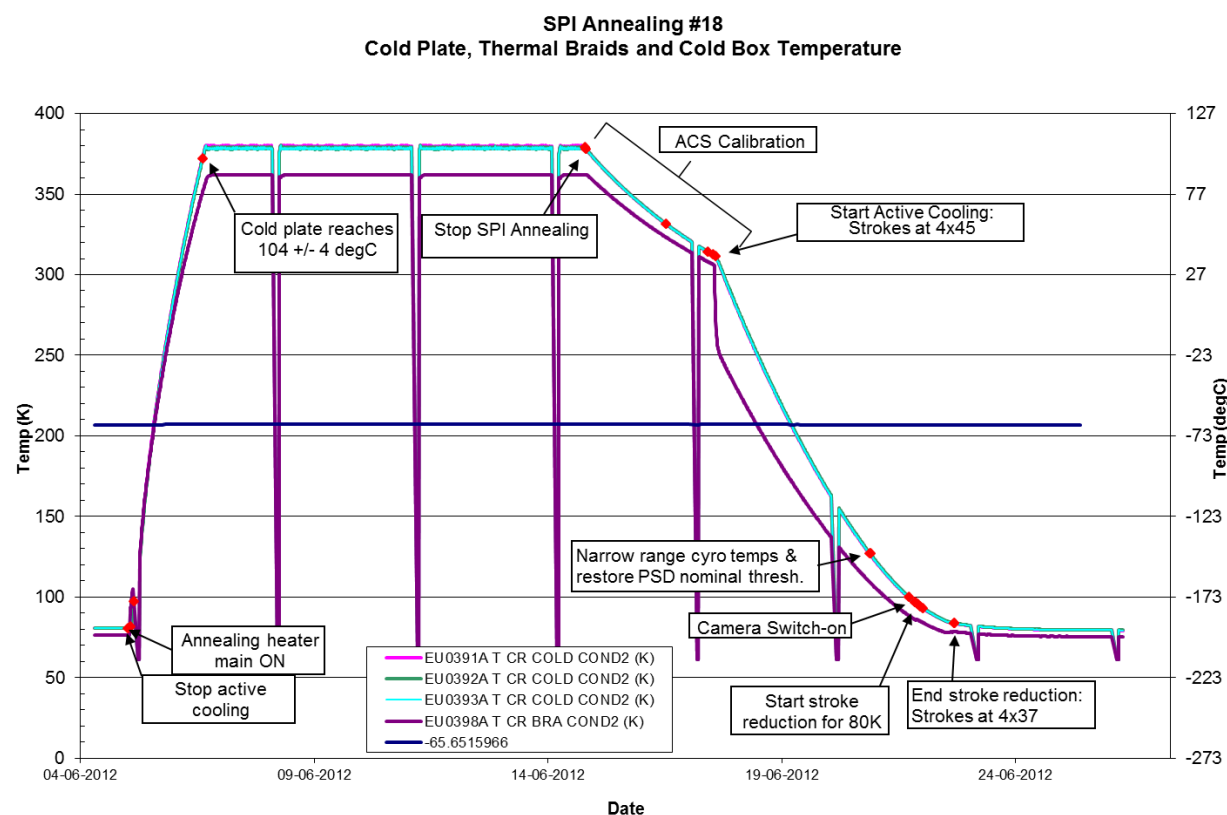


Figure 13: SPI Cold plate and H-bus temperature

The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K after annealing #18.

The evolution of the cold plate and H bus temperature since the end of annealing is illustrated in the following plot. The downward spikes correspond to eclipses.

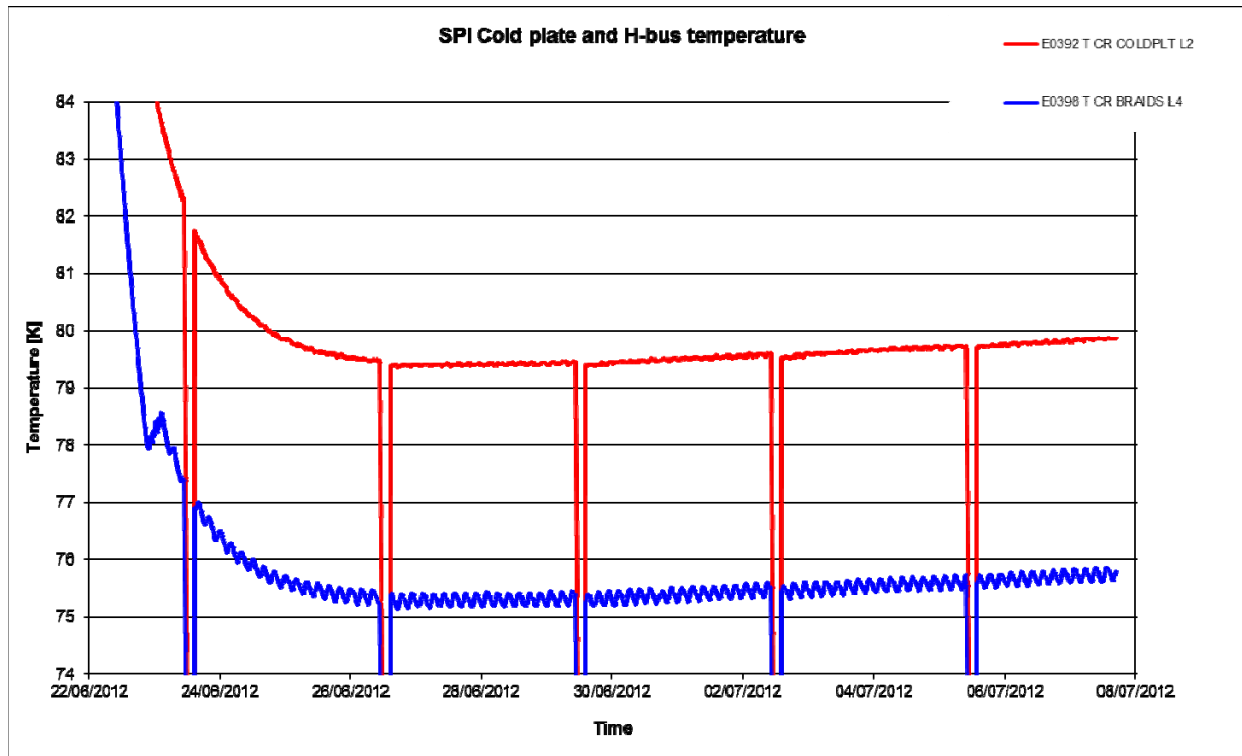


Figure 14: SPI Cold plate and H-bus temperature since the end of annealing #19.

