

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 367
Week 40
05.10.09
Routine Phase

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LIST OF CONTENTS

1	General.....	3
2	Summary of Activities.....	3
3	Satellite Status.....	3
3.1	Platform.....	3
3.1.1	AOCS.....	3
3.1.2	Power.....	3
3.1.3	Thermal.....	3
3.1.4	OBDH.....	4
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	5
3.2.3	JEM-X.....	7
3.2.4	OMC.....	7
3.2.5	IREM.....	7
3.2.6	Radiation Background.....	8
4	Ground Facilities.....	9
4.1	Mission Operations Centre.....	9
4.2	Ground Stations & Network.....	9
4.3	Science Ground Segment.....	10
4.3.1	ISOC.....	10
5	Special Events.....	10
6	Anomalies.....	10
7	Future Milestones.....	10
8	Appendix.....	11
8.1	Detailed Satellite Information.....	11
8.1.1	AOCS SUMMARY OPERATIONS REPORT, 26/09/2009 – 02/10/2009.....	11
8.1.2	SPI Operations.....	15
8.1.3	IBIS Operations.....	19
8.1.4	JEM-X Operations.....	22
8.1.5	OMC Operations.....	24
8.1.6	IREM Operations.....	25

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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.

It addresses the activities from 26.09.09 until 02.10.09 (both dates inclusive) and covers the revolutions 849 and 850.

2 Summary of Activities

The operations were performed according to the planning inputs from ISOC combined with some manual commanding by MOC.

The targets of these revolutions consisted of a hexagonal dither of Galactic Bulge region (RA 17:45:36.00, -28:56:00.0), a custom pointing of the Galactic disk, (RA 19:04:22.00, +06:17:13.0), a raster dither of the Galactic Centre (RA 17:45:40.03, -29:00:28.1), a raster dither of Galactic disk, l=+25 (RA 18:36:53.70, -07:03:19.4), a raster dither of Galactic disk, l=-25 (RA 16:27:14.74, -48:57:19.9) and a staring OMC FF #33 (RA 19:57:12.00, -22:36:00.0).

Note: Some further information concerning the activities is provided in the Appendix.

3 Satellite Status

3.1 Platform

The performance of the platform was good. No new unexpected behaviour / malfunction was identified.

3.1.1 AOCS

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

Slows 08490064, 08490065 and 08500028 were not executed from the timeline, neither the OTF was reached for their corresponding PIDs.

The fuel consumption over the period between 26/09/2009 and 02/10/2009 was 0.0871 Kg. The remaining propellant is in the order of 132.2645 Kg.

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

3.1.2 Power

All the other units of EPS are working nominally; available power from the arrays is of the order of 2100W.

3.1.3 Thermal

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

3.1.4 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.

3.1.5 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.

3.2 Payload

3.2.1 SPI

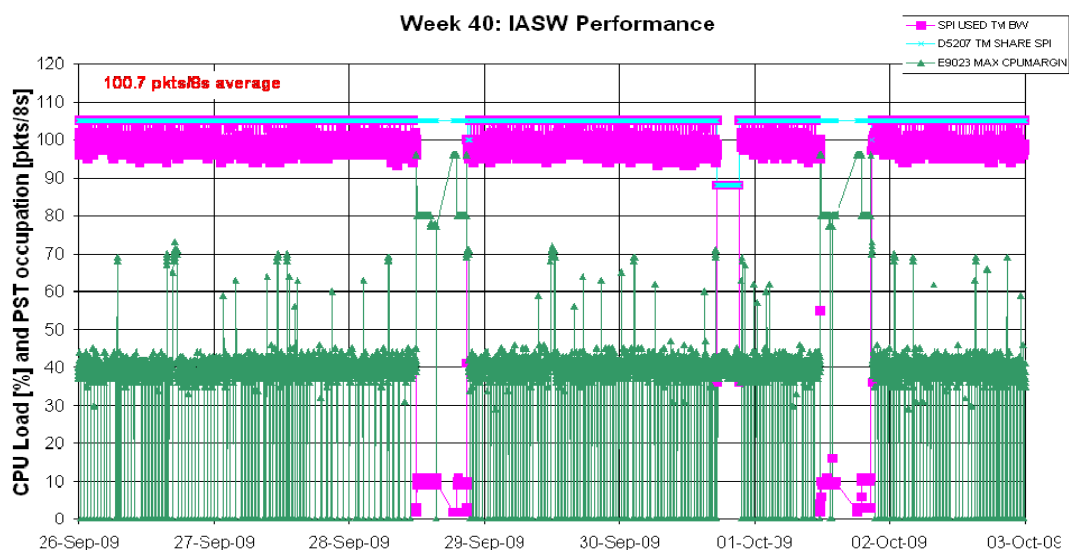
Following the 13th SPI annealing, which ended on 11/05/2009, the overall status of the gamma-ray spectrometer is nominal, except for detector #2 (failed since 06/12/2003); detector #17 (failed since 17/07/2004) and detector #5 (failed since 19/02/2009).

The Stirling compressors are working nominally. The Germanium detectors' temperature was kept in the range 80K $\pm$ 1K.

Eclipse operations for SPI continued nominally during the reporting period.

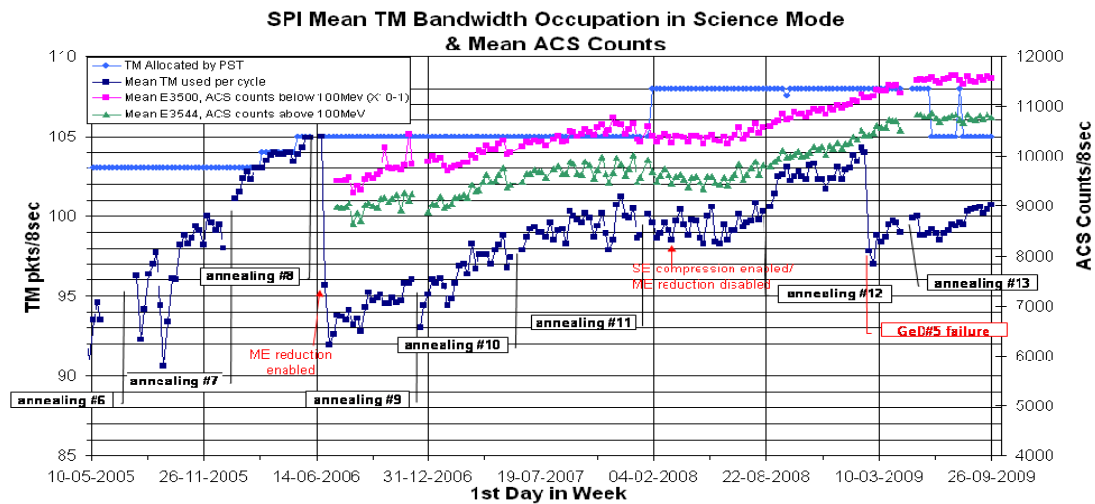
SPI was operated in photon-by-photon mode with spectra TM enabled during science observations. The assigned TM bandwidth in the science observation windows was 105 packets/cycle except from 2009-09-30T17:20:53Z to 2009-09-30T21:11:54Z, when it was 88 packets/cycle due to an OMC FFC. The average telemetry occupation when the allocation was 105 packets/cycle was 100.7 packets/cycle.

The following plot shows the TM bandwidth allocation, occupation and DPE CPU load during the reporting period¹:



¹ Data sampled every 8th packet (64sec)

The following plot shows the evolution of the assigned and the average occupation of the SPI TM bandwidth since May 2005 along with the mean ACS count rate evolution (since July 2006). As can be seen, there is a strong correlation between the evolution of the background as measured by the ACS and the overall TM bandwidth usage.



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

3.2.2 IBIS

The overall status of IBIS is nominal.

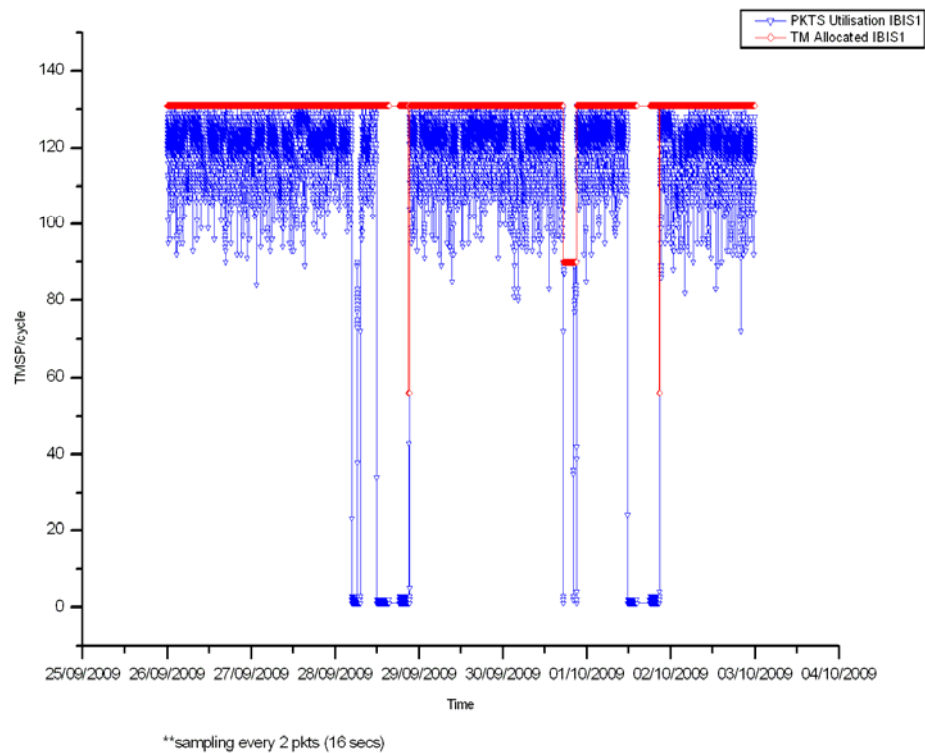
Eclipse operations for IBIS are progressing nominally.

