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

INTEGRAL
Mission report

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

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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 August and covers the revolutions 952 until 962 (included). The targets of these revolutions can be found on the ISOC web: <http://integral.esac.esa.int/isocweb/schedule.html?action=intro> .

The previous weekly and monthly reports are available at the XMM-INTTEGRAL website: <http://xmm.esoc.esa.int/documentation/documentation.php3> .

2 Satellite status

2.1 Platform

2.1.1 AOCS

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

7 slews were missed from the Timeline.

The fuel consumption over the reporting period was 0.5611 Kg. The remaining propellant is in the order of 126.6736 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; available power from the arrays is of the order of 2100W.

Eclipse Season #17 started on the 2nd August, Table 1 summarises all the important information from an EPS Point of view.

Table 1: Eclipse information

Date	Penumbra Entry	Umbra Entry	Umbra Exit	Penumbra Exit	Eclipse Duration		Observed Depth of Discharge Ah		Expected Recharge		Recharge Duration Battery	
					Total	Umbra	1	2	Ah	Time	1	2
02/08/10	21:18:34			21:25:12	0:06:38	0:00:00	1.53	1.52	0.00	0:00:00		
05/08/10	21:00:28	21:01:36	21:20:36	21:22:04	0:21:36	0:19:00	1.86	1.84	1.97	1:05:49	1:05:52	1:05:20

08/08/10	20:44:26	20:45:17	21:12:50	21:14:01	0:29:35	0:27:33	2.69	2.67	2.86	1:35:26	1:36:03	1:35:07
11/08/10	20:28:29	20:29:12	21:03:21	21:04:26	0:35:57	0:34:09	3.28	3.25	3.55	1:58:18	1:57:38	1:56:26
14/08/10	20:15:23	20:16:02	20:55:56	20:56:58	0:41:35	0:39:54	3.82	3.77	4.15	2:18:13	2:17:07	2:15:31
17/08/10	20:04:18	20:04:54	20:49:39	20:50:40	0:46:22	0:44:45	4.51	4.45	4.65	2:35:01	2:42:13	2:40:21
20/08/10	19:53:10	19:53:46	20:42:22	20:43:23	0:50:13	0:48:36	4.73	4.68	5.05	2:48:21	2:50:26	2:48:26
23/08/10	19:40:54	19:41:31	20:32:52	20:33:56	0:53:02	0:51:21	4.98	4.92	5.34	2:57:52	2:59:21	2:57:13
26/08/10	19:27:38	19:28:17	20:21:10	20:22:16	0:54:38	0:52:53	5.25	5.20	5.50	3:03:11	3:09:09	3:01:09
29/08/10	19:14:51	19:15:32	20:08:23	20:09:33	0:54:42	0:52:51	5.34	5.28	5.49	3:03:04	3:12:16	3:10:08

From the EPS point of view all eclipse passages and subsequent battery recharge periods were completely nominal.

Prior to the eclipse season the Battery Full Charge rate was set to the high charge rate of C/13 (1.8A).

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.

On 01.08.2010 the On-board monitoring tables for use during the eclipse season were loaded and enabled.

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.

As a result of the reduction in perigee height Integral will start to violate ITU regulations if the transmitter is left on below 4200km. Therefore starting from 26.08.2010 the transmitter is being switched off every perigee. This takes place outside of station visibility and hence does not affect science operations in any way.

2.2 Payload

2.2.1 SPI

Following the 15th SPI annealing, which ended on 16/04/2010, 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.

An eclipse season began on 02/08/2010 and continued throughout the month. Eclipse activities for SPI were nominal, other than a problem with the Timeline EDs reported in the Event Log section below.

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 105 packets/cycle, except from 2010-08-08T12:25:59Z until the end of revolution 954 (OMC Flat Field Calibration), when it was 88 packets/cycle. The average telemetry occupation when the allocation was 105 packets/cycle was 80.3 packets/cycle.

The following plot shows the TM bandwidth allocation and occupation during the reporting period:

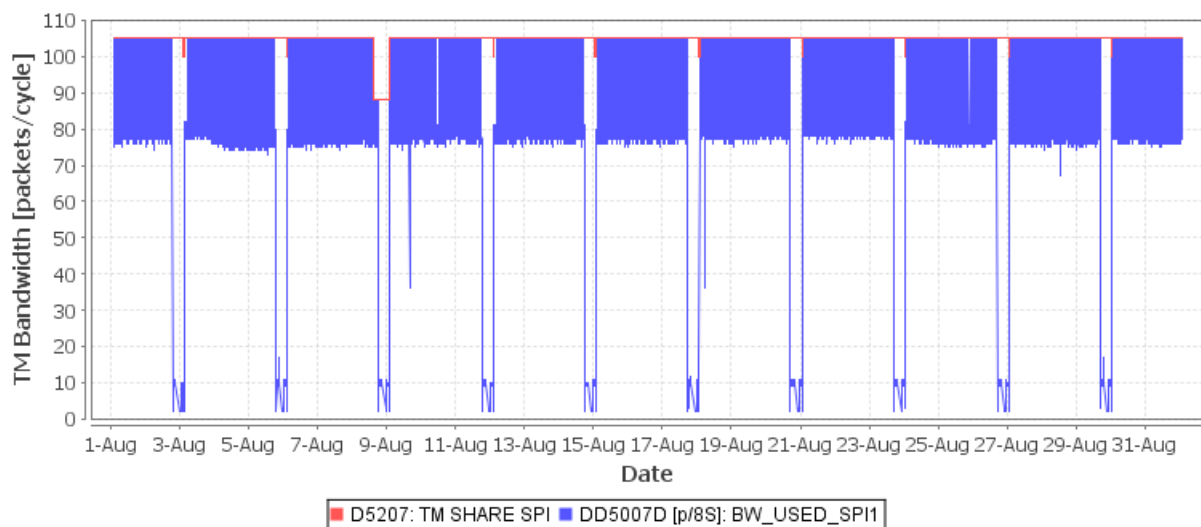


Figure 1: SPI TM bandwidth utilisation

The following plot shows the DPE CPU load during the reporting period:

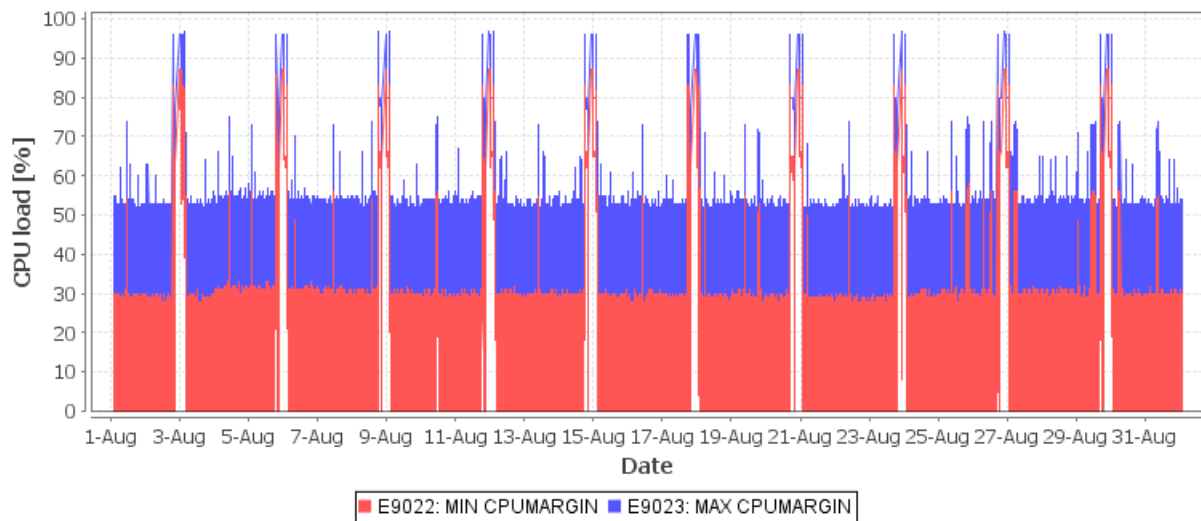


Figure 2: SPI IASW Performance

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

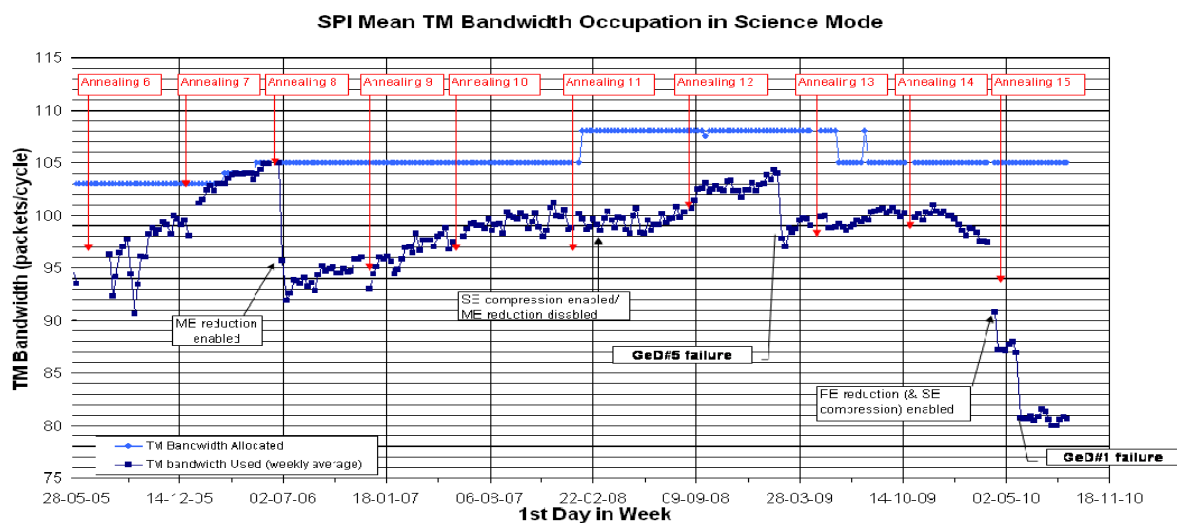


Figure 3: SPI TM bandwidth usage evolution since May 2005

Note: Some more information concerning the SPI operations is provided in Appendix 6.2.

