EUROPEAN SPACE AGENCY

DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT

MISSION OPERATIONS DEPARTMENT

INTEGRAL

Mission report

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

No. 398

01.07.2011

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 perfomed 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 1054 untill 1063 (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-INTEGRAL 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.

18 slews were missed from the Timeline.

The fuel consumption over the reporting period was 1.0311 Kg. The remaining propellant is in the order of 119.2023 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.

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 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+/-1K.

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 2011-06-24T04:21:17Z to 2011-06-24T09:38:29Z (OMC Flat Field Calibration), when it was 88 packets/cycle.

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

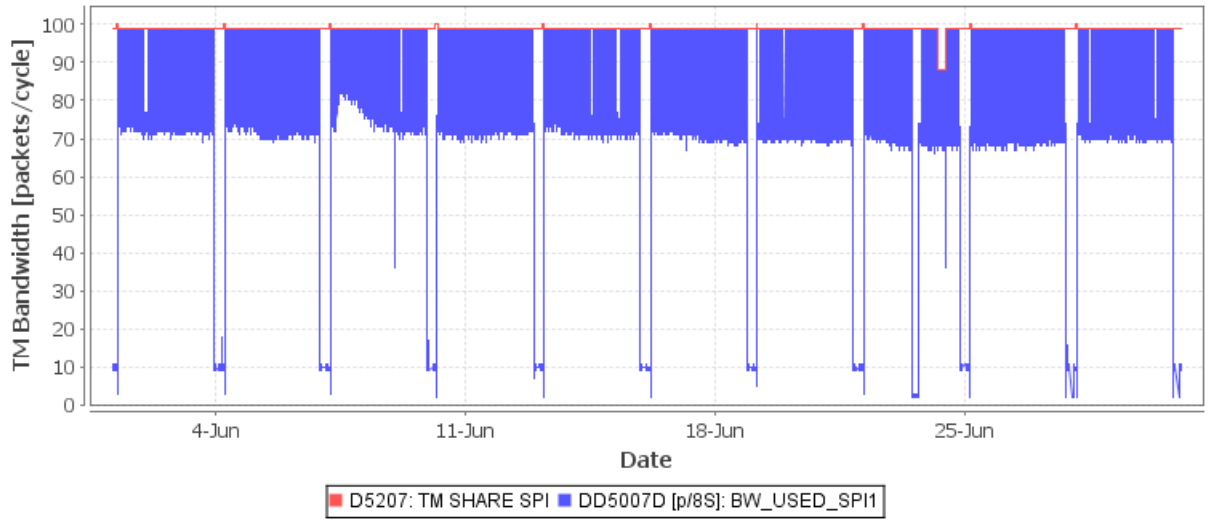


Figure 1: SPI TM bandwidth utilisation

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

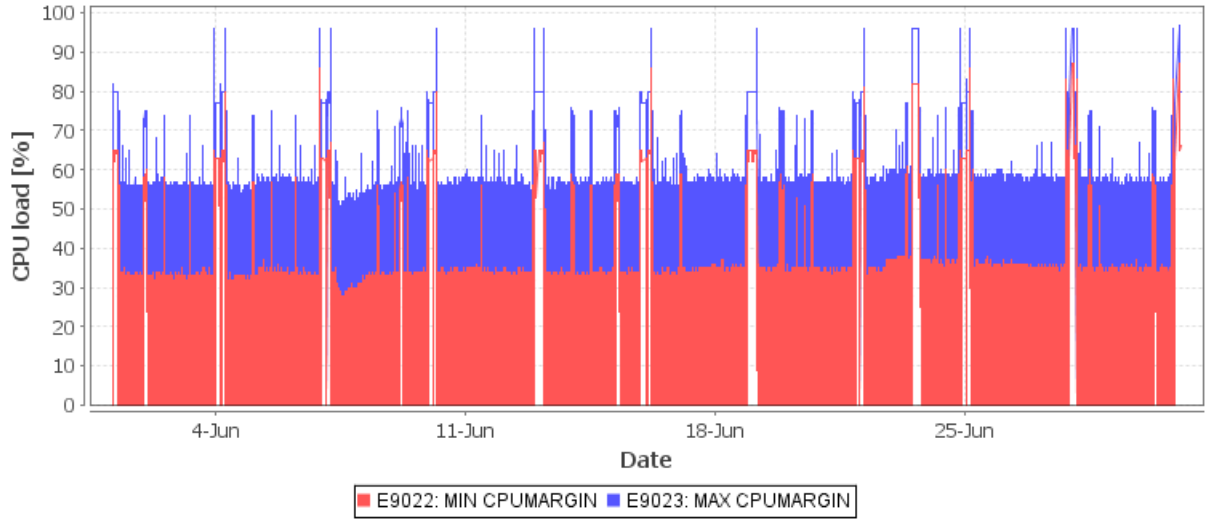


Figure 2: SPI IASW Performance

Note: Some 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 2011-06-24T04:21:17Z to 2011-06-24T09:38:29Z (OMC Flat Field Calibration), when it was 90 packets/cycle

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

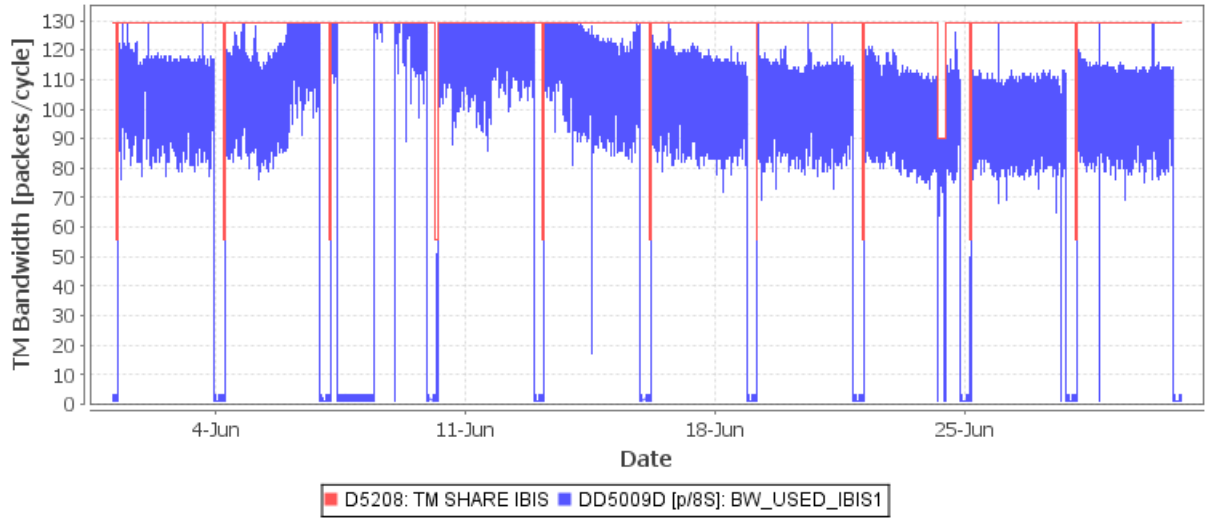


Figure 3: IBIS TM bandwidth utilisation

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:

- JEMX-1 & 2 were operated in Data Taking mode with a TM allocation of 8 packets/cycle each, except from 2011-06-24T04:21:17Z to 2011-06-24T09:38:29Z during the OMC Flat-field calibration, when it was 4 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 2011-06-24T04:21:17Z to 2011-06-24T09:38:29Z during the Flat-field calibration, when it was 63 packets/cycle.

During this reporting period, 618 of the 688 planned science pointings were executed nominally. 62 pointings were lost and 3 interrupted due to high radiation. 2 pointings were lost to imcs problems. 1 point was lost and another interrupted due to AOCS problems. Finally 1 pointing was cut short after the CCCFs were scheduled as part of a JEMX-1 recovery. One 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

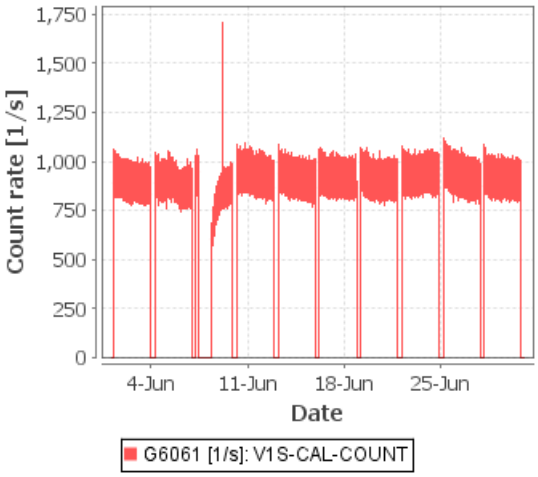
The status of IREM is nominal.