The following plot shows the evolution of the CDE LCL currents during the reporting period.

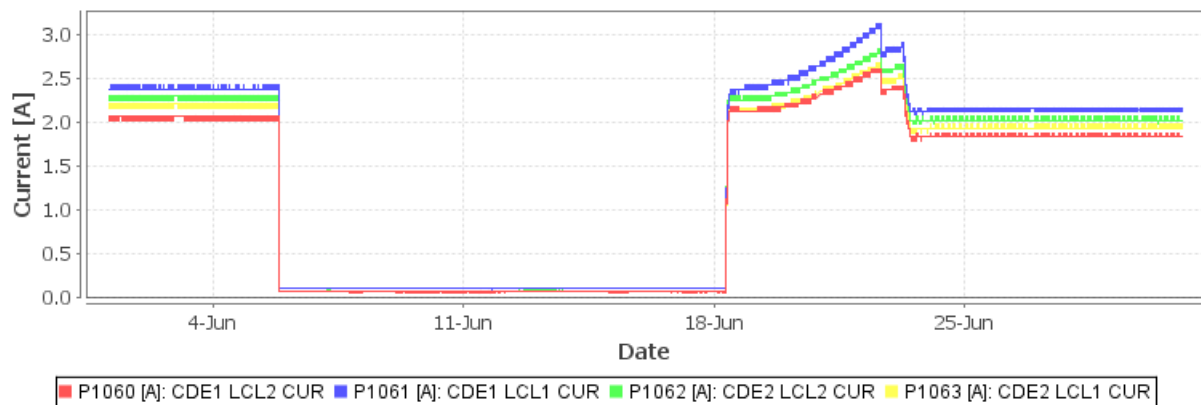


Figure 15: SPI CDE LCL current

DPE & IASW

The DPE health and IASW performance are nominal. The IASW version installed is v4.3.5 with both SE compression and PE reduction enabled and the spectra scaling factor set to 7/19 SE. Due to the annealing operations, the IASW was in CONF mode from the start of annealing until the camera switch-on performed on 22/06/2012. The DPE CPU usage was nominal during the reporting period (see Figure 2).

ACS

The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61). Due to the annealing operations, the ACS High Voltages were set to the minimum voltage (~980V) and the ACS was in CONF mode until the start of passive cooling on 15/06/2012, when the ACS Calibration was performed. A plot of the ACS counts is given in Figure 6: Instrument Count Rates.

AFEE

The health of the AFEE is nominal. Detector #2 is failed since 06/12/2003, detector #17 is failed since 17/07/2004, detector #5 is failed since 19/02/2009 and detector #1 is failed since 27/05/2010. The HV of the failed detectors are nominally set to 0.5kV and events from these GeDs are disabled in the DFEE and PSD.

Due to the annealing operations, all detector HVPSSs were switched off and only the LVPSSs left on with the AFEE in CONF mode from the start of annealing until the SPI camera switch-on, which started on 22/06/2012 at 14:33:00Z. Following the end of the camera switch-on, the nominal GeD High Voltages have been set to 2.5kV.

The following plot shows the AFEE DC output voltages over the reporting period.

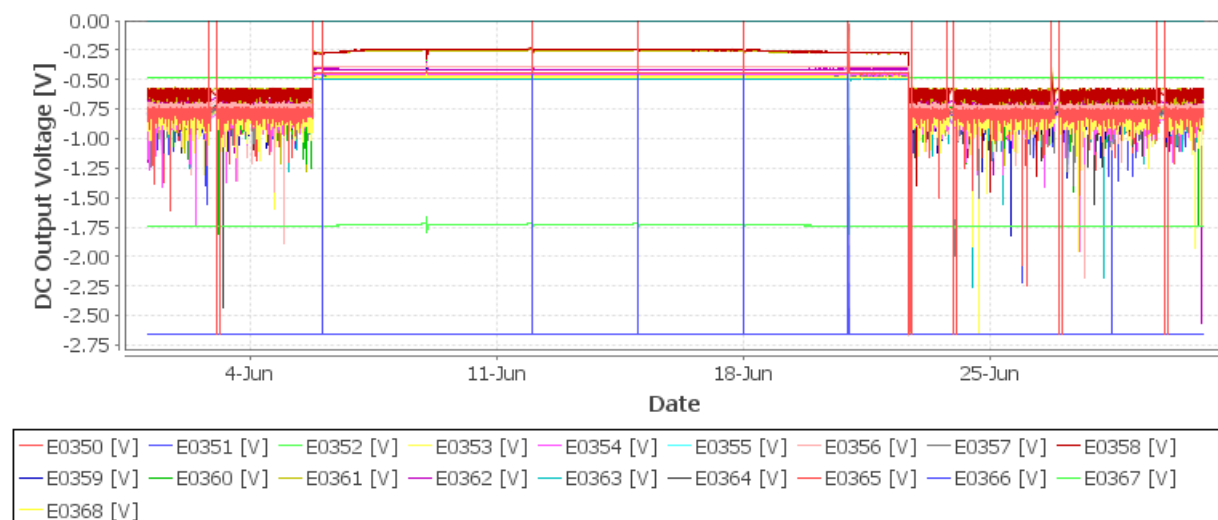


Figure 16: AFEE DC Output Voltages. Note that the data is sampled every 8th packet (64sec)

DFEE

The health of the unit is nominal. The following plots show the Non Vetoed, Time Tagged and Time Tagged Saturated Event count rates during the reporting period.

Due to the annealing operations, the DFEE was in CONF mode from the start of annealing until the SPI camera switch-on.



Figure 17: SPI GeD Non-Vetoed count rates. Note that the scale used for plotting is logarithmic.