2.2.2 IBIS

The overall status of IBIS is nominal.

An eclipse season began on 02/08/2010 and continued throughout the month. Eclipse activities for IBIS were nominal, other than one occurrence of a VETO crash during the post-eclipse VETO patch (reported in Event Log section below).

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: 131 packets/cycle, except from 2010-08-08T12:25:59Z until the end of revolution 954 (OMC Flat Field Calibration), when it was 90 packets/cycle
- IBIS mean bandwidth utilisation in science mode: 114.51 packets/cycle

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

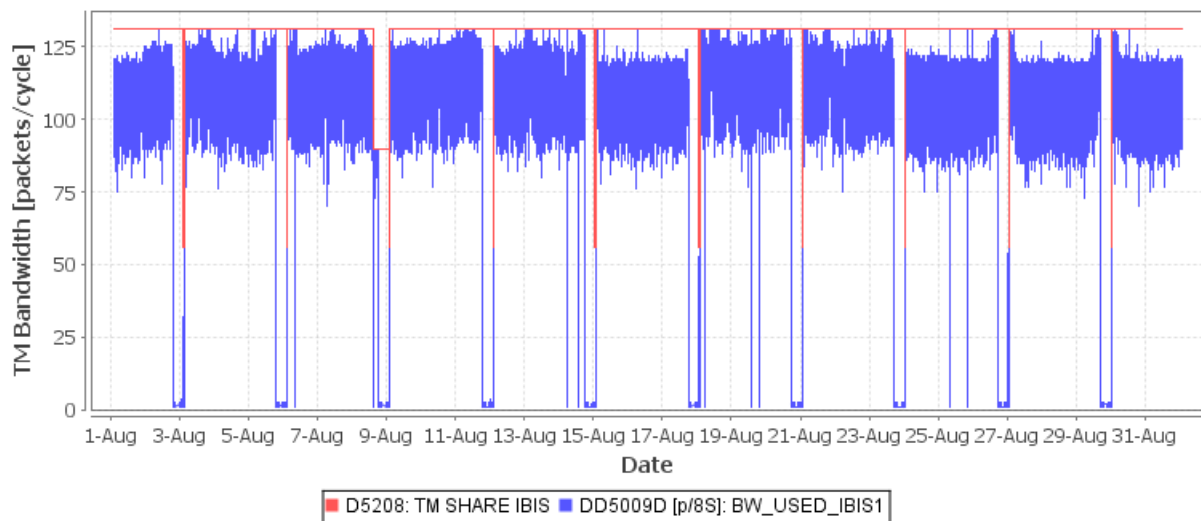


Figure 4: IBIS TM bandwidth utilisation

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

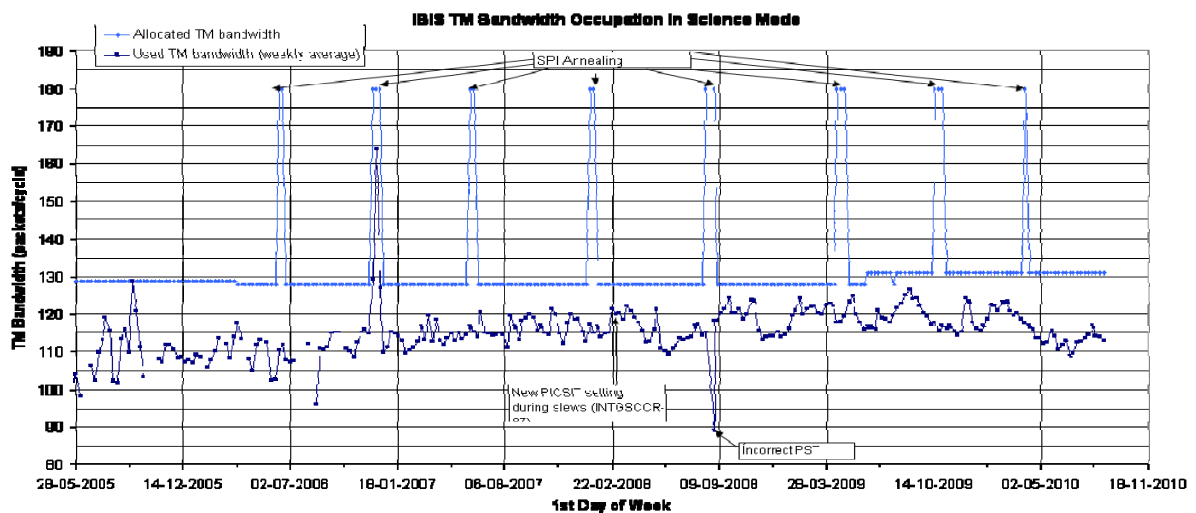


Figure 5: IBIS TM bandwidth usage evolution since May 2005

Note: Some 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-X2 was operated in Data Taking mode with a TM allocation of 8 packets/cycle.
- JEM-X1 was dormant (DPE OFF) with no TM slots allocated.

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 2010-08-08T12:25:59Z to 2010-08-08T16:36:42Z (Rev 954) during the Flat-field calibration, when it was 63 packets/cycle.

During this reporting period, 732 of the 736 planned science pointings were executed nominally, 2 pointings were lost to FD maintenance, 1 pointing was lost due to hit on the line with Redu, and another shortened after the OMC commands were re-uplinked manually. In addition 1 Flat-field calibration was performed this month.

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

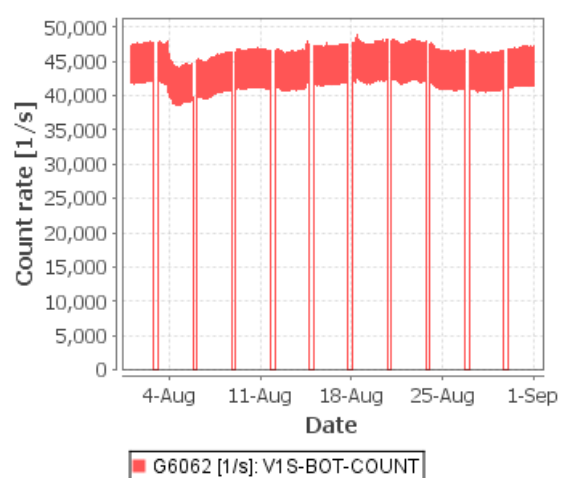
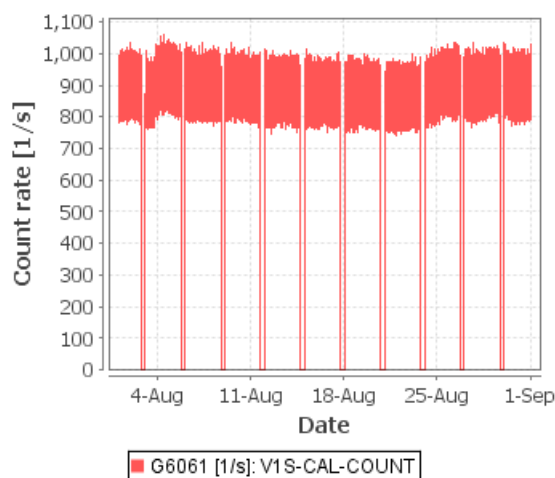
2.2.5 IREM

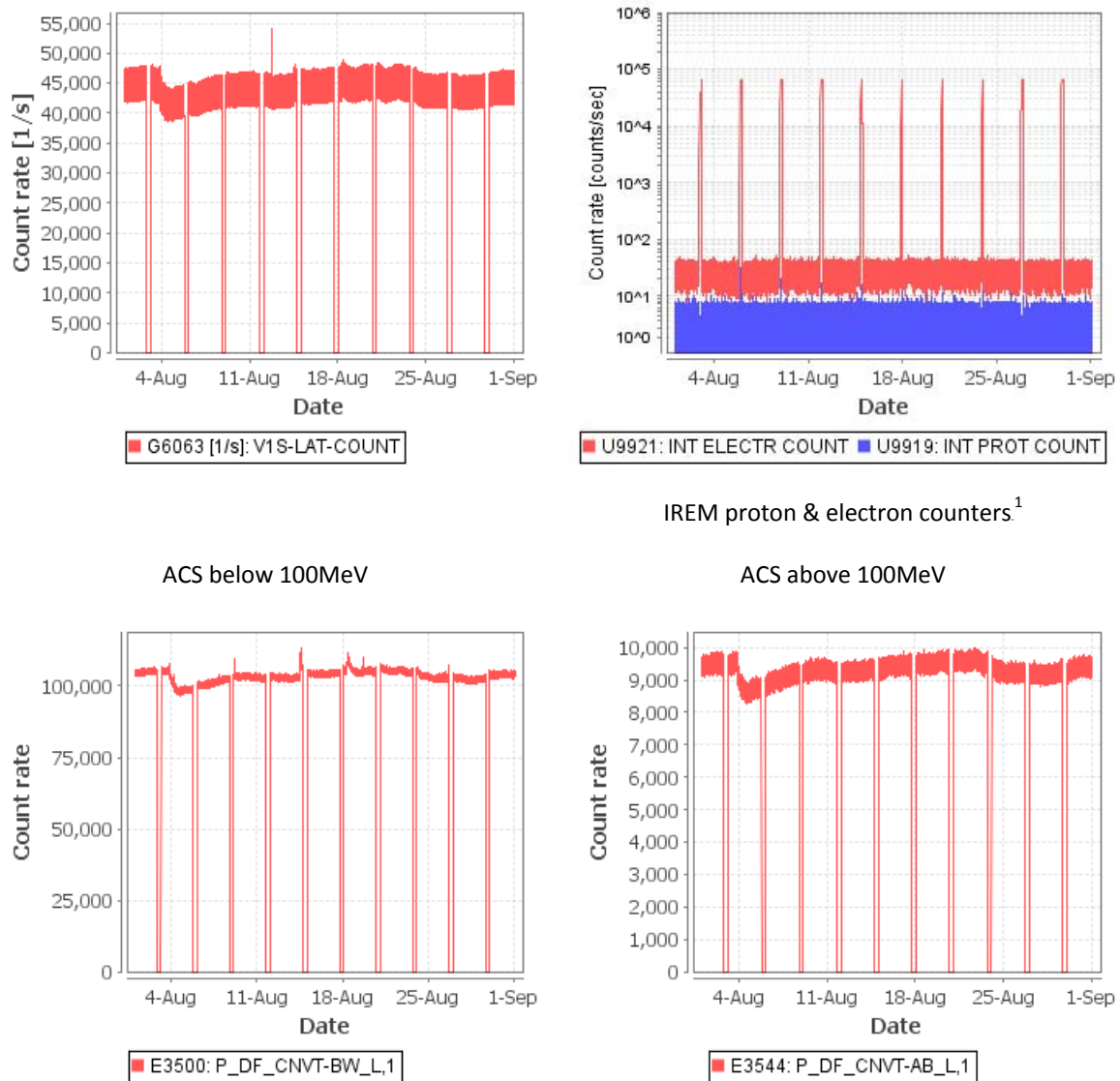
The status of IREM is nominal.

