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

INTEGRAL
Mission Report

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

No. 264
Week 41

15.10.07

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.

It addresses the activities from 06.10.07 until 12.10.07 (both dates inclusive) and covers the revolutions 609 and 610.

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 raster dither of SS433 (RA 19:11:49.56, DEC +04:58:57.6), a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), a Custom Pointing at the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), a raster dither of the Galactic Plane Region 1 (RA 18:04:41.75, DEC -05:04:48.4).

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.

The winter 2007 Eclipse Season occurred on 11/10/2007. The first eclipse passage was nominal from an AOCS point of view.

As results of the periodic IMU 1 calibration performed on 03/10/2007, the IMUs drift corrections were updated during rev 609.

As part of the AOCS preparation for the winter 2007 eclipse season, the onboard AMD thresholds were set to their eclipse season values at the beginning of rev 609. In the same time frame were verified the AMD dead band value, the IMU timers, the load of the TT sequence to re-enable the IMU Auto Switch-Off function in the ACC and the Eclipse ACC\FDE\FCE timers.

No slews were missed from TL, during the observation period.

The fuel consumption over the period between 06/10/2007 and 11/10/2007 was 0.0644 Kg. The remaining propellant is in the order of 144.2016 Kg.

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

3.1.2 Power

The EPS is 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.

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

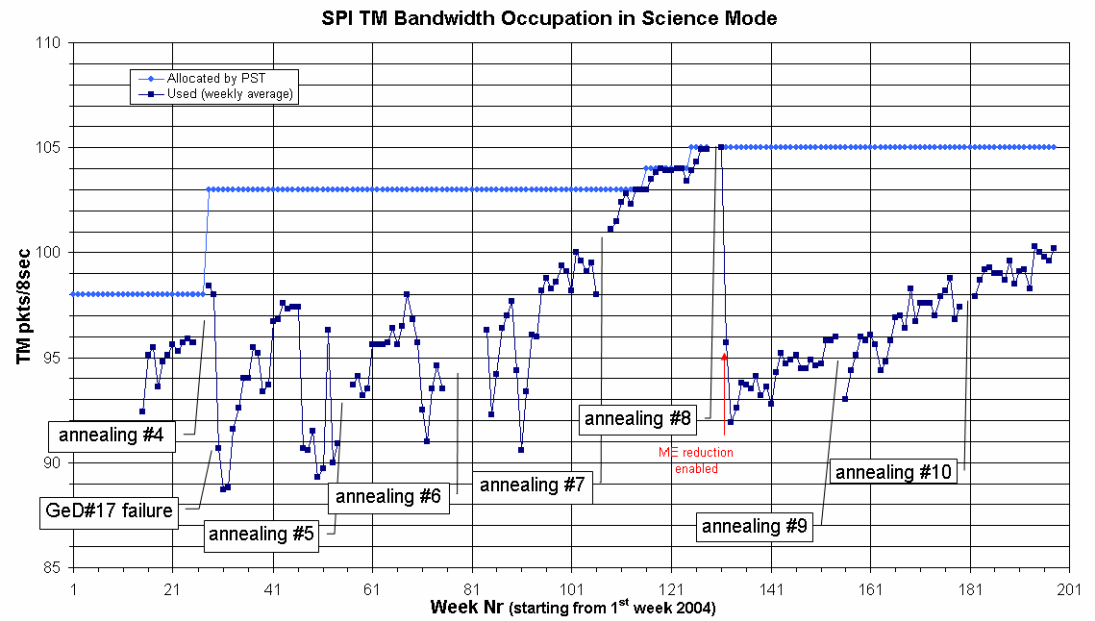
Following the 10th annealing, which ended on 17th June, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operating at a lower HV setting of 3.5kV (instead of 4kV). Detector #2 is failed since 06.12.2003 and detector #17 since 17.07.2004.

The Stirling compressors are working nominally, maintaining the Germanium detectors at 80 +/-1K.

During science operations, the instrument was kept in photon-by-photon mode with spectra TM enabled. The assigned TM bandwidth in the science observation windows was 105 packets/cycle except. The average telemetry occupation when the TM allocation was 105 packets/cycle was 100.2 packets/cycle.

The first eclipse of the season occurred on 11/10/2007, during the perigee passage of revolution 609-610. SPI operations for eclipse were executed nominally, with the exception of a minor problem in the uplink of the EEXIT-02 sequence (see Event Log section in 8.3.2).

The following plot shows the assigned and the average occupation of the SPI TM bandwidth.



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

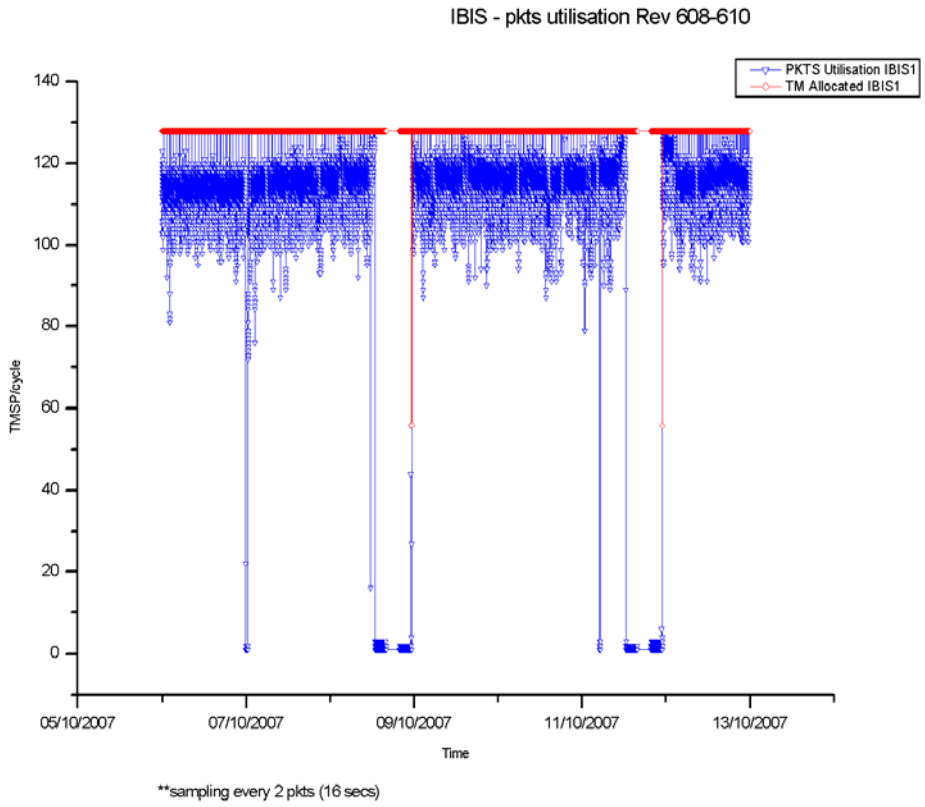
3.2.2 IBIS

The overall status of the unit is nominal.

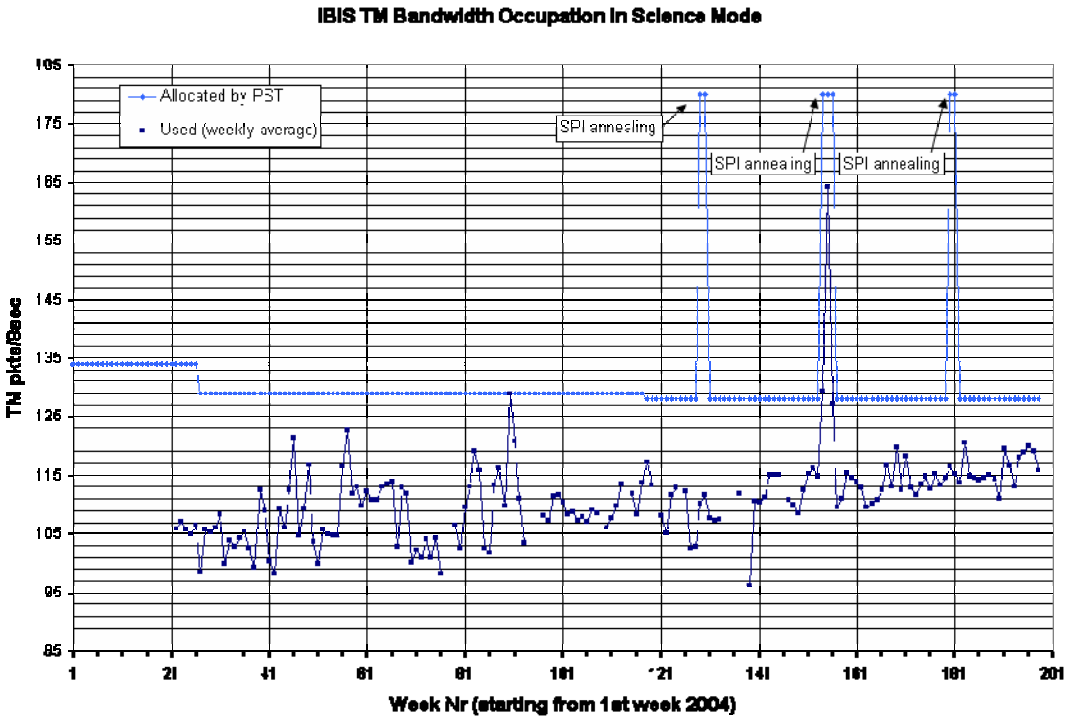
During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 115.87 TMPS/cycle, down 3.19 on last week.

The first eclipse of the season occurred on 11/10/2007, during the perigee passage of revolution 609-610. IBIS operations for eclipse were executed nominally.

A plot of the IBIS TM utilisation during the observation period is shown below:



A plot of the IBIS weekly bandwidth utilisation since 2004 is shown below:



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

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.

During this reporting period, 167 of the 168 planned science pointings for OMC were executed nominally, 1 was interrupted by an IREM SEU..

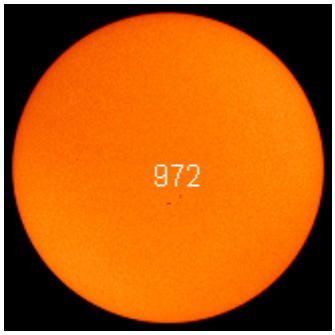
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. Sunspot 972, which posed no threat of solar flares, appeared at the beginning of the week, but by the 9th October, it had disappeared.



Reference: www.spaceweather.com

Note: Some more information concerning the IREM operations is provided in the Appendix Section 8.3.6.

4 Ground Facilities

The Operational ground facilities performance was very good this week, no pointings were missed from the Timeline. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was very good this week. The overall performance was well over the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were, however, 6 occasions of small TM drops from Redu, one of which caused a slight delay in the uplink of the JEMX commands, and 2 occasions of errors sending data to the isds. The overall performance was well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSFs for revolutions 616 & 617 have been received. Revolutions 611-614 have been replanned to work around a constraint checking problem in 611.

TSFs for revolutions 611 & 612 have been received this week.

2. Observation status

The ECS files for revolutions 601 & 602 have been received.

3. ISOC Science Data Archive

No news.

4. ISOC system

Version 16.0 has been released on 08 October.

5. Problems

The problem with different constraint checks at ISOC and MOC has not been resolved, despite efforts on both sides to investigate the question.

4.3.2 ISDC

Status of ISDC observation processing on 15/10/2007:

- Latest Standard Analysis completed: observation 05200010007 (Galactic Bulge region, Revolution 599) on 30/09/2007.

- Latest products archived: observation 05200280001 (Her X-1, Revolution 597-598) on 01/10/2007.

- Latest observation products sent to the observer: observation 05200280001 (Her X-1, Revolution 597-598) on 01/10/2007.

5 Special Events

6 Anomalies

The following problems were reported that impacted operations:

- On DoY 279, at 23:58:22, an IREM SEU (#55) caused OMC and IBIS to switch to SAFE mode. A recovery was performed, with OMC in stand-by at 00:18:57, IBIS in science mode at 00:40:33. IREM was recovered at 02:45. The impact was the loss of OMC & IBIS data for pointing 06080029.

The following anomaly reports were entered into the ARTS system this week.

AR id	Date Created	Subject	Segment	Status
INT_SC-207	2007-10-12	IBIS VETO VDM09 and VDM13 High Voltage Breakdown	Payload	Pending
INT_SC-208	2007-10-17	IREM Anomaly: Reset of IREM_CSCI S/W #55, 06/10/2007	Payload	Pending
INT-2960	2007-10-17	TMPrint Task in Summary Mode does not work if more than one parameter is selected.	IMCS	Pending
INT-2961	2007-10-05	Event Log Message appeared over 4 hours late.	IMCS	Open

7 Future Milestones

The following activities are foreseen in the next few weeks.