Note: Some more information concerning the IREM operations is provided in Appendix 0.

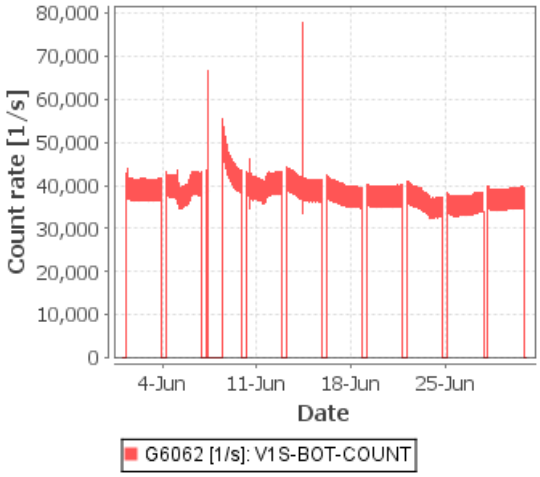
Radiation background

Apart from the 7th to 9th of the month, 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:

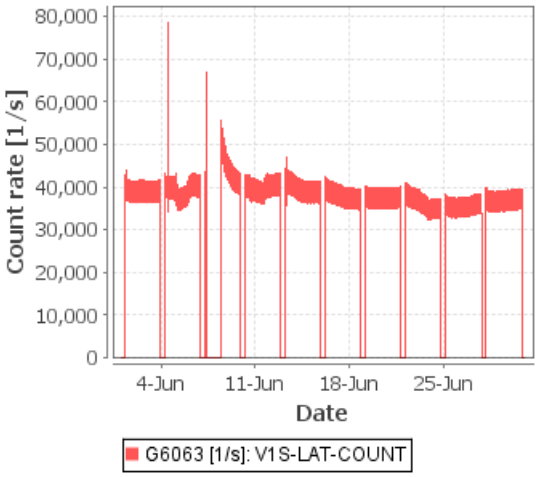
VETO Calibration Source Count Rate



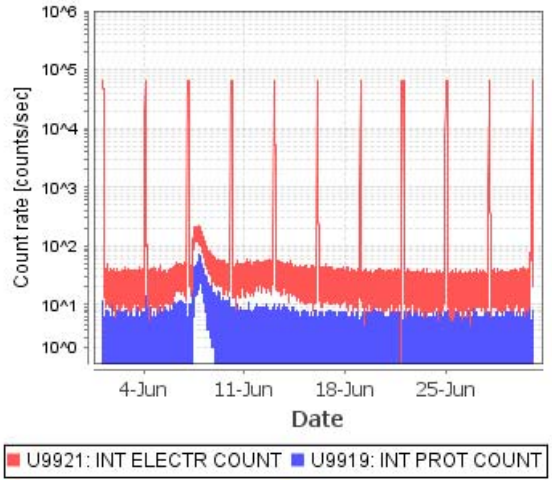
VETO Bottom Count Rate



VETO Lateral Count Rate



IREM Proton & Electron Counters[1]



ACS Below 100MeV

ACS Above 100MeV

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

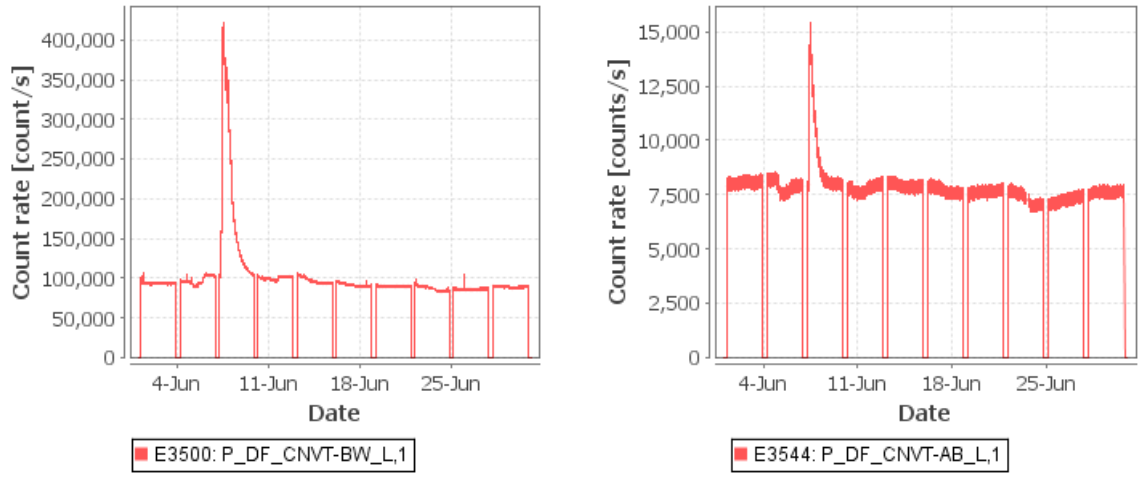


Figure 4: Instrument Count Rates

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

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

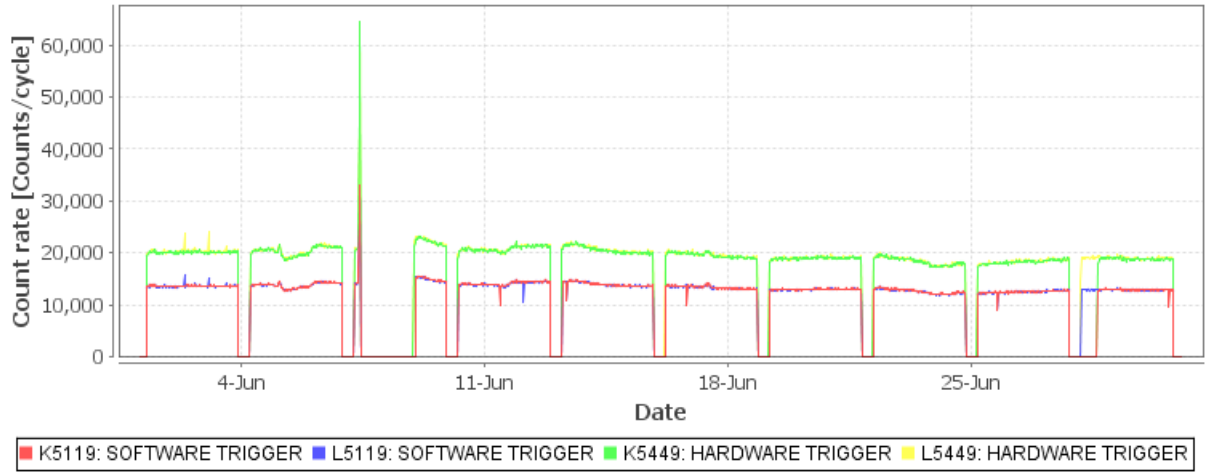


Figure 5: JEM-X Count rates. The smaller downward spikes in the figure are due to the slews of the spacecraft

Radiation Belts

Figure 6 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.