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:



IREM proton & electron counters¹

ACS below 100MeV

ACS above 100MeV

Figure 6: Instrument Count Rates

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

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

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

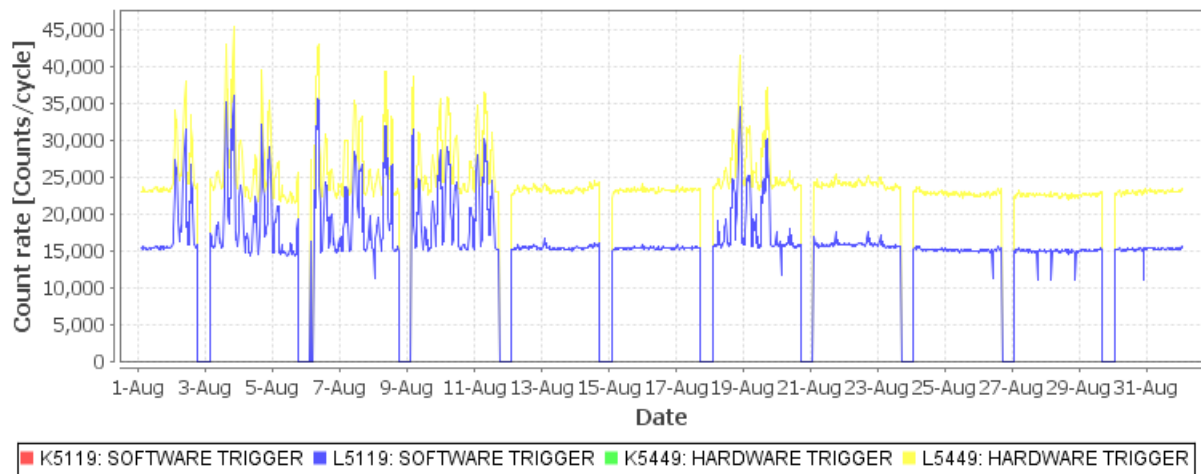
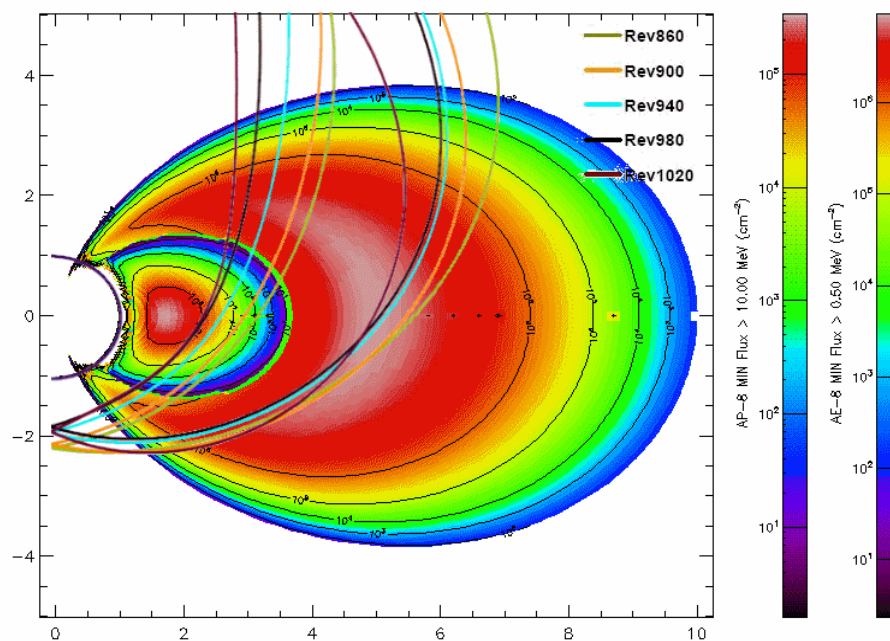


Figure 7: JEM-X Count rates. The smaller downward spikes in the figure are due to the slews of the spacecraft

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.



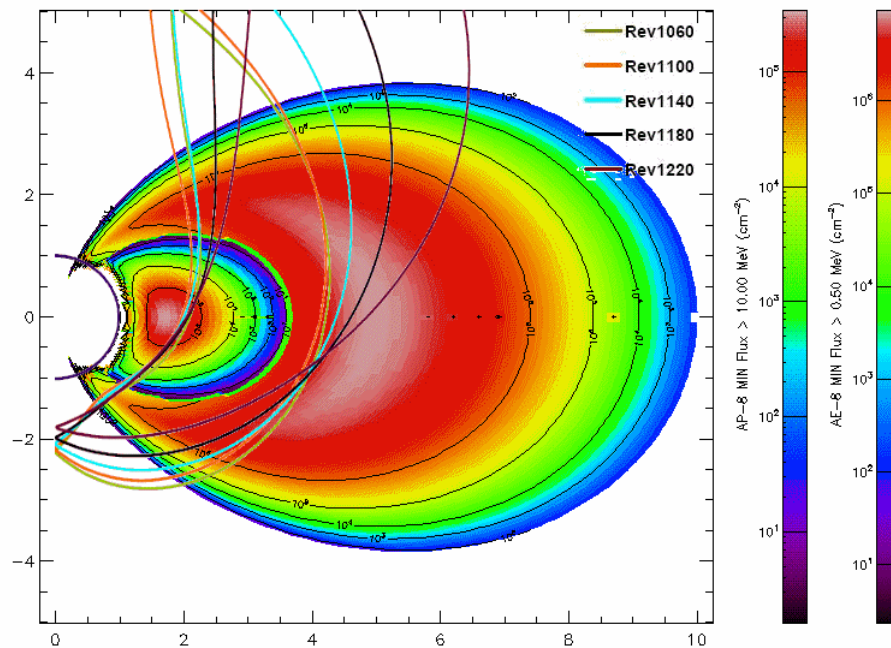


Figure 8: The predicted evolution of the orbit of Integral through the radiation belts

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.

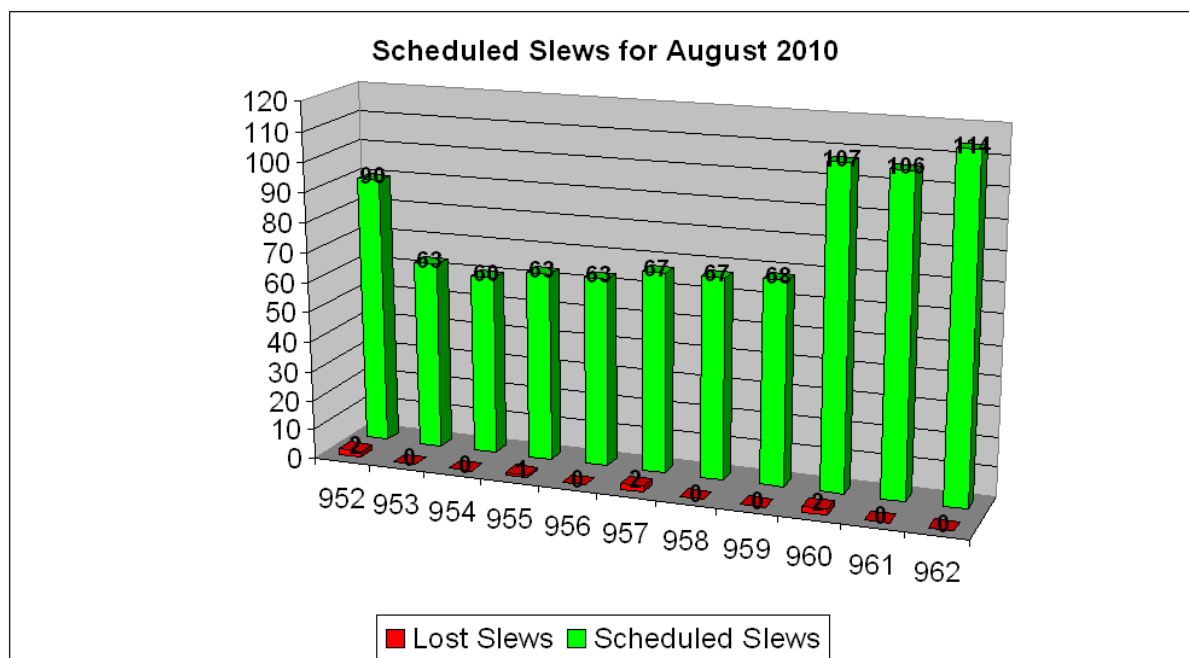


Figure 9: The number of slews scheduled compared to the number of slews lost

3.1 Mission Control System

This month the HFA_TM task was restarted six times on iddb (due to MUST retrievals). The OMCH task (DOY 229), the Limit checker (DOY238), and the CMDmultiplexer (DOY241) had to be restarted once this month.