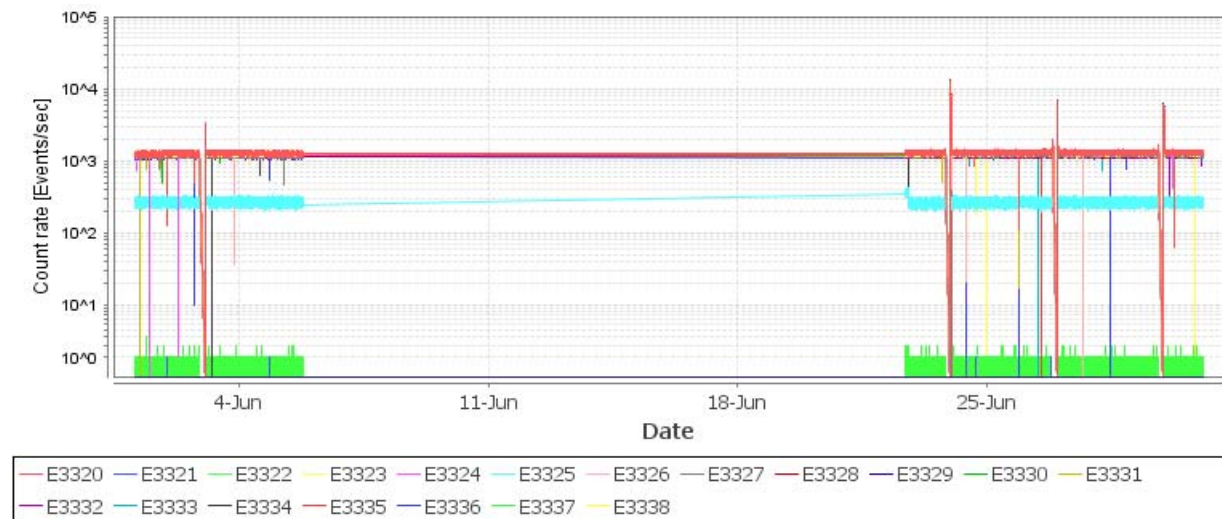


Figure 18: SPI GeD Time Tagged count rates. Note that the scale used for plotting is logarithmic.

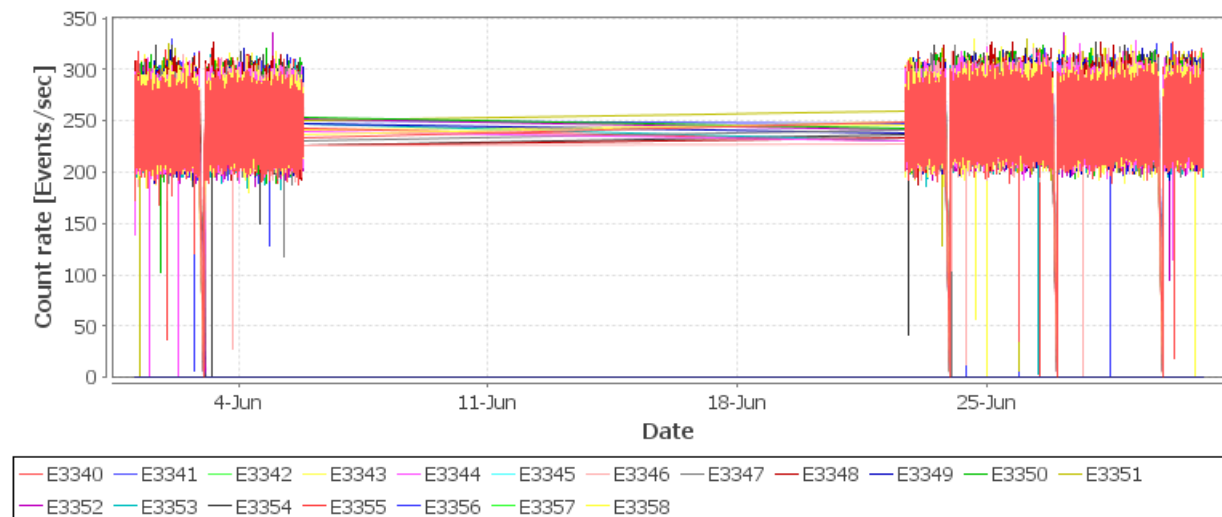


Figure 19: SPI GeD Time Tagged Saturated count rates

PSD

The health of the PSD is nominal. Due to the annealing operations, the PSD was in CONF mode from the start of annealing until the SPI camera switch-on. The following plot shows the PSD channel rates over the reporting period.

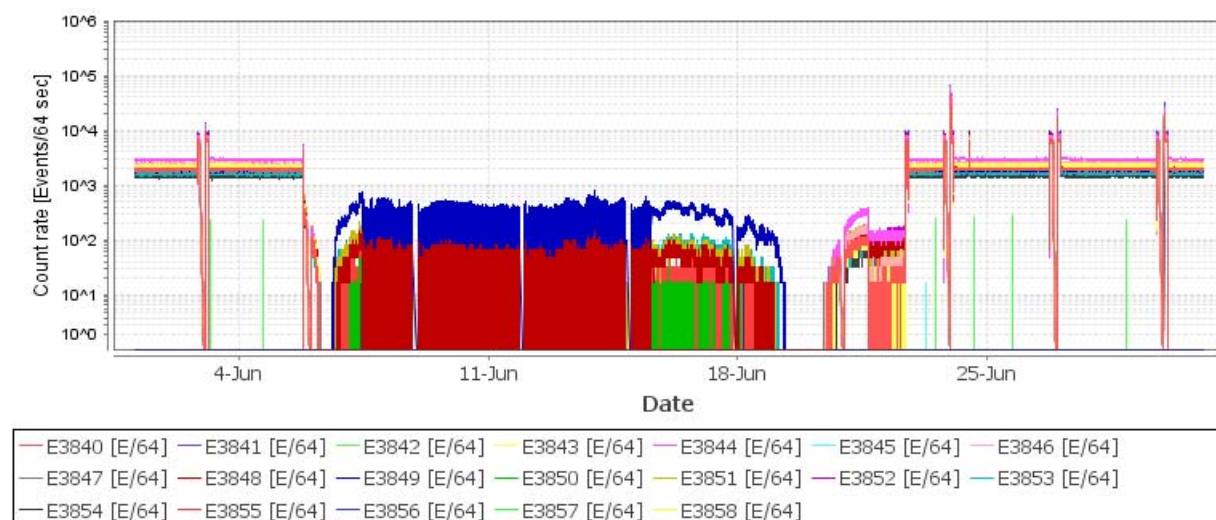


Figure 20: SPI PSD GeD Channel rates

6.2.2 Event Log

05-06-2012 until 24-06-2012 (Day of Year 157-176, Revolution 1177-1184)

SPI annealing #19 without outgassing of the coldbox as per OCR#324. The whole SPI annealing took place during the eclipse season. Therefore, the SPI annealing had to be planned carefully. Instead of the EDs EENTRY03 and EEXIT03, the SPI configuration pre and post eclipse was performed via commanding stacks. The switch on of the annealing heaters was performed via stacks as well.