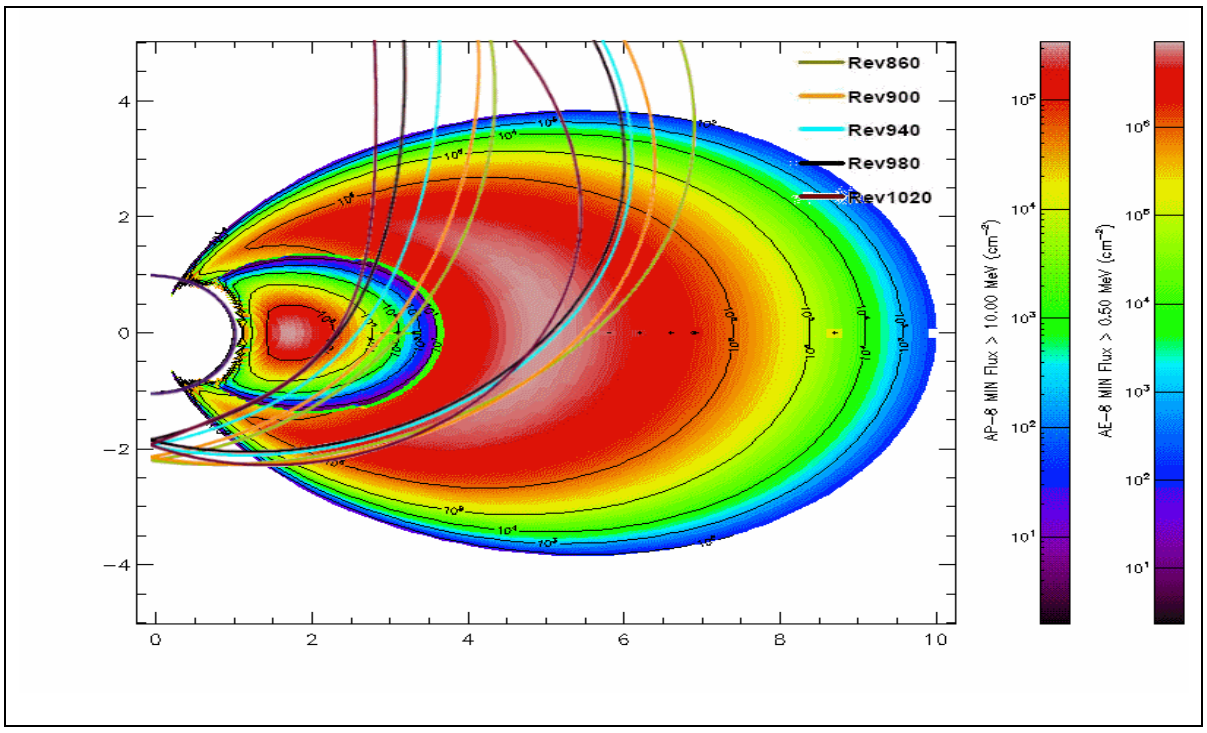


Figure 6: The predicted evolution of the orbit of Integral through the radiation belts

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.

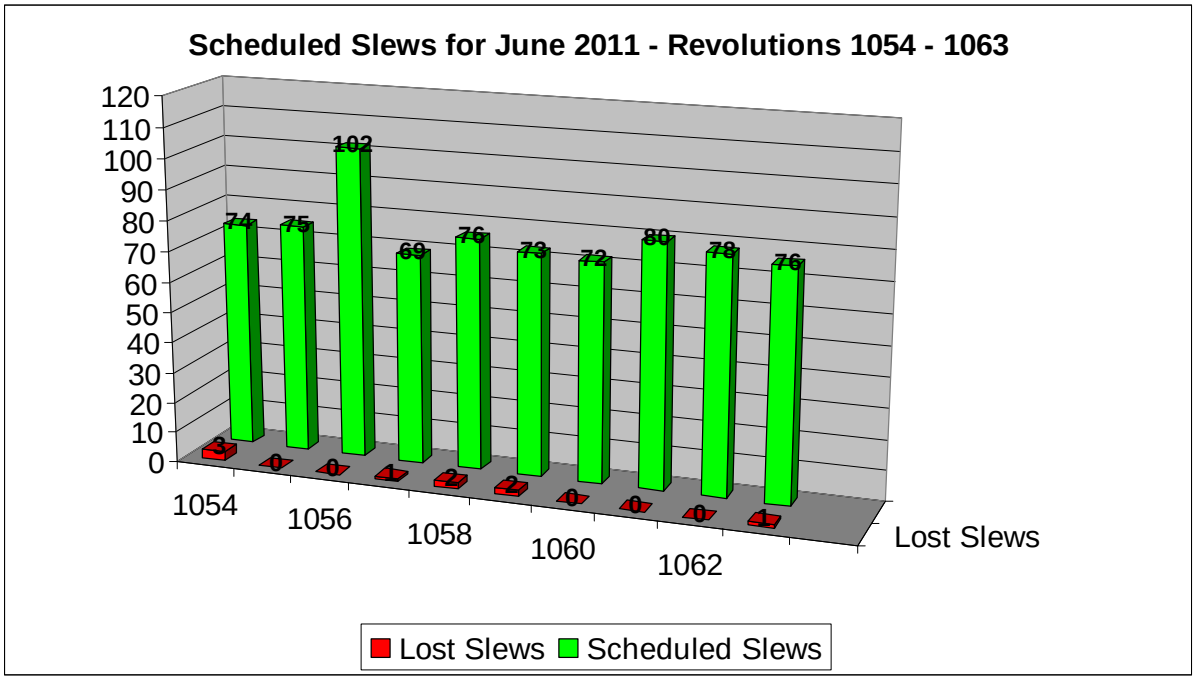


Figure 7: The number of slews scheduled compared to the number of slews lost

3.1 Mission Control System

On DOY 157 the production of OLF files stopped. The AUX, OLF and CHIS tasks were restarted which cleared the problem.

On DOY 166 the Verifier on IMCA lost connection to the TM CPD. A restart of the application did not clear the problem. All commanding applications were restarted on IMCA, but this also did not clear the problem. Operations were moved to the B-Chain – which also had problems (see below) - then IMCA was restarted which cleared the problems on the A-Chain.
On the B-Chain the Event Logger and the On Board History Display would not connect to the EV CPD. After the problems on the A-Chain were cleared operations were moved back and IMCB was restarted. After this both chains were fully functional again.

On DOY 166 at AOS the Multiplexer crashed on IMCA and was restarted without further problems.

On DOY 168 the limit checker on IMCA stopped working – also a restart of the application did not help. Operations were moved to the B-Chain and IMCA was restarted. Operations were then moved back without further problems.

On DOY 169 during perigee IMCA was restarted to try to prevent the problems seen at AOS on regular occasions. During this activity the MCCM Central Monitor crashed and was restarted. Later at AOS the manual stack crashed.

On DOY 178 the OMCH task on IMCA crashed. It was restarted successfully.

On DOY 181 the Manual Stack on sun122 crashed (closed itself) and the Multiplexer and OMCH tasks stopped on IMCA. All tasks were restarted successfully.

The connection to ISDC dropped 18 times and the ISDS and IFRD tasks needed to be restarted on 9 occasions.

3.2 Ground Stations and Network

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

2 TM drops and 6 data gaps were identified. Bad frames were received from REDU on 14 occasions and from VIL2 on 3 occasions mostly due to RFI.

Figure 8 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.

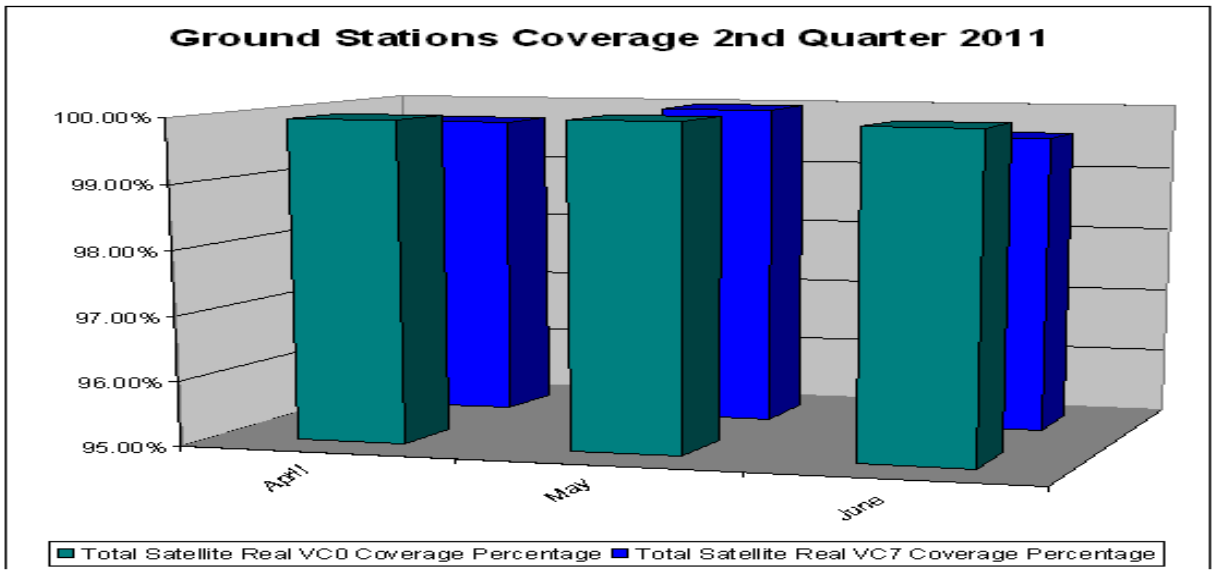


Figure 8: The usage of ESA ground stations compared to the usage of DSN ground stations

3.3 ISOC

3.3.1 Mission Planning

New or updated PSFs have been received for revolutions 1063 to 1070, corresponding to the time range 28 June to 21 July. New observations have been planned for revolutions 1059 (16-18 June) to 1065 (7-9 July). There were multiple cases of revolutions requiring re-planning with added RWBs to allow finding a valid wheel pattern. TOO observations on the transient accreting pulsar 4U 0115+63 were
done in revolutions 1061 and 1063.