Due to problems with the dataflow to ISDC this month, the ISDS and the IFRD were restrated numerous times on both isdsa and isdab. At beginning of week 36, operations were run from B-chain to ensure ISDC data flow. See anomaly report INT-3110 for more information.

On DOY226 the Manual Stack closed itself on SUN122 and SUN123.

The new software release 3.2.2 was installed on the A-chain on DOY221 and on the B-chain on DOY232.

3.2 Ground Stations and Network

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

REDU

There were several occasions of RFI reported (DOY216, DOY218 DOY221, DOY223, DOY227, DOY236 and DOY240). The drop in VC-0 & VC-7 on DOY214 and DOY216 were due to a hit on the line. The errors on the comm's line on DOY227 were the cause of the bad frames that were received. On DOY229 there was a data gap on VC-7 and on DOY242 bad frames were received.

DSS27

On DOY220 Network noticed a drop in VC-7. There was, however, no indication on MCS that it had

dropped out. On DOY224 Network requested a series of short Dataflow connections to DSN during commanding gap on NCTRS-A. On DOY243 the pass was delayed due to a late scheduling change and later that day there was a data gap on VC-0 and VC-7.

VIL2

On DOY 228 and DOY242 bad frames were received and on DOY243 there was a drop in VC-0 for a few seconds.

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.

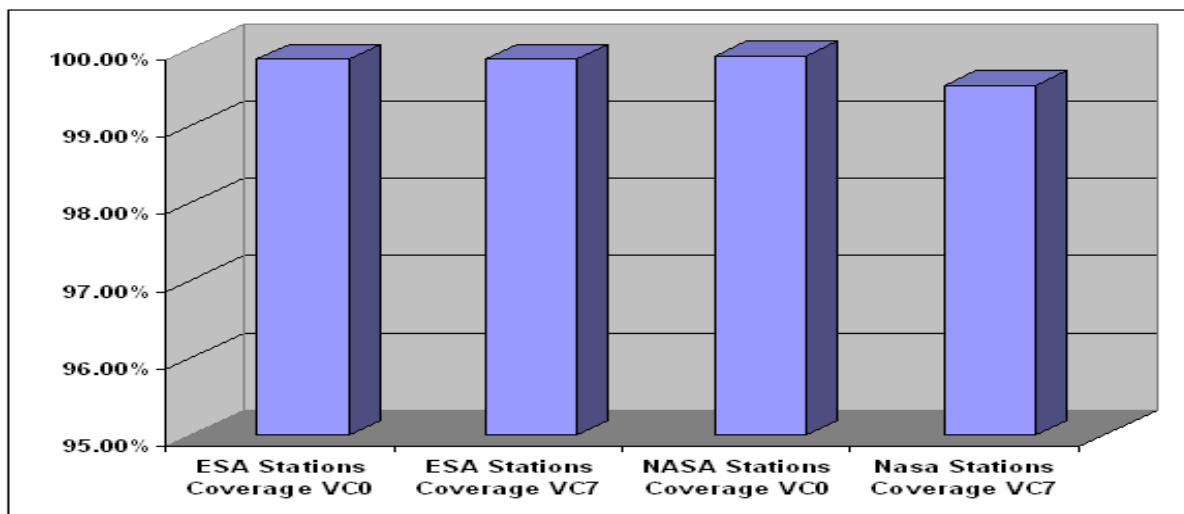


Figure 10: The usage of ESA ground stations compared to the usage of DSN ground stations

3.3 ISOC

3.3.1 Mission Planning

New PSFs have been received for revolutions 960 to 970, corresponding to the time range August 23 - September 25. New observations have been planned for revolutions 958 to 965, corresponding to the time range August 17 - September 10. Because of two long slews during eclipse season revolution 961 had to be replanned, by interrupting these slews with dummy pointings.

TSFs have been received for revolutions 954 to 963, corresponding to the time range August 6 - September 4.

3.3.2 Observation Status

New ECS files have been received for revolutions 938 to 948 corresponding to the time range June 19 - July 21.

3.3.3 ISOC Science Data Archive

The raw TM copied from MOC is complete until July 16.

3.3.4 ISOC System

New IODB (IODB_3.1_064_28_07_10) was installed. ISOC system v26.0 was released at the end of August. This release provides the Exposure Map Tool and the OMC FF calibration modes update, together with the AO-8 Data Rights phase release.

The AO-8 call for data right proposals to subscribe to accepted AO-8 observing proposals was issued on August 30.

3.3.5 Problems

No new problems.

4 Anomalies

Table 2 contains the anomalies that occurred in the reporting period:

Table 2: Anomalies reported

AR id	Date of occurrence	Subject	Segment	Status
INT-3108	08.08.2010	DSS27 - TM drop on VC-7 not noticed - no alarm (DOY 220)	NASA Station	Testing
INT-3109	16.08.2010	FD updateslew failure on DOY226	FDS	Pending
INT-3110	12.08.2010	IFRD - problems causing back-pressure (DOYs 223 & 227)	I/F to SGS	Testing
INT-3111	20.08.2010	Missing ED in EPOS.	FDS	Pending
INT-3112	26.08.2010	Impact of FDS maintenance in Timeline for revolution 960		Pending
INT-3113	26.08.2010	IMCS - BEHV limit checker died on imca after GS H/O (DOY 238)	IMCS	Closed
INT_SC-300	05.08.2010	JEM-X2 DFEE CRC Anomaly following eclipse on 2010-08-05	Payload	Pending

5 Special Events & Future Milestones

- The Perigee altitude is evolving rapidly, with the current altitude 4850km compared to a maximum of over 13000km in late 2006. A minimum value of about 2800km will be reached in 2011. This will lead to greatly increased exposure to Proton radiation.
- Further upgrades of the communications infrastructure to ISDC are planned, including new

routers, internet VPN backup and Out of Band Management.

- A refurbishment of the DCA is currently taking place, the move back is planned for September 2010.
- The next SPI Annealing will take place in October 2010.
- FSS / STR calibration is planned for October 2010.

6 Appendix

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

6.1 AOCS operations

During this period, 487 Open Loop Slews, 322 Closed Loop Slews and 26 Momentum Biases were executed (as reported by ACC OEM).

7 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 31/08/2010 is reported in the following plot:

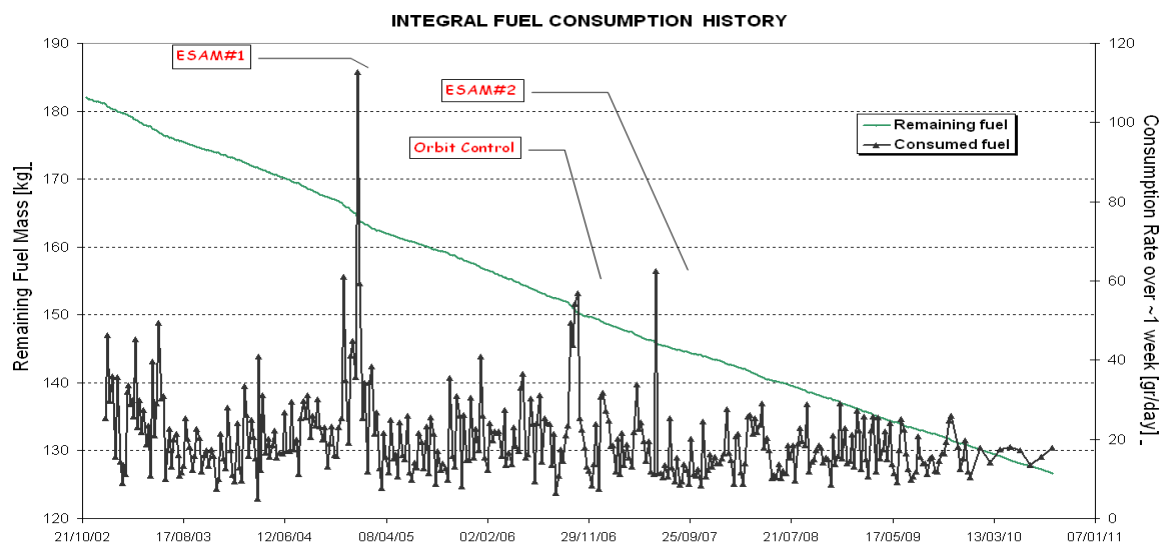


Figure 11: Fuel consumption. Note: ESAM fuel consumption is spread over period of ~1 week.

6.1.2 The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel as from December 2009 up to date are reported in the plot below. Historic data is not available at the moment, but present in the

archives. The evolution of the drift on yaw channel is under constant monitoring but the values are still well within the specs.