- Eclipse season is scheduled to finish, with the last eclipse on 1st November 2007, at the beginning of revolution 617.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 609

The observations in revolution 609 consisted entirely of a raster dither of SS433 (RA 19:11:49.56, DEC +04:58:57.6), lasting ~55.2 hours.

Revolution 610

The observations in revolution 610 began with a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. They continued with a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), lasting ~5.6 hours. This was followed by a Custom Pointing at the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), lasting ~33.7 hours. Finally a raster dither of the Galactic Plane Region 1 (RA 18:04:41.75, DEC -05:04:48.4), lasting ~11.9 hours, was performed, until the end of the revolution.

Throughout these observations, all instruments were in their nominal science modes, except JEM-X2, which is switched off. The TM allocation was IBIS 128; SPI 105; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

```
2007-09-20T21:49:58.000Z     144.5000    F   Automatic TM processing.
2007-09-22T08:04:02.000Z     144.4776    F   Automatic TM processing.
2007-09-23T21:37:18.000Z     144.4676    F   Automatic TM processing.
2007-09-25T07:25:21.000Z     144.4222    F   Automatic TM processing.
2007-09-26T21:26:30.000Z     144.4106    F   Automatic TM processing.
2007-09-28T06:54:50.000Z     144.3511    F   Automatic TM processing.
2007-09-29T21:11:34.000Z     144.3404    F   Automatic TM processing.
2007-10-01T06:44:42.000Z     144.3103    F   Automatic TM processing.
2007-10-02T20:58:30.000Z     144.2960    F   Automatic TM processing.
2007-10-04T06:22:41.000Z     144.2737    F   Automatic TM processing.
2007-10-05T20:45:41.000Z     144.2660    F   Automatic TM processing.
2007-10-07T06:12:57.000Z     144.2486    F   Automatic TM processing.
2007-10-08T20:47:49.000Z     144.2403    F   Automatic TM processing.
2007-10-10T06:12:25.000Z     144.2142    F   Automatic TM processing.
2007-10-11T21:05:01.000Z     144.2016    F   Automatic TM processing.

This report was generated  Fri Oct 12 08:00:22 GMT 2007
```

8.3 Detailed Satellite Information

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

8.3.1 AOCS SUMMARY OPERATIONS REPORT, 06/10/2007 – 12/10/2007

The AOCS operations were executed from the Automatic Timeline.

During this period, 72 Open Loop Slews, 101 Closed Loop Slews and 4 Momentum Biases were executed.

No slews were missed from TL, during the observation period.

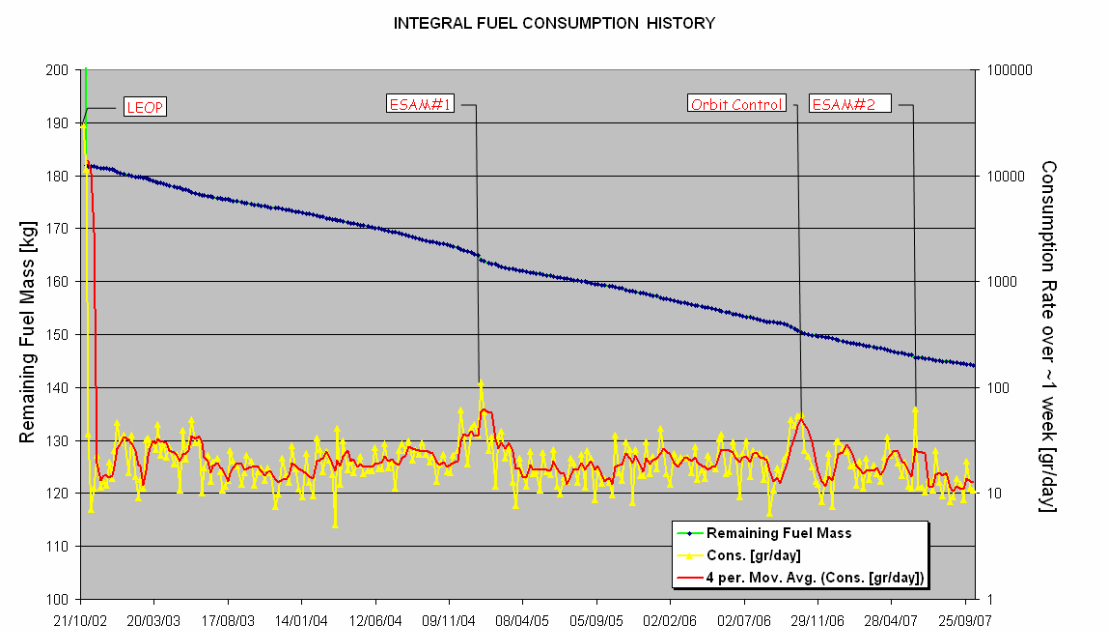
The OTF was not reached during PID 06090046.

Orbit Control

No update.

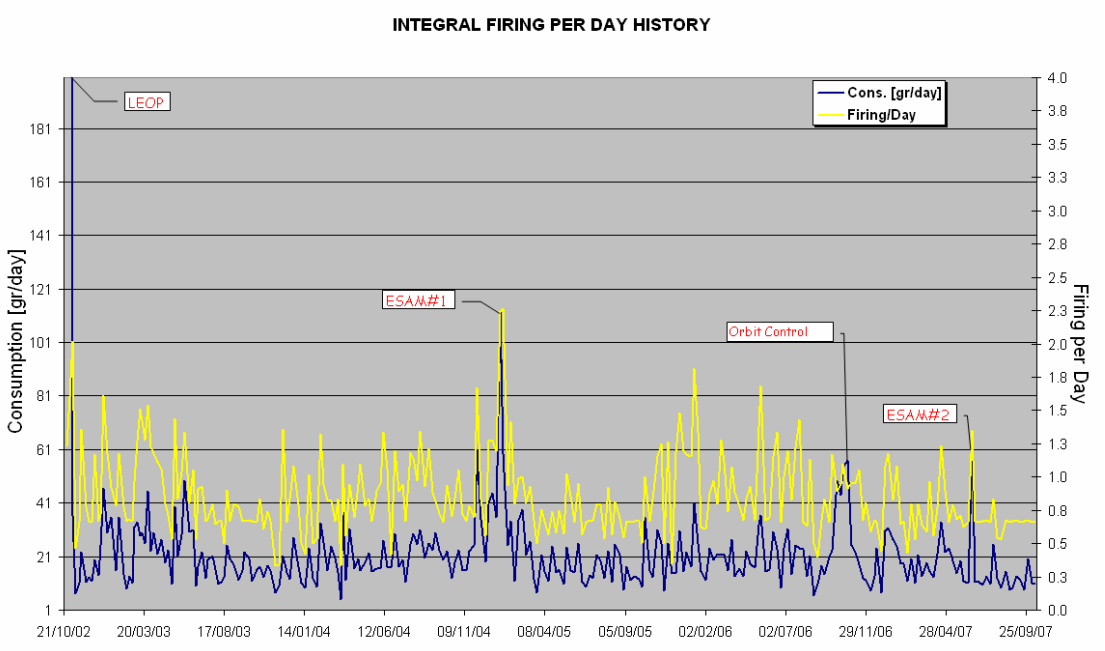
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 11/10/2007 is reported in the plot below.



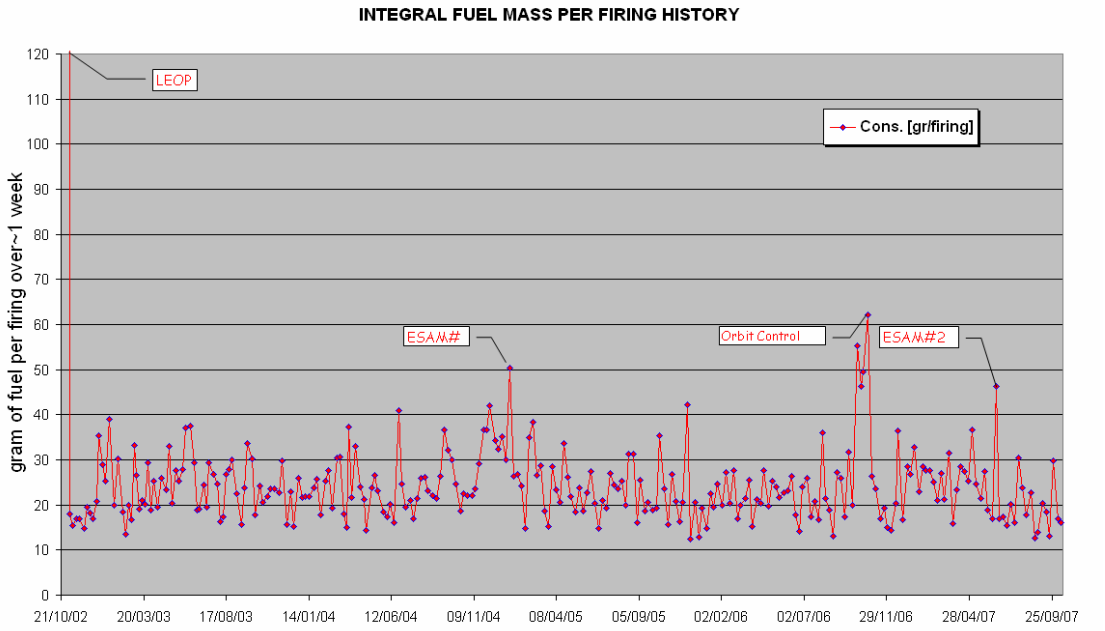
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 11/10/2007 is reported in the plot below.



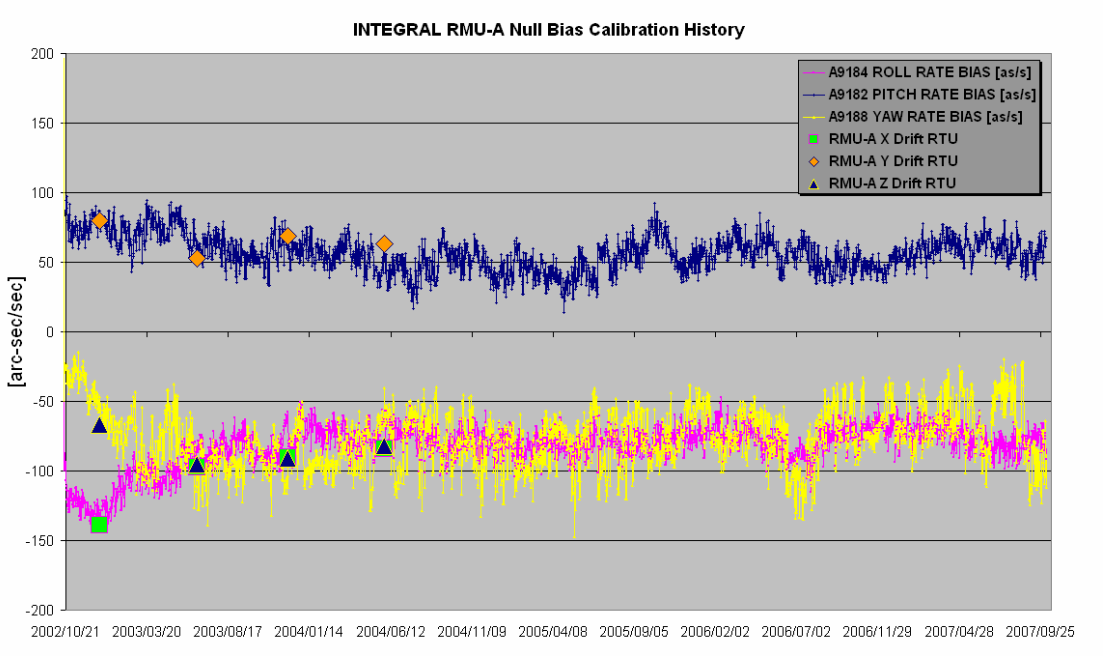
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 11/10/2007 is reported in the plot below.