07-06-2012 (Day of Year 159, Revolution 1178)

ESAM entry on 07/06/2012 (LCL RWDE4 SEU -Integral ESAM Entry #3): please see INT_SC-386. The ESAM did not have any impact on the SPI annealing operations.

22-06-2012 (Day of Year 174, Revolution 1183)

The camera was switched on was performed on 22-06-2012 at 14:33Z and the HV increased in steps of 0.5kV from 0.5kV to 3.5kV.

On 22-06-2012 at 17:25Z the IASW parameters were set to nominal. The nominal detector HV was restored (2.5kV but 0.5kV for failed detectors #1, #2, #5 and #17) as well as the nominal ACS configuration (FEE#57 & FEE#81 OFF).

From 22-06-2012 at 13:21:00Z the stroke of the compressors was gradually reduced from 45 to 37 (37 was reached on 23-06-2012 at 09:10:00Z) for the 80K target temperature:

22-06-2012T13:21:00	Compressor Stroke TTs to 44
22-06-2012T13:51:30	Compressor Stroke TTs to 43
23-06-2012T04:52:00	Compressor Stroke TTs to 42
23-06-2012T05:37:30	Compressor Stroke TTs to 41
23-06-2012T06:23:00	Compressor Stroke TTs to 40
23-06-2012T07:08:30	Compressor Stroke TTs to 39
23-06-2012T08:09:00	Compressor Stroke TTs to 38
23-06-2012T09:09:30	Compressor Stroke TTs to 37

05-06-2012 (Day of Year 157, Revolution 1177)

On 2012-06-05 DOY 157 at 17:56:01Z the last TC EU0112D CEV unverified of the stack annealing_EENTRY03.sun121. Same for the second TC from annealing_EEXIT03.sun121: EU0112D CEV unverified on 2012-06-06 (DOY 158) at 01:05:55Z. The stack was restarted from where it had stopped (please see INT-3281).

Reason for this is that both report commands wait for the CEV from the previous load command that have been deleted from the sequence EENTRY03 due to the different configuration during SPI annealing (see INT_CCR-564). For the following eclipses, the stacks were updated accordingly.

6.3 IBIS**6.3.1 Operations****ISGRI**

The health and performance of ISGRI was nominal during the reporting period. The following plot shows the ISGRI MCE counters during the reporting period:

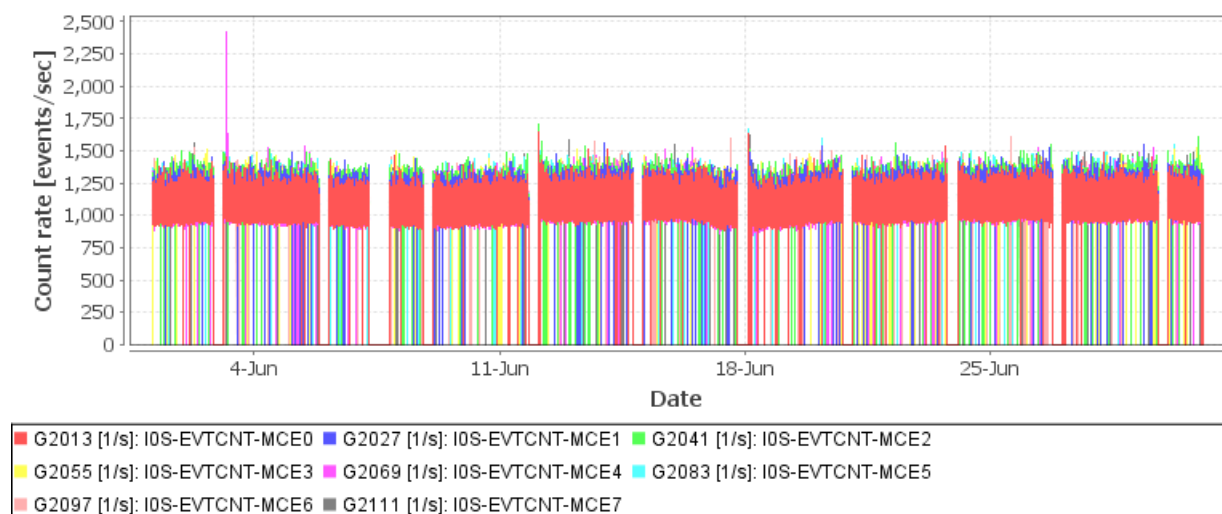


Figure 21: ISGRI MCE Counters

PICsIT

The health and performance of PICsIT was nominal during the reporting period. The following plot shows the PICsIT semi-module counters during the reporting period.



Figure 22: PICsIT semi-module counters. Note that the scale used for plotting is logarithmic.

VETO

The health and performance of VETO was nominal during the reporting period. Plots of the VETO counters are given in Figure 6: Instrument Count Rates.

6.3.2 Event Log

07-06-2012 (Day of Year 159, Revolution 1178)

ESAM entry on 07/06/2012 (LCL RWDE4 SEU -Integral ESAM Entry #3): please see INT_SC-386.

11-06-2012 (Day of Year 163, Revolution 1179)

IREM Anomaly: Reset of IREM_CSCI S/W #130 which forced IBIS to automatically enter safe configuration. Please see INT_SC-387.

17-06-2012 (Day of Year 169, Revolution 1182)

IREM Anomaly: Reset of IREM_CSCI S/W #131 which forced IBIS to automatically enter safe configuration. Please see INT_SC-388.

18-06-2012 (Day of Year 170, Revolution 1182)

IREM Anomaly: Reset of IREM_CSCI S/W #132 which forced IBIS to automatically enter safe configuration. Please see INT_SC-389.

26-06-2012 (Day of Year 178, Revolution 1184)

IREM Anomaly: Reset of IREM_CSCI S/W #133 which forced IBIS to automatically enter safe configuration. Please see INT_SC-390.

30-06-2012 (Day of Year 182, Revolution 1186)

IREM Anomaly: Reset of IREM_CSCI S/W #134 which forced IBIS to automatically enter safe configuration. Please see INT_SC-391.