TSFs have been received for revolutions 1056 to 1064.

3.3.2 Observation Status

New ECS files have been received for revolutions 1035 to 1051 (up to 25 May).

3.3.3 ISOC Science Data Archive

Syncing of rev_3 data has been done up to revolution 1051. Raw telemetry copied from MOC is available up to 11 June.

3.3.4 ISOC System

V29.1.1 was released on 10 June as a bug-fix.
V30 is scheduled for release on 18 July.

3.3.5 Problems

During eclipse seasons a very large part of the sky is now constrained for about half of the revolution.

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-3156	2011-06-07	Science Operations Interrupted by Solar Flare	Payload	Testing
INT-3157	2011-06-09	Potential of SCOS1 keyboard shortcuts causing operational errors	IMCS	Pending
INT-3158	2011-06-09	Monitoring of B-Chain insufficient	IMCS	Pending
INT-3159	2011-06-10	MUST archive problems		Pending
INT-3160	2011-06-15	Verifier crash on DOY 166	IMCS	Pending
INT-3161	2011-06-17	OOL display & TM desktop not working (DOY 168)	IMCS	Pending
INT-3162	2011-06-16	AS left in BD-mode after switching to AD mode in TM SPACON	IMCS	Pending
INT-3163	2011-06-17	Incorrect GSID for Maspalomas in antenna.dat	IMCS	Pending
INT-3164	2011-06-28	IFRD_SPI_A connection problems requiring restart of IFRD on isdsa	I/F to SGS	Pending
INT-3165	2011-06-25	FDS /tmp dir full (or low disk space) causing MCCM alarms	FDS	Pending
INT-3166	2011-06-29	SYS: Lost connection to TM CPD	IMCS	Pending

INT_SC-327	2011-06-22	SPI PSD channel rates malfunction	Payload	Pending
INT_SC-328	2011-06-28	JEM-X1 DFEE CRC Anomaly following eclipse on 2011-06-27	Payload	Pending
INT_SC-329	2011-06-27	IBIS PICSIT PDM04 LATCH UP	Payload	Pending

5 Special Events & Future Milestones

The ongoing eclipse season #19 ends on 17th August 2011.
Star-tracker blemish pixel survey planned for the 24th August 2011
Analysis for possible Earth observations in 2012

6 Appendix

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

6.1 AOCS operations

During this period, 485 Open Loop Slews, 285 Closed Loop Slews and 29 Momentum Biases were executed (as reported by ACC OEM).

18 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 01/07/2011 is reported in the following plot:

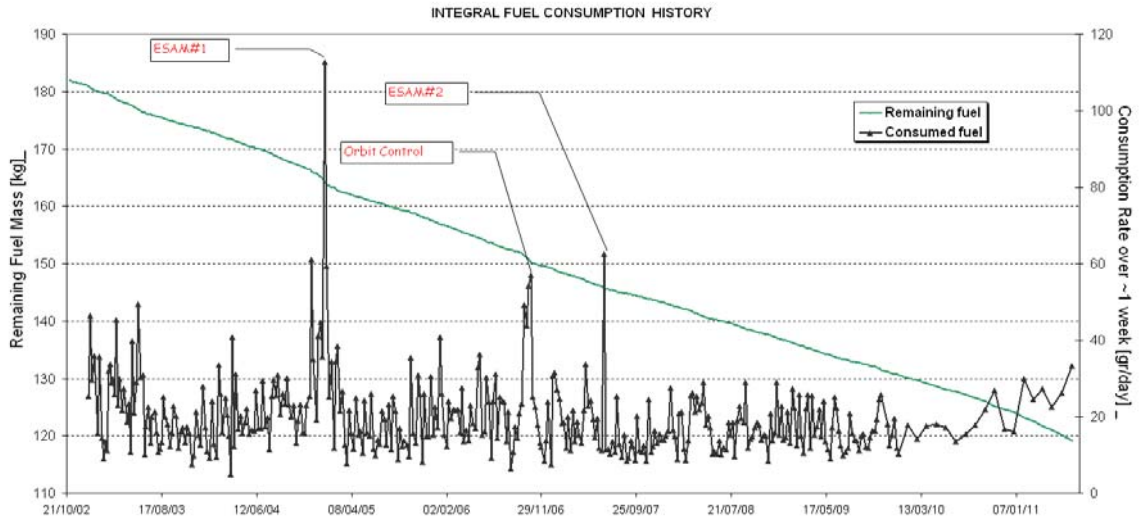


Figure 9: Fuel consumption. Note: ESAM fuel consumption is spread over period of ~1 week.

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.

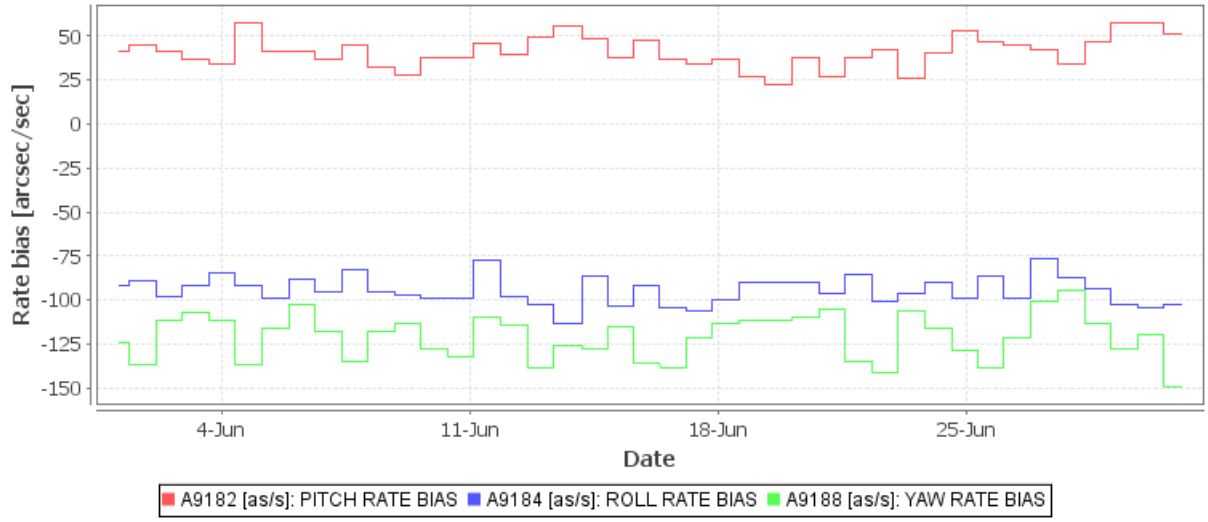


Figure 10: RMU pitch, roll and yaw. Historic data is available on request

6.1.3 Event log

01/06/2011 (Day of Year 152, Revolution 1053 to 1054)

Because of a loss of guide star directly after OSL 10540023 completion (22:06:00Z), the command to start the SSL failed release (static PTV).

FD were called in and generated a manual slew from attitude 10540023 to attitude 10540027, followed by another manual slew from attitude 10540027 to attitude 10540028.

After the manual slew was completed, the parameters for slew 10540029 were manually updated (spacontool).

Slews 10540024 to 10540028 were missed from the Timeline. The OTF was not reached for PIDs 10540023 to 10540028.

03/06/2011 (Day of Year 154, Revolution 1054)

IMU1 switched ON during the stable pointing of PID 10540064 (12:00:00Z). After the IMU switched back OFF, a manual mapping was commanded and the parameters for slew 10540065 were manually updated (spacontool).

OTF was not reached for PID 10540064.

No slew was missed.