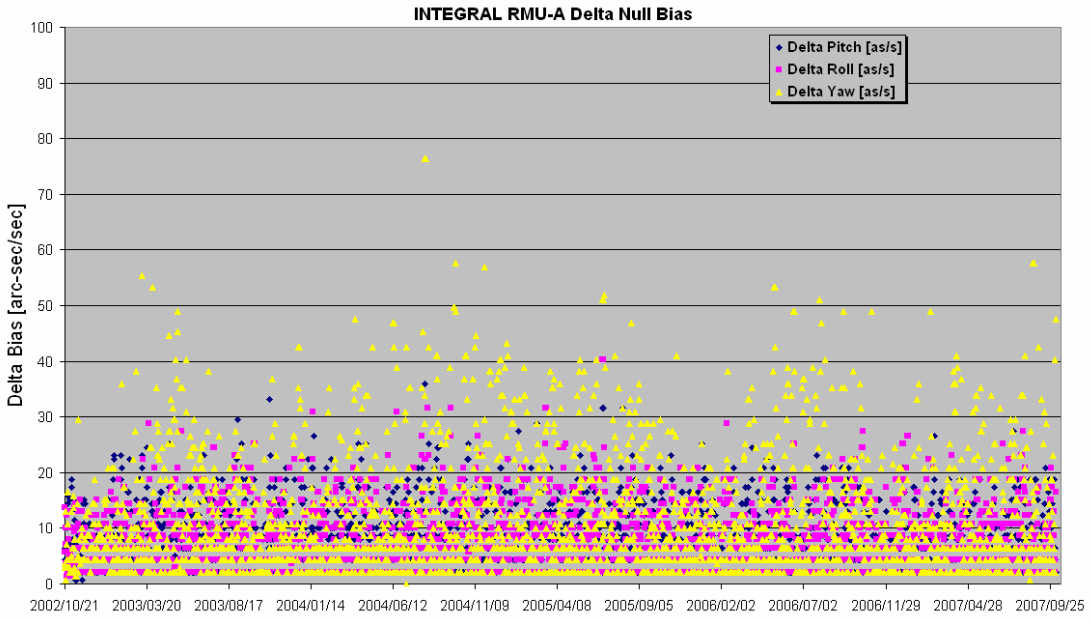
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 05/10/2007 is reported in the plot below.



The evolution of the drift on yaw channel is under constant monitoring..

The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 05/10/2007 is reported in the plot below.



06/10/2007 (Day of Year 279, Revolution 608)

Nothing to report.

07/10/2007 (Day of Year 280, Revolution 608)

Nothing to report.

08/10/2007 (Day of Year 281, Revolution 608-609)

Loss of guide star: at 16:17:50z and 16:39:04z losses of the selected guide star, Mi 7.05 @ CCD location [9309, 11180], due to false event (STR THRESHOLD EXCEEDED), occurred during the perigee passage for rev 608.

As foreseen by the IPS logic, the ACC switched ON the IMU 1 and a new automatic mapping commanded. A new guide star (same as before PP), Mi 7.05 @ CCD location [9279, 11157], suitable for the coming RWB, was picked after a manual CGS.

No impact on TL.

Loading of the Eclipse Season AMD thresholds: In preparation for the winter 2007 Eclipse passages (according to FCP_AOC_0524), the on-board AMD thresholds were set to their eclipse season values, accordingly to the table below:

Thresholds from INT-MA-AI-0001, 5.3.2.4.2.2, and INT-PR-MMB-0005 page 5-9, modified as per new AMD Threshold agreement for the eclipse season.

01- Update of thresholds after uplink of new RW Inertias on 22/01/2004. 0155_0001_M.RWI

Wheel Inertia:

RW#1:	0.096000	Kgm**2
RW#2:	0.097650	Kgm**2
RW#3:	0.097272	Kgm**2
RW#4:	0.097649	Kgm**2

Eclipse Season:

	Subset 1		Subset 2	
WSMAX	39.5	Nms	35.9	Nms
WSMIN	1.2	Nms	4.8	Nms

WSMAX	To Uplink:				In rpm:	
	X1		X2		X1	X2
RW#1:	411.458333	rd/s	373.958333	rd/s	3929	3571
RW#2:	404.507960	rd/s	367.641411	rd/s	3863	3511
RW#3:	406.078637	rd/s	369.068939	rd/s	3878	3524
RW#4:	404.508374	rd/s	367.641788	rd/s	3863	3511

WSMIN	To Uplink:				In rpm:	
	X1		X2		X1	X2
RW#1:	12.500000	rd/s	50.000000	rd/s	119	477
RW#2:	12.288849	rd/s	49.155398	rd/s	117	469
RW#3:	12.336566	rd/s	49.346265	rd/s	118	471
RW#4:	12.288862	rd/s	49.155448	rd/s	117	469

The uplink was performed at the beginning of rev 609 in accordance to the eclipse Wheels profile planned by FD.

In the same time frame, were verified the AMD dead band value, the IMU timers, the load of the TT sequence to re-enable the IMU Auto Switch-Off function in the ACC and the Eclipse ACC\FDE\FCE timers.

FDS not updating Reaction Wheels Plot: at 23:25z the FDS stopped updating the Reaction Wheels profiles plot with real-time S/C TM. The origin of the problem was related to a lost of TM links at REDU station. FD on call solved the problem on slew update and the FDS provided regularly the manoeuvre updates.

The problem on the Wheels profiles lasted until the morning, when the FD team restarted the task responsible for the plot generation. Under advice of FD on call the Wheels profiles were checked wrt the predicted values, at the end of each slew, manually, by using the table reported in the Epos Summary (ESM) file.

No impact on TL.

09/10/2007 (Day of Year 282, Revolution 609)

Nothing to report.

10/10/2007 (Day of Year 283, Revolution 609)

Loss of guide star: at 18:37:32z loss of the selected guide star, due to false event (STR THRESHOLD EXCEEDED), occurred during PID 06090046.

As foreseen by the IPS logic, the ACC switched ON the IMU 1 and a new automatic mapping commanded. A new guide star was picked.

No impact on TL. The OTF was not reached during PID 06090046.

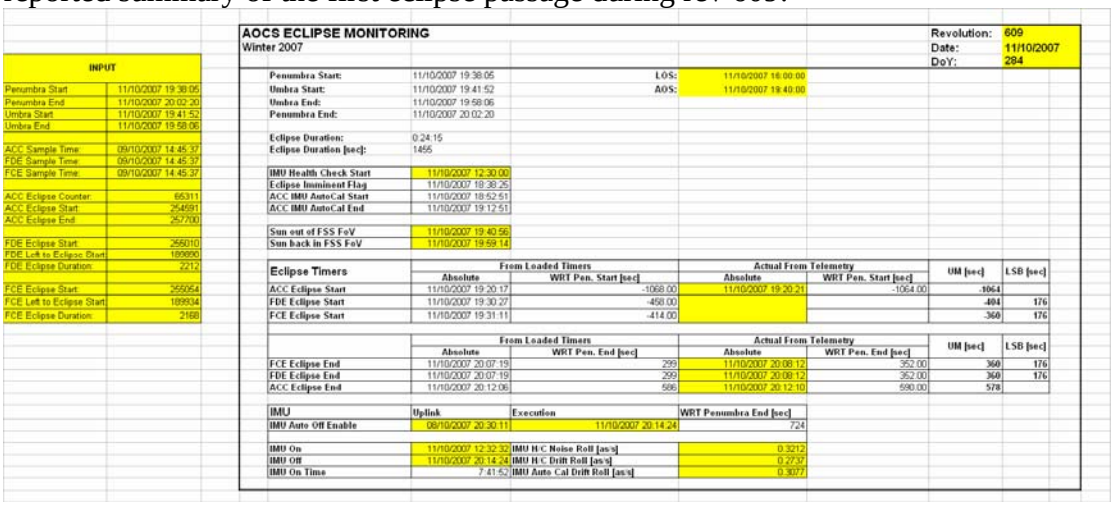
IMU 1 drifts update: following the latest IMU 1 calibration, in preparation of the winter 2007 eclipse passage, the ACC IMU 1 drift corrections were updated during rev 609 at 13:05z.

The calculated drifts from FD resulted consistent with the quick evaluation performed in parallel by FCT and with the drifts history. The IMU 1 drift corrections were updated accordingly to the following table (source FD , TPF 0609_0001_M.DRA):

```
IMU-1-X= 0.2678  arcsec/sec
IMU-1-Z= 0.2934  arcsec/sec

IMU-2-X= 0.1753 (unchanged)arcsec/sec
IMU-2-Z= -0.0308 (unchanged)arcsec/sec

IMU-3-Z= 0.0555 (unchanged)arcsec/sec

IMU-4-X=-0.0378 (unchanged)arcsec/sec
```

11/10/2007 (Day of Year 284, Revolution 609-610)

The first eclipse operations were nominal from the AOCS point of view. Hereafter is reported summary of the first eclipse passage during rev 609:



AOCS ECLIPSE MONITORING — Winter 2007

Revolution: 609 | Date: 11/10/2007 | DoY: 284

INPUT	
Penumbra Start	11/10/2007 19:38:05
Penumbra End	11/10/2007 20:02:20
Umbra Start	11/10/2007 19:41:52
Umbra End	11/10/2007 19:58:06
ACC Sample Time:	09/10/2007 14:45:37
FDE Sample Time:	09/10/2007 14:45:37
FCE Sample Time:	09/10/2007 14:45:37
ACC Eclipse Counter:	65311
ACC Eclipse Start:	254591
ACC Eclipse End:	257700
FDE Eclipse Start:	256010
FDE Left to Eclipse Start:	189890
FDE Eclipse Duration:	2212
FCE Eclipse Start:	255054
FCE Left to Eclipse Start:	188934
FCE Eclipse Duration:	2168

Penumbra Start:	11/10/2007 19:38:05	LOS:	11/10/2007 16:00:00	
Umbra Start:	11/10/2007 19:41:52	AOS:	11/10/2007 19:40:00	
Umbra End:	11/10/2007 19:58:06			
Penumbra End:	11/10/2007 20:02:20			
Eclipse Duration:	0:24:15			
Eclipse Duration [sec]:	1455			
IMU Health Check Start	11/10/2007 12:30:00			
Eclipse Imminent Flag	11/10/2007 18:38:25			
ACC IMU AutoCal Start	11/10/2007 18:52:51			
ACC IMU AutoCal End	11/10/2007 19:12:51			
Sun out of FSS FoV	11/10/2007 19:40:56			
Sun back in FSS FoV	11/10/2007 19:59:14			

Eclipse Timers	From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
	Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]		
ACC Eclipse Start	11/10/2007 19:20:17	-1068.00	11/10/2007 19:20:21	-1064.00	-1064	
FDE Eclipse Start	11/10/2007 19:30:27	-458.00			-404	176
FCE Eclipse Start	11/10/2007 19:31:11	-414.00			-360	176

	From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
	Absolute	WRT Pen. End [sec]	Absolute	WRT Pen. End [sec]		
FCE Eclipse End	11/10/2007 20:07:19	299	11/10/2007 20:08:12	352.00	360	176
FDE Eclipse End	11/10/2007 20:07:19	299	11/10/2007 20:08:12	352.00	360	176
ACC Eclipse End	11/10/2007 20:12:06	586	11/10/2007 20:12:10	590.00	578	

IMU	Uplink	Execution	WRT Penumbra End [sec]
IMU Auto Off Enable	08/10/2007 20:30:11	11/10/2007 20:14:24	724

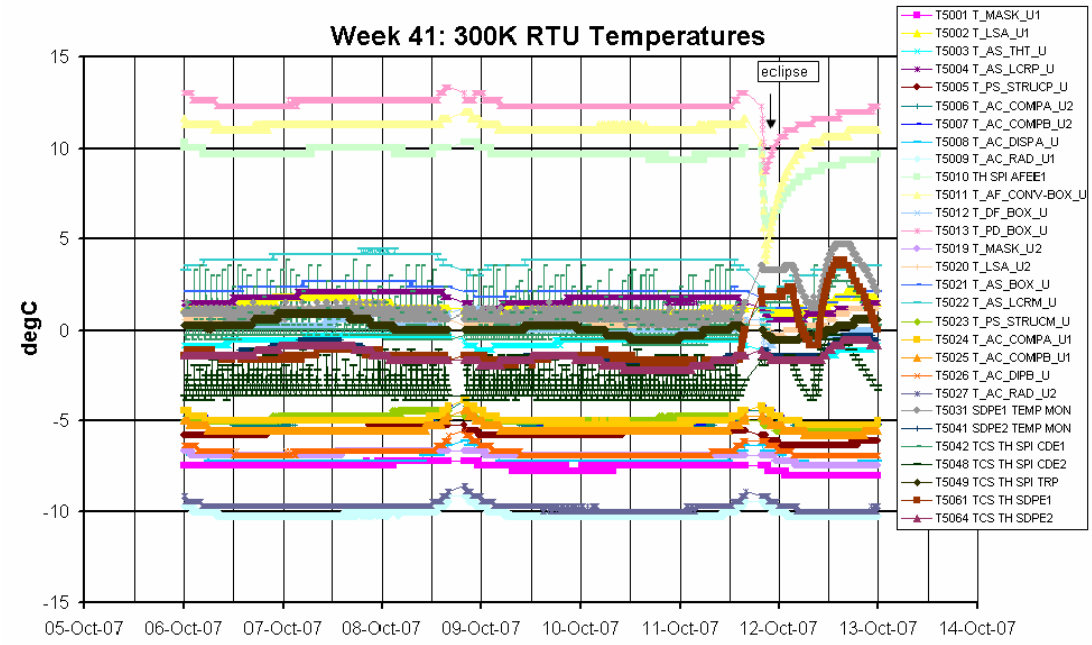
IMU On	11/10/2007 12:32:32	IMU H/C Noise Roll [as/s]	0.3212
IMU Off	11/10/2007 20:14:24	IMU H/C Drift Roll [as/s]	0.2737
IMU On Time	7:41:52	IMU Auto Cal Drift Roll [as/s]	0.3077

12/10/2007 (Day of Year 285, Revolution 610)

Nothing to report.