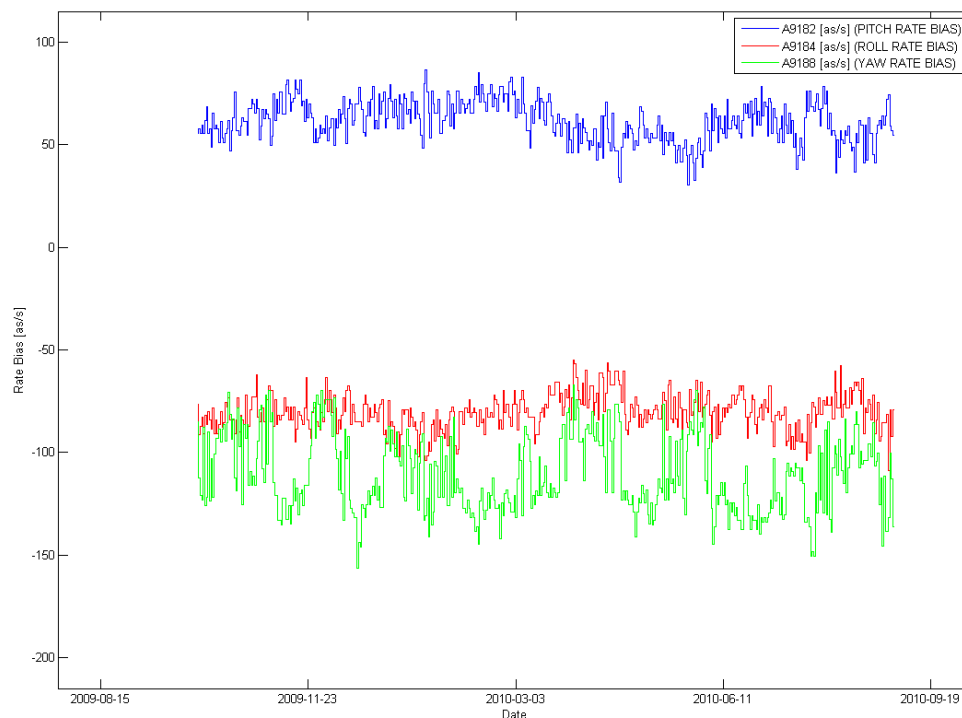


Figure 12: RMU pitch, roll and yaw. Historic data is available on request

6.1.3 Event log

04/08/2010 (Day of Year 216, Revolution 953)

As a consequence of Redu GS drop, the commanding release for slew 09530047 failed (23:59:43Z).

Once GS TC link was recovered, a manual slew was performed from attitude 09530046 to attitude 09530047.

After the manual slew was completed, the parameters for slew 09530048 were manually updated (spacontool).

Slew 09530047 was missed from the Timeline, and OTF was not reached for its pointing.

05/08/2010 (Day of Year 217, Revolution 953)

IMU1 switched ON after perigee exit (21:49:00Z), before the RWB. After the IMU switched back OFF, a mapping was commanded and a manual CGS was generated, in preparation for the RWB.

No impact on the Timeline.

10/08/2010 (Day of Year 222, Revolution 955)

FDS TPF update failed (attitude determination) for slew 09550033 (08:56:00Z). A manual mapping was commanded and a slew was manually generated from attitude 09550032 to attitude 09550033.

After the manual slew was completed, the parameters for slew 09550034 were manually updated (spacontool).

Slew 09550033 was missed from the Timeline.

OTF was not reached for PID 09550033.

11/08/2010 (Day of Year 223, Revolution 955)

IMU-1 switched on after perigee exit (21:28:52Z). After IMU-1 switched OFF, no recovery was applied and the Timeline was resumed.

No impact on the Timeline.

14/08/2010 (Day of Year 226, Revolution 957)

FDS TPF update failed for slew 09570001 (22:56:00Z). A manual mapping was commanded and a slew was manually generated from perigee passage attitude to attitude 09570001.

Then another mapping was commanded and a manual slew generated from attitude 09570001 to attitude 09570002 (DOY227, 00:31:00Z).

After the manual slew was completed, the parameters for slew 09570003 were manually updated (spacontool).

Slews 09570001 and 09570002 were missed from the Timeline.

OTF was not reached for PID 09570001 and 09570002.

15/08/2010 (Day of Year 227, Revolution 956 to 957)

FDS TPF update failed for slew 09570004 (01:07:00Z). A manual mapping was commanded and the parameters for slew 09570004 were manually updated (spacontool).

No impact on the Timeline.

FDS TPF update failed for slew 09570005 (02:10:00Z). A manual mapping was commanded and the parameters for slew 09570005 were manually updated (spacontool).

No impact on the Timeline.

21/08/2010 (Day of Year 233, Revolution 958)

IMU1 switched ON during the stable pointing of PID 09580024 (17:46:00Z). After the IMU switched back OFF, a manual mapping was commanded and the parameters for slew 09580025 were manually updated (spacontool).

OTF was not reached for PID 09580025.

25/08/2010 (Day of Year 237, Revolution 960)

FDS TPF update failed for slews 09600077 (16:56:00Z), 09600078 (17:50:00Z) and 09600079 (18:35:00Z) due to a FDS maintenance. The AOCS was suspended in the Timeline until problem cured. Then a manual mapping was commanded and a slew was manually generated from attitude 09600076 to attitude 09600079.

After the manual slew was completed, the parameters for slew 09600080 were manually updated (spacontool).

Slews 09600077, 09600078 and 09600079 were missed from the Timeline.

OTF was not reached for PIDs 09600077, 09600078 and 09600079.

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.

The stroke of all four compressors was set to 40 until 2010-08-15 at 11:42Z, when they were increased to 41 on all four compressors as the Cold Plate temperature had reached 80.9K.

The following plot shows the evolution of the cold plate and H bus temperature during the reporting period. The downward spikes should be disregarded as they are due to missing data during the time the AFEE is off due to eclipse:

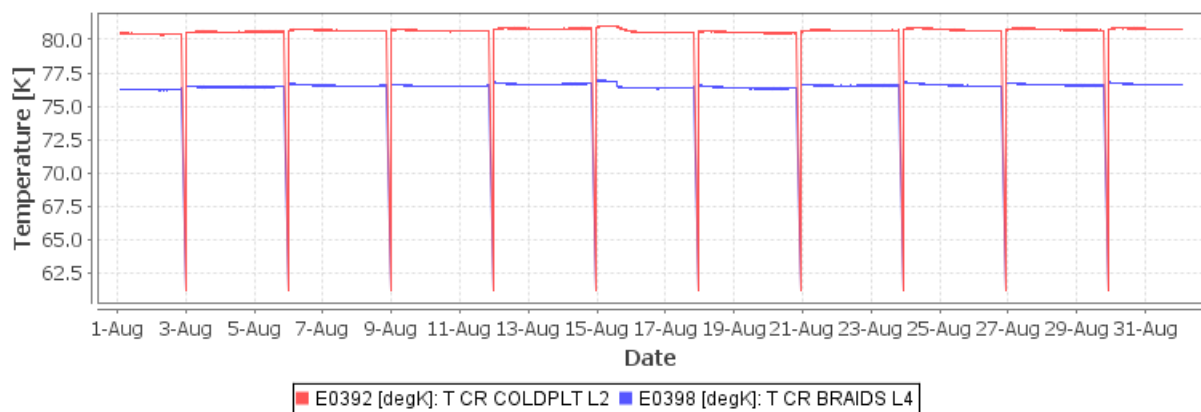


Figure 13: SPI Cold plate and H-bus temperature

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

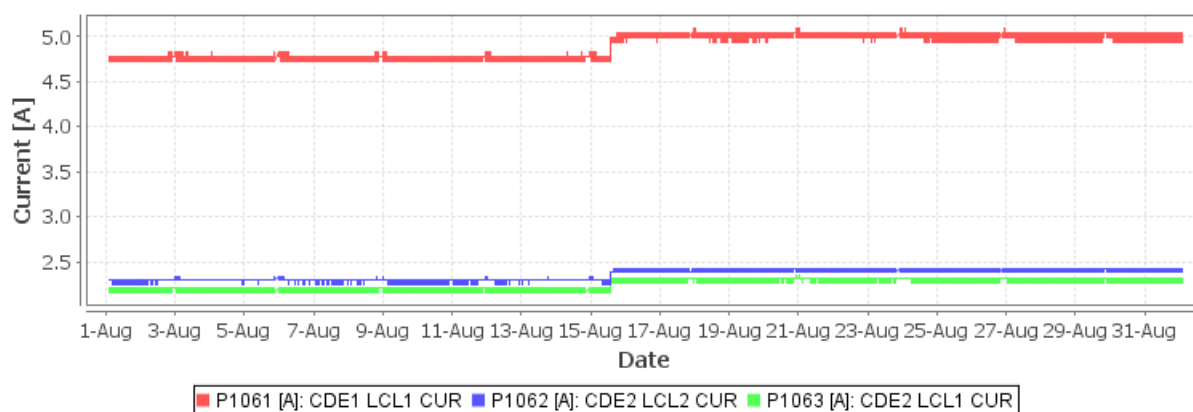


Figure 14: SPI CDE LCL current

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. 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). 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. The following plot shows the AFEE DC output voltages over the reporting period. GeD#8 DC output voltage is still higher than the others but remains stable.

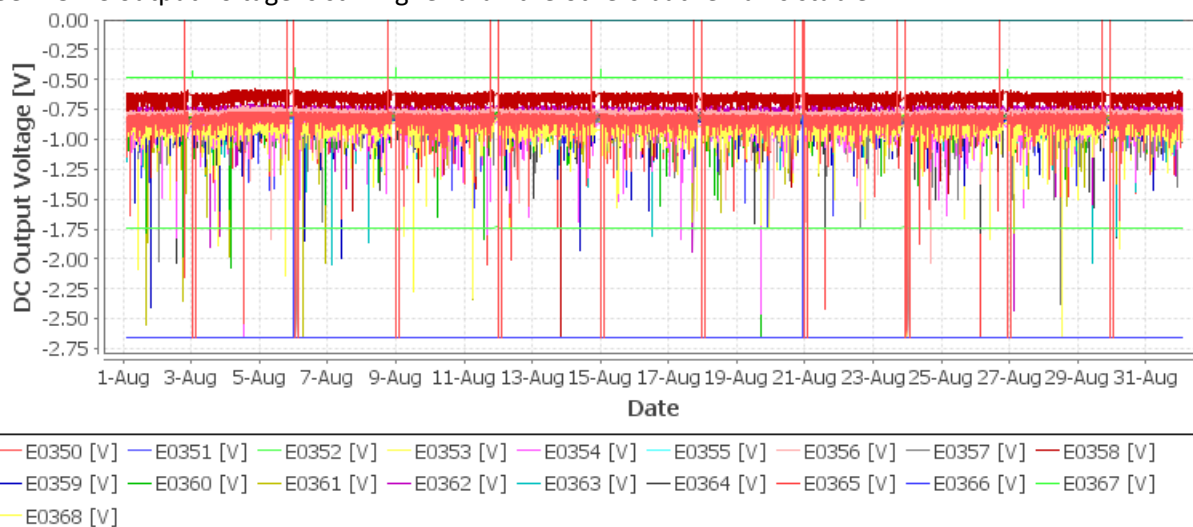


Figure 15: AFEE DC Output Voltages. Note that the data is sampled every 8th packet (64sec)

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.