6.4 JEM-X

6.4.1 Operations

The Status of JEMX-1 & 2 is nominal. The following plot shows the JEMX DFEE and detector temperatures over the reporting period.

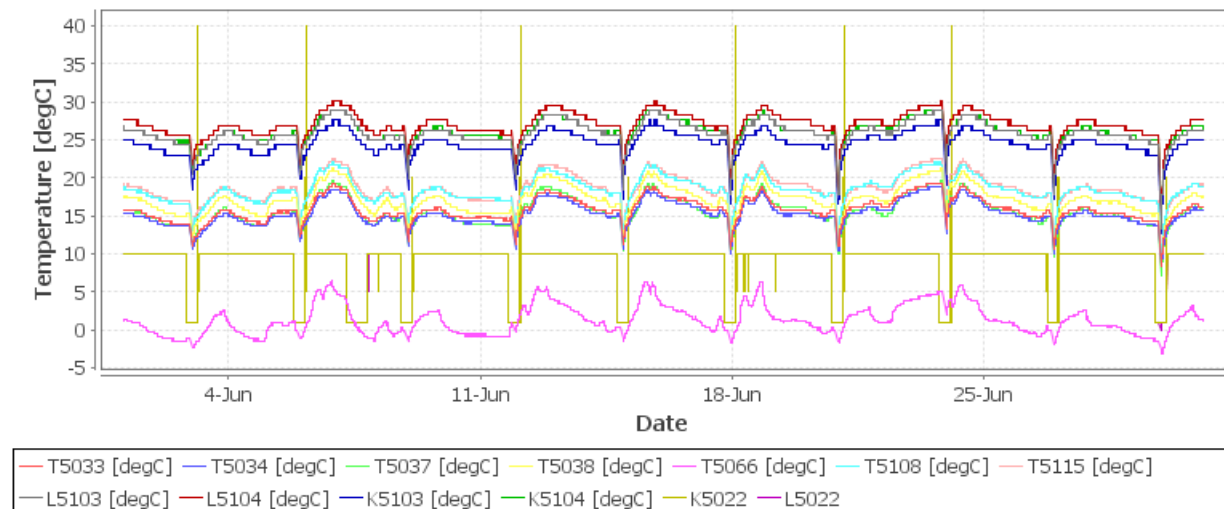


Figure 23: JEMX Detector and DFEE Temperatures

6.4.2 Event Log

07-06-2012 (Day of Year 159, Revolution 1178)

At 04:49:56, JEMX 1 & 2 went to SAFE mode due to ESAM entry.

The response was:

14:09:21 FCP_JEM1_0040 JEMX1 Transition to safe. This was to clear the Out-of-Limit KD5380D (EQ SHUTDOWN LEV)

14:13:30 FCP_JEM2_0040 JEMX2 Transition to safe. To clear the same on JEMX-2 LD5380D (EQ SHUTDOWN LEV)

18:09:00 CRP_JEM1_5100 RECOVERY FROM ESAM, which was completed at 18:41

18:42:00 CRP_JEM2_5100 RECOVERY FROM ESAM, which was completed at 19:13

The impact was 831 minutes science time lost on JEMX-1 and 863 minutes science time lost on JEMX-2.

18-06-2012 (Day of Year 170, Revolution 1182)

At 05:28, as part of the recovery from an IREM crash, the CCCFs were enabled. During the execution of these commands, the verifier crashed, interrupting the KEDATA02 & LEDATA02 EDs.

Subsequently, at 06:12 & 06:14 for JEMX 1 & 2 respectively, the EDs were manually resent. The impact was 44 & 46 minutes respectively lost science time.

26-06-2012 (Day of Year 178, Revolution 1185)

At 23:43:19, at the start of revolution 1185, the operating dV voltages for JEMX 1 & 2 were permanently reduced from 68 and 69 respectively, to 67 & 68.

6.5 OMC

6.5.1 Operations

The status and performance of OMC is nominal.

6.5.2 Event Log

06-06-2012 (Day of Year 158, Revolution 1178)

At 11:12, an AOCs problem forced an interruption to the timeline, a recovery was performed, and the timeline rejoined at 11:33. The impact was pointing 11780017 was lost.

07-06-2012 (Day of Year 159, Revolution 1178)

At 04:49:56, OMC went to SAFE mode owing to an ESAM entry. After recovery from ESAM, OMC was commanded back to stand-by mode at 10:38:51, and at 00:39:39 the following day was returned to Science mode. The impact was pointing 11780049 was interrupted after 1256 from a planned 1785 seconds and pointings 11780050 to 11780081 (31 pointings) were lost. It was at this time the following OEMs were received:

2012.159.04.59.08.972 TC1	2012.159.04.59.15.588	1792 0	RealTime 0	131 65535	PR	TC REJECT N E	REJECTED E
2012.159.04.59.15.097 TC1	2012.159.04.59.23.650	1792 0	RealTime 0	131 65535	PR	TC REJECT N E	REJECTED E

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for pointing 11780050.

08-06-2012 (Day of Year 160, Revolution 1178)

At 08:34, a FD problem forced an interruption to the timeline. A recovery was performed, and the timeline rejoined at 11:09. The impact was the loss of pointings 11780092, 11780093 & 11780094. It was at this time the following OEMs were received:

2012.160.09.08.03.159 TC1	2012.160.09.08.11.648	1792 0	RealTime 0	131 65535	PR	TC REJECT N E	REJECTED E
2012.160.09.08.08.909 TC1	2012.160.09.08.11.688	1792 0	RealTime 0	131 65535	PR	TC REJECT N E	REJECTED E
2012.160.09.48.29.661 TC1	2012.160.09.48.35.598	1792 0	RealTime 0	131 65535	PR	TC REJECT N E	REJECTED E
2012.160.09.48.35.911 TC1	2012.160.09.48.43.670	1792 0	RealTime 0	131 65535	PR	TC REJECT N E	REJECTED E

2012.160.10.28.59.162	2012.160.10.29.07.589	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

2012.160.10.29.04.912	2012.160.10.29.07.600	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for those pointings.

09-06-2012 (Day of Year 161, Revolution 1179)

At 08:04:03, owing to a sparse star field, pointing 11790010 was executed at with an attitude offset of 1 degree.

11-06-2012 (Day of Year 163, Revolution 1179)

At 04:08:03, owing to an IREM SEU, OMC switched to SAFE mode. A recovery was performed, and the timeline rejoined at 04:27:31. The impact was pointing 11790052 was interrupted after 2521 from a planned 3556 seconds.