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

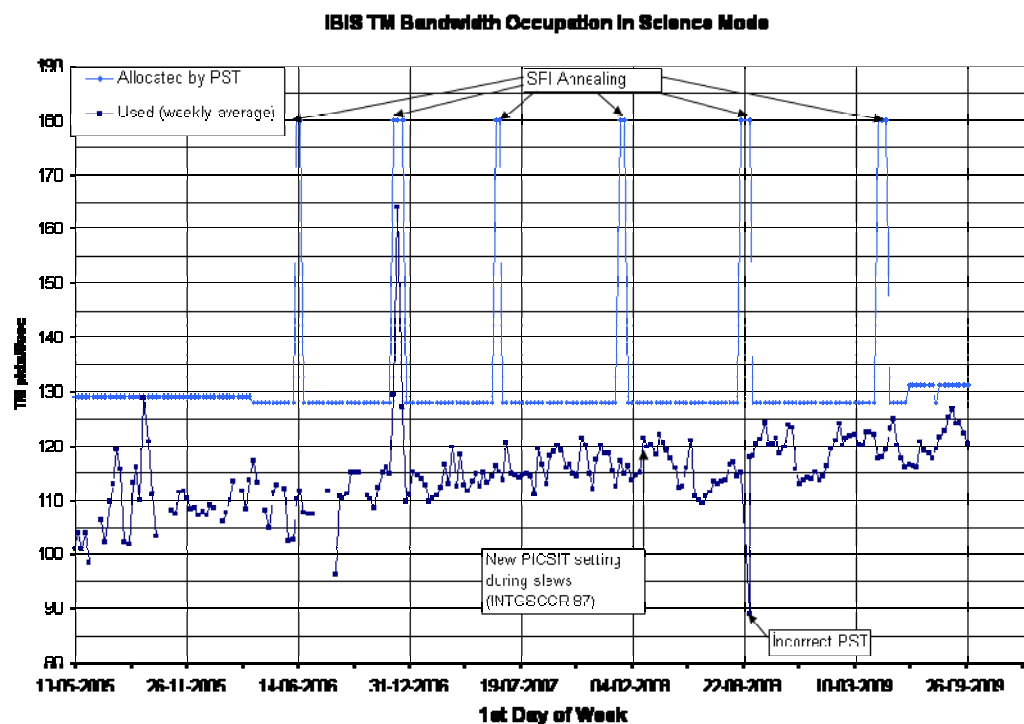
- PST allocation to IBIS above radiation belts: 131 packets/cycle, except from 2009-09-30T17:20:53Z to 2009-09-30T21:11:54Z, when it was 90 packets/cycle due to an OMC FFC.
- IBIS mean bandwidth utilisation in science mode: 120.37 packets/cycle (down 2.03 on previous week)
- Percentage of TM cycles with allocation > 100 packets/cycle for which full bandwidth was used: 4.7%

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

IBIS - TM Bandwidth Utilisation Rev 849-851



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



3.2.3 JEM-X

The status of both JEM-X units is nominal.

JEM-X operations were performed by the automatic Timeline.

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

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

3.2.4 OMC

The status of OMC is nominal.

OMC operations were performed by the automatic Timeline. OMC was operated in Science Normal mode during science observations, with a TM allocation of 5 packets/cycle, except from 2009-09-30T17:20:53Z to 2009-09-30T21:11:54Z during the Flat Field calibration, when it was 63 packets/cycle.

During this reporting period, 221 of the 226 planned science pointings were executed nominally, 2 were lost, 1 was interrupted, and 2 were executed at the wrong attitude. In addition, the Flat field calibration was performed nominally.

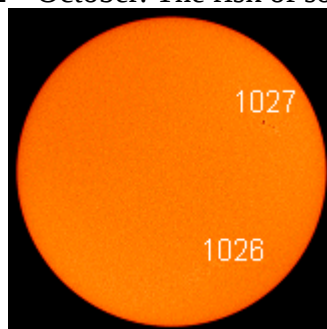
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. The week began with two sun spots #1026 and #1027. Sun spot #1026 had disappeared by the 29th September and #1027 by the 2nd October. The risk of solar flares was very low.

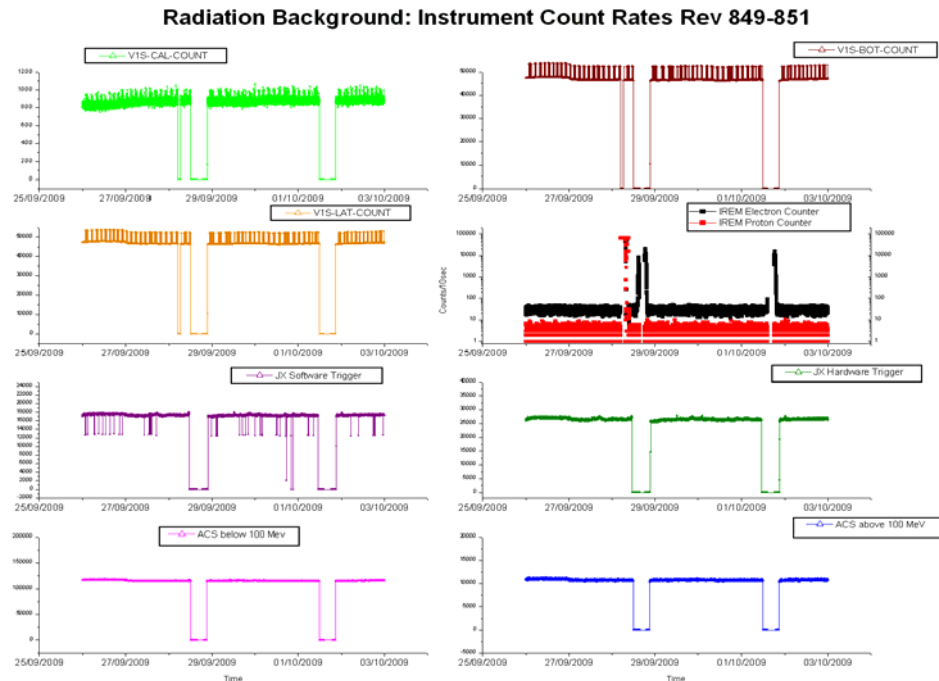


Reference: www.spaceweather.com

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

3.2.6 Radiation Background

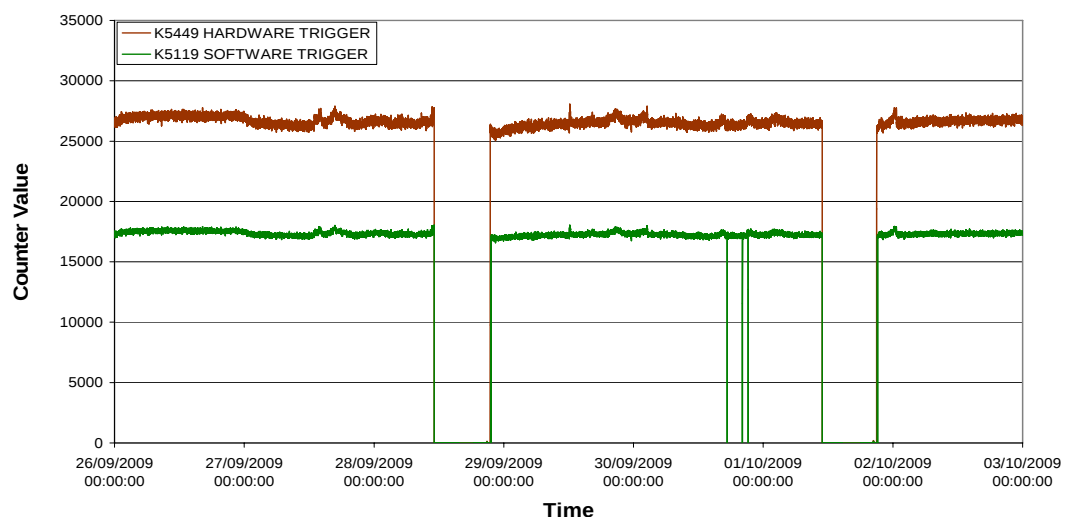
The background radiation level as measured by the instrument counters was low during the reporting period. The following plots show the SPI ACS, IBIS VETO, JEM-X Triggers and IREM count rates over the week²:



JEM-X Count Rates

JEM-X count rates over the reporting period are displayed in the following graph³.