Figure 16: SPI GeD Non-Vetoed count rates. Note that the scale used for plotting is logarithmic

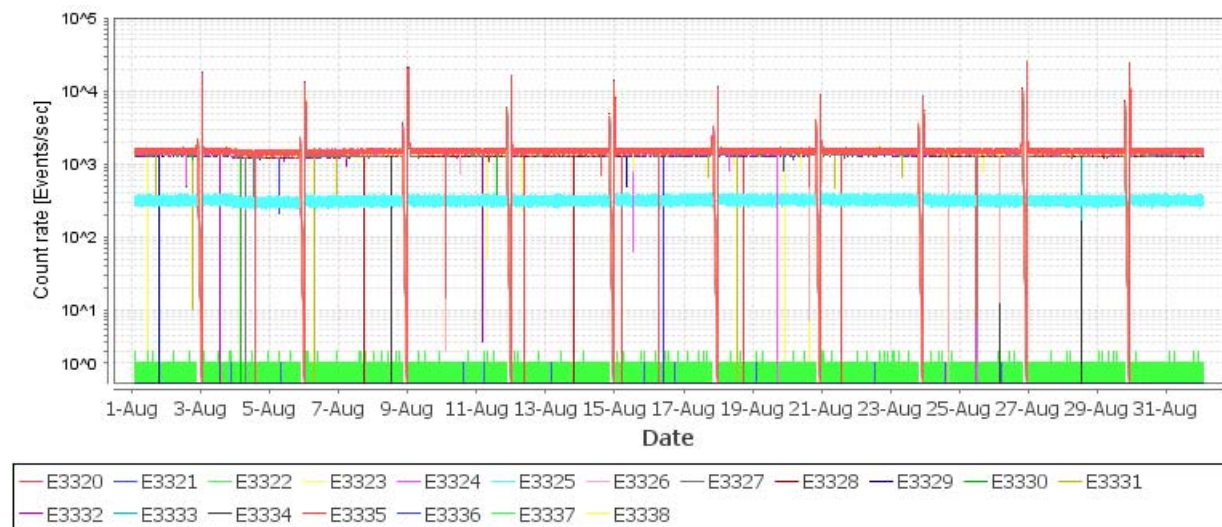


Figure 17: SPI GeD Time tag count rates

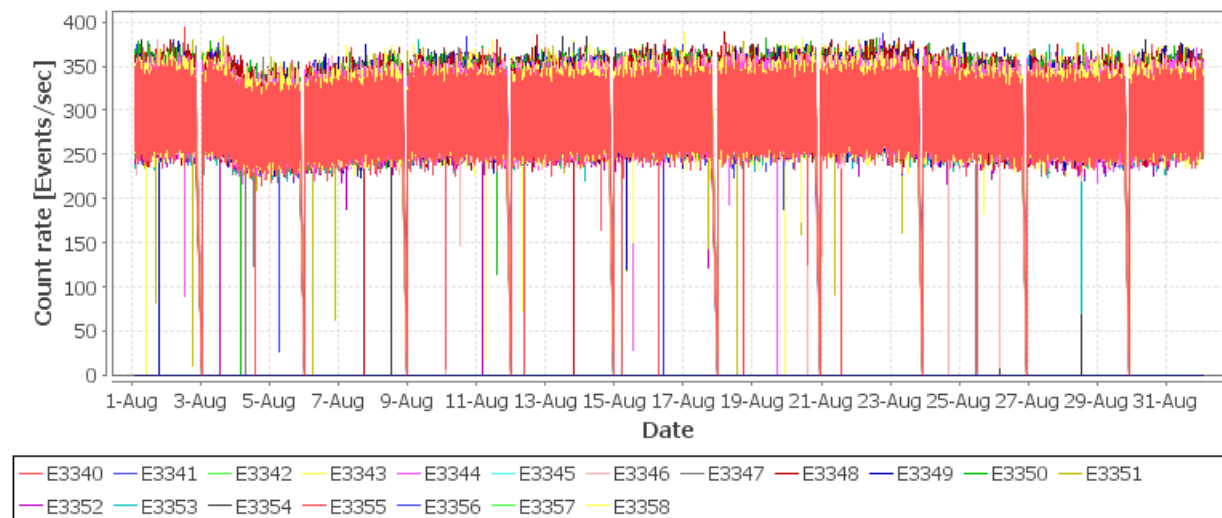


Figure 18: SPI GeD Time tag saturated count rates

PSD

The health of the PSD is nominal. The following plot shows the PSD channel rates over the reporting period:



Figure 19: SPI PSD GeD Channel Rates

6.2.2 Event Log

02-08-2010 to 03-08-2010 (Day of Year 214-215, Revolution 952-953)

Due to a problem with timing of commands in the sequences EENTRY03 and EEXIT-03 for the configuration of SPI before and after eclipse, some commands of these EDs failed release due to interlock as follows:

- The last TC of EENTRY03 (TC E0501) failed release at 2010.214.17.04.01Z.
- TC EU0252D of EEXIT-03 failed release at 2010.215.00.51.08Z.

In both cases the ED was re-uplinked manually as per the recovery guidelines, in the case of EEXIT-03 with command interlock disabled. However, to avoid this problem for the remainder of the eclipse season, saved stacks were created for these sequences with the relevant command timing increased. An Operational Instruction is in place such that these sequences are sent manually for the remainder of the eclipse season (Timeline commanding disabled for these EDs). These EDs will be updated in the next database release.

05-08-2010 (Day of Year 217, Revolution 953-954)

At 2010.217.16.54.36Z TC EU0523D of ED EENTRY03 for SPI configuration pre-eclipse was unverified, causing the next command of the ED to fail release. This command and the remaining TCs of the ED were then sent successfully starting at 2010.217.17.00.26Z. However, the entire ED was also then resent starting at 2010.217.17.20.47Z to ensure the correct configuration of SPI.

12-08-2010 (Day of Year 224, Revolution 956)

As the incorrect command stack was loaded for the sequence EEXIT-03 following radiation belt exit of revolution 956 (the sequence from the database was loaded instead of the saved command stack), the TC EU0253D at 2010.224.00.12.00Z failed release due to command interlock. The sequence was resent at starting 2010.224.00.23.33Z and completed at 2010.224.00.30.36Z.

25-08-2010 (Day of Year 237, Revolution 960)

At 07.34.50Z TM parameter E3122 (ACS FEE analogue status -5 V #51) went OOL with value = PARAM < SPEC. It returned within limits of its own accord at 07.45.30Z and no action was taken.

28-08-2010 (Day of Year 240, Revolution 961)

At 10.14.51Z TM parameter E2310 (ACS FEE analogue status 5 V #60) went OOL with value = PARAM > SPEC. TC sequence ES1831 was sent at 10.26.29Z to report the ACS HK data and the parameter returned within limits.

6.3 IBIS

6.3.1 Operations

ISGRI

The health and performance of ISGRI was nominal during the reporting period, although MCE5 displayed occasional spikes in the count rate. These spikes did not last long enough to trigger an Out of Limit alarm, however they can be seen from the following plot showing the ISGRI MCE counters during the reporting period:

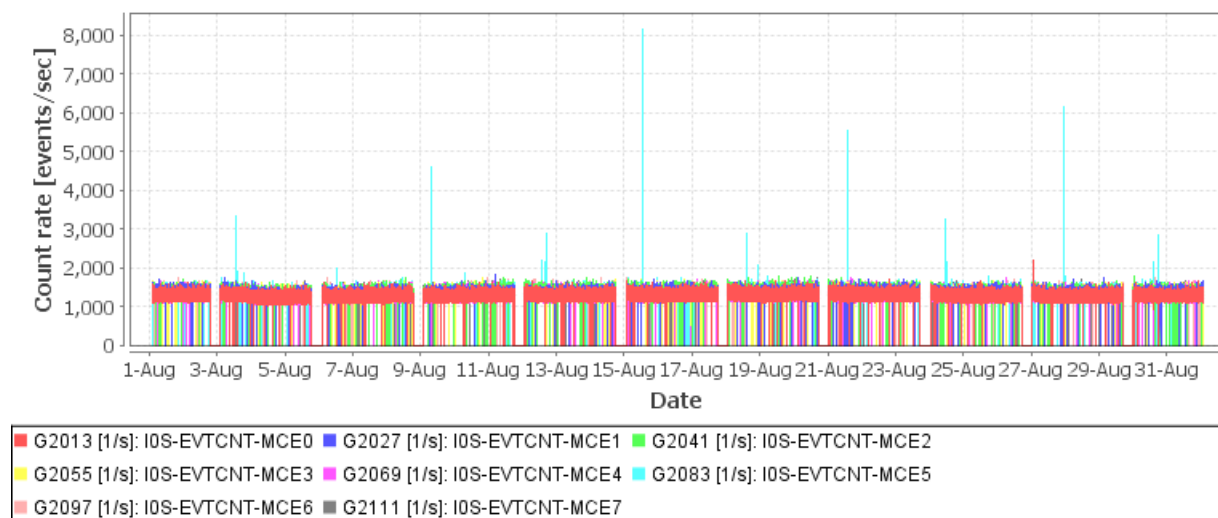


Figure 20: ISGRI MCE Counters

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 21: 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

- TM parameter G2070 went OOL several times during the reporting period, indicating an overflow of the noisy pixel address buffer in MCE5. As in each instance it returned within limits of its own accord after a few TM cycles, no action was taken. However this is probably

associated to the spikes in the MCE5 count rate (see above), which seem to be becoming more frequent.