At 05:23, an AOCS problem forced an interruption to the timeline, a recovery was performed, and the timeline rejoined at 06:09. The impact was the loss of pointing 1179054. It was at this time the following OEMs were received:

2012.163.05.26.54.806	2012.163.05.26.59.671	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

2012.163.05.27.00.806	2012.163.05.27.07.812	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for that pointing.

13-06-2012 (Day of Year 165, Revolution 1180)

At 00:14, an FD problem forced a suspension of the timeline. A recovery was performed, and the timeline rejoined at 01:15. The impact was the loss of pointing 11800033. It was at this time the following OEMs were received:

2012.165.01.01.25.913	2012.165.01.01.31.977	1792	RealTime	131	TC	REJECT	REJECTED	TC1
0	0	65535	PR	N	E	E		

2012.165.01.01.19.913	2012.165.01.01.24.018	1792	RealTime	131	TC	REJECT	REJECTED	TC1
0	0	65535	PR	N	E	E		

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for that pointing.

14-06-2012 (Day of Year 166, Revolution 1180)

At 03:39, a FD problem forced a suspension of the timeline. A recovery was subsequently performed, and the timeline rejoined at 05:20. The impact was the loss of pointing 11800064. It was at this time the following OEMs were received:

2012.166.04.25.15.481	2012.166.04.25.24.110	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

2012.166.04.25.20.981	2012.166.04.25.24.256	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for that pointing.

17-06-2012 (Day of Year 169, Revolution 1182)

At 21:06 after AOS, an IREM SEU that occurred during the perigee passage was missed. Thus at 00:18, the M1131 Reset ROE command failed, as OMC was still in SAFE mode. A recovery was performed, and the timeline rejoined at 01:59. The impact was the loss of pointing 11820002.

18-06-2012 (Day of Year 170, Revolution 1182)

At 05:26, a verifier crash interrupted the timeline. After a restart, the timeline was restored at 05:28. The impact was the loss of pointing 11820009.

At 18:47:08, owing to another IREM SEU, OMC switched to SAFE mode. A recovery was performed, and the timeline rejoined at 19:26:00. The impact was pointing 11820024 was interrupted after 2304 from a planned 3000 seconds, and pointing 11820025 was lost. It was at this time the following OEMs were received:

2012.170.19.00.11.738	2012.170.19.00.20.264	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

2012.170.19.00.16.988	2012.170.19.00.20.297	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for pointing 11820025.

19-06-2012 (Day of Year 171, Revolution 1182)

At 16:06, a FD problem forced an interruption of the timeline. A recovery was performed, and the timeline rejoined at 17:18. The impact was the loss of pointing 11820049. It was at this time the following OEMs were received:

2012.171.16.53.16.539	2012.171.16.53.24.389	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

2012.171.16.53.22.289	2012.171.16.53.24.523	1792	RealTime	131	TC	REJECT	REJECTED
0	0	65535	PR	N	E	E	TC1

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for that pointing.

21-06-2012 (Day of Year 173, Revolution 1183)

At 05:28, a FD problem forced an interruption in the timeline, a recovery was performed, and the timeline rejoined at 07:02. The impact was the loss of pointing 11830010. It was at this time the following OEMs were received:

2012.173.06.50.30.875	2012.173.06.50.43.273	1792	RealTime	131	TC REJECT	REJECTED
TC1		0	0	65535 PR	N E	E
2012.173.06.50.37.000	2012.173.06.50.50.192	1792	RealTime	131	TC REJECT	REJECTED
TC1		0	0	65535 PR	N E	E

These correspond to the rejected M1130 (RESET IM) and MU1310 (IMAGING-A) commands sent from the auto-stack for that pointing.

26-06-2013 (Day of Year 178, Revolution 1184)

At 09:39:17, owing to yet another IREM SEU, OMC switched to SAFE mode. A recovery was performed, and the timeline rejoined at 10:07:08. The impact was pointing 11840063 was interrupted after 761 from a planned 2200 seconds.

27-06-2013 (Day of Year 179, Revolution 1185)

At 15:37, there was a TM & TC drop from Redu due to a FEC crash. After a restart, the timeline was resumed at 17:04. The impact was the loss of pointing 11850018.

30-06-2012 (Day of Year 182, Revolution 1186)

At 22:39:17, owing to still one more IREM SEU, OMC switched to SAFE mode. A recovery was performed, and the timeline rejoined at 22:49:03. The impact was pointing 11860024 was interrupted after 2113 from a planned 8270 seconds.

6.6 IREM

6.6.1 Operations

Radiation belts entry and exit

The following plots show the Radiation Belt Entry (Figure 24, red line) and Exit times (Figure 25, blue line) obtained from the ISDC website, defined where the IREM TC3 (soft electrons) rate reads 600 counts. The blue line in Figure 24 and the magenta line in Figure 25 are the altitudes used by the MOC for planning purposes.