JEMX-1 Count Rates

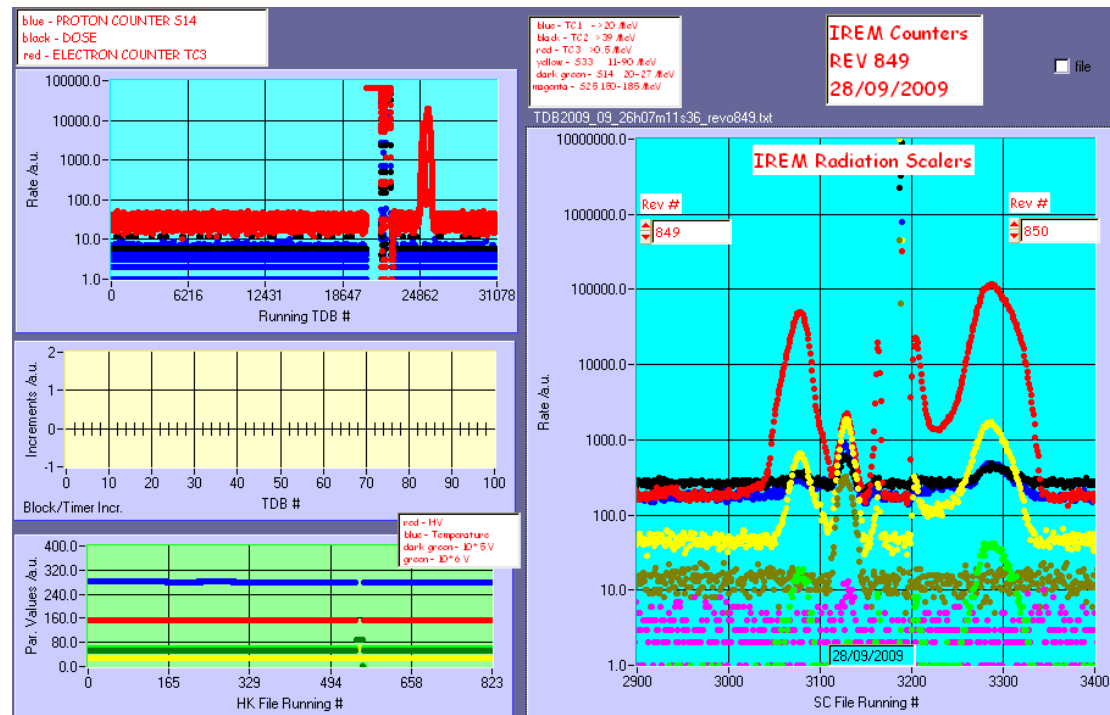


² Data sampled every 6th packet (48sec)

³ Data sampled (1 frame in 4) and smoothed to remove spikes in S/W Trigger due to flushing of buffer after slews.

IREM radiation counters:

Revolution 849



Revolution 850 is not available

4 Ground Facilities

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

4.1 Mission Operations Centre

The performance of the MOC was very good this week. A new database was installed on the IMCS A and B-chains on October 1st. After the installation there were three occasions when the links to ISDC dropped, necessitating a restart of the isds & ifrd. After that ISDC was still not receiving TM and it was decided to reboot the server isdsa. This did not fix the problem and ISDC moved the link to IMCS B and stayed with this configuration until the next day. On the next day, 2nd of October after investigating the problem with SWS, operations were swapped back to IMCS A and ISDC re-connected their link to the A-chain successfully.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There was one occasion of a TM drop VC0 and VC7 from Redu and one occasion of Bad Frames received from VIL2, there was no impact.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSFs have been received for revolutions 857 and 858.

Observations have been planned for revolutions 854 & 855.

New or updated TSFs have been received for revolutions 850 to 852.

2. Observation status

No new ECS files have been received, the last is from revolution 834.

3. ISOC Science Data Archive

Ingestion of data from ISDC is complete up to revolution 834. IC files are being synchronized from ISDC.

The SAID project for advertising archive data from the scheduling pages is making good progress.

4. ISOC system

No news.

5. Problems

No new problems.

5 Special Events

A new database has been installed on the IMCS A and B-chains on the 1st of October.

6 Anomalies

The following anomaly occurred this week:

AR id	Date Created	Subject	Segment	Status
INT_SC-267	2009-09-29	IREM Anomaly: Reset of IREM_CSCI S/W #81, 28/09/2009	Payload	Pending

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Detailed Satellite Information

This section contains some detailed information concerning the various subsystems of the satellite and instruments.

8.1.1 AOCS SUMMARY OPERATIONS REPORT, 26/09/2009 – 02/10/2009

The AOCS operations were executed from the Automatic Timeline.

During this period, 142 Open Loop Slews, 102 Closed Loop Slews and 5 Momentum Biases were executed (as reported by ACC OEM).

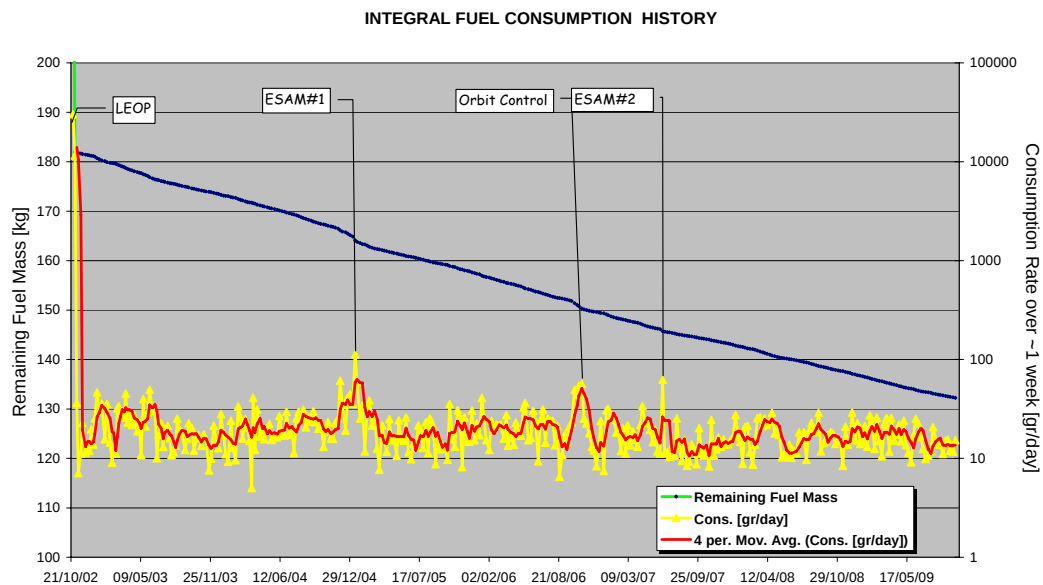
Slews 08490064, 08490065 and 08500028 were not executed from the timeline, neither the OTF was reached for their corresponding PIDs.

Orbit Control

No update.

Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 02/10/2009 is reported in the plot below.

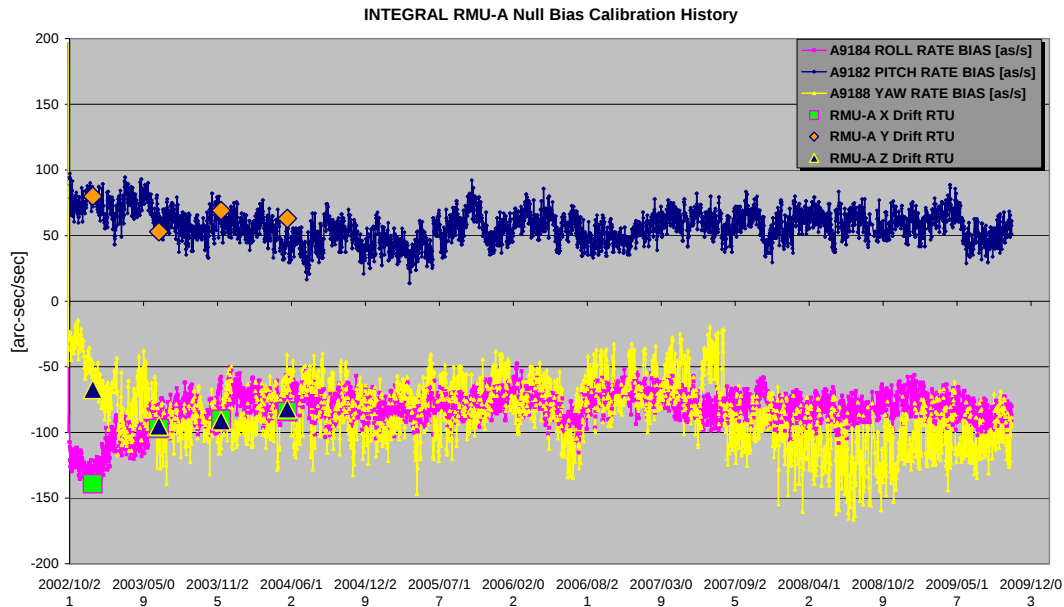


The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 02/10/2009 is 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. At moment the current constraints (for drift update generation) on the FDS have been relaxed to cope with the current situation.



Daily events Log:

26/09/2009 (Day of Year 269, Revolution 849)

Nothing to report

27/09/2009 (Day of Year 270, Revolution 849)

- TC A3189 failed release for slew 08490064 (10:58:00Z). The recovery was performed by generating an OSL from attitude 08490063 to 08490065 (0849_0500_M.OSL), followed by a corrective CSL to the same attitude (0849_0501_M.CSL). Both were generated by the SPACON using spacontool.

Then the parameters for the next manoeuvre in the Timeline were also manually updated (0849_0502_A.CSL), and the AOCS subsystem enabled.

Slews 08490064 and 08490065 were not executed from the timeline, neither the OTF was reached for their corresponding PIDs.

28/09/2009 (Day of Year 271, Revolution 849 to 850)

Nothing to report

29/09/2009 (Day of Year 272, Revolution 850)

- FDS failed to update slew 08500027 (11:52:00Z), which was executed from the Timeline without update.

A problem was spotted at this time in the FD job scheduler, which was running the updateslew tasks twice (the conflict between the parallel runs lead to the failure).

A manual slew was generated to slew from attitude 08500027 to 08500028 (0850_0500_M.CSL).

Until the problem was fixed, FD kicked off the update for slews 08500029 and 08500030.

Slew 08500028 was not executed from the timeline, neither the OTF was reached for its PID.