08-08-2010 (Day of Year 220, Revolution 954-955)

During the uplink of the ED GEVESPO1 for the VETO SW patch post eclipse, the TC GU0613 uplinked at 2010.220.22.24.26Z failed completion. In addition the following OEMs were received at 2010.220.22.24.31Z:

- One occurrence of OEM APID 1280 ID 134 TC REJECT IBIS1 IASW EXTERNAL TC REJECTED COULD NOT BE EXECUTED
- Three occurrences of OEM APID 1280 ID 129 ANOMALY IBIS1 IASW TIME-OUT TRANSMITTING LSL DATA (NO ANSWER FROM CSSW)

Also at this time TM parameters G8012 (S1E-A4 BI V) and G6030 (V1s-CDMO2STAT) failed Status Consistency Check with value = ON.

This indicates that a VETO reset occurred during the uplink of the patch, which is a known anomaly (see INT_SC-130). Following the specified recovery actions for this anomaly, the following was then performed:

- 2010.220.22.40.38Z FCP_IBIS1_0332 IBIS VEB-A Deactivation
- 2010.220.22.56.26Z FCP_IBIS1_0111 VETO VEB Activation
- 2010.220.23.08.06Z FCP_IBIS1_0199 IBIS: VETO Restore CTX
- 2010.220.23.11.16Z GEVESPO1 ED re-uplinked

The recovery was completed by 2010.220.23.17.00Z and IBIS operations continued nominally. This did not delay the activation of IBIS for science.

14-08-2010 (Day of Year 226, Revolution 956-957)

Following a ground station handover, at 03:00Z TM parameter X7500 went OOL indicating a problem with the histogram process. The following recovery procedure was then executed to force the histogram accumulation and download process to resume:

- 2010.226.03.38.39Z FCP_IBIS1_0312
- 2010.226.03.44.47Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

Again, following a ground station handover, at 11:07Z TM parameter X7500 went OOL, indicating a problem with the histogram process. The following recovery procedure was then executed to force the histogram accumulation and download process to resume:

- 2010.226.11.21.09Z FCP_IBIS1_0312
- 2010.226.11.24.11Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

19-08-2010 (Day of Year 231, Revolution 958)

Following a ground station handover, at 11:26Z TM parameter X7500 went OOL, indicating a problem with the histogram process. The following recovery procedure was then executed to force the histogram accumulation and download process to resume:

- 2010.231.11.38.31Z FCP_IBIS1_0312
- 2010.231.11.40.14Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

25-08-2010 (Day of Year 237, Revolution 960)

Following a ground station handover, at 06:05Z TM parameter X7500 went OOL, indicating a problem with the histogram process. The following recovery procedure was then executed to force the histogram accumulation and download process to resume:

- 2010.237.06.13.15Z FCP_IBIS1_0312
- 2010.237.06.19.10Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

Again, following a ground station handover, at 17:47Z TM parameter X7500 went OOL, indicating a problem with the histogram process. The following recovery procedure was then executed to force the histogram accumulation and download process to resume:

- 2010.237.18.11.36Z FCP_IBIS1_0312
- 2010.237.18.12.57Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

6.4 JEM-X**6.4.1 Operations**

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

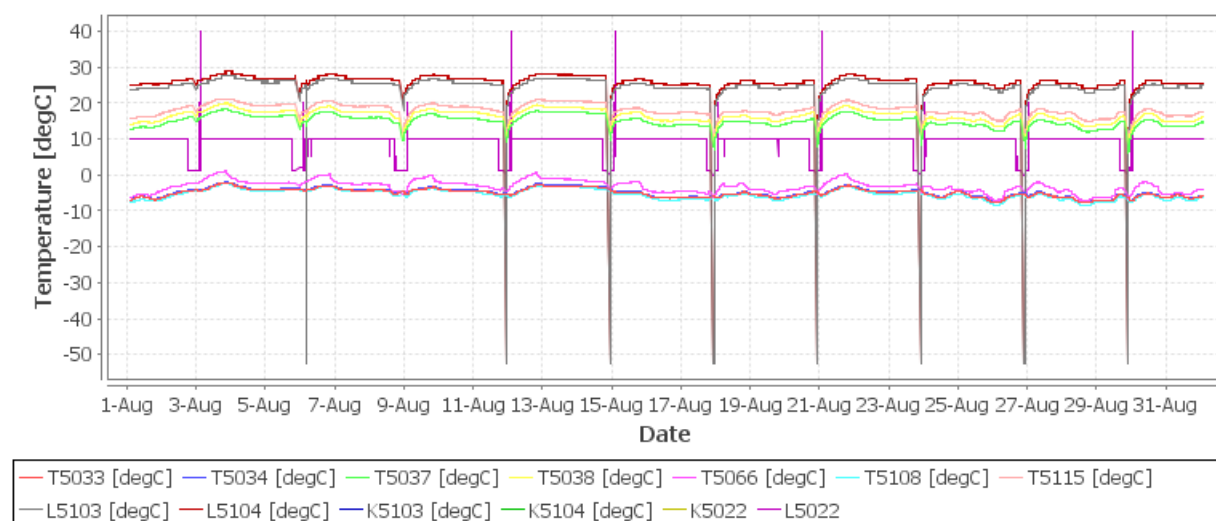


Figure 22: JEMX Detector and DFEE Temperatures

6.4.2 Event Log**03-08-2010 (Day of Year 215, Revolution 953)**

Between 17:00 and 21:00, there were repeated instances of parameters L5119 & L5449 exceeding limits. These were then modified (see below) alleviating the problem.

06-08-2010 (Day of Year 215, Revolution 953)

At 01:03:00, during the AOS checks, it was noticed that a JEM-X2, DFEE anomaly had occurred:

The symptoms were as follows:

- 1) Following the execution of LECLXT01 ED, the JEM-X2 DFEE state (TM parameter L5022) remained MEMORY, instead of SAFE, and the Active Shutdown Level (TM parameter L5381) remained ECLIPSE instead of RAD. BELTS.
- 2) The DFEE CPU speed, TM parameter L5583 CPU MODE, remained at a value of 8 MHz WAIT (as at start-up) rather than the nominal value of 16MHz.

A DFEE power cycle was then performed according to CRPJEM25010 JEMX2 DFEE POWER CYCLE, consisting of:

- 01:06Z FCPJEM25010 JEMX2 DFEE power cycle
- 02:07Z FCPJEM20021 JEMX2 DFEE activation
- 02:10:28Z command L0030 (Load DPE to DFEE) terminates leaving the DFEE in MEMORY mode instead of the expected SAFE mode, which terminates the sequence.
- 02:27:31, command L0008 (DFEE to SAFE) manually sent, and the activation sequence was then successfully completed.
- 02:36Z FCPJEM21010 Configuration for science operations
- 03:04Z FCPJEM20044 JEMX2 to Data-Taking
- 03:06Z CCCF enabled

The above recovery proceeded nominally and JEM-X2 operations then continued from the Timeline.

During the month, the following modifications to limits were applied:

Parameter	Parameter Name	Limit	Value	
			From	To
L5119	SOFTWARE TRIGGER	Soft High	35000	50000
L5119	SOFTWARE TRIGGER	Hard High	39000	54000
L5449	HARDWARE TRIGGER	Soft High	30000	60000
L5449	HARDWARE TRIGGER	Hard High	50000	64000
K5119	SOFTWARE TRIGGER	Soft High	35000	50000
K5119	SOFTWARE TRIGGER	Hard High	39000	54000
K5449	HARDWARE TRIGGER	Soft High	30000	60000
K5449	HARDWARE TRIGGER	Hard High	50000	64000

K5101	DET PRESSURE 1	Soft Low	137000	125000
K5101	DET PRESSURE 1	Hard Low	120000	110000
K5102	DET PRESSURE 2	Soft Low	137000	125000
K5102	DET PRESSURE 2	Hard Low	120000	110000
L5101	DET PRESSURE 1	Soft Low	137000	125000
L5101	DET PRESSURE 1	Hard Low	120000	110000
L5102	DET PRESSURE 2	Soft Low	137000	125000
L5102	DET PRESSURE 2	Hard Low	120000	110000

This dramatically improved the number of out-of-limits observed, however parameter L5136 (BUFFER LOSS) still regularly exceeded soft limits, and occasionally hard limits.

Other Out of limits observed were L9134, L5315, L5317, but these were sporadic.

Additionally during the month, dumps were performed of the DPE between addresses 1E6D8 & 1E6DB inclusive & the DFEE CRCs after AOS, to verify their content following the post-eclipse switch-on. This was done on 14th, 17th, 20th, 23rd, 26th & 29th August. The results were always:

Start Address	Length of dump	CRC value	DPE Dump
B000	2000	F1B3	2A23 296A CBFF F1B3
B000	1000	F074	
C000	1000	CF9F	

6.5 OMC

6.5.1 Operations

The status and performance of OMC is nominal.

6.5.2 Event Log

04-08-2010 (Day of Year 216, Revolution 953)

At 23:59, a hit on the line to Redu caused a TM drop. A recovery was performed, and the timeline rejoined at 00:42. The impact was the loss of pointing 09530047. It was at this time that the following pair of commands were rejected:

```
2010.217.00.03.52.876  2010.217.00.03.59.417  1792  RealTime  131  TC REJECT  REJECTED
TC1                    0                    0    65535  PR    N    E    E
```

2010.217.00.03.59.001	2010.217.00.04.07.250	1792	RealTime	131	TC	REJECT	REJECTED
TC1		0	0	65535	PR	N	E

These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing.

06-08-2010 (Day of Year 218, Revolution 954)

At 05:58:00, after a JEM-X recovery, the CCCFs were enabled, and as a precaution, the OMC commands were re-sent. The impact was pointing 09540007 was shortened from a planned 3530 to 2944 seconds

25-08-2010 (Day of Year 237, Revolution 960)

Between 16:56:00 and 18:36:00, on-going FD maintenance caused an interruption of operations. The impact was the loss of pointing 09600077 and 09600078

6.6 IREM

6.6.1 Operations

Radiation belts entry and exit

The following plots show the Radiation Belt Entry (Figure 23, red line) and Exit times (Figure 24, blue line) obtained from the ISDC website, defined where the IREM TC3 (soft electrons) rate reads 600 counts. The blue line in Figure 23 and the magenta line in Figure 24 are the altitudes used by the MOC for planning purposes.