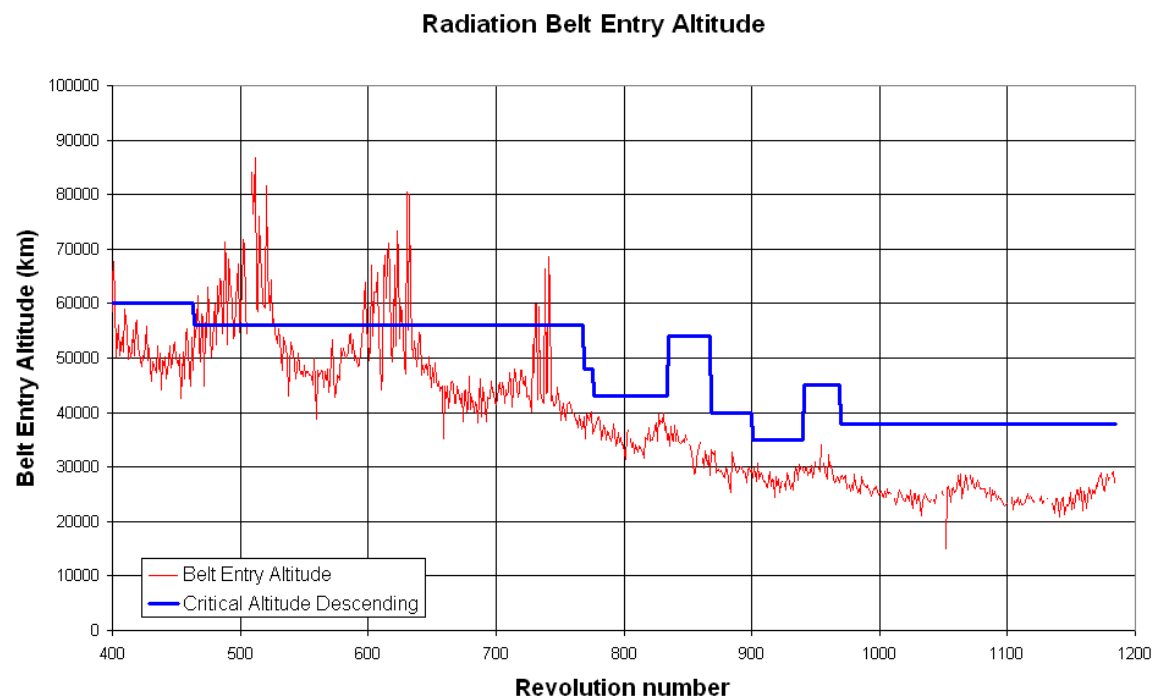


Figure 24: Radiation belt entry

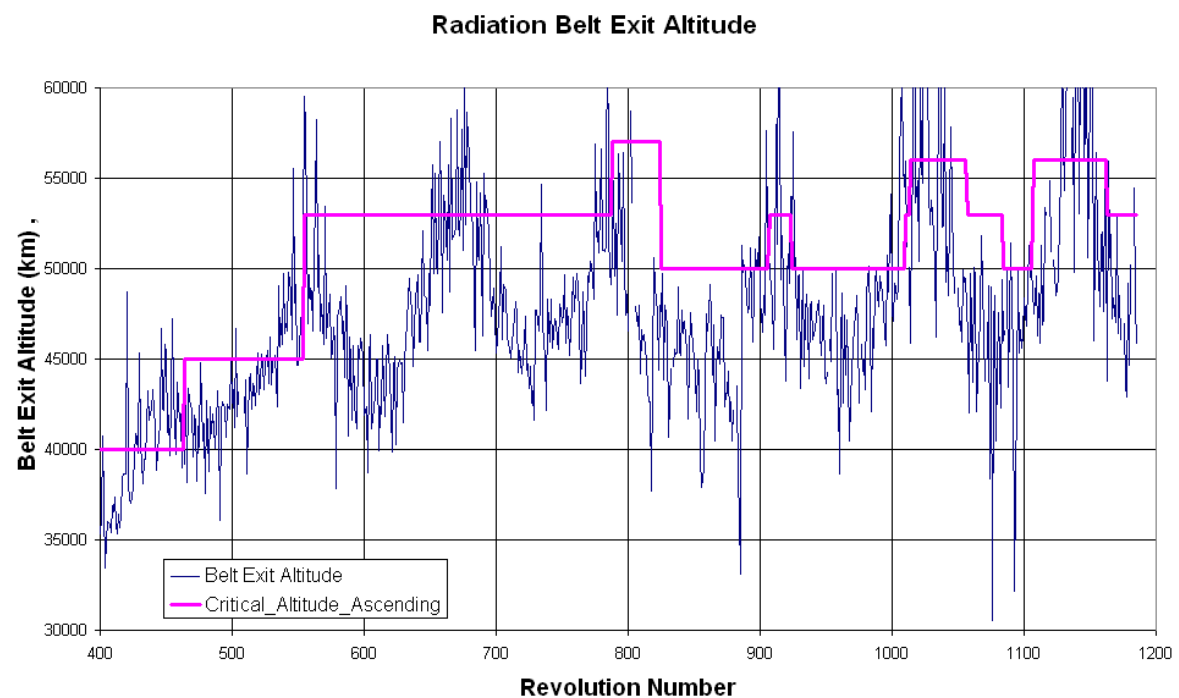


Figure 25: Radiation belt exit

Table 2: Radiation belts. Radiation belt entry crossings are ignored if there is a subsequent gap of at least 30 minutes of low radiation.

Revo number	Spacecraft BCPKT (electron)	Observed entry/exit time by Electron CUT-OFF	Observed entry/exit altitude [km] by Electron CUT-OFF	Predicted entry/exit time by Electron CUT-OFF	Predicted entry/exit altitude [km] by Electron CUT-OFF	Predicted entry/exit time by Proton CUT-OFF	Predicted entry/exit altitude [km] by Proton CUT-OFF
1176	RAD_ENTR R 2012-06-02T18:14:57Z	N/A	N/A	02-Jun-2012 19:42:43	19310.6	02-Jun-2012 20:22:43	9592.76
1177	RAD_EXIT R 2012-06-03T01:15:47Z	02/06/2012 23:41:22	43147	03-Jun-2012 00:52:43	49519.92	02-Jun-2012 21:02:43	3541.482
1177	RAD_ENTR R 2012-06-05T18:01:45Z	05/06/2012 19:19:39	28356	05-Jun-2012 19:25:53	20564.3	05-Jun-2012 20:15:53	8567.08
1178	RAD_EXIT R 2012-06-06T01:03:33Z	05/06/2012 23:24:59	42426	06-Jun-2012 00:35:53	48515.27	05-Jun-2012 20:45:53	3659.636
1178	RAD_ENTR R 2012-06-08T17:46:38Z	08/06/2012 18:53:47	30768	08-Jun-2012 19:12:40	20050.2	08-Jun-2012 20:02:40	8058.296
1179	RAD_EXIT R 2012-06-09T00:48:46Z	08/06/2012 23:45:23	48889	09-Jun-2012 00:22:40	48867.82	08-Jun-2012 20:32:40	3627.263
1179	RAD_ENTR R 2012-06-11T17:32:15Z	N/A	N/A	11-Jun-2012 19:00:15	19538.68	11-Jun-2012 19:40:15	9870.145
1180	RAD_EXIT R 2012-06-12T00:34:12Z	11/06/2012 23:31:23	48922	12-Jun-2012 00:10:15	49281.19	11-Jun-2012 20:20:15	3589.684
1180	RAD_ENTR R 2012-06-14T17:19:16Z	14/06/2012 18:32:19	29493	14-Jun-2012 18:42:48	20267.34	14-Jun-2012 19:32:48	8273.148
1181	RAD_EXIT R 2012-06-15T00:21:29Z	14/06/2012 23:30:43	51063	14-Jun-2012 23:52:48	48713.28	14-Jun-2012 20:02:48	3634.611
1181	RAD_ENTR R 2012-06-17T17:04:50Z	17/06/2012 18:28:27	27270	17-Jun-2012 18:28:41	20768.64	17-Jun-2012 19:18:41	8844.616
1182	RAD_EXIT R 2012-06-18T00:07:38Z	N/A	N/A	17-Jun-2012 23:48:41	49890.33	17-Jun-2012 19:48:41	3809.748
1182	RAD_ENTR R 2012-06-20T06:18:05:47	20/06/2012 18:05:47	29230	20-Jun-2012 18:22:41	18837.78	20-Jun-2012 19:02:41	9226.773