04/06/2011 (Day of Year 155, Revolution 1054 to 1055)

- IMU1 switched ON during perigee passage (00:40:01Z). The Timeline was disabled and FD was called in, since the next AOCS manoeuvre in the Timeline was a RWB.

A manual RWB was executed, followed by a manual update of 10550001.

No impact on the Timeline.

- Due to attitude flickering, the OTF was lost for PID 10550017 (16:14:00Z)

09/06/2011 (Day of Year 160, Revolution 1056)

IMU1 switched ON during the stable pointing of PID 10560086 (06:57:56Z). After the IMU switched back OFF, a manual slew was performed from attitude 10560086 to attitude 10560087.

Then a mapping was commanded and the parameters for slew 10560088 were manually updated (spacontool).

OTF was not reached for PIDs 10560086 and 10560087.

Slew 10560087 was missed from the Timeline.

12/06/2011 (Day of Year 163, Revolution 1057)

FDS TPF update failed for slew 10570068 (19:36:00Z) stating that a RWB was necessary prior to the slew. The AOCS was suspended in the Timeline and a manual CGS + RWB was performed.

Then a manual mapping was commanded and a slew was manually generated from attitude 10570067 to attitude 10570069.

Since the next AOCS manoeuvre in the Timeline was a CGS (prior to perigee entry) this was executed manually by FD and then the AOCS subsystem was re-enabled in the Timeline.

Slews 10570068 and 10570069 were missed from the Timeline. The OTF was not reached for their PIDs.

15/06/2011 (Day of Year 166, Revolution 1058)

- Caused by MCS problems, the AOCS subsystem had to be suspended in the Timeline (02:58:00Z). During the time it was disabled, slews 10580055 to 10580057 failed release.

After the MCS problem was solved, a manual mapping was commanded and a slew was manually generated from attitude 10580054 to attitude 10580057.

Once the manual slew was completed, the parameters for slew 10580058 were manually updated (spacontool).

Slews 10580055 to 10580057 were missed from the Timeline. The OTF was not reached for their PIDs.

- Autostack commanding for slew 10580076 (19:45:00Z) failed release. The AOCS was suspended in the Timeline, then a manual mapping was commanded and a slew was manually generated from attitude 10580075 to attitude 10580076.

After the manual slew was completed, the parameters for the subsequent CGS were manually updated, just before LOS at perigee.

Slew 10580076 was missed from the Timeline. The OTF was not reached for its PID.

- IMU1 switched ON during perigee passage (22:07:00Z) from revolution 1058 to 1059. Due to lack of time to perform the recovery, the AOCS subsystem was suspended in the Timeline.

The first RWB of the revolution had to be performed manually (00:55:00Z), which was then followed by a manual mapping used to update the parameters of 10590001.

No impact in the Timeline.

18/06/2011 (Day of Year 169, Revolution 1059)

FDS TPF update failed for slew 10590072 (19:09:39Z).The AOCS was suspended in the Timeline , then a manual mapping was commanded and a manual slew failed to be generated due to wheelspeed constrain violation (RWB needed)

A reaction wheel bias was manually executed. Following its completion, a manual mapping was commanded and a slew was manually generated from attitude 10590071 to attitude 10600001.

In this attitude a further RWB was performed. Following its completion, a manual mapping was commanded and a slew was manually generated from attitude 10600001 to attitude 10600002.

After the manual slew was completed, the parameters for slew 10600003 were manually updated (spacontool).

Slews 10590072, 10590073, 10600001 and 10600002 were missed from the Timeline. The OTF was not reached for its PID.

30/06/2011 (Day of Year 181, Revolution 1063)

Autostack commanding for slew 10630061 (04:20:00Z) failed release. The AOCS was suspended in the Timeline, then a manual mapping was commanded and a slew was manually generated from attitude 10630060 to attitude 10630061.

Manual stack commanding for slew 10630062 (04:35:00Z) failed release. The AOCS was suspended in the Timeline, then a manual mapping was commanded and a slew was manually generated from attitude 10630060 to attitude 10630062.

After the manual slew was completed, the parameters for slew 10630063 were manually updated (spacontool).

Slews 10630061 and 10630062 were missed from the Timeline. The OTF was not reached for their PIDs.

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 following plot shows the evolution of the cold plate and H bus temperature during the reporting period:

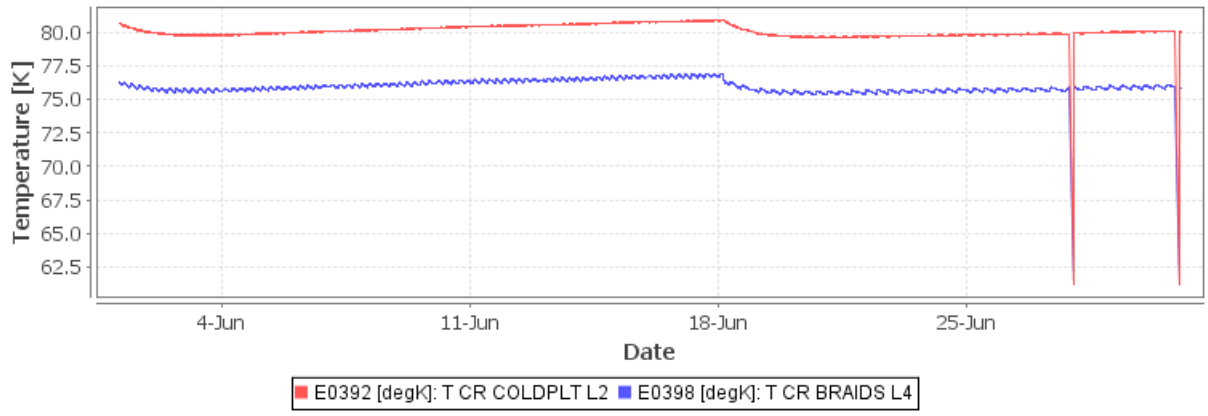


Figure 11: SPI Cold plate and H-bus temperature

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

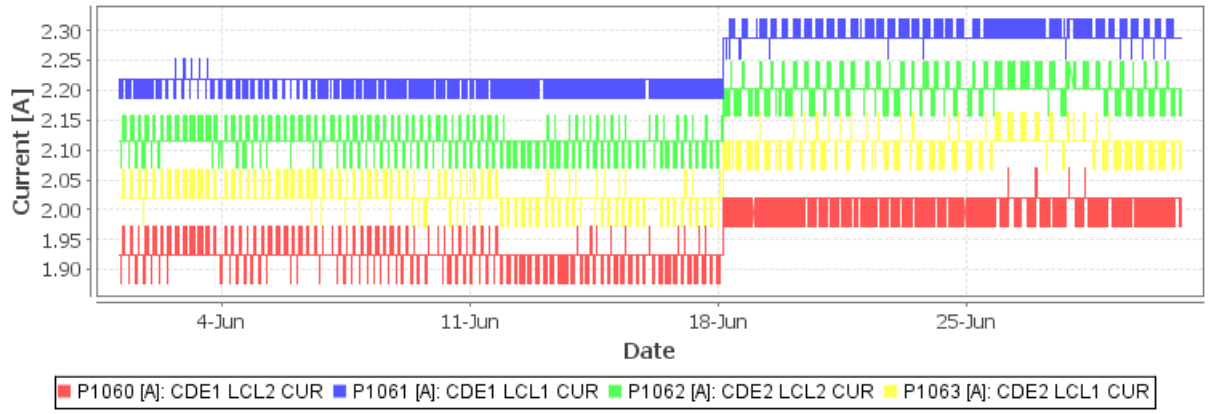


Figure 12: SPI CDE LCL curent

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 4: 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.

