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

INTEGRAL
Mission Report

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

No. 316
Week 41

13.10.08

Routine Phase

Prepared by: M.J.H. Walker (OPS-OAI) and INTEGRAL FCT

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 ... 4
3.1.3 Thermal ... 4
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
4 Ground Facilities ... 7
4.1 Mission Operations Centre ... 8
4.2 Ground Stations & Network ... 8
4.3 Science Ground Segment ... 8
4.3.1 ISOC ... 8
4.3.2 ISDC ... 8
5 Special Events ... 9
6 Anomalies ... 9
7 Future Milestones ... 9
8 Appendix ... 10
8.1 Overview of Revolutions ... 10
8.2 Consumables ... 10
8.2.1 Detailed Fuel Book-keeping ... 10
8.3 Detailed Satellite Information ... 11
8.3.1 AOCS SUMMARY OPERATIONS REPORT, 04/10/2008 – 10/10/2008 ... 11
8.3.2 SPI Operations ... 15
8.3.3 IBIS Operations ... 20
8.3.4 JEM-X Operations ... 24
8.3.5 OMC Operations ... 26
8.3.6 IREM Operations ... 27

DISTRIBUTION LIST

Addressees	Copy	Addressees	Copy
D/OPS		ESA HQ	
G. Winters D/OPS	1	D. Southwood D/SCI	1
J. F. Kaufeler OPS-G	1		
N. Bobrinsky OPS-ON	1	ESTEC	
A. Rudolf OPS-OA	1	J. Louet SCI-P	1
		ESTEC / PG	
M. Schmidt	1	G. Sarri	1
R. Southworth	1		
F. Di Marco	1	ESTEC/RSSD	
F. Cordero	1	M. Kessler SCI-SD	1
M. Walker	1	C. Winkler	1
P. Lippi	1	A. Parmar	1
S. Fahmy	1		
	1		
		ISDC	
SPACONs	1	T. Courvoisier	1
I. Bayliss	1	R. Walter	1
G. Di Girolamo	1	ISDC Shift Team	1
F. Dreger	1		
G. Gienger	1		
S. Pallaschke	1	ALENIA	
W. Hell	1	M. Montagna	1
K.J. Schulz	1	F. Ravera	1
M.A. Larsen	1		
		PI / Instrument Teams	
M. Butkovic	1	J. P. Roques – SPI	1
D. Heinzer	1	G. La Rosa – IBIS	1
U. Feucht	1	P. Ubertini – IBIS	1
Shift - Coord	1	A. Bazzano - IBIS	1
Scheduling Office	1	F. Lebrun - IBIS	1
T. Beck	1	S. Brandt – JEM X	1
J. Wardill	1	E. De Miguel - OMC	1
M. Unal	1	W. Hajdas – IREM	1
P. Maldari	1		
		JPL / Goldstone	
		D. Holmes	1
Redu		J. Valencia	1
B. Demelenne	1	Jesse Velasco	1
		DSN - MPSETD	1
ESAC			
P. Kretschmar	1		
V. Gomez SCI-O	1		
E. Kuulkers	1		
C Gonzales	1		
ESTEC/SCI-A			
Nicola Rando	1		

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 04.10.08 until 10.10.08 (both dates inclusive) and covers the revolutions 730, 731 and 732.

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 2 Hexagonal dithers of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), 6 pointings of a Galactic disk scan, (RA 18:55:12.72, DEC +01:50:24.0), (RA 19:04:22.80, DEC +06:17:13.2), (RA 19:13:42.72, DEC +10:43:26.4), (RA 18:58:52.08, DEC +03:37:12.0), (RA 19:00:00.00, DEC +05:24:00.0) and (RA 19:12:00.00, DEC +09:48:00.0), plus 2 Targets of Opportunity: both raster dithers 1E 1547.0-5408 (RA 15:50:55.00, DEC -54:19:20.0), and H 1743-322 (RA 17:46:15.61, DEC -32:14:00.6).

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 Eclipse season started on 22/09/2008. The fifth (04/10/2008), sixth (07/10/2008) and seventh (10/10/2008) eclipse passages were nominal from an AOCS point of view.

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 were verified for the 5th, 6th and 7th eclipse passages.

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

The fuel consumption over the period between 04/10/2008 and 10/10/2008 was 0.1601 Kg. The remaining propellant is in the order of 138.1207 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.