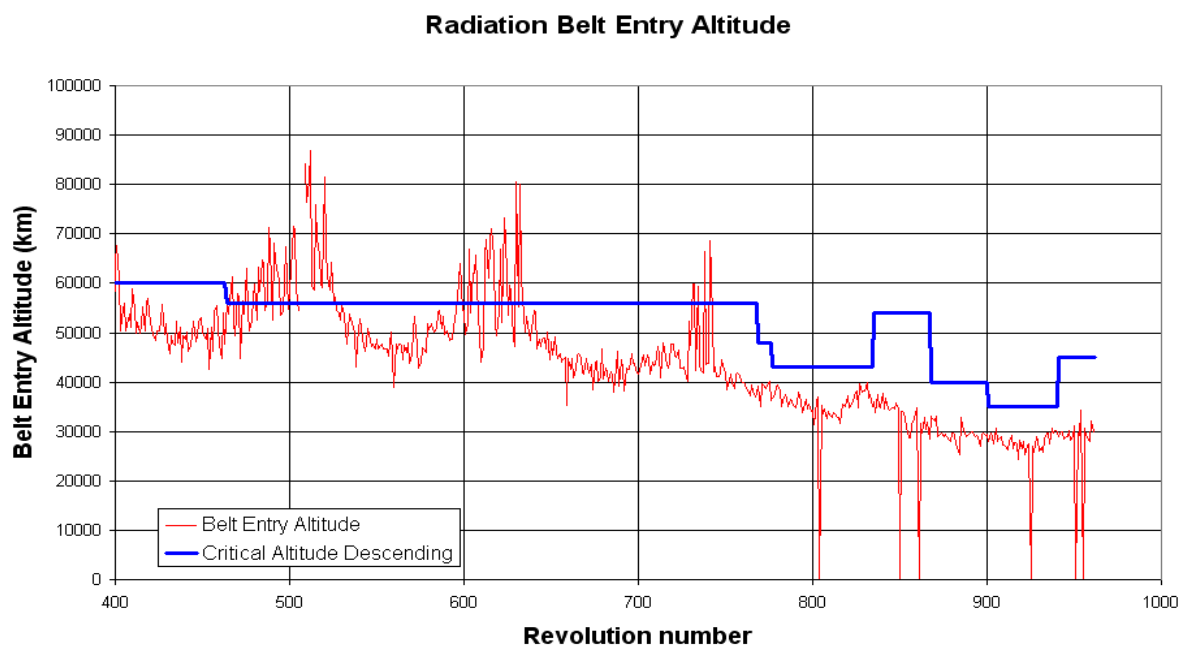
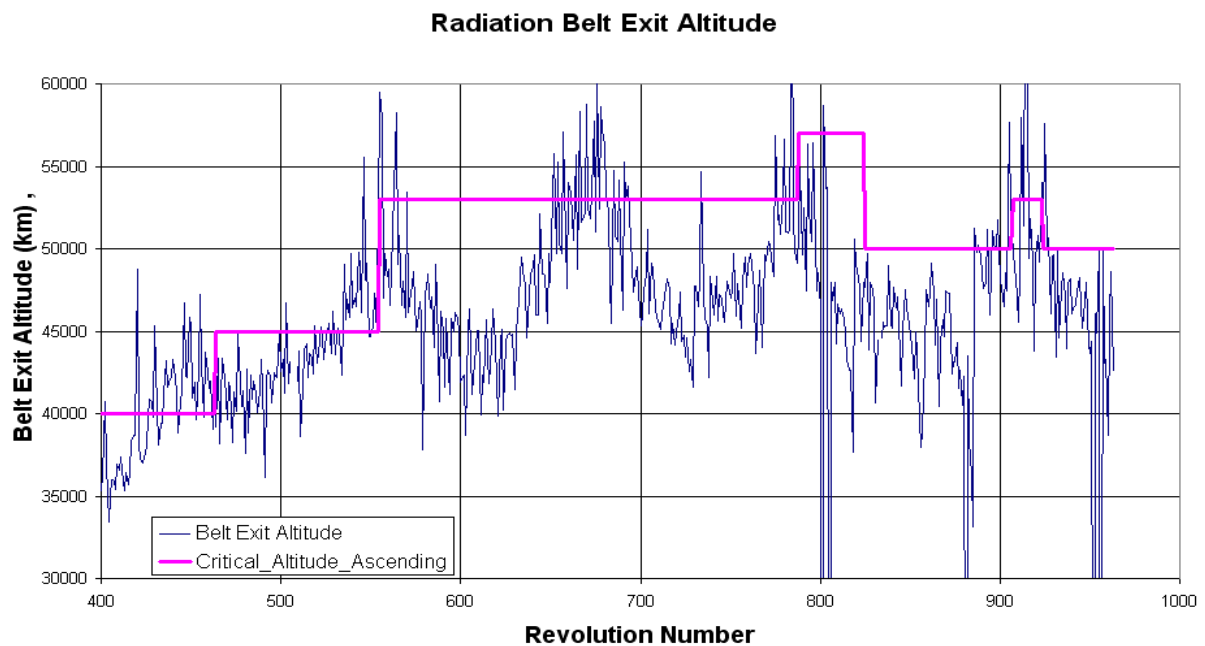


Figure 23: Radiation belt entry

**Figure 24: Radiation belt exit****Table 3: Radiation belts. Radiation belt entry crossings are ignored if there is a subsequent gap of at least 30 minutes of low radiation.**

Revo num.	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
952	RAD_ENTR R 2010-08-02T17:07:10Z	02/08/2010 18:57:56	23322.6	02-Aug-2010 19:08:52	21448.63	02-Aug-2010 19:58:52	10242.93
953	RAD_EXIT R 2010-08-03T00:41:18Z	02/08/2010 23:42:21	>37715.6	03-Aug-2010 00:18:52	46645.55	02-Aug-2010 20:28:52	5246.076
953	RAD_ENTR R 2010-08-05T16:53:29Z	05/08/2010 18:47:33	22553.3	05-Aug-2010 18:54:06	21799.28	05-Aug-2010 19:44:06	10609.07
954	RAD_EXIT R 2010-08-06T00:27:35Z	05/08/2010 23:19:49	37719.4	06-Aug-2010 00:04:06	46355.41	05-Aug-2010 20:14:06	5415.089
954	RAD_ENTR R 2010-08-08T16:37:50Z	08/08/2010 18:04:29	29293.9	08-Aug-2010 18:41:04	21399.51	08-Aug-2010 19:31:04	10260.18
955	RAD_EXIT R 2010-08-09T00:12:22Z	08/08/2010 23:36:05	>37689.3	08-Aug-2010 23:51:04	46585.14	08-Aug-2010 20:01:04	5345.767
955	RAD_ENTR R 2010-08-11T16:22:37Z	11/08/2010 18:06:21	24904.6	11-Aug-2010 18:24:52	21876.17	11-Aug-2010 19:14:52	10681.7

Revo num.	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
956	RAD_EXIT R 2010-08-11T23:56:44Z	11/08/2010 22:43:25	37717.7	11-Aug-2010 23:34:52	46307.05	11-Aug-2010 19:44:52	5440.96
956	RAD_ENTR R 2010-08-14T16:10:31Z	14/08/2010 17:54:05	25194.1	14-Aug-2010 18:13:34	21074.21	14-Aug-2010 19:03:34	9813.975
957	RAD_EXIT R 2010-08-14T23:43:49Z	14/08/2010 22:52:21	>37775.2	14-Aug-2010 23:23:34	47016.37	14-Aug-2010 19:33:34	5017.976
957	RAD_ENTR R 2010-08-17T15:59:20Z	17/08/2010 17:49:09	23496.3	17-Aug-2010 17:59:47	21645.28	17-Aug-2010 18:49:47	10377.76
958	RAD_EXIT R 2010-08-17T23:32:24Z	17/08/2010 22:12:45	35947.3	17-Aug-2010 23:09:47	46591.8	17-Aug-2010 19:19:47	5211.388
958	RAD_ENTR R 2010-08-20T15:46:57Z	20/08/2010 17:43:34	23062.8	20-Aug-2010 17:43:47	22422.11	20-Aug-2010 18:33:47	11208.78
959	RAD_EXIT R 2010-08-20T23:20:22Z	20/08/2010 22:03:42	37767.5	20-Aug-2010 23:03:47	47573.2	20-Aug-2010 19:13:47	4920.985
959	RAD_ENTR R 2010-08-23T15:32:56Z	23/08/2010 17:30:46	23520.9	23-Aug-2010 17:33:15	21884.66	23-Aug-2010 18:23:15	10695.06
960	RAD_EXIT R 2010-08-23T23:06:44Z	23/08/2010 21:29:18	34017.5	23-Aug-2010 22:53:15	47925.48	23-Aug-2010 19:03:15	4940.437
960	RAD_ENTR R 2010-08-26T15:18:03Z	26/08/2010 16:29:02	33104.0	26-Aug-2010 17:17:36	22295.54	26-Aug-2010 18:07:36	11086.31
961	RAD_EXIT R 2010-08-26T22:51:43Z	26/08/2010 21:49:18	37748.0	26-Aug-2010 22:37:36	47661.11	26-Aug-2010 18:47:36	4921.276
961	RAD_ENTR R 2010-08-29T15:04:04Z	29/08/2010 16:52:54	25057.3	29-Aug-2010 17:09:07	20967.11	29-Aug-2010 17:59:07	9692.295
962	RAD_EXIT R 2010-08-29T22:37:03Z	29/08/2010 21:51:02	>37796.6	29-Aug-2010 22:19:07	47125.08	29-Aug-2010 18:29:07	4960.002

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

Nothing to report