30/09/2009 (Day of Year 273, Revolution 850)

Nothing to report

01/10/2009 (Day of Year 274, Revolution 850 to 851)

Nothing to report

02/10/2009 (Day of Year 275, Revolution 851)

Nothing to report

Winter Eclipse Season 2009 Summary

The AOCS eclipse operations were nominal. After the end of the season the ACC/FDE/FCE Eclipse Timers were stopped and the AMD thresholds were set to their non-eclipse season values. The complete eclipse times and IMUs usages are provided below:

Complete Eclipse Times

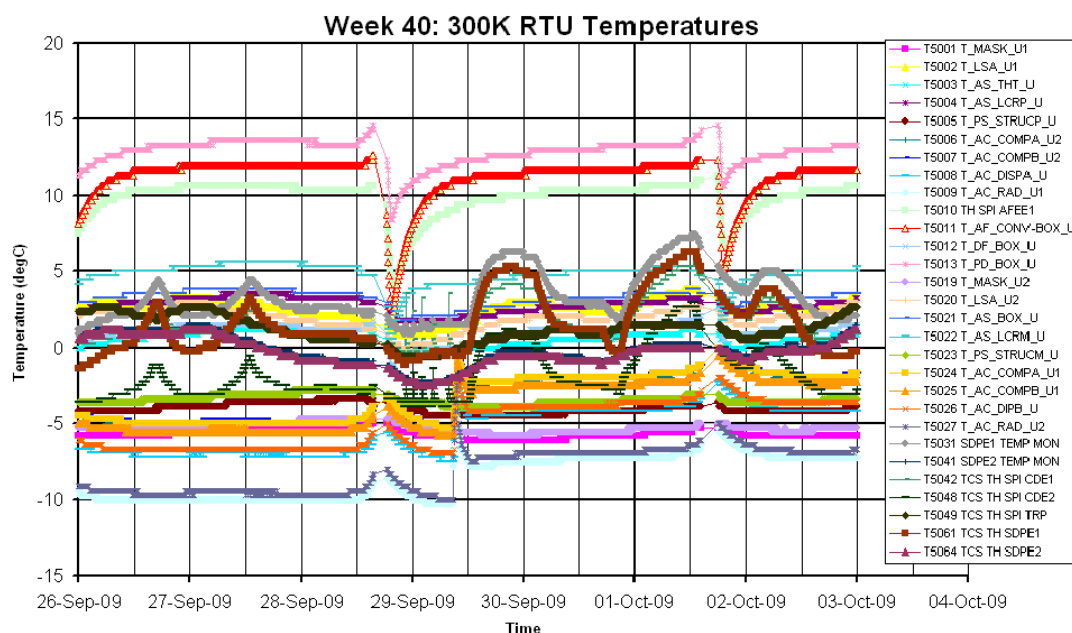
AOCS Eclipse Times											Winter 2009					
Date	LOS	AOS	ACC Eclipse Imminent	Eclipse Start						Eclipse End						Eclipse Duration
				ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbra	Umbra	FSS Sun In	Penumbra	FDE/FCE	ACC		
2009-09-01	17:13:06	20:06:49	18:27:37	19:09:39	19:20:39	19:21:22	19:27:17	19:29:41	19:30:48	19:39:53	19:41:08	19:43:45	19:50:10	19:53:29	0:16:28	
2009-09-04	17:01:11	19:55:28	18:12:18	18:54:28	19:05:29	19:06:12	19:11:58	19:13:02	19:13:27	19:42:28	19:42:58	19:44:21	19:50:24	19:54:13	0:32:23	
2009-09-07	16:48:52	19:49:38	17:58:03	18:40:03	18:51:03	18:51:46	18:57:43	18:58:34	18:58:52	19:38:47	19:39:11	19:40:22	19:46:14	19:50:04	0:42:39	
2009-09-10	16:28:58	19:38:04	17:44:49	18:26:50	18:37:50	18:38:33	18:44:29	18:45:15	18:45:29	19:33:41	19:34:02	19:35:08	19:41:05	19:44:50	0:50:39	
2009-09-13	16:15:45	19:23:59	17:33:12	18:15:13	18:26:13	18:26:56	18:32:52	18:33:34	18:33:49	19:28:03	19:28:23	19:29:28	19:35:20	19:39:10	0:56:36	
2009-09-16	16:03:10	19:19:20	17:21:15	18:03:08	18:14:08	18:14:51	18:20:55	18:21:37	18:21:52	19:19:43	19:20:18	19:21:10	19:26:55	19:30:45	1:00:15	
2009-09-19	16:11:00	18:58:37	17:10:18	17:52:14	18:03:14	18:03:57	18:09:58	18:10:41	18:10:57	19:10:00	19:10:21	19:11:30	19:17:29	19:21:08	1:01:32	
2009-09-22	15:54:43	18:48:21	17:02:18	17:44:12	17:55:12	17:55:55	18:01:58	18:02:45	18:03:02	19:00:24	19:00:49	19:02:01	19:07:59	19:11:38	1:00:03	
2009-10-25	15:29:43	18:35:42	16:56:53	17:38:55	17:49:55	17:50:38	17:56:33	17:57:29	17:57:49	18:49:27	18:49:55	18:51:18	18:57:34	19:01:02	0:54:45	
2009-09-28	15:33:44	18:31:08	16:53:52	17:35:52	17:46:52	17:47:35	17:53:32	17:54:52	17:55:22	18:34:22	18:34:59	18:36:47	18:42:47	18:46:29	0:43:15	
2009-10-01	14:26:00	18:13:22	16:58:21	17:40:28	17:51:28	17:52:11	17:58:01	n.a.	n.a.	n.a.	n.a.	18:10:57	18:17:19	18:20:43	0:12:56	

IMU1 Usage during Eclipse

IMU Usage during Eclipse Season					Winter 2009	
IMU On	IMU Off	From Health Check		From Auto Calibration	On Time	Accumulated On Time
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]		
2009-09-01 13:52:40	2009-09-01 19:55:51	0.3271	0.2451	0.2657	6:03:11	6:03:11
2009-09-04 13:57:48	2009-09-04 19:56:36	0.2888	0.3010	0.3562	5:58:48	12:01:59
2009-09-07 13:26:00	2009-09-07 19:52:25	0.2763	0.2317	0.3562	6:26:25	18:28:24
2009-09-10 13:15:50	2009-09-10 19:47:12	0.2534	0.1793	0.2381	6:31:22	24:59:46
2009-09-13 13:12:14	2009-09-13 19:41:00	0.2821	0.2233	0.2587	6:28:46	31:28:32
2009-09-16 12:49:02	2009-09-16 19:33:07	0.2050	0.2617	0.3301	6:44:05	38:12:37
2009-09-19 12:47:04	2009-09-19 19:23:30	0.3314	0.2883	0.3057	6:36:26	44:49:03
2009-09-22 12:41:00	2009-09-22 19:14:00	0.2314	0.2983	0.2805	6:33:00	51:22:03
2009-09-25 12:15:00	2009-09-25 19:03:23	0.2367	0.2220	0.2723	6:48:23	58:10:26
2009-09-28 12:20:06	2009-09-28 18:48:50	0.3062	0.2067	0.2723	6:28:44	64:39:10
2009-10-01 13:28:00	2009-10-01 18:23:05	0.0856	0.2900	0.2914	4:55:05	69:34:15

8.1.2 SPI Operations

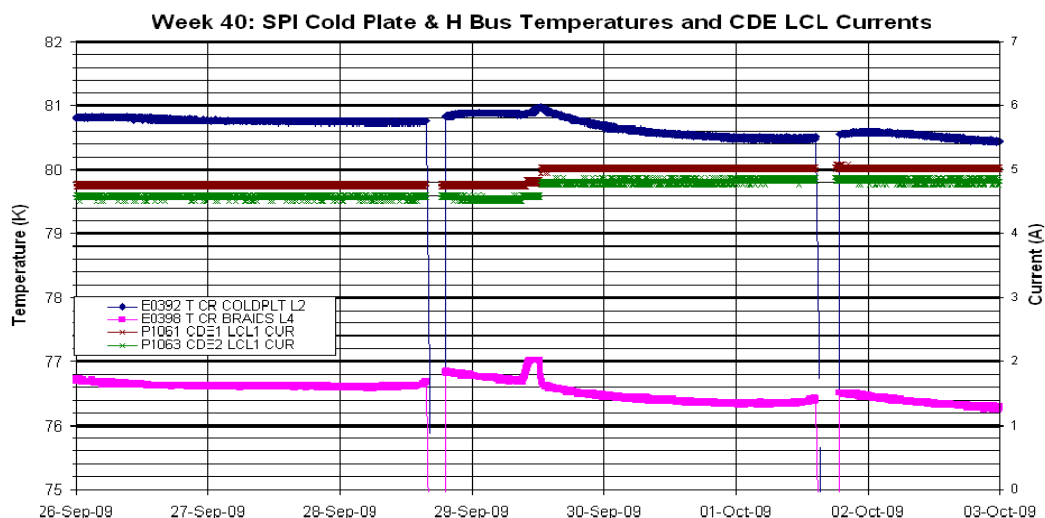
Unit Temperatures: All the equipment temperatures are inside the operational limits. The following plot shows their evolution during the reporting period. The temperature recovery after eclipse was nominal:



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 2009-09-29 at 12:21:17Z, when it was 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 as well as the CDE LCL currents during the reporting period⁴:

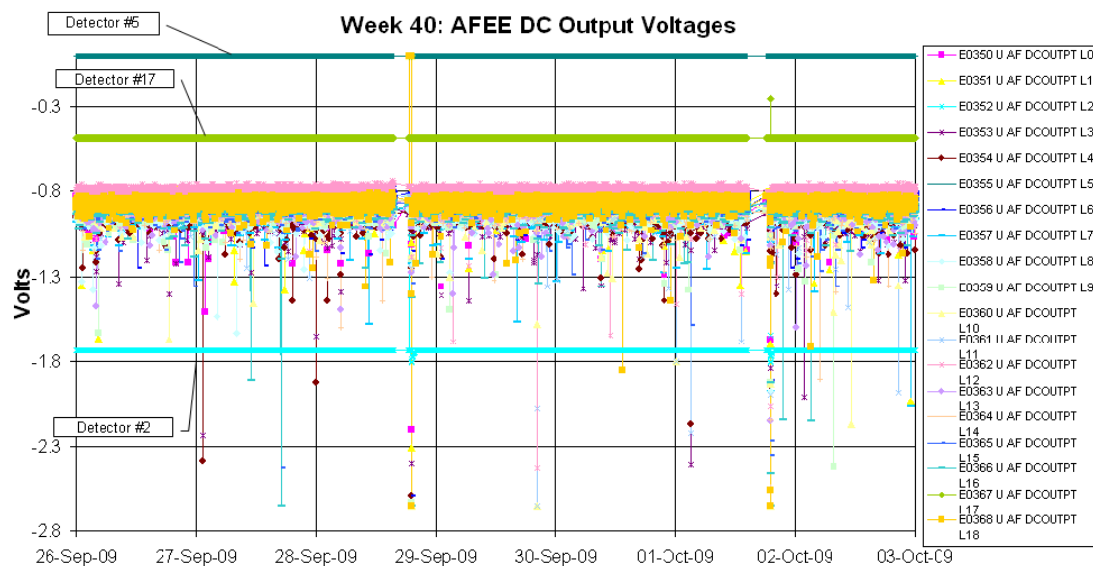


⁴ Data sampled every 8th packet (64sec)

DPE & IASW: The DPE health and IASW performance are nominal. The IASW version installed is v4.3.4 with SE compression only enabled and the spectra scaling factor set to 8/19 SE. The DPE CPU usage was nominal during the reporting period (see plot in Section 3.2.1).