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

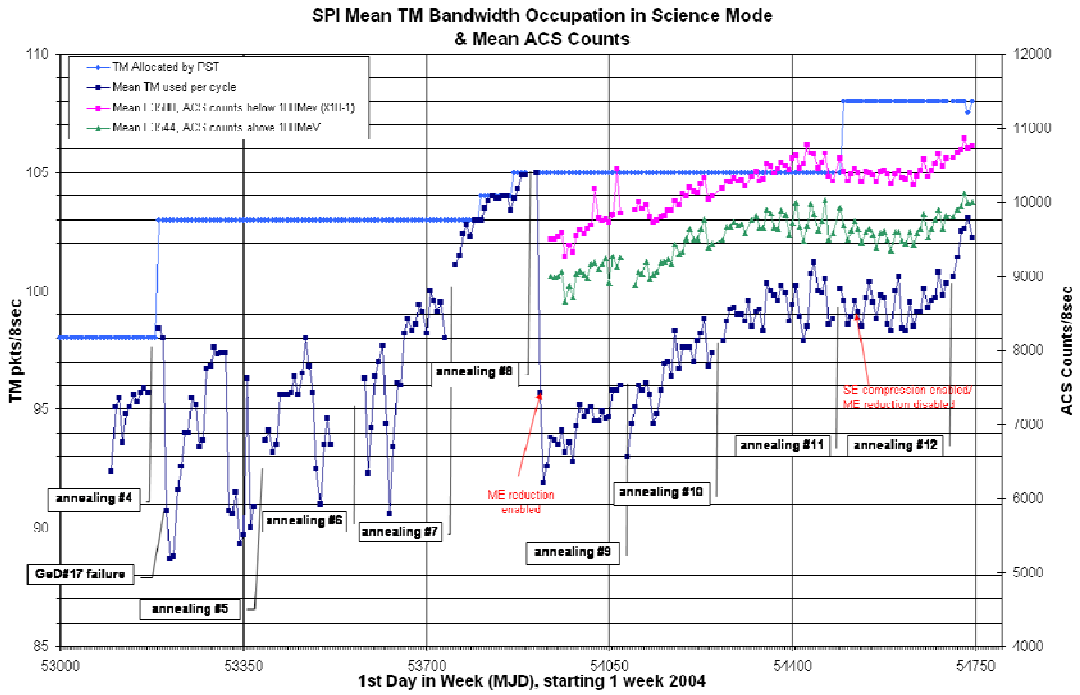
Following the 12th annealing, ended on 04/09/2008 at 23:50Z, the overall status of the gamma-ray spectrometer is nominal, except for detector #2 (failed since 06/12/2003) and detector #17 (failed since 17/07/2004). The energy resolution of the previously degraded GeD#12 has improved following this annealing and the bias of this detector is now set to 4kV as for the other detectors.

Eclipse operations for SPI were executed nominally.

The Stirling compressors are working nominally. The Germanium detectors temperature was kept in the range 80K+/-1K throughout the week.

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 108 packets/cycle and the average telemetry occupation was 102.2 packets/cycle.

The following plot shows the evolution of the assigned and the average occupation of the SPI TM bandwidth 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 SPI operations is provided in the Appendix.

3.2.2 IBIS

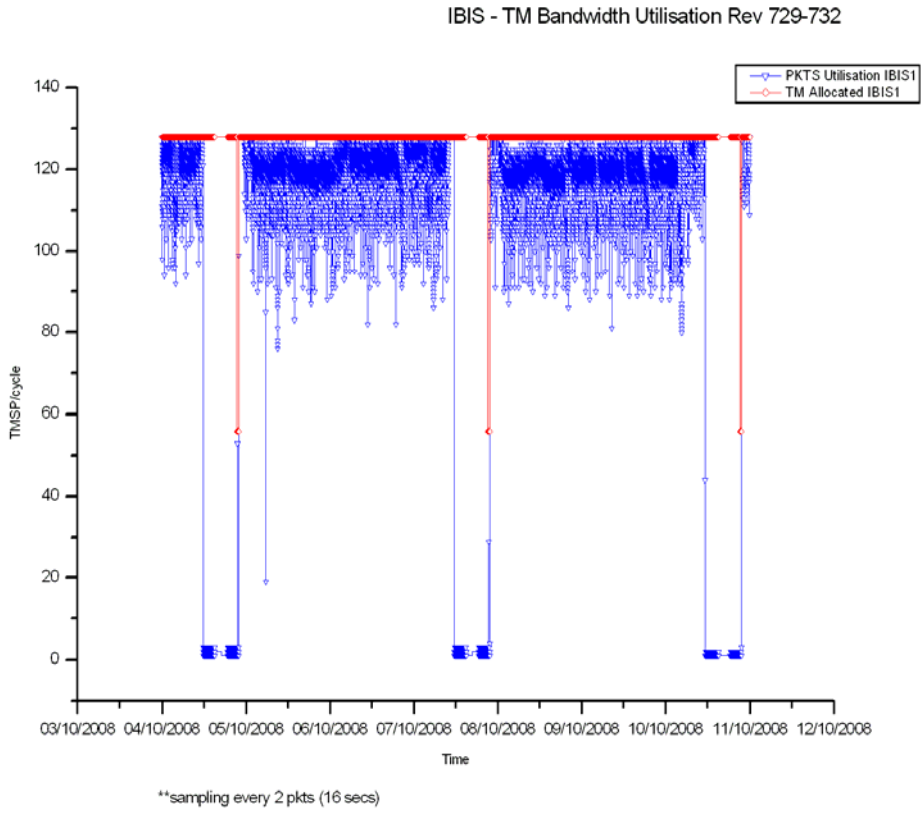
The overall status of the unit is nominal.