8.3.2 SPI Operations

Unit Temperatures: All the equipment temperatures are inside the operational limits. The following plot shows their evolution during the reporting period.

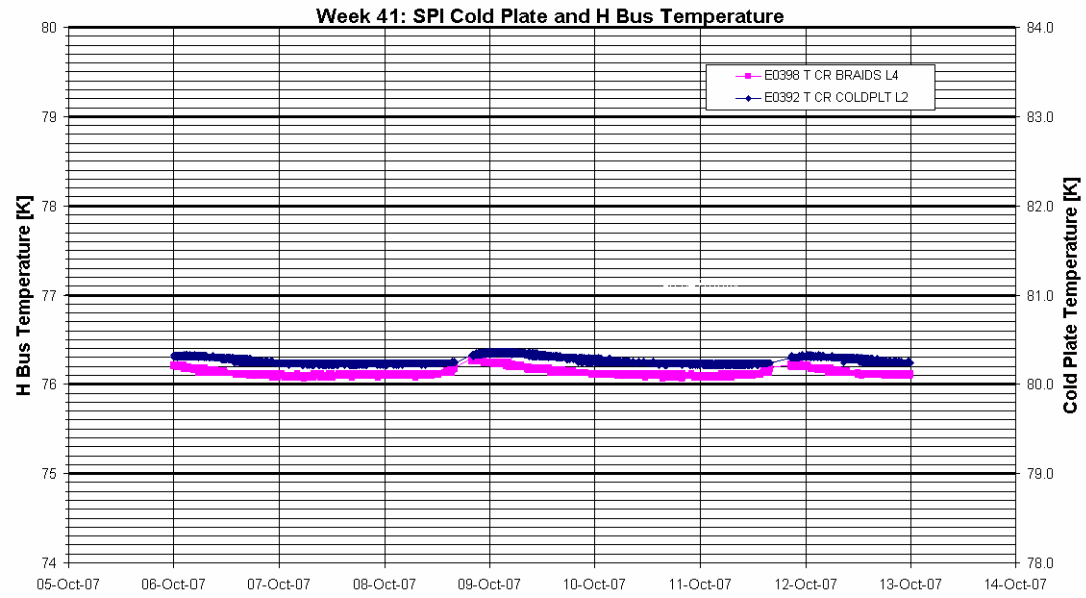


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

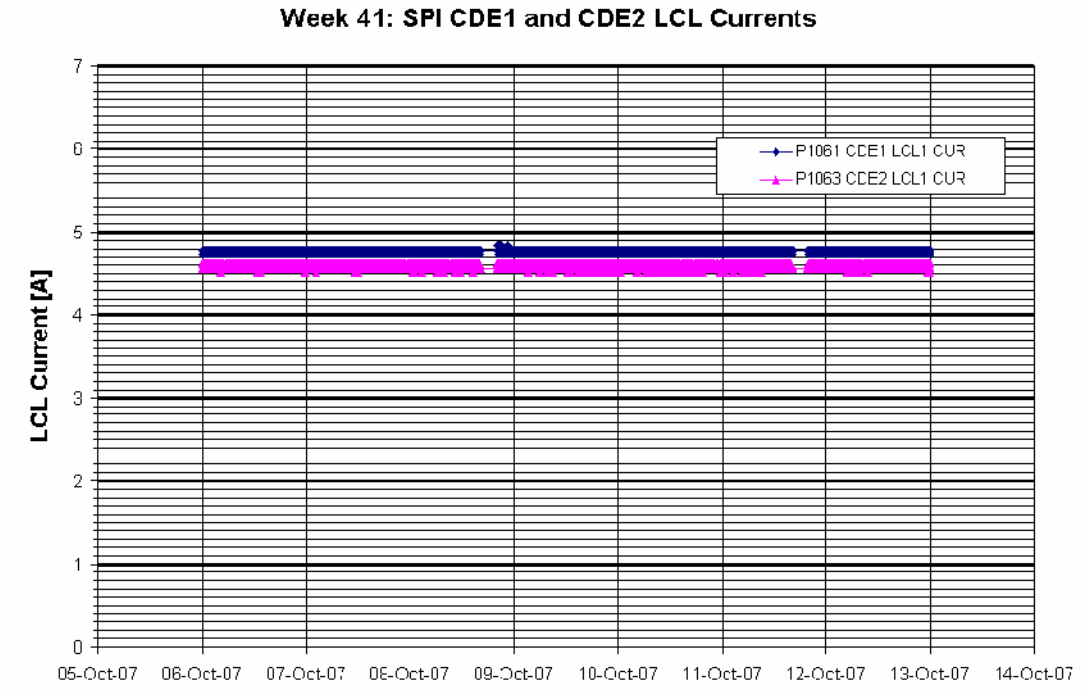
The stroke of all four compressors was set 40 throughout the week with the average CDE LCL currents as follows:

- CDE1 LCL Current = 4.77A
- CDE2 LCL Current = 4.57A

The following plot shows the evolution of the cold plate and H bus temperatures during the reporting period.

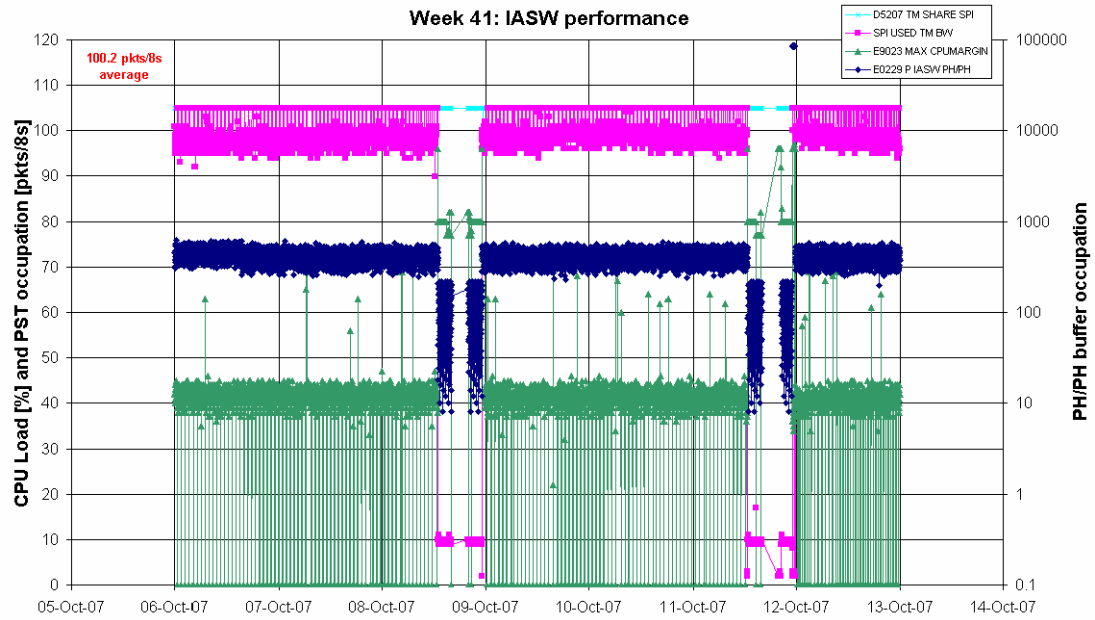


The following plot shows the evolution of the CDE currents during the reporting period.



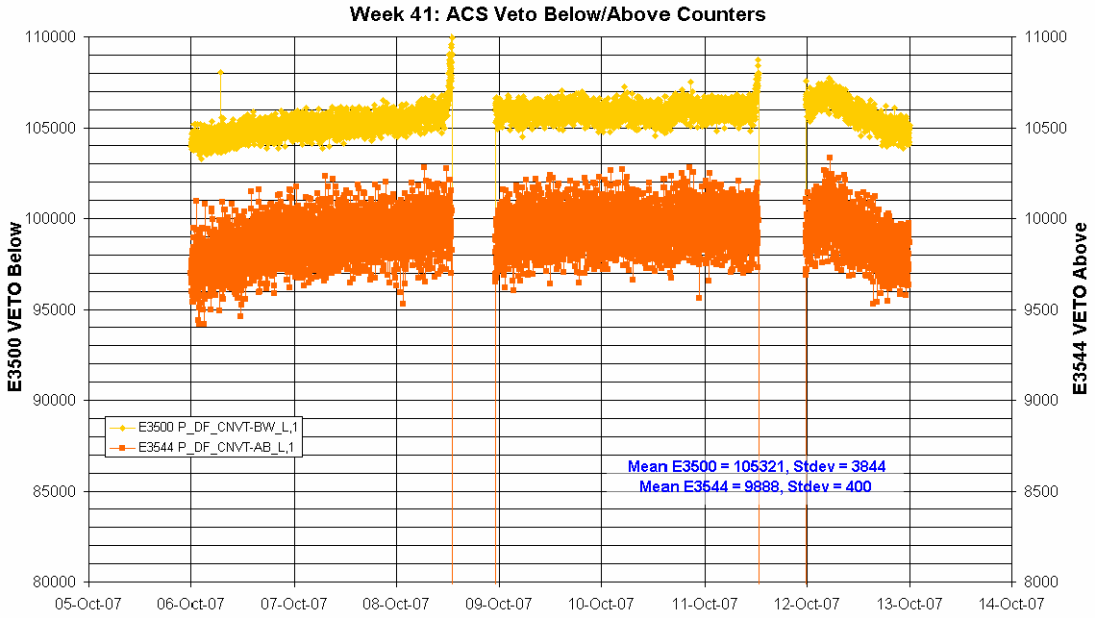
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is v433 patch #1 with the spectra scaling factor set to 8/19 SE. The average TM bandwidth occupation of SPI was 100.2 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



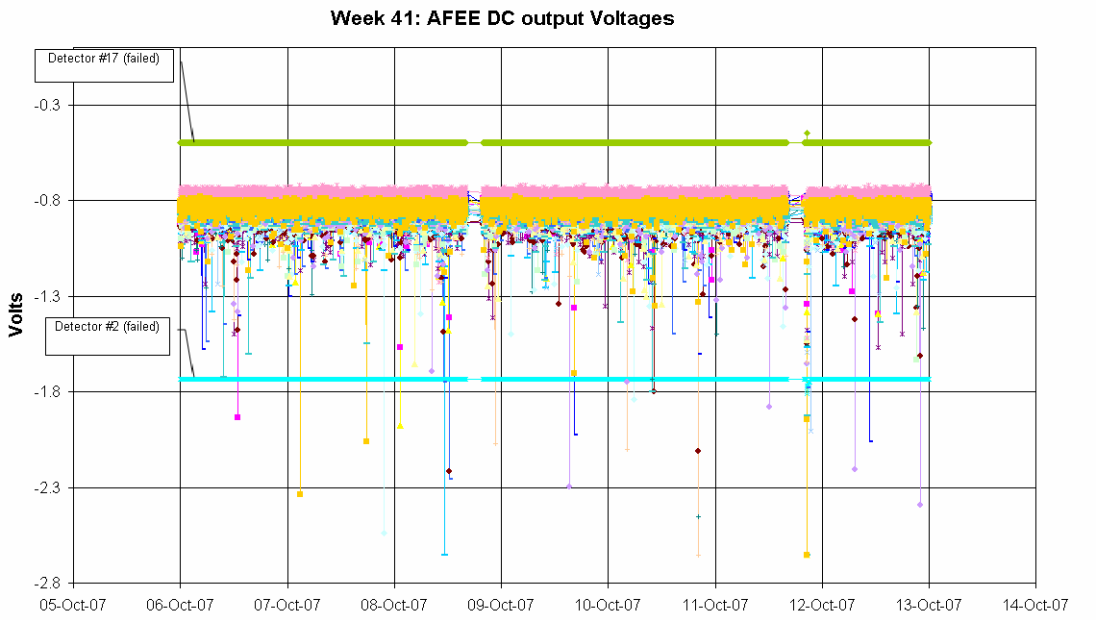
ACS: The performance of the ACS is nominal, except for FEE #81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

The following plot shows the ACS overall count rate evolution during the reporting period:

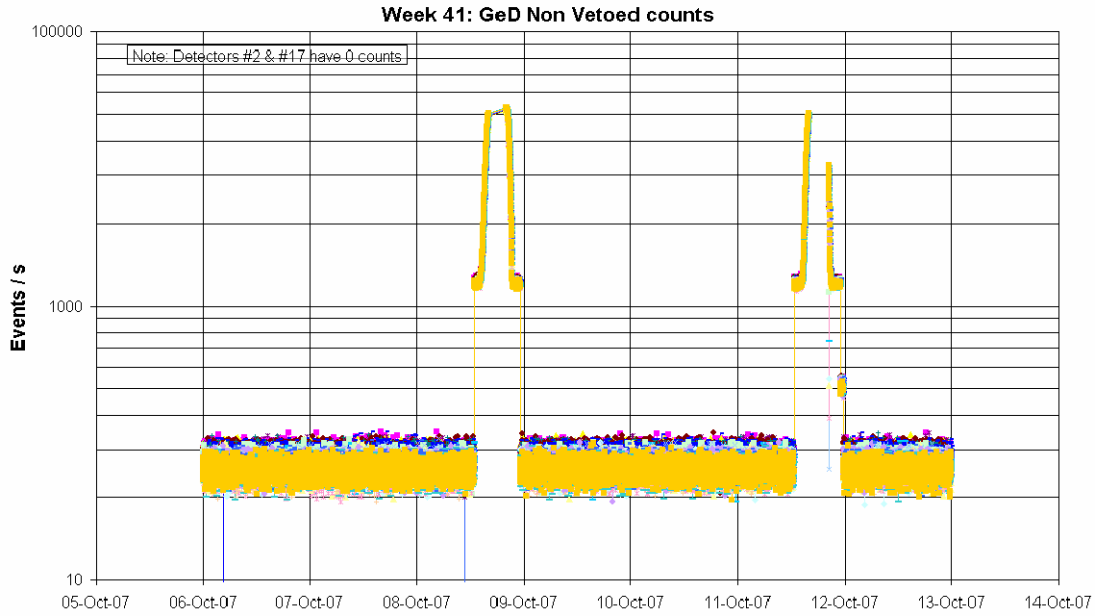


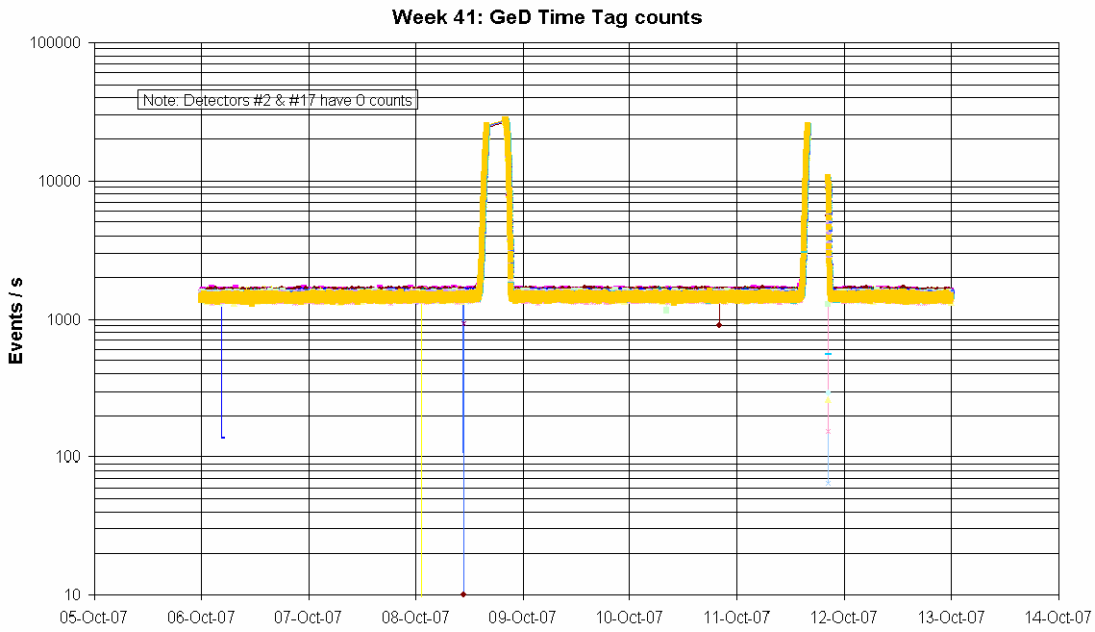
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

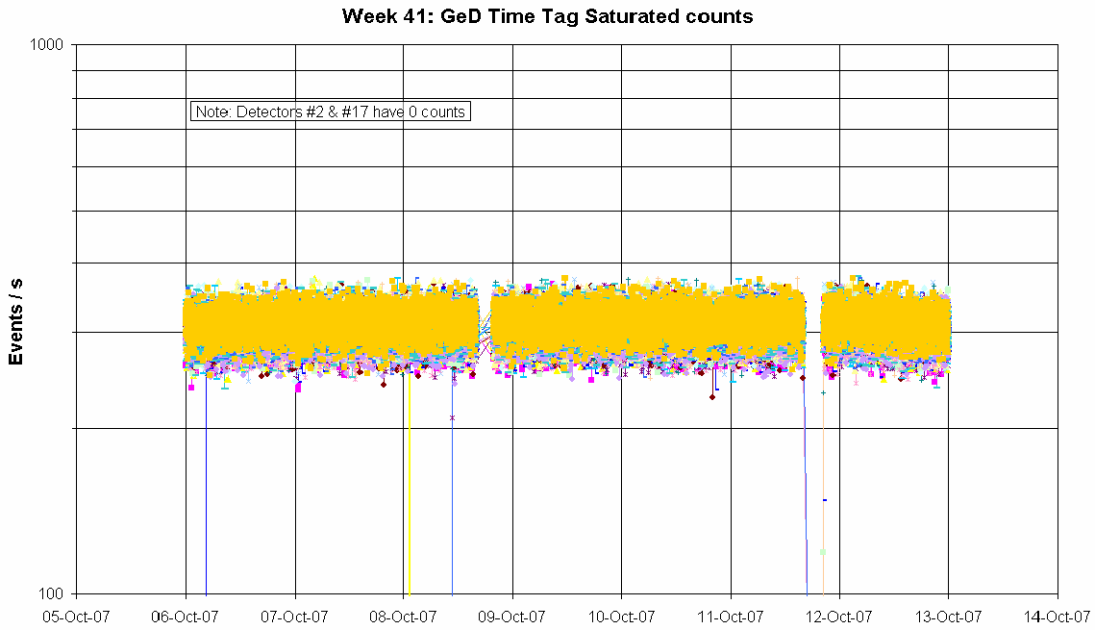
The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.



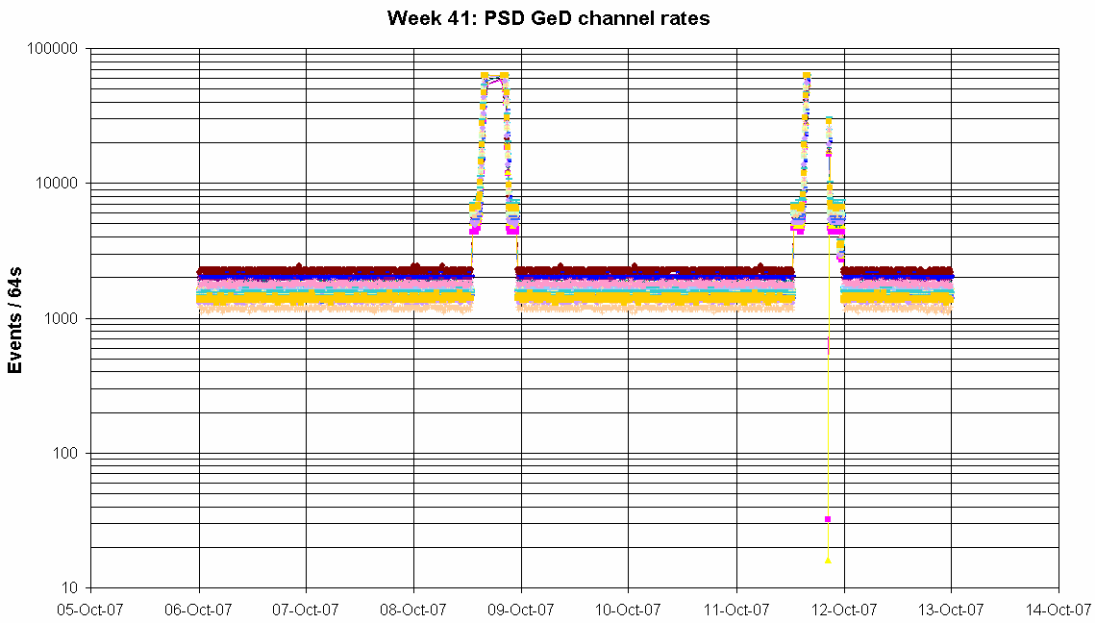
DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.







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



Event Log:

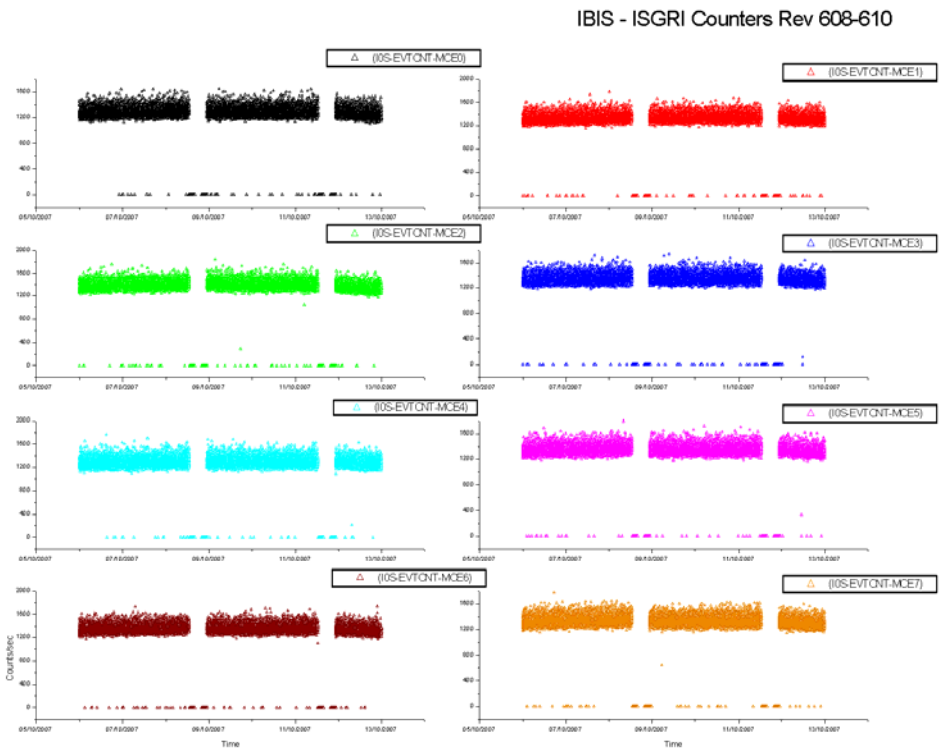
The following non-nominal events occurred on SPI during the reporting period:

- 13 occurrences of OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED were received during the week. As they were each single occurrences, no action was taken.
- On 2007-10-08 at 20:04:20Z TM parameter E4009 S DF HSLERR L toggled in and out of limits until 20:15:56Z, indicating errors on the HSL during this time. This was before radiation belt exit of revolution 609 and was probably due to high count rates. As it returned stably within limits of its own accord, no action was taken.
- On 2007-10-11 at 20:05:34Z OEM APID 1024 ID 1 EXCEPTION SPI1 FIXED POINT OVERFLOW was received. This was during the AOS_CHK window of revolution 610, when the time verification TC was sent. This OEM is sometimes received when this TC is sent and no action was taken.
- On 2007-10-11 at 23:00Z, during the execution of the ED EEXIT-02 following radiation belt exit after eclipse, the TCs EU0201D TC-C AS SERV1 and EU0202D TC-C AS SERV2 failed release due to interlock failure (the previous command was awaiting verification). The other TCs of the sequence were uplinked and therefore SPI went back to PHOTON mode but with not all of the ACS HVs on. The ED EEXIT-02 was re-uplinked manually at 23:35:41Z, successfully returning to SPI to the correct configuration with all ACS HVs on.
- 2007-10-12 at 19:09:46Z TM parameter E2115 (Plastic Scintillator temperature) went OOL warning low (value = -15.38 degC). All heaters were in the correct configuration and therefore no action was taken.