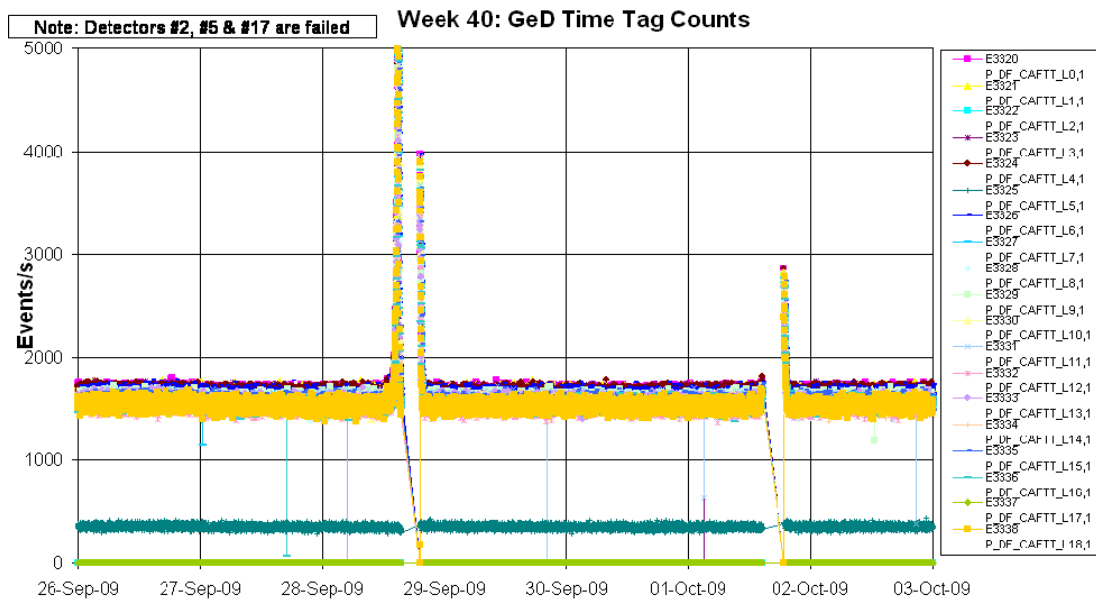
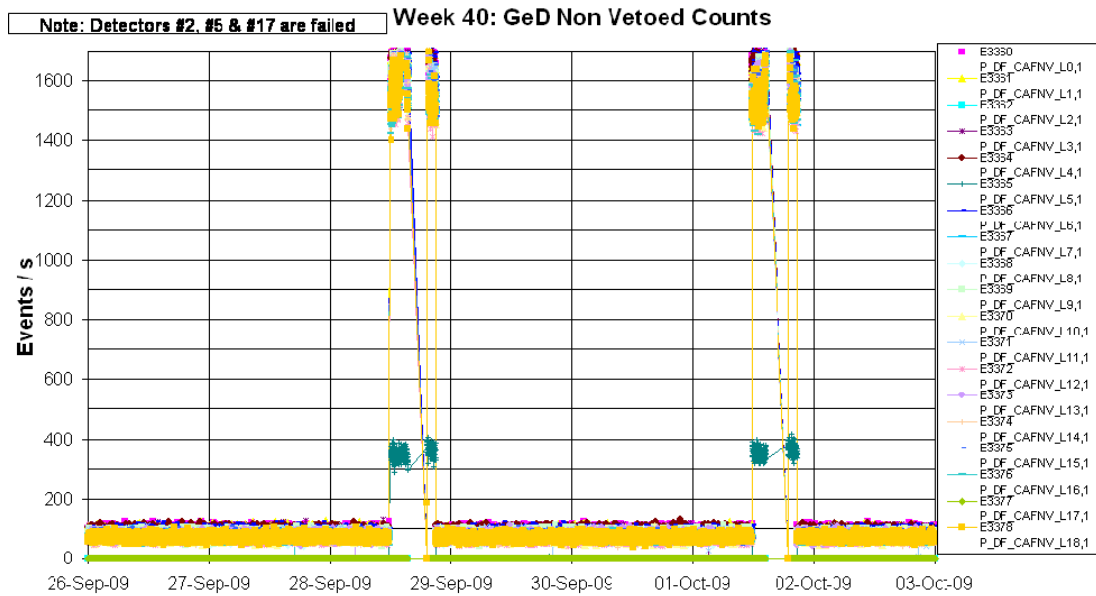
ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61). A plot of the ACS counts is given in Section 3.2.6.

AFEE: The health of the AFEE is nominal. The following plot shows the dc output voltage of the detector channels during the reporting period⁵. The values are nominal. Detector #2 is failed since 06/12/2003; detector #17 is failed since 17/07/2004 and detector #5 is failed since 19/02/2009. The HV of the failed detectors are nominally set to 0.5kV.

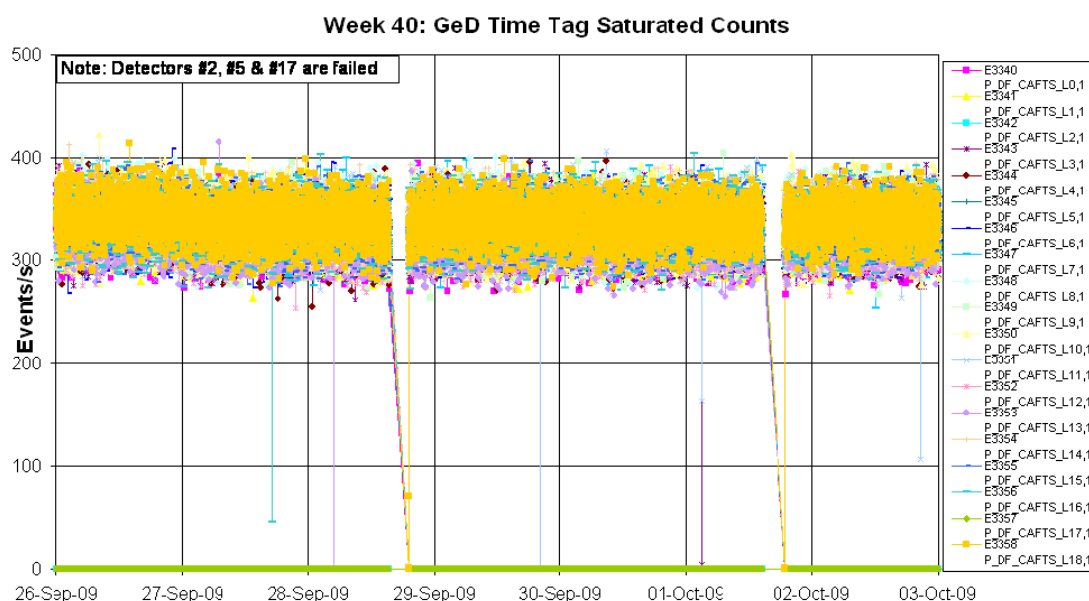


⁵ Data sampled every 8th packet (64sec)

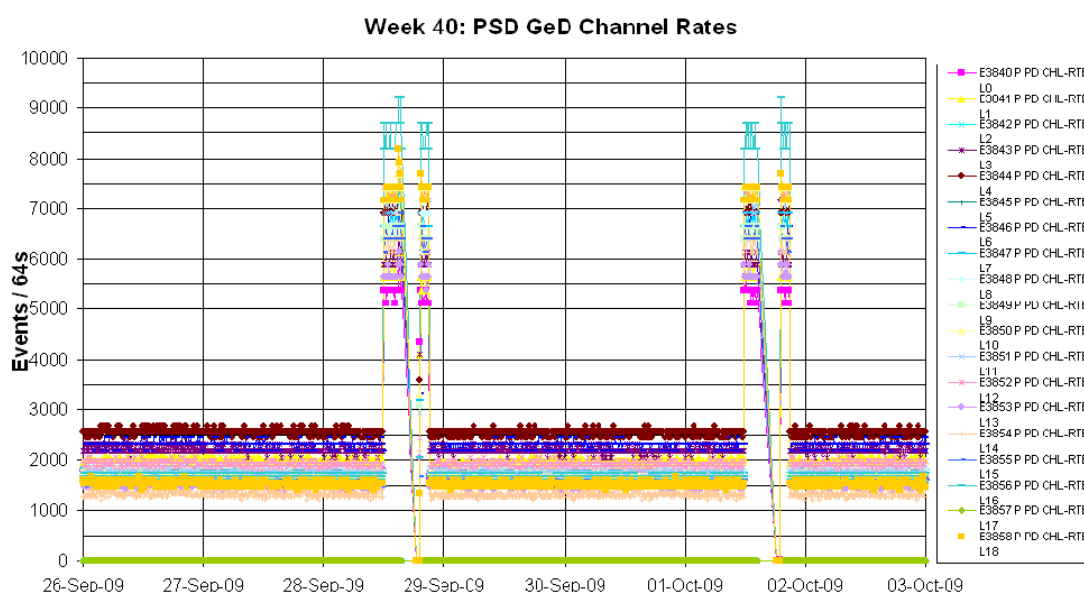
DFEE: The health of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event count rates during the reporting period⁶.