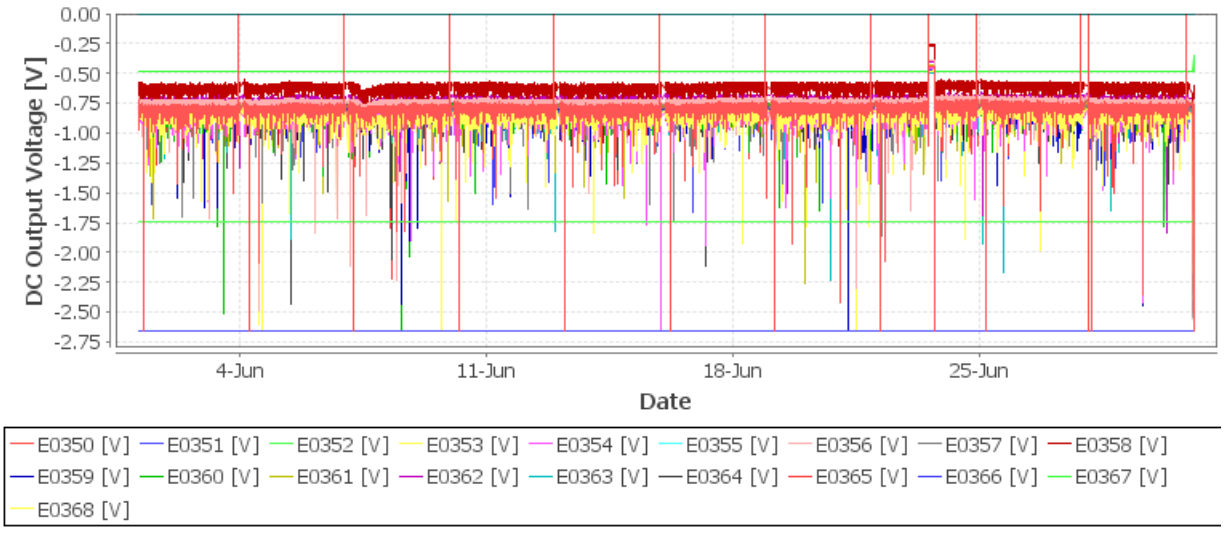


Figure 13: AFEE DC Output Voltages. Note that the data is sampled every 8th packet (64sec)

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

Figure 15: SPI GeD Time Tagged count rates. Note that the scale used for plotting is logarithmic

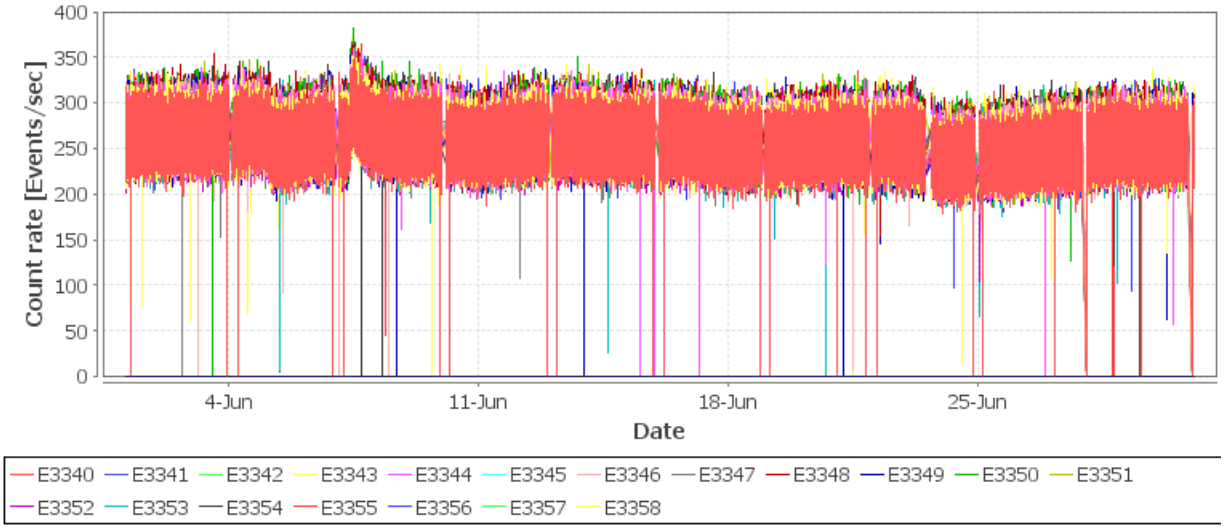


Figure 16: SPI GeD Time Tagged Saturated count rates

PSD

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

Figure 17: SPI PSD GeD Channel rates

6.2.2 Event Log

Not available

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:

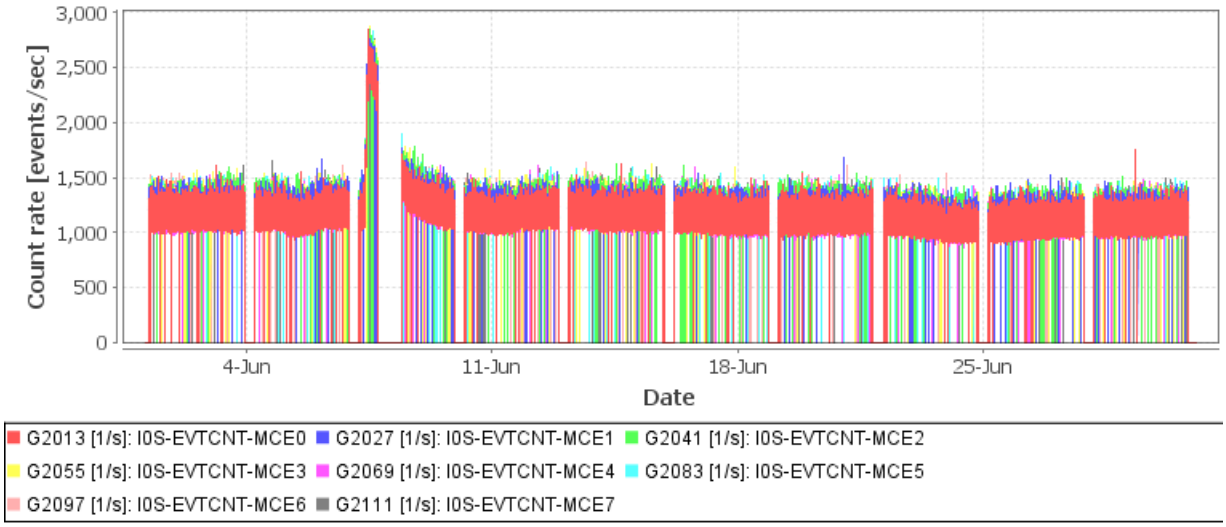


Figure 18: ISGRI MCE Counters

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:

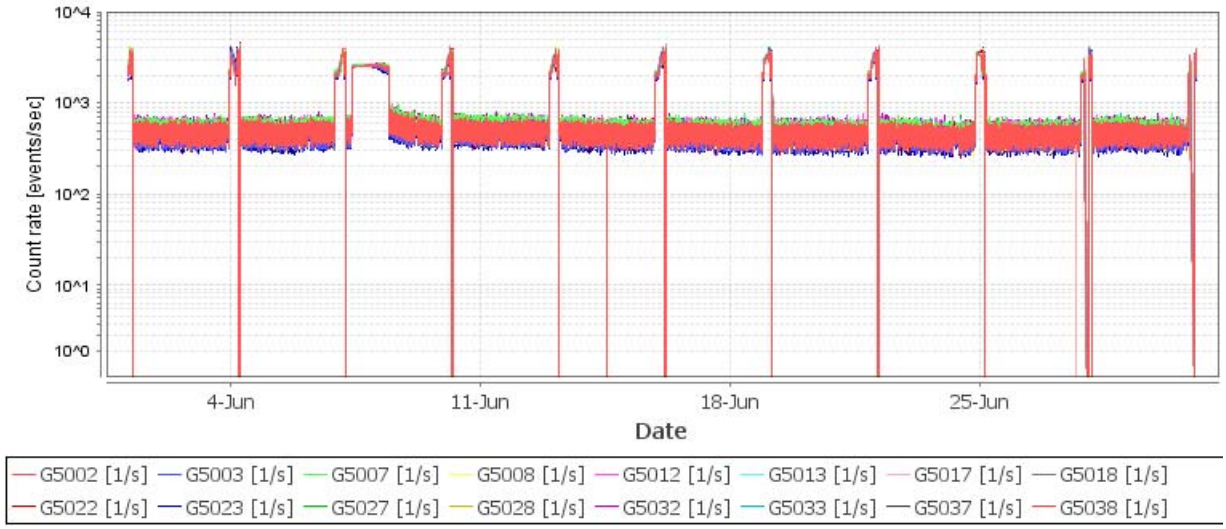


Figure 19: PICsIT semi-module counters. Note that the scale used for plotting is logarithmic

VETO

The health and performance of VETO was nominal during the reporting period. Plots of the VETO counters are given in Figure 4: Instrument Count Rates.

6.3.2 Event Log

Not available

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.