8.3.3 IBIS Operations

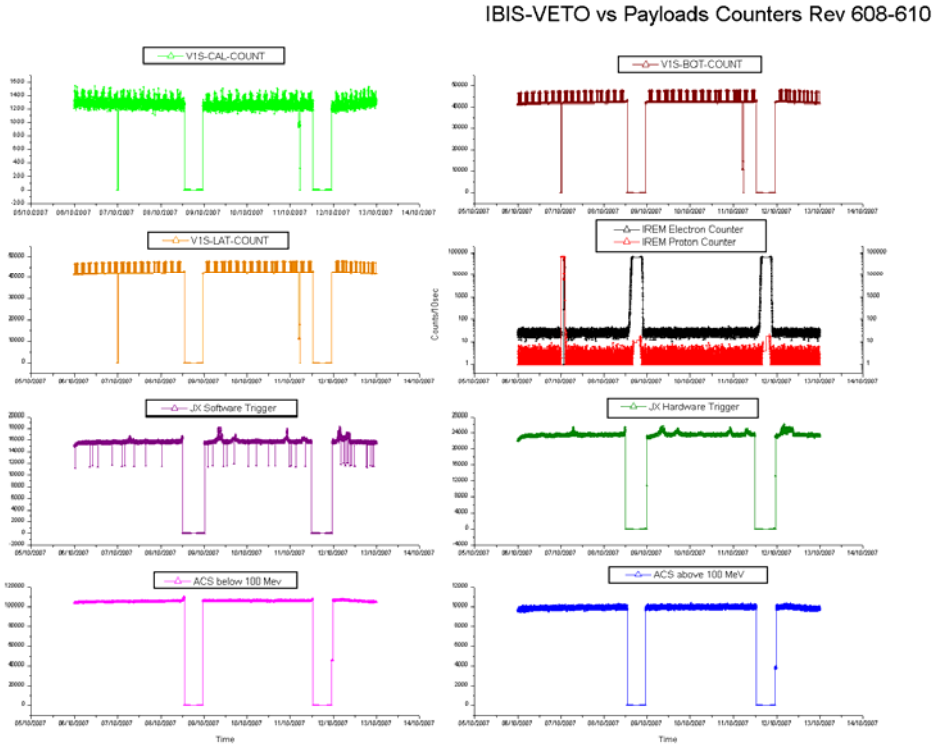
IBIS Event Counters Plots

ISGRI Counters:



**sampling every 4 pkts (32 secs)

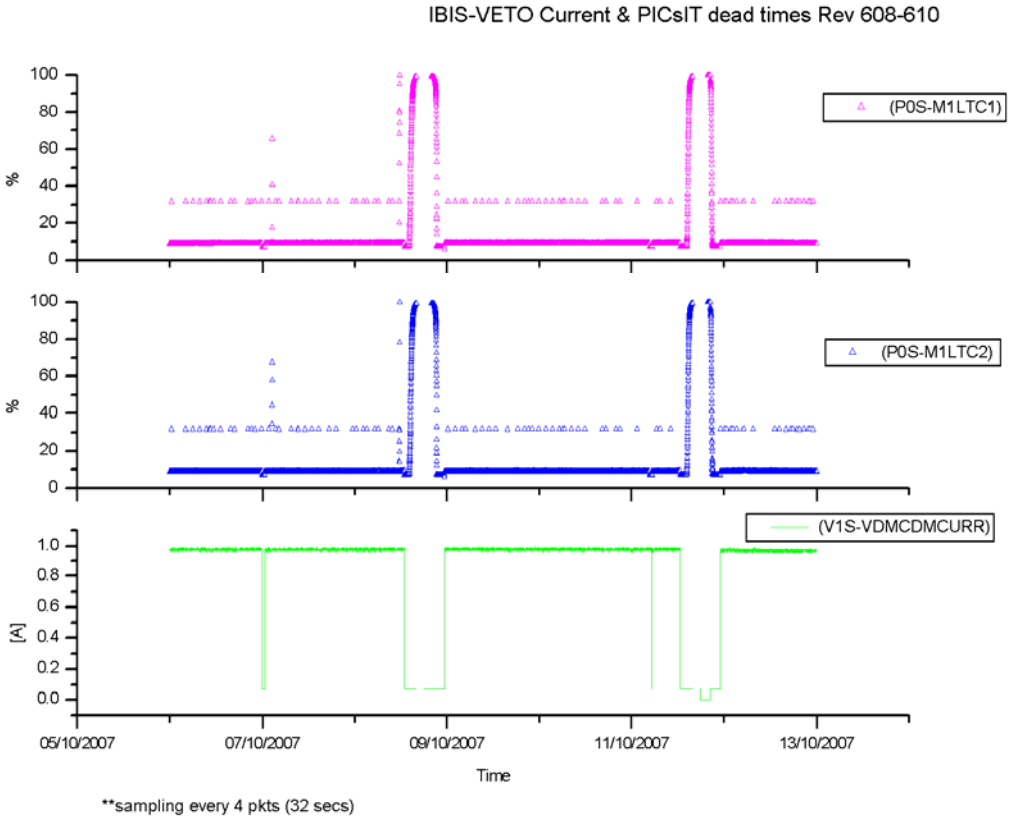
VETO vs Payloads Counters:



**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

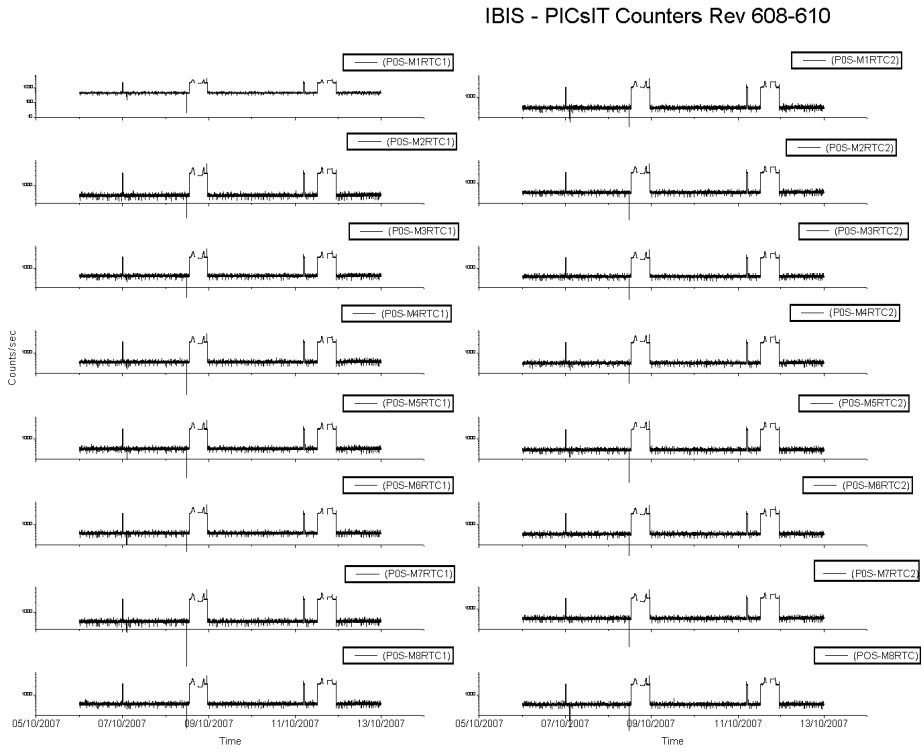
The week was characterised low radiation as reported by the payload.

VETO Current:



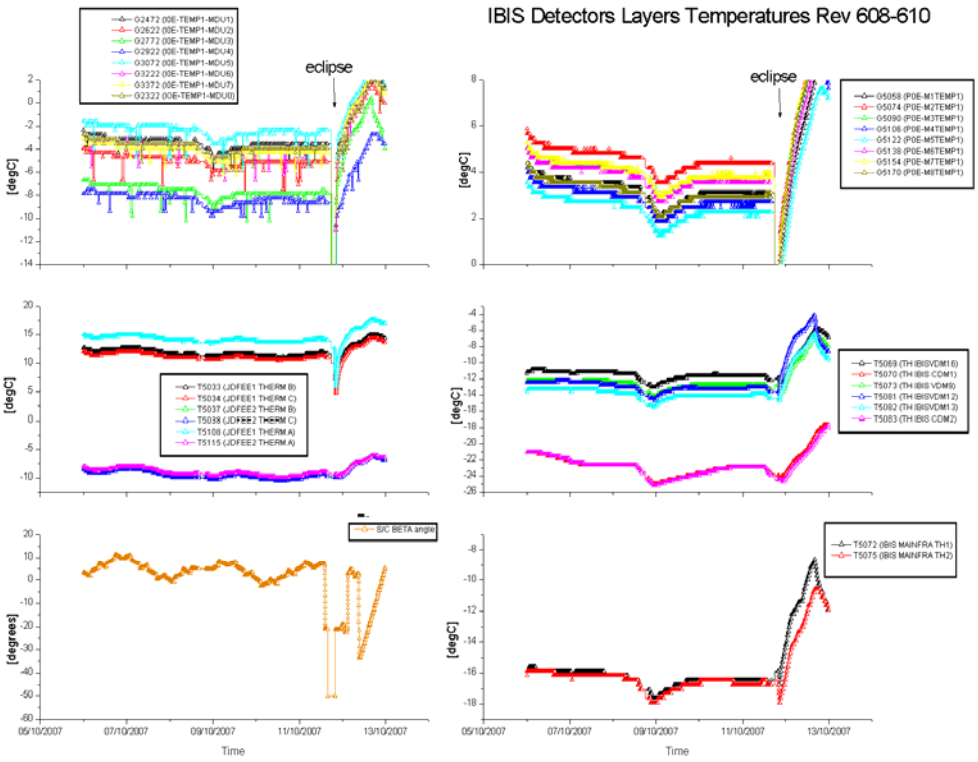
**sampling every 4 pkts (32 secs)

PICsIT Counters:



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:



**sampling every 8 pkts (64 secs)

IBIS daily report:

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), G5002 (P0S-Mi_RTC1) and G5003 (P0S-Mi_RTC2) families and G2000 family (I0E-OVFWPXADD-Mi) were received during the radiation belt passages.

Throughout the week the TM parameter G6061 (Veto calibration source counter) toggled OOL Warning Low. In each case it only remained OOL for a short time and no action was taken. This is due to the nominal radioactive decay of the source and the limits for this parameter will be updated in the next IODB release.

2007-10-06 (DOY 279, Rev 608) to 2007-10-07 (DOY 280, Rev 608)

Due to an IREM SEU, IBIS transitioned autonomously to Safe configuration on 2007-10-06 at 23:58:32Z. It was recovered as follows:

- On 2007-10-07 at 00:26:50Z FCP_IBIS1_0803 IBIS EXIT FROM SAFE MODE
- On 2007-10-07 at 00:40:33Z ED GESTAN02 uplinked with the planned observation parameters and commanding to IBIS from the Timeline re-enabled.

On 2007-10-07 at 02:31:37Z TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semimodule FIFO error flags. As they returned within limits after a few minutes no action was taken.

2007-10-08 (DOY 281, Rev 608-609)

At 11:35:05Z, the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semimodule FIFO error flags. At 11:38:04Z the TM parameters families G5002 and G5003 for the PDM semimodule counters also went OOL (value = 0). As these were followed at 11:41:28Z by OEM APID 1280 ID 132 EVENT IBIS1 IASW HEPI RESYNCHRONIZED, indicating that HEPI resynchronised autonomously, by which time all the above parameters had returned within limits, no action was taken.

At 14:31:05Z, during the radiation belt passage of revolution 608-609, TM parameter G5079 went OOL warning high (value = 2.60509804V). This is the PDM2: +2.5 V. As it returned within limits at 14:31:37Z no action was taken.

2007-10-09 (DOY 282, Rev 609) to 2007-10-10 (DOY 283, Rev 609)

IBIS operations executed nominally.

2007-10-11 (DOY 284, Rev 609-610)

At 04:42:44Z, the VETO VDM09 and VDM13 HV went OOL Alarm Low:
G6043 (V1S-VDM09HV) = 489.52V,
G6047 (V1S-VDM13HV) = 520.28V
and the VETO Calibration counter went OOL Warning Low:
G6061 (VETO CAL counter) = 956/s

The other VETO count rates had also dropped to much lower values than nominal however the VETO currents remained at the nominal values:
G6012 (VETO current) = 1.65A
G6013 (VETO VDM/CDM current) = 0.98A
G6062 (VETO BOT counter) = 10816/s
G6063 (VETO LAT counter) = 11296/s

Note that before the anomaly (04:42:20Z) these VETO parameters were all nominal:
G6012 (VETO current)= 1.63A
G6013 (VETO VDM/CDM current)= 0.97A
G6061 (VETO CAL counter)= 1228/s
G6062 (VETO BOT counter)= 42448/s
G6063 (VETO LAT counter)= 42432/s
G6043 (V1S-VDM09HV) with value = 992.68V,
G6047 (V1S-VDM13HV) with value = 992.96V,

At 04:42:52Z, due to the reduced count rates from VETO, the PICsIT PDM counters, TM families G5002 and G5003 all went OOL High with values around 2300/s.