⁶ Data sampled every 8th packet (64sec)



PSD: The overall health of the unit is nominal. The following plot shows the PSD channel rates over the reporting period⁷:



Event Log:

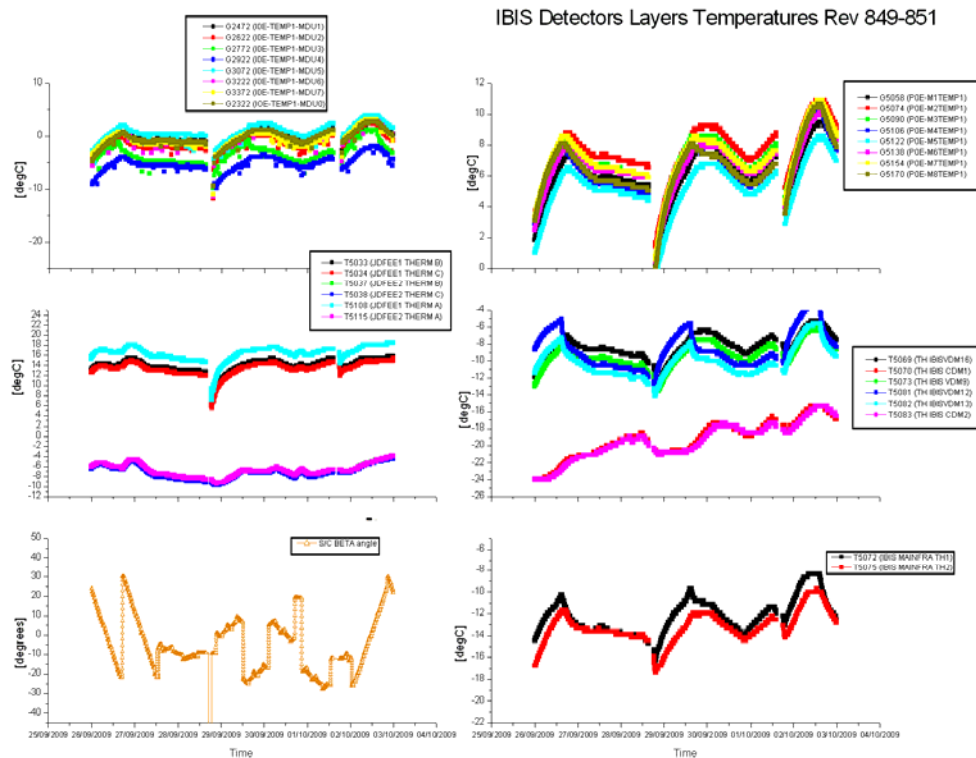
The following non-nominal events occurred with SPI over the reporting period:

- On 2009-09-29 at 01:12:42Z TM parameter E1297 (ACS FEE Configuration error) went OOL (value = ERROR STATE). As it returned within limits at the next TM cycle (01:12:50Z), no action was taken.

⁷ Data sampled every 8th packet (64sec)

8.1.3 IBIS Operations

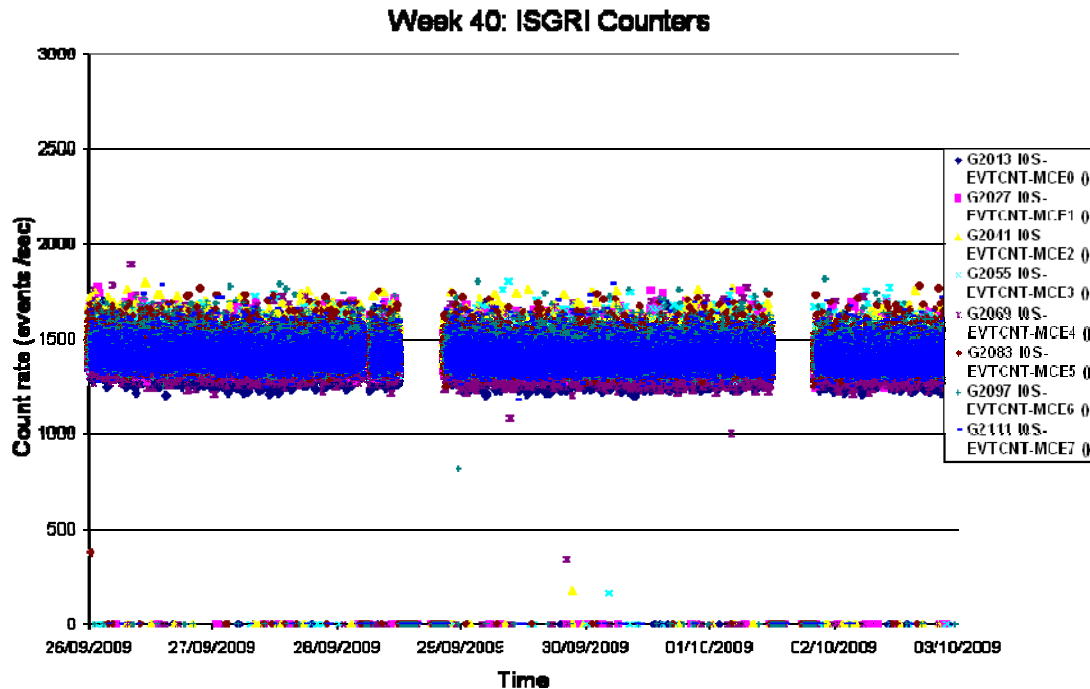
Unit Temperatures: All the equipment temperatures were inside the operational limits throughout the week. The following plot shows selected IBIS temperatures, along with those of the JEM-X DFEF and the S/C beta angle for comparison. The temperature recovery of the units after eclipse was nominal.



**sampling every 8 pkts (64 secs)

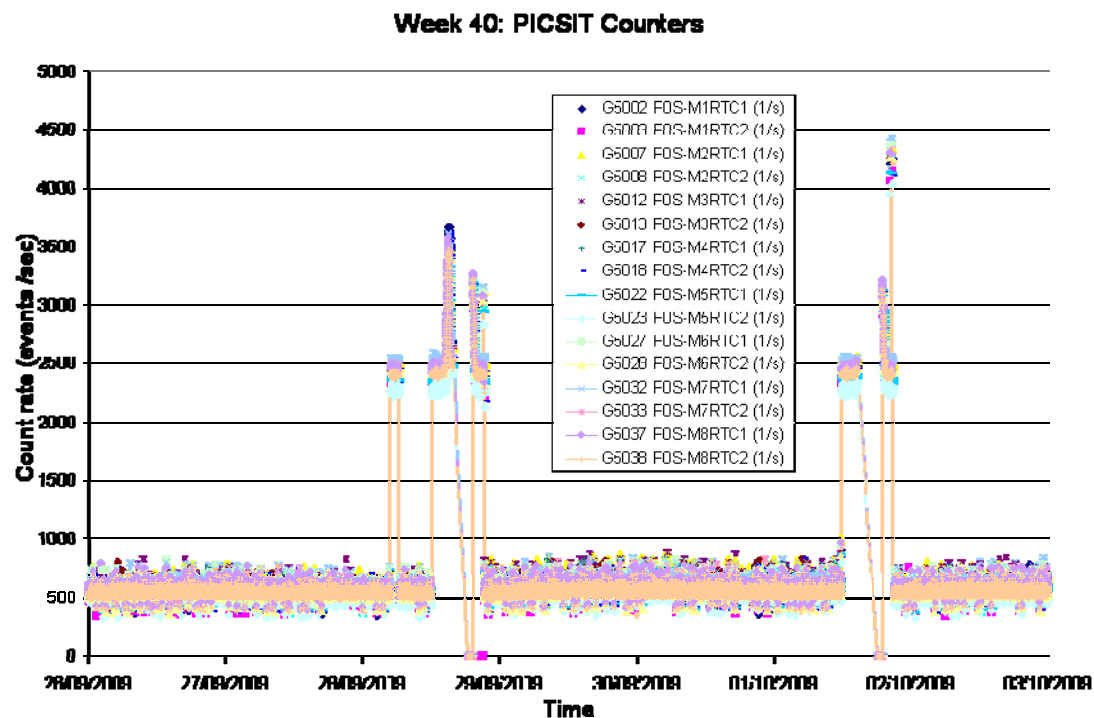
ISGRI

The health and performance of ISGRI was nominal during the reporting period. The following plot shows the ISGRI MCE counters during the week⁸:



PICsIT

The health and performance of PICsIT was nominal during the reporting period. The following plot shows the PICsIT semi-module counters during the week⁹:

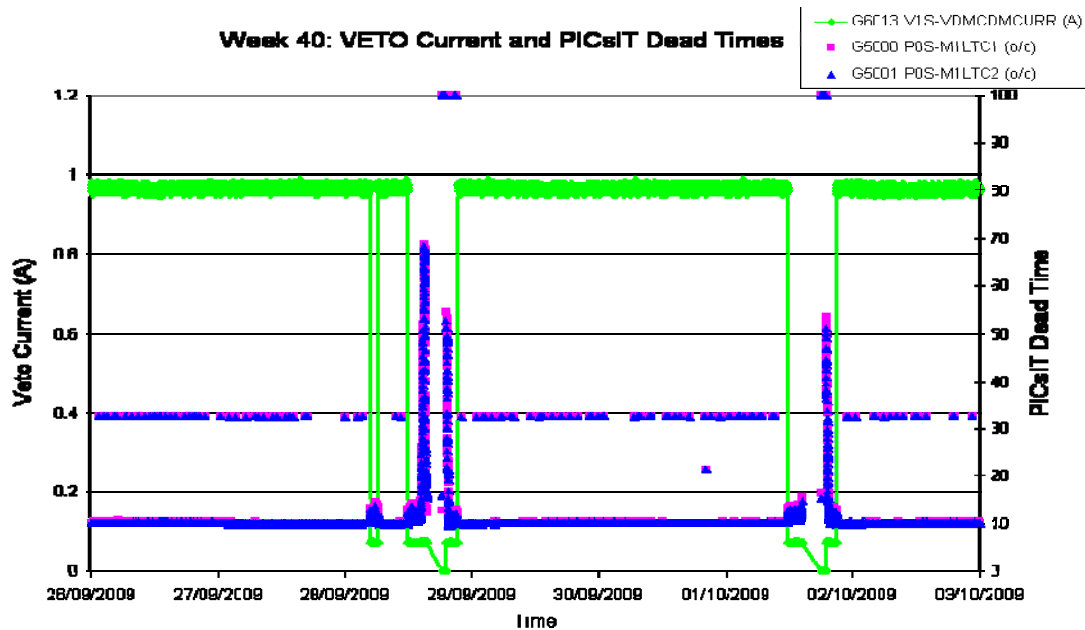


⁸ Data sampled every 4th packet (32sec)

⁹ Data sampled every 4th packet (32sec)

VETO

The health and performance of VETO was nominal during the reporting period. The following plot shows the VETO current and PICsIT dead-times during the week¹⁰:



IBIS Daily Report

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), G5002 (POS-Mi_RTC1) and G5003 (POS-Mi_RTC2) families and G2000 family (IOE-OVFWPXADD-Mi) were received during the radiation belt passages.

2009-09-26 (DOY 269, Rev. 849) to 2009-09-27 (DOY 270, Rev. 849)

IBIS operations executed nominally.

2009-09-28 (DOY 271, Rev. 849-850)

Due to an IREM SEU, IBIS transitioned autonomously to Safe configuration at 04:51:07Z. It was recovered as follows:

- At 06:12:25Z FCP_IBIS1_0803 IBIS EXIT FROM SAFE MODE
 - At 07:17:34Z ED GESTAN02 uplinked with the planned observation parameters and commanding to IBIS from the Timeline re-enabled.
- IBIS operations continued nominally.

At 06:27:14Z TM parameter G2097 went OOL Low (value = 0). This is the number of events triggering the MCE6 per second. As it returned within limits of its own accord at 06:28:42Z, no action was taken.

2009-09-29 (DOY 272, Rev. 850) to 2009-10-02 (DOY 275, Rev. 851)

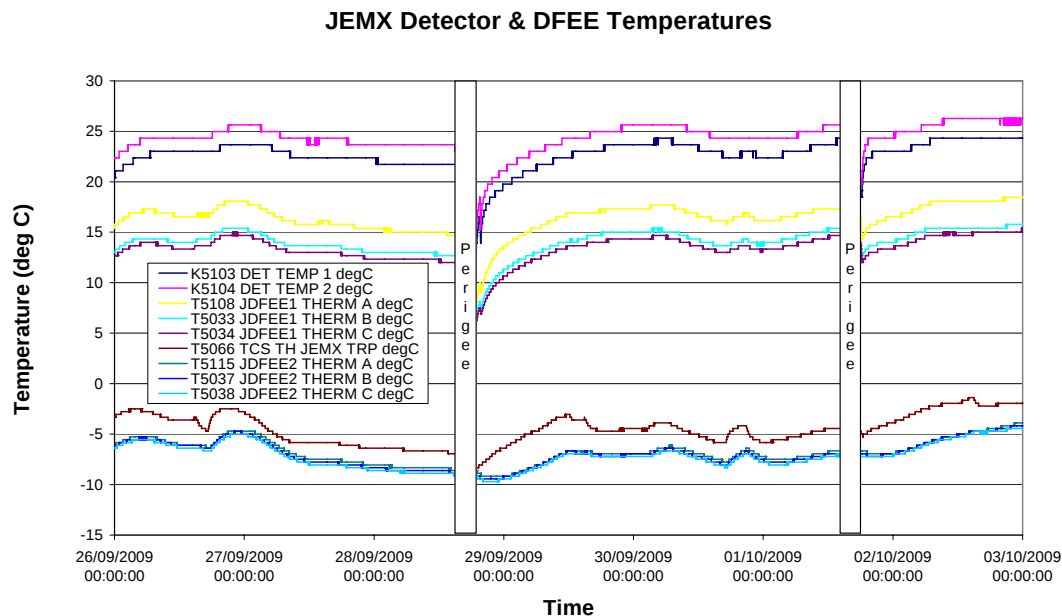
IBIS operations executed nominally.

¹⁰ Data sampled every 4th packet (32sec)

8.1.4 JEM-X Operations

JEM-X Temperatures

JEM-X Detector and DFEE temperatures, along with the temperature on the detector bench between the two units, over the reporting period are displayed in the following graph¹¹.



JEM-X Daily Report

2009-09-26 (DoY 269 Rev 849) to 2009-09-27 (DoY 270 Rev 849)

JEM-X 1 operations executed nominally.

2009-09-28 (DoY 271 Rev 849-850)

At 04:51:49 JEMX parameters K5315, K5316 & K5317 went Out-of-Limits due to an IREM SEU (#81). There was no impact as the reaction has been disabled.

At 18:42:32, during the post-eclipse reconfiguration of JEM-X1, a DFEE anomaly occurred:

The symptoms were as follows:

1) The following OEMs were received after the JEM-X1 DFEE was switched on by the ED KECLXT01 (executed by time-tag at 2009-09-28T18:41:51Z):

```
2009.271.18.42.31.671 2009.271.18.42.41.805 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 8
FIX16 0
```

¹¹ Data sampled (1 frame in 8)

Doc. Title : INTEGRAL Mission Report #367
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 05/10/09

Issue : 1
Rev. : 0
Page : 23

>> Indicating that the operation “Load DFEE context” was unsuccessful due to CRC failure of the area B000 (hex) to CFFF (hex).

```
2009.271.18.42.31.671 2009.271.18.42.41.818 1536 RealTime 234 EVENT JEM-X1 AUTO
EVENT 4 0 0 65535 PR N E E
FIX6 4
K9079 MESS CLASS 0
K9080 MESS ID 234
K5419 ACTUAL LEVEL ECLIPSE
K5420 TARGET LEVEL RAD.
```

>>> Indicating failure of the automatic recovery from shutdown level ECLIPSE to shutdown level RAD. BELTS

A dump of the CRCs yielded the following values:

K5012 - 255 - 255 - 255
K5017 - B000 - B000 - C000
K5018 - 2000 - 1000 - 1000
K5019 - F1B3 - F074 - CF9F

These are nominal and would indicate there was actually no CRC error.

2) 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.

In response to this, the following operations were performed:

- 1) To recover JEM-X1, a DFEE power cycle was then performed according to CRP_JEM1_5010 JEMX1 DFEE POWER CYCLE

From 19:44:00 to 19:44:20, TM parameter KD5380D indicated a false status. No action was taken, and there was no impact.

During the power cycling activities, there were a string of minor out-of-limits, which are normal during this activity.

At 20:15Z JEMX re-enabled in T/L.

The above recovery proceeded nominally and JEM-X1 operations then continued from the Timeline.

2009-09-29 (DoY 272 Rev 850)

At the indicated times, the following OEMs were received:

```
2009.272.23.36.09.235 2009.272.23.36.12.475 1536 RealTime 5 EXCEPTION
JEM-X1 EXC IACS INTERF EXID 0 0 65535 PR N
E E
FIX6 0
K9079 MESS CLASS 1
K9080 MESS ID 5
K9065 CSSW OPERAT ID START
K9066 TASK ID 8 IASW
K9067 LOGICAL ADDRESS 4989
```

Doc. Title : INTEGRAL Mission Report #367
 Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
 Date : 05/10/09

Issue : 1
 Rev. : 0
 Page : 24

```

2009.272.23.36.09.235  2009.272.23.36.12.487  1536  RealTime  6  EXCEPTION
JEM-X1 EXC IACS INTERF CULP  0  0  65535  PR  N
E  E
  FIX6  0
  K9079  MESS CLASS  1
  K9080  MESS ID  6
  K9065  CSSW OPERAT ID  START
  K9066  TASK ID 8  IASW
  K9067  LOGICAL ADDRESS  19726
  
```

No action was taken, and there was no impact.

2009-09-30 (DoY 273 Rev 850)

JEM-X 1 operations executed nominally.

2009-10-01 (DoY 274 Rev 850-851)

From 18:16:28 to 18:16:52, TM parameter KD5380D indicated a false status. No action was taken, and there was no impact.

2009-10-02 (DoY 275 Rev 851)

JEM-X 1 operations executed nominally.

8.1.5 OMC Operations

2009-09-26 (DoY 269, Rev 849)

Nothing to report.