Revo number	Spacecraft BCPKT (electron)	Observed entry/exit time by Electron CUT-OFF	Observed entry/exit altitude [km] by Electron CUT-OFF	Predicted entry/exit time by Electron CUT-OFF	Predicted entry/exit altitude [km] by Electron CUT-OFF	Predicted entry/exit time by Proton CUT-OFF	Predicted entry/exit altitude [km] by Proton CUT-OFF
	20T16:50:28Z						
1183	RAD_EXIT R 2012-06- 20T23:53:25Z	20/06/2012 23:30:11	55519	20-Jun-2012 23:32:41	49632.77	20-Jun-2012 19:42:41	3846.037
1183	RAD_ENTR R 2012-06- 23T16:38:37Z	23/06/2012 17:47:40	30398	23-Jun-2012 18:10:16	18590.49	23-Jun-2012 18:50:16	8932.861
1184	RAD_EXIT R 2012-06- 23T23:41:11Z	23/06/2012 22:35:08	48403	23-Jun-2012 23:20:16	49880.35	23-Jun-2012 19:30:16	3837.788
1184	RAD_ENTR R 2012-06- 26T16:27:21Z	N/A	N/A	26-Jun-2012 17:53:59	19903.48	26-Jun-2012 18:33:59	10262.11
1185	RAD_EXIT R 2012-06- 26T23:29:35Z	26/06/2012 22:08:52	45673	26-Jun-2012 23:03:59	49000.15	26-Jun-2012 19:13:59	3593.275
1185	RAD_ENTR R 2012-06- 29T16:17:30Z	29/06/2012 17:36:12	28211	29-Jun-2012 16:36:59	20888.97	29-Jun-2012 17:26:59	8958.575
1186	RAD_EXIT R 2012-06- 29T23:20:04Z	29/06/2012 22:17:40	49068	29-Jun-2012 21:56:59	49701.11	29-Jun-2012 17:56:59	3783.891

Reference:

- High radiation
- Very small error vs reference (less than 10 minutes)
- Small error vs reference (between 10 and 30 minutes)
- Large error vs reference (more than 30 minutes)

6.6.2 Event Log

11-06-2012 (Day of Year 163, Revolution 1179)

At 04:08:03Z, a local reset of the IREM CSCI S/W (SEU #130) was observed. The status of the unit, before the local reset of the IREM CSCI S/W, was nominal, here is a summary:

- 1) The temperatures were nominal;
- 2) The LCL current was nominal;

- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits;
- 4) The anomaly occurred at 2012.163.04:08:03Z (124432.6 km). The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex);
- 5) The recovery of the unit started immediately using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of BCC0 HEX = 48320 DEC = 10111100**11**000000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation ON, and ground link ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 09:45:00Z.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the PIs request. OMC was recovered at 04:17:32Z and IBIS at 04:30:00Z.

17-06-2012 (Day of Year 169, Revolution 1182)

At 21:04:59Z, (at AOS), a local reset of the IREM CSCI S/W (SEU #131) was observed. The status of the unit, before the local reset of the IREM CSCI S/W, was nominal, here is a summary:

- 1) The temperatures were nominal;
- 2) The LCL current was nominal;
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits;
- 4) The anomaly was observed at 2012.169.21:04:59Z (17572.6 km). The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex);
- 5) The recovery of the unit was performed using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of 38C0 HEX = 14528 DEC = 00111000**11**000000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation ON, and ground link OFF. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 04:56:00Z the following day.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the PIs request. OMC was recovered at 01:58:46Z and IBIS at 02:49:00Z.

18-06-2012 (Day of Year 170, Revolution 1182)

At 18:47:07Z, a local reset of the IREM CSCI S/W (SEU #132) was observed. The status of the unit, before the local reset of the IREM CSCI S/W, was nominal, here is a summary:

- 1) The temperatures were nominal;
- 2) The LCL current was nominal;
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits;
- 4) The anomaly occurred at 2012.170.18:47:07Z (144591.7 km). The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex);
- 5) The recovery of the unit started immediately using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of BCC0 HEX = 48320 DEC = 1011110011000000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation ON, and ground link ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 00:40:00Z.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the Pls request. OMC was recovered at 19:24:07Z and IBIS at 20:06:00Z.

26-06-2012 (Day of Year 178, Revolution 1184)

At 09:39:16Z, a local reset of the IREM CSCI S/W (SEU #133) was observed. The status of the unit, before the local reset of the IREM CSCI S/W, was nominal, here is a summary:

- 1) The temperatures were nominal;
- 2) The LCL current was nominal;
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits;
- 4) The anomaly occurred at 2012.178.09:39:16Z (92917.0 km). The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex);
- 5) The recovery of the unit started immediately using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of BCC0 HEX = 48320 DEC = 1011110011000000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation ON, and ground link ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 13:33:00Z.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the Pls request. OMC was recovered at 09:48:17Z and IBIS at 10:02:00Z.

30-06-2012 (Day of Year 182, Revolution 1186)

At 22:39:16Z, a local reset of the IREM CSCI S/W (SEU #134) was observed. The status of the unit, before the local reset of the IREM CSCI S/W, was nominal, here is a summary:

- 1) The temperatures were nominal;
- 2) The LCL current was nominal;
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits;
- 4) The anomaly occurred at 2012.182.22:39:16Z (153298.7 km). The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex);
- 5) The recovery of the unit started immediately using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of BCC0 HEX = 48320 DEC = 10111100**1100**0000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation ON, and ground link ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 06:08:00Z.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the PIs request. OMC was recovered at 22:49:03Z and IBIS at 23:02:00Z.