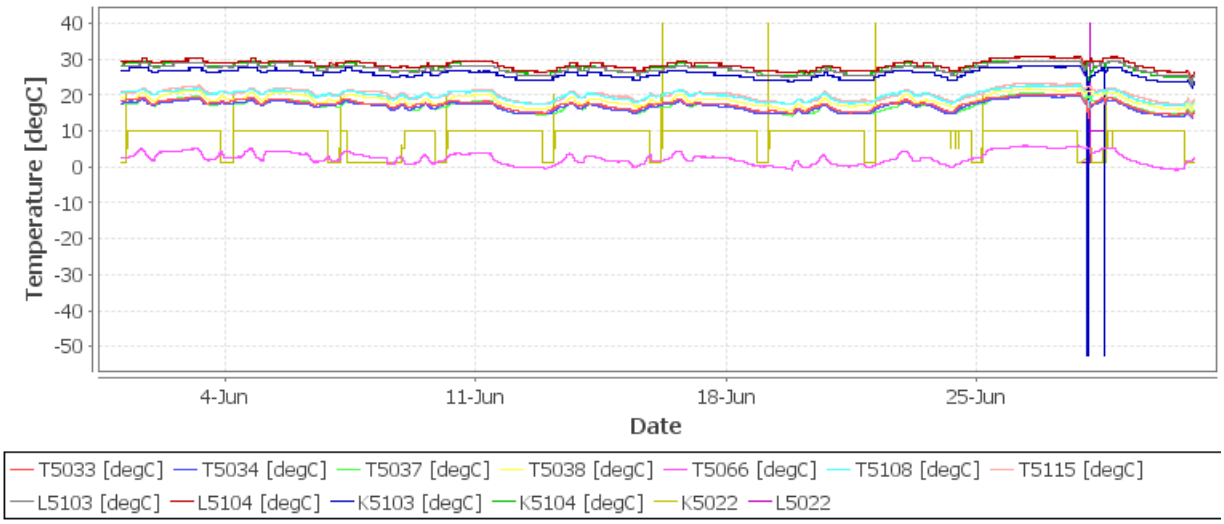


Figure 20: JEMX Detector and DFEE Temperatures

6.4.2 Event Log

27-06-2011 (Day of Year 178, Revolution 1063)

At 22:45:00, after AOS, it was observed that JEMX-1 had not switched-on correctly after the eclipse. The symptoms were as follows:

1) Following the execution of KECLXT01 ED, the JEM-X1 DFEE state (TM parameter K5022) remained MEMORY, instead of SAFE, and the Active Shutdown Level (TM parameter K5381) remained ECLIPSE instead of RAD. BELTS.

3) The DFEE CPU speed, TM parameter K5583 CPU MODE, remained at a value of 8 MHz WAIT (as at start-up) rather than the nominal value of 16MHz.

4) A power cycle was performed according to CRP_JEM1_5010 JEMX1 DFEE POWER CYCLE, consisting of:

- 11:11:00Z FCP_JEM1_9010 JEMX1 DFEE SWITCH OFF
- 11:20:00Z FCP_JEM1_0021 JEMX1 DFEE ACTIVATION

5) At 11:23:54Z The following OEMs were received:

```
2011.179.11.23.54.030   2011.179.11.24.01.434   1536   RealTime   191     EVENT       JEM-X1
PROB DFEE 11                                      0       0    65535   PR    N     E   E

    FIX6                                          11
```

```
    K9079          MESS CLASS                      0

    K9080          MESS ID                         191

    FIX16                                          15

    FIX16                                          0

2011.179.11.23.54.030   2011.179.11.24.01.456   1536   RealTime   211     EXCEPTION   JEM-X1
IASW PROB 1                                      0       0    65535   PR    N     E   E

    FIX6                                           1

    K9079          MESS CLASS                      1

    K9080          MESS ID                         211

    K5265          TASK ID                         2

    FIX16                                          0
```

6) It was decided to re-start the recovery by performing:

a) a dump according to the XRef table, which gave results of:

Start Length CRC Value

B000 2000 F1B3

B000 1000 F074

C000 1000 CF9F

which are correct.

b) A power cycle was performed according to CRP_JEM1_5010 JEMX1 DFEE POWER CYCLE, consisting of:

- 11:50:00Z FCP_JEM1_9010 JEMX1 DFEE SWITCH OFF
- 11:58:00Z FCP_JEM1_0021 JEMX1 DFEE ACTIVATION

7) At 12:41:00 The KEACAL01 was sent

8) At 13:02:00 KEHVAC01 was sent.

9) 13:25:00 KEDATA02 was sent

10) Subsequently the CCCFs were enabled, which went at 17:11.

The impact was the loss of 11 hours science time.

6.5 OMC

6.5.1 Operations

The status and performance of OMC is nominal.

6.5.2 Event Log

07-06-2011 (Day of Year 158, Revolution 1056)

At 07:42:23, OMC switched autonomously to SAFE due to high radiation levels. At 21:07:58 the following day, after the radiation had died down, OMC was manually recovered to Stand-by, and at 21:22:38 the unit was back in science operations. The impact was pointing 10560010 was cut short from a planned 1785 to 1249 seconds, and pointings 10560011 through to 10560075 (62 pointings) inclusive were lost.

It was at this time that the following pair of commands was rejected:

```
2011.158.07.51.36.619   2011.158.07.51.43.000   1792   RealTime   131     TC REJECT   REJECTED
TC1                                             0       0    65535   PR    N     E   E

2011.158.07.51.42.369   2011.158.07.51.54.418   1792   RealTime   131     TC REJECT   REJECTED
TC1                                             0       0    65535   PR    N     E   E
```

These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for pointing 10560011.

08-06-2011 (Day of Year 159, Revolution 1056)

At 22:14, as part of the recovery from the above high radiation, the CCCFs were enabled. This switched OMC back to Stand-by. At 22:20, the pointing commands were manually resent to restart science operations. The impact was pointing 10560077 was cut short from a planned 2600 to 1952 seconds.

09-06-2011 (Day of Year 160, Revolution 1056)

At 01:41:11, a radiation spike put OMC to SAFE. At 01:44:42, the unit was manually recovered and at 03:34:22, was back in science operations. The impact was pointing 10560081 was cut short from a planned 2600 to 1345 seconds.

At 06:57:26, an AOCS problem caused a suspension of the timeline. This was recovered at 07:37:00. The impact was pointing 10560087 was cut short from a planned 2600 to 1904 seconds.

15-06-2011 (Day of Year 166, Revolution 1058)

At 02:46:00, a problem with the imcs forced a suspension of operations. After a recovery involving switching to the b-chain, operations were finally restored at 04:43. The impact was the loss of pointings 10580055 & 10580056

28-06-2011 (Day of Year 179, Revolution 1063)

At 17:11:04, OMC switched to Standby. This was caused by the uplinking of the CCCFs as part of the JEMX-1 recovery. The impact was pointing 10630028 was cut short from a planned 3530 to 313 seconds.

30-06-2011 (Day of Year 181, Revolution 1063)

At 04:19:37, an AOCS problem forced a suspension of operations. A recovery was performed, and the timeline rejoined at 05:27. The impact was the loss of pointing 10630061.

6.6 IREM

6.6.1 Operations

Radiation belts entry and exit

The following plots show the Radiation Belt Entry (Figure 21, red line) and Exit times (Figure 22, blue line) obtained from the ISDC website, defined where the IREM TC3 (soft electrons) rate reads 600 counts. The blue line in Figure 21 and the magenta line in Figure 22 are the altitudes used by the MOC for planning purposes.