2009-09-27 (DoY 270, Rev 849)

At 10:58, an AOCS command failed release forcing a suspension of the timeline. A manual slew was performed enabling the OMC commands at 11:37 for pointing 08490065 to proceed nominally. The timeline rejoined at 11:51. The impact was the loss of pointing 08490064. It was at this time that the following pair of commands were rejected:

```

2009.270.11.01.16.844  2009.270.11.01.30.113  1792  RealTime  131  TC REJECT
REJECTED TC1  0  0  65535  PR  N
E  E
2009.270.11.01.23.532  2009.270.11.01.36.549  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 that pointing.

2009-09-28 (DoY 271, Rev 850)

At 04:51:08, an IREM SEU (#81) forced OMC to SAFE mode, a recovery was performed, and the unit returned to standby at 05:58:54. The impact was the interruption after 1088 from a planned 3479 seconds of pointing 08490086, and the loss of pointing 08490087.

2009-09-29 (DoY 272, Rev 850)

At 11:52, Flight dynamics failed to update slew 08500027, this however was allowed to go from the timeline. At 12:30, with the FD job scheduler not working, the AOCS part of the timeline was stopped. The next 3 slews were manually updated, before the scheduler was fixed in time for pointing 08500031. The impact was pointings 08500028 & 08500029 were executed at the wrong attitude.

2009-09-30 (DoY 273, Rev 850)

From 17:20:53 to 21:11:54 a Flat-field calibration was performed.

2009-10-01 (DoY 274, Rev 850) to 2009-10-02 (DoY 275, Rev 851)

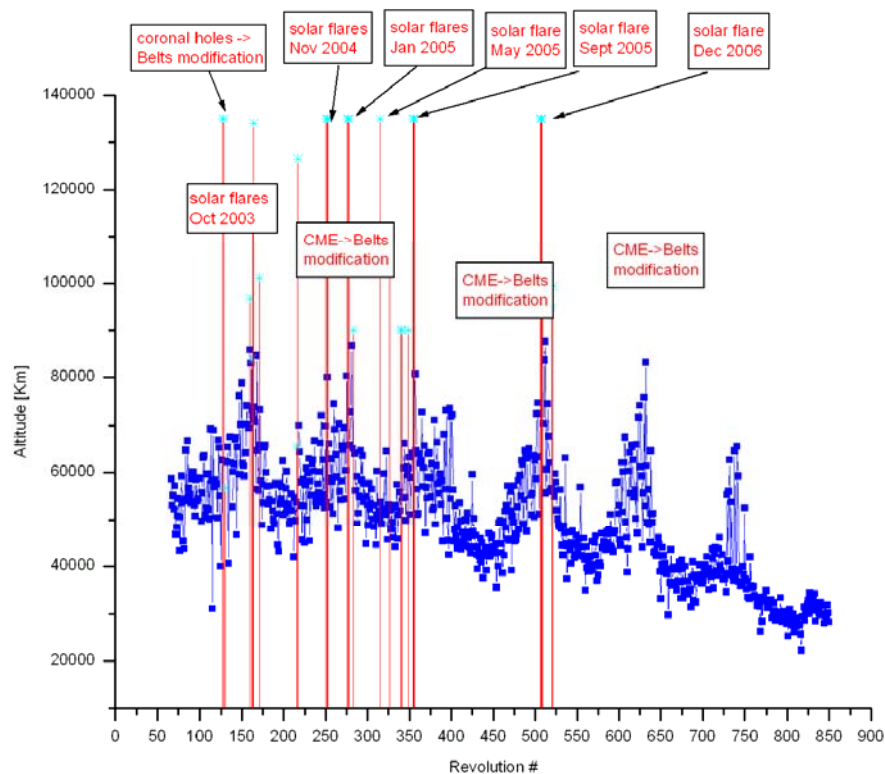
Nothing to report.

On DoY 271 at 11:58:12 and DoY 274 at 11:46:12 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

8.1.6 IREM Operations

Radiation Belts Entry

Evolution of Radiation Belt Entry 2003-2008



IREM daily report

DoY 2009.271 (28/09/2009):

At 04:51:07Z, a local reset of the IREM CSCI S/W (SEU #81) occurred. 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 2009.271.04.51:07Z (101266.0 km). The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex); just before the anomaly, radiation counters reported nominal values considering the position of the S/C along the orbit;
- 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. 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 11:00:00Z.

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 05:59:00Z and IBIS at 07:17:00Z.

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Observed Entry/Exit Altitude [Km]	Electron CUT-OFF Predicted Entry/Exit	Predicted Entry/Exit Altitude [Km]
849	RAD_ENTR R 2009-09-28T11:58:09Z	28/09/2009 14:25:07	30122.0	28-Sep-2009 14:22:38	29701.24
850	RAD_EXIT R 2009-09-28T20:49:25Z	28/09/2009 19:36:27	38252.0	28-Sep-2009 20:32:38	47657.69
850	RAD_ENTR R 2009-10-01T11:46:10Z	01/10/2009 14:22:35	28230.9	01-Oct-2009 13:32:15	30425.54
851	RAD_EXIT R 2009-10-01T20:37:41Z	01/10/2009 19:28:03	38238.4	01-Oct-2009 19:52:15	48464.42

Reference

High radiation

Very small error vs reference (less than 10 minutes)

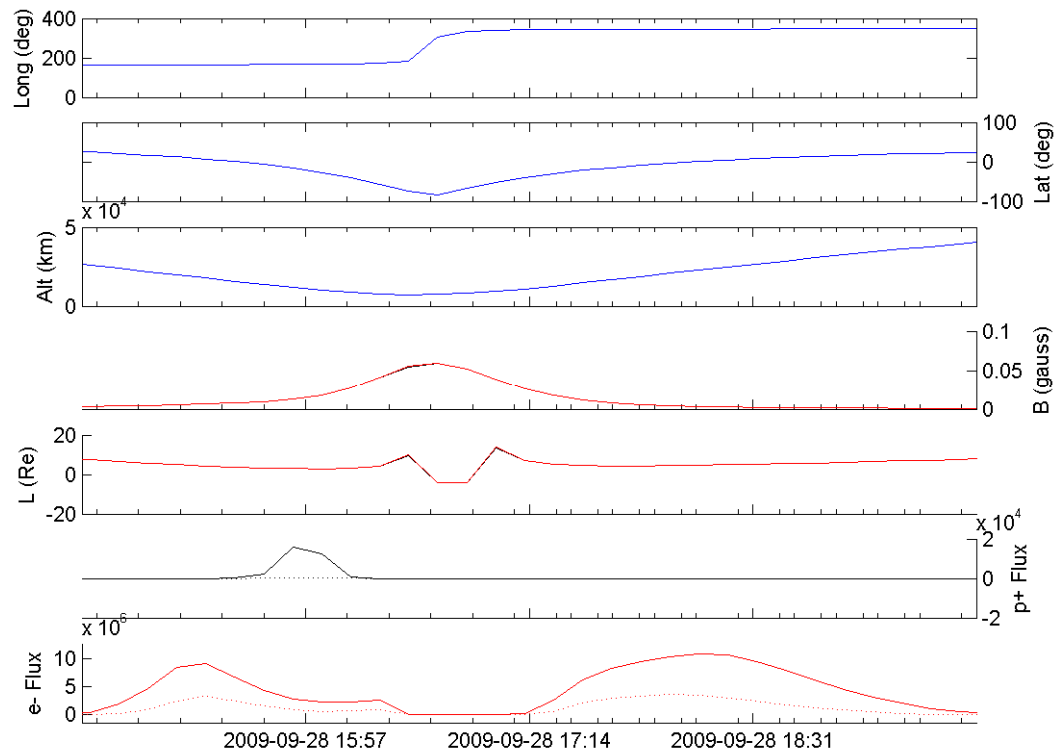
Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

Rad belt entry time ignoring previous threshold crossings where a gap of more than 30 minutes is present.

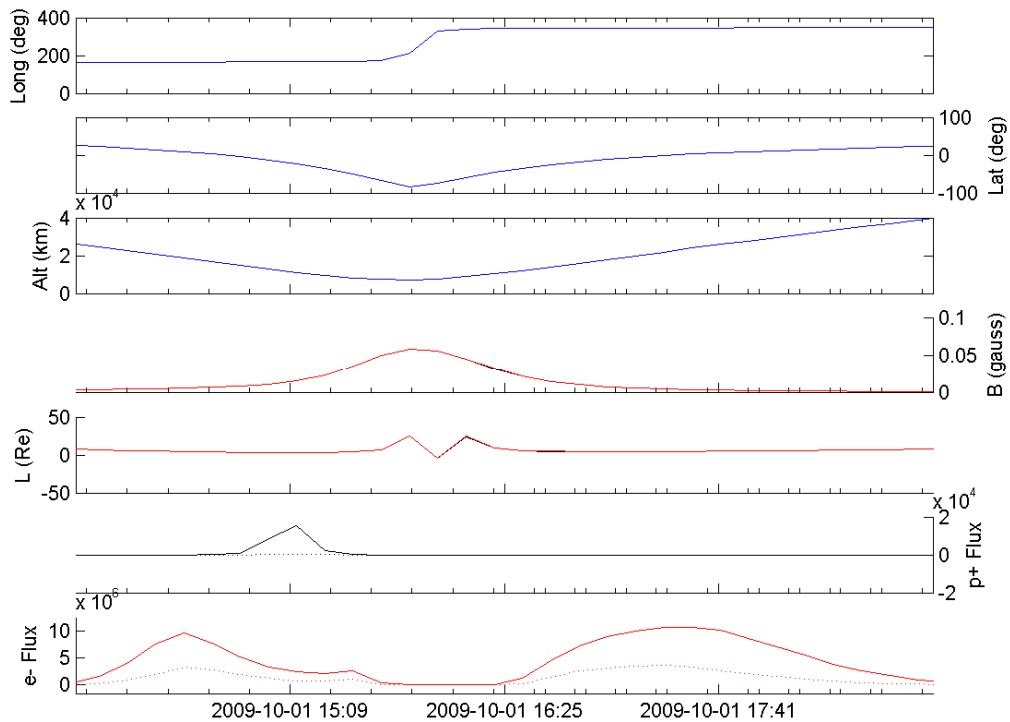
IREM Predicted Radiation Belt Passages

Rev 849



X: 0 Y: 0 get Data Zoom Print...

Rev 850



X: 0 Y: 0 get Data Zoom Print...