At 04:44:48Z the following OEM was received:

```
APID   1280   ID   167     ANOMALY     IBIS1 PICSIT NOISY SEMIMODULE
SIGNALLING: ORIGIN SM COO.
```

This was at the start of slew 06090057:

```
2007-10-11T04:44:45Z MOUTP                SLEW_START           /*
2007-10-11T04:46:41Z MOUTP                SLEW_END             /*
```

After the end of the slew another occurrence of the OEM was received:

```
2007.284.04.47.12.299   1280   RealTime   167     ANOMALY     IBIS1
PICSIT NOISY SEMIMODULE SIGNALLING: ORIGIN SM COO
```

At 04:47:48Z the VDM09 and VDM13 HV recovered to nominal values however the VETO count rates remained at the reduced values:
G6061 (VETO CAL counter) = 984/s
G6062 (VETO BOT counter) = 10808/s
G6063 (VETO LAT counter) = 11432/s
G6043 (V1S-VDM09HV) = 992.68V
G6047 (V1S-VDM13HV) = 992.96V
The PICsIT counters also remained OOL High, due to the reduced count rates from VETO.

The situation remained as such until the anomaly was recovered by the operator as follows:
1- At 05:07:45Z, set IBIS-IASW in Stand-By (TC G0125)
2- At 05:17:51Z, set IBIS-VETO in Stand-By (TC G0601)
3- At 05:20:42Z, set IBIS-VETO in Nominal (TC G0600)
4- At 05:23:28Z, set IBIS-IASW in Science Standard (TC G0129).

Following the recovery VETO was in Nominal and the main VETO parameters were nominal:
At 05:24:04Z:
G6012 (VETO current) = 1.63A
G6013 (VETO VDM/CDM current) = 0.98A

G6061 (VETO CAL counter) = 1264/s
G6062 (VETO BOT counter) = 42328/s
G6063 (VETO LAT counter) = 42320/s
G6043 (V1S-VDM09HV) = 992.68V
G6047 (V1S-VDM13HV) = 992.96V
The PICsIT counters also returned stably within limits, with nominal values.

This anomaly is recorded as AR INT_SC-207. Note that this is only the second time that more than one VDM experienced a High Voltage breakdown at the same time (the first instance, in which 3 VDM HVs broke down simultaneously was on 2007-08-11 and is reported in Anomaly Report INT_SC-198).

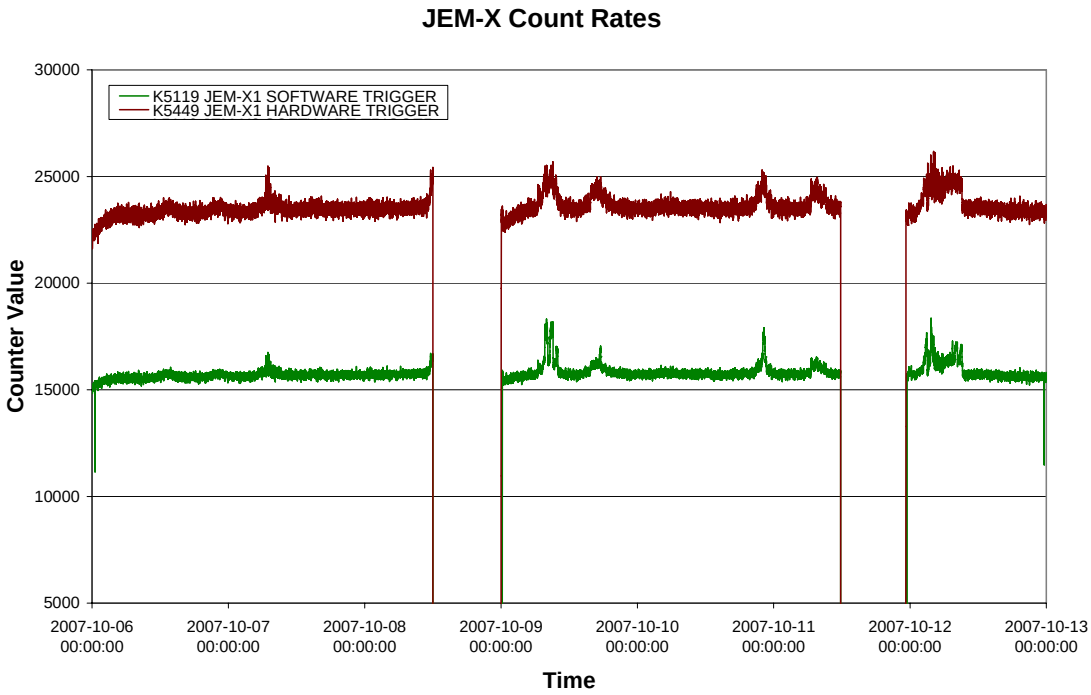
2007-10-12 (DOY 285, Rev 610)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

JEM-X Count Rates

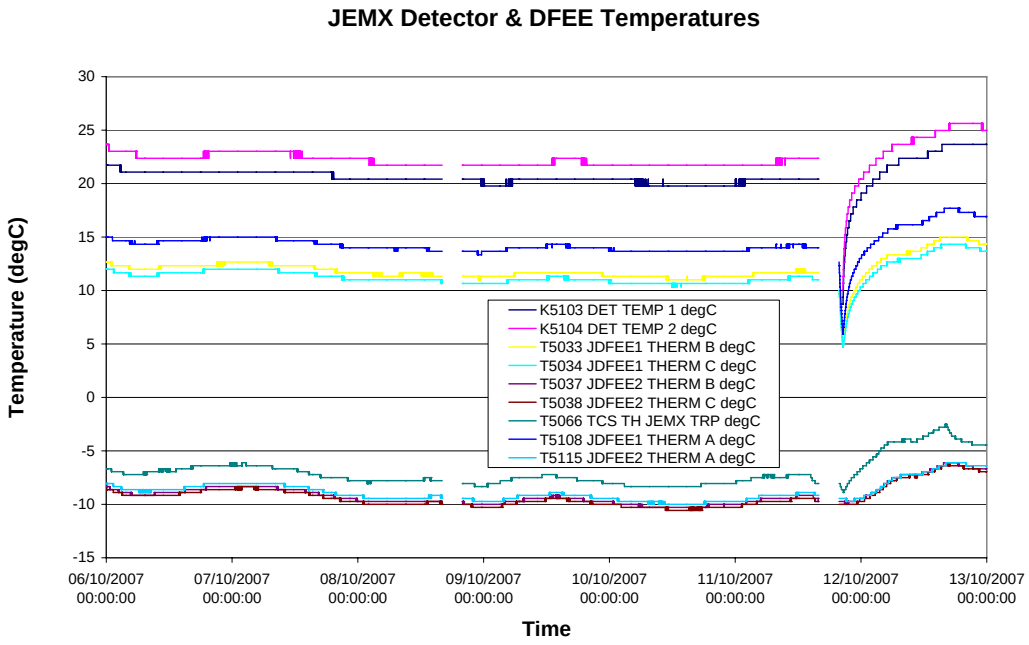
JEM-X count rates over the reporting period are displayed in the following graph[1].



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 graph[2].

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



JEM-X Daily Report

2007-10-06 (DoY 279, Rev 608)

At 04:07:24, the TC K0021 terminated with status uncertain failed. This was a message connected with the KEDATA02 originally uplinked at 23:53:09 the previous day. Why this message took so long to appear is unknown. No action was taken, and there was no impact.

At 23:59:04 JEMX parameters K5315, K5316 & K5317 went Out-of-Limits due to an IREM SEU (#55). There was no impact as the reaction has been disabled.

2007-10-07 (DoY 280, Rev 608)

JEM-X1 operations executed nominally

2007-10-08 (DoY 281, Rev 608)

At 12:01.25 and 12:01.30, The TC KU0014 (SW SET INT 84) twice terminated with execution unverified. This is part of the KESAFE02 ED. JEMX-1 was put to SAFE mode for the perigee/eclipse passage, so no action was taken.

At 23:25, a loss of TM links caused the following commands to fail their PTV.

23:25:17	K0006	KEHVAC01
23:25:27	KU0044	KEHVAC01
23:26:27	K0003	KEHVAC01
23:31:52	K0013	KEHVAC01
23:36:57	K0009	KEHVAC01
23:37:27	K0011	KEHVAC01

[2] Data sampled (1 frame in 8)

23:38:42	K0009	KEDATA02
23:39:02	KU0014	KEDATA02
23:39:27	K0021	KEDATA02
23:39:27	K0011	KEDATA02

After recovery of the TM, the sequences were manually uplinked at 23:55.

2007-10-09 (DoY 282, Rev 609) to 2007-10-10 (DoY 283, Rev 609)

JEM-X1 operations executed nominally

2007-10-11 (DoY 284, Rev 609)

At 20:32:08, the TM parameter KD5380D (EQ SHuTDoWN LEVel) was outside nominal range for 24 seconds. No action was taken, and there was no impact.

2007-10-12 (DoY 285, Rev 610)

JEM-X1 operations executed nominally

8.3.5 OMC Operations

2007-10-06 (DoY 279, Rev 608)

At 23:58:22, an IREM SEU caused OMC to switch autonomously to SAFE mode. A manual recovery was executed, and the unit returned to Stand-by at 00:18:57, in time for the next pointing at 00:45:09. The impact was pointing 06080029 was cut short from a planned 3107 to 417 seconds.

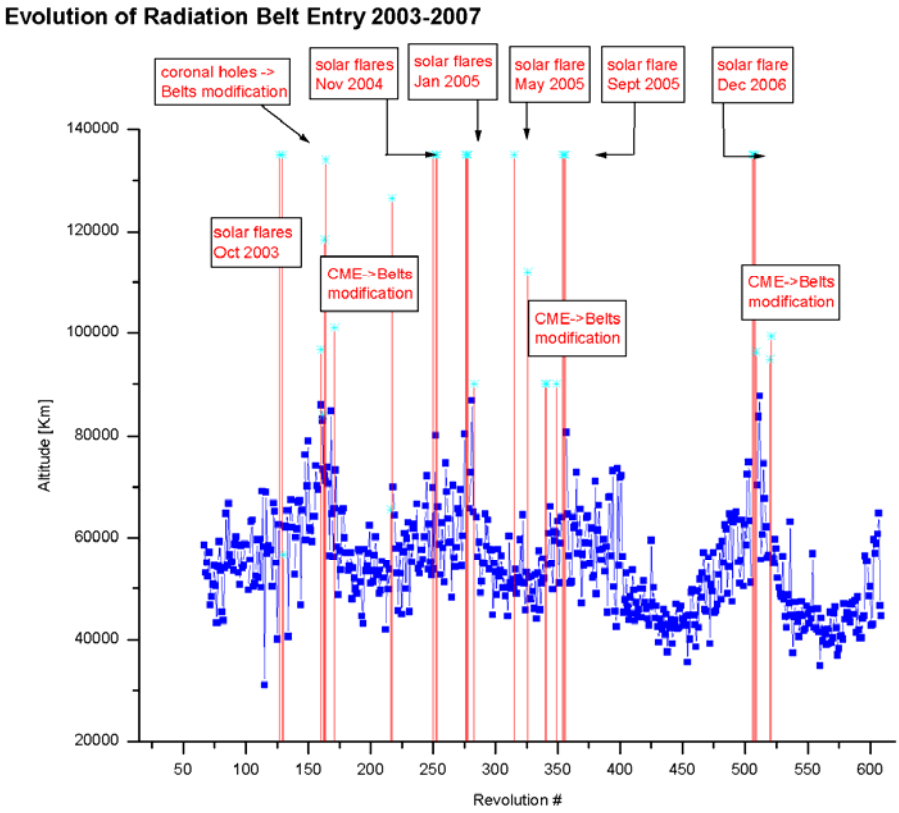
2007-10-07 (DoY 280, Rev 608) to 2007-10-12 (DoY 285, Rev 610)

Nothing to Report.

On DoY 281 at 12:55:50 and DoY 284 at 12:41:50 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

DoY 2007.279 (06/10/2007):

At 23:58:22Z, a local reset of the IREM CSCI S/W (SEU #55) 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 2007.279.23.58Z at 146959.4 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 at 00:05Z 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) A dump of all the registers gave a status word BC80 HEX = 48256 DEC = 1011110010000000, ie. the unit was still reporting the status as if it was in Integral

mode but the Checksum Failure flag was this time OFF and the checksum counter in the register number 3 incremented by 1 unit.
7) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 02:45Z.