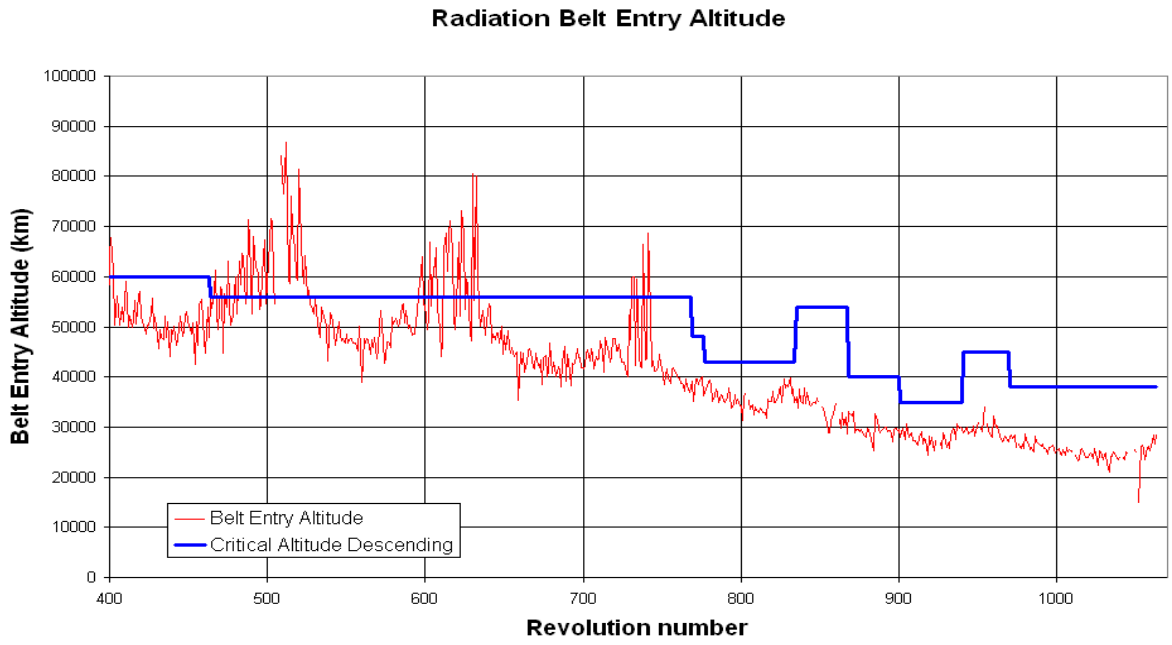


Figure 21: Radiation belt entry

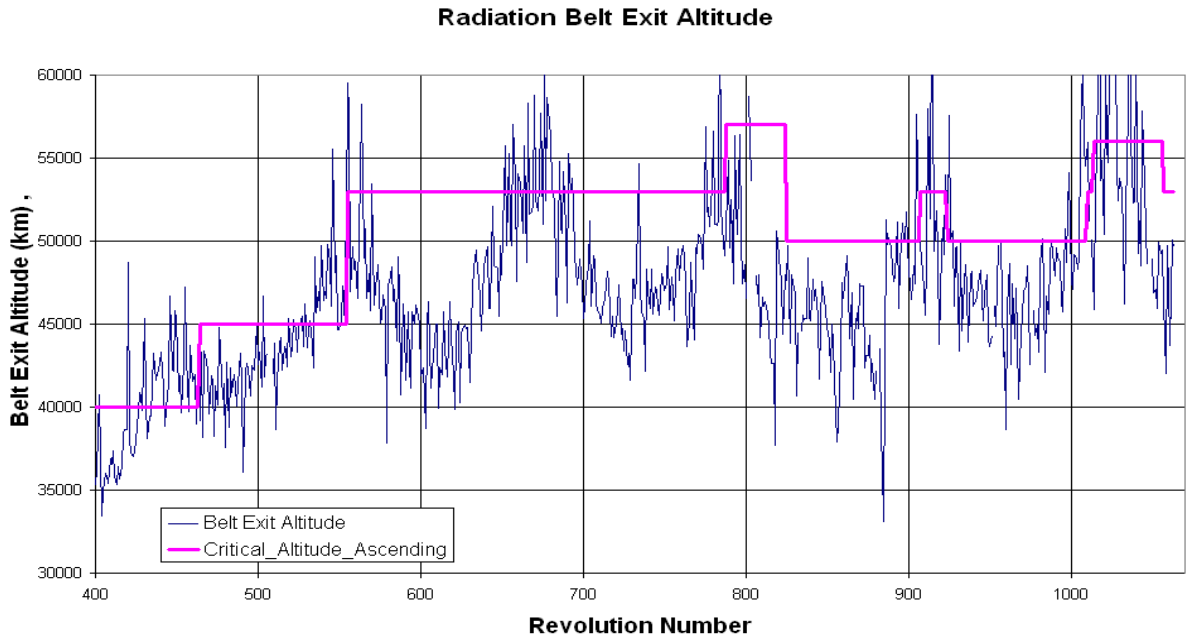


Figure 22: Radiation belt exit

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
1054	RAD_EXIT R 2011-06-01T03:54:02Z	01/06/2011 02:49:57	>>28945.6	01-Jun-2011 02:58:43	47369.67	31-May-2011 23:12:59	3236.578
1054	RAD_ENTR R 2011-06-03T20:21:55Z	03/06/2011 21:45:42	20674.3	03-Jun-2011 21:48:43	18464.19	03-Jun-2011 22:28:43	8657.049
1055	RAD_EXIT R 2011-06-04T03:40:55Z	04/06/2011 02:30:14	28908.5	04-Jun-2011 02:48:43	48592.31	03-Jun-2011 22:58:43	3431.403
1055	RAD_ENTR R 2011-06-06T20:08:00Z	N/A	N/A	06-Jun-2011 21:38:39	18894.68	06-Jun-2011 22:18:39	9061.363
1056	RAD_EXIT R 2011-06-07T03:26:57Z	07/06/2011 02:11:50	43700.0	07-Jun-2011 02:38:39	48360.53	06-Jun-2011 22:58:39	3456.298

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
1056	RAD_ENTR R 2011-06-09T19:57:09Z	09/06/2011 21:30:22	18389.9	09-Jun-2011 21:33:29	17227.27	09-Jun-2011 22:03:29	9772.486
1057	RAD_EXIT R 2011-06-10T02:56:11Z	10/06/2011 01:49:34	41879.0	10-Jun-2011 02:23:29	47935.61	09-Jun-2011 22:43:29	3231.15
1057	RAD_ENTR R 2011-06-12T19:46:49Z	12/06/2011 21:11:50	20513.3	12-Jun-2011 21:13:43	19372.96	12-Jun-2011 21:53:43	9521.021
1058	RAD_EXIT R 2011-06-13T02:45:45Z	13/06/2011 01:12:38	>>28948.0	13-Jun-2011 02:13:43	48092.45	12-Jun-2011 22:33:43	3281.004
1058	RAD_ENTR R 2011-06-15T19:35:58Z	15/06/2011 20:58:22	21138.9	15-Jun-2011 21:03:40	19504.46	15-Jun-2011 21:43:40	9719.302
1059	RAD_EXIT R 2011-06-16T02:35:35Z	16/06/2011 01:44:22	44674.7	16-Jun-2011 02:03:40	47885.24	15-Jun-2011 22:23:40	3375.917
1059	RAD_ENTR R 2011-06-18T19:22:24Z	18/06/2011 20:50:54	20434.7	18-Jun-2011 20:54:41	18120.26	18-Jun-2011 21:34:41	8357.447
1060	RAD_EXIT R 2011-06-19T02:22:47Z	19/06/2011 01:14:54	>>28855.6	19-Jun-2011 01:44:41	47095.62	18-Jun-2011 22:04:41	3466.128
1060	RAD_ENTR R 2011-06-21T19:08:02Z	N/A	N/A	21-Jun-2011 20:42:37	17798.79	21-Jun-2011 21:22:37	8030.574
1061	RAD_EXIT R 2011-06-22T02:08:33Z	22/06/2011 00:34:47	>>28846.4	22-Jun-2011 01:32:37	47337.52	21-Jun-2011 21:52:37	3427.724
1061	RAD_ENTR R 2011-06-24T18:54:20Z	24/06/2011 20:03:43	24098.8	24-Jun-2011 20:21:21	19506.26	24-Jun-2011 21:01:21	9732.867
1062	RAD_EXIT R 2011-06-25T01:54:36Z	25/06/2011 01:00:23	>>30930.6	25-Jun-2011 01:21:21	47859.83	24-Jun-2011 21:41:21	3397.342
1062	RAD_ENTR R 2011-06-27T18:41:01Z	27/06/2011 20:03:03	20430.5	27-Jun-2011 20:10:52	18632.53	27-Jun-2011 20:50:52	8856.335

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
1063	RAD_EXIT R 2011-06-28T01:41:28Z	28/06/2011 00:45:11	43804.6	28-Jun-2011 01:10:52	48426.05	27-Jun-2011 21:20:52	3521.035
1063	RAD_ENTR R 2011-06-30T18:25:59Z	30/06/2011 19:35:35	22801.2	30-Jun-2011 19:57:47	18651.93	30-Jun-2011 20:37:47	8930.11

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.