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 00:18:57Z and IBIS at 00:40Z.

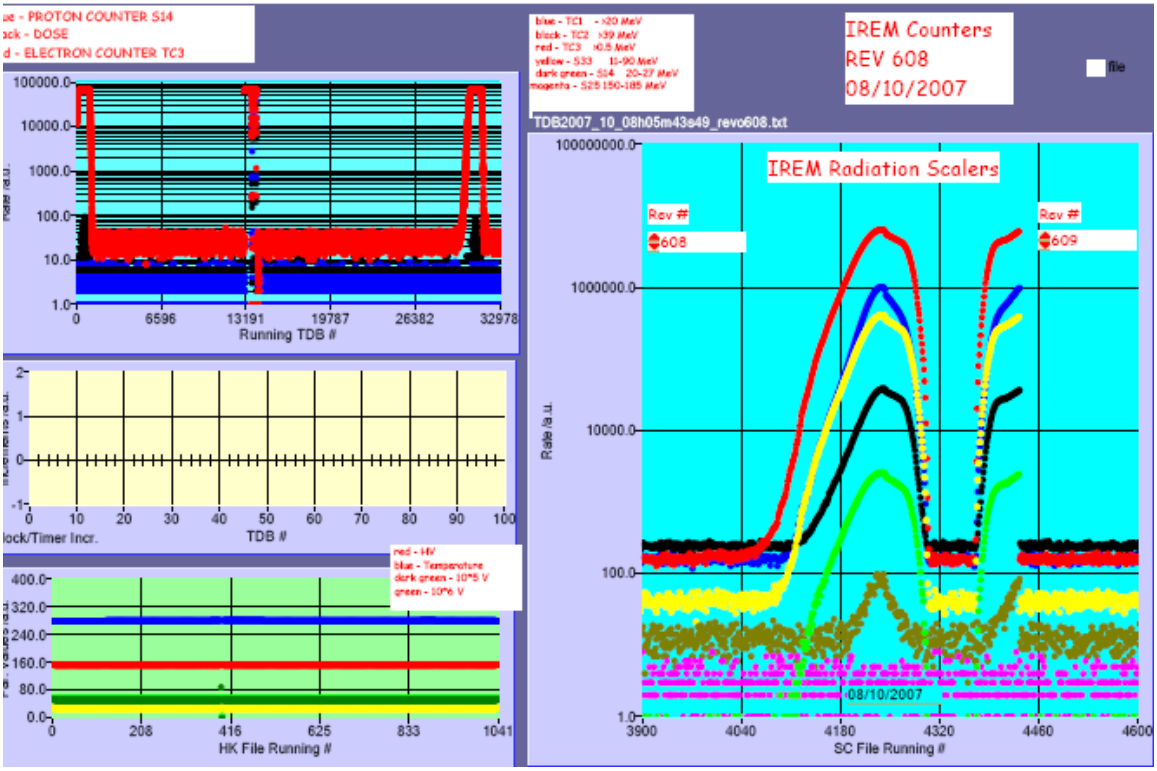
The cause of these S/W resets is apparently due to the unit's memory device that is sensitive to high energy radiation, as proved during test campaign on-ground.

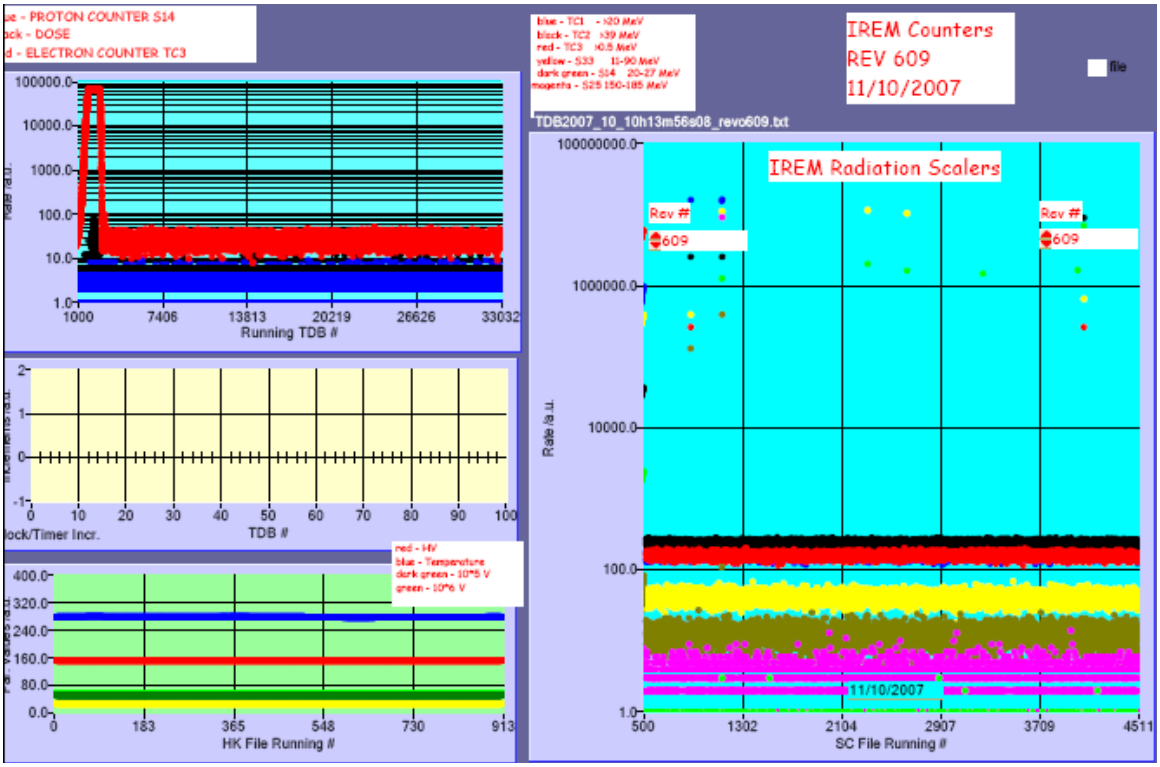
Electron Belts

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]
608	RAD_ENTR R 2007-10-08T12:55:44Z	08/10/2007 14:02:30	46601.6	08-Oct-2007 14:07:34	45483.15
609	RAD_EXIT R 2007-10-08T23:07:31Z	08/10/2007 22:02:22	>>34621.2	08-Oct-2007 21:57:34	43594.41
609	RAD_ENTR R 2007-10-11T12:41:42Z	11/10/2007 14:10:46	44641.3	11-Oct-2007 14:04:52	44319.1
610	RAD_EXIT R 2007-10-11T22:53:27Z	11/10/2007 21:31:42	>>39310.0	11-Oct-2007 21:54:52	44788.89

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)

IREM radiation counters:

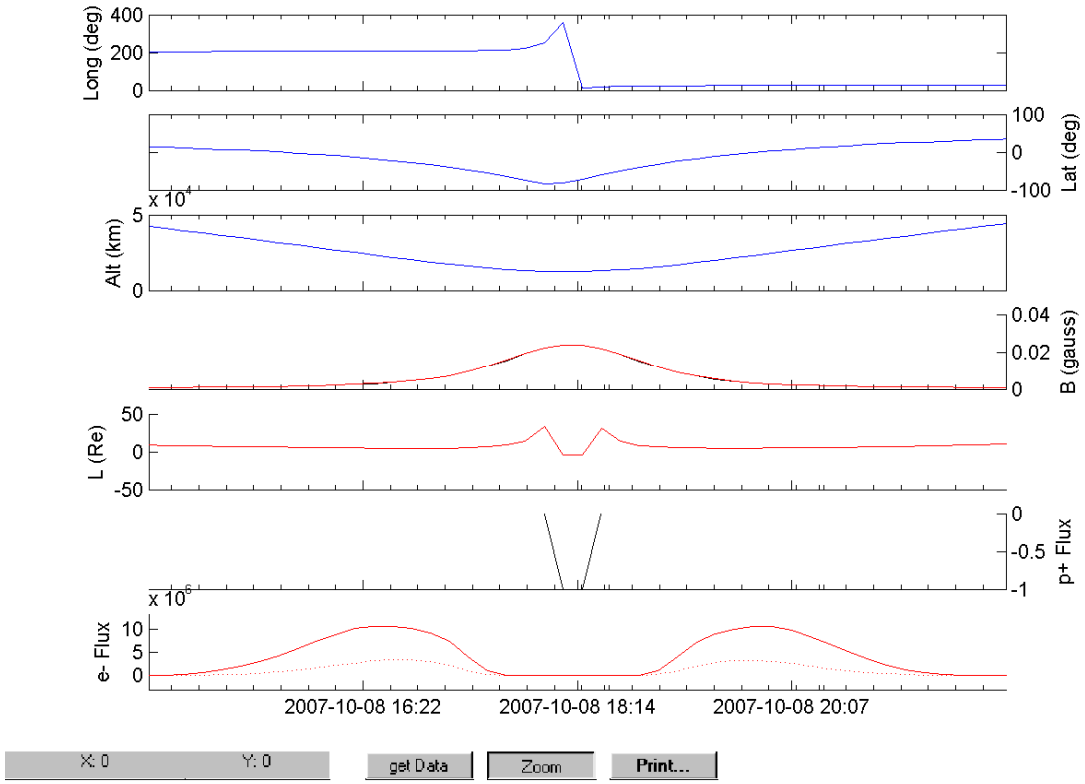




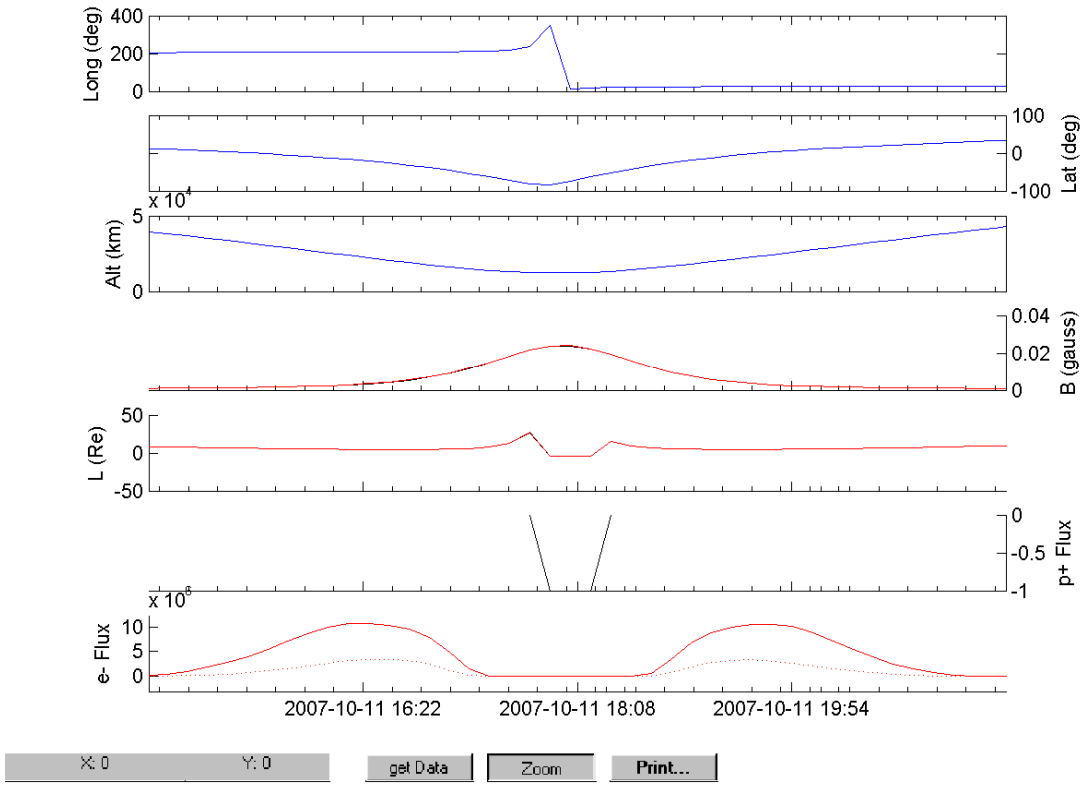
For part of the belt passage of revolution 608, and the whole of the passage for 609, no data was present.

IREM Predicted Radiation Belt Passages

Rev 608



Rev 609



SEC-GOES Observed Particles Fluxes (using SEIS/RAT tool):

Due to a problem on the SEISOP server, no data are available this week. However, the week was very quiet and no radiation was reported.