Eclipse operations for IBIS continued to be executed nominally.

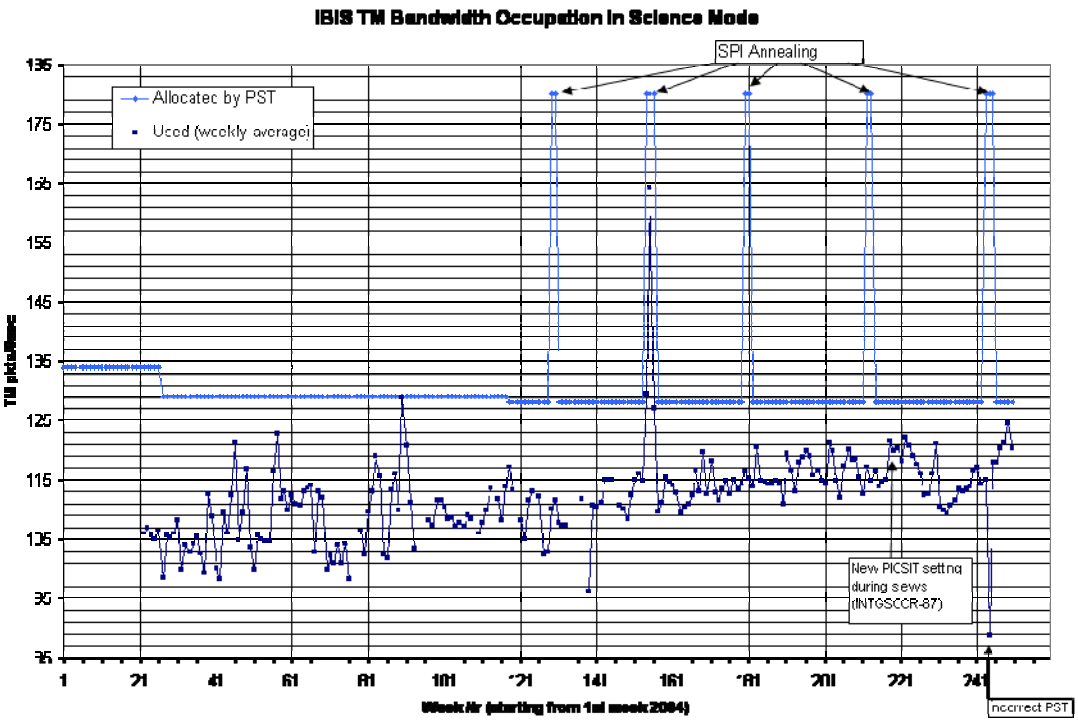
During the reporting period, the TM bandwidth statistics were as follows:

- PST allocation to IBIS above radiation belts: 128 packets/cycle
- IBIS mean bandwidth utilisation in science mode:120.22 packets/cycle (down 4.18 on previous week)
- Percentage of TM cycles in which full bandwidth was used: 14.6%

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



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 per cycle.

During this reporting period, all of the 218 planned science pointings were executed nominally.

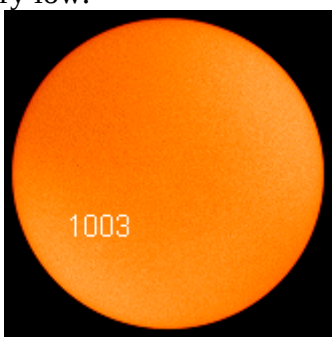
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. A small sun spot had appeared on the 3rd October, during the previous week, and disappeared by the 6th. 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 Section 8.3.6.

4 Ground Facilities

The Operational ground facilities performance was excellent this week. No pointings were lost. The overall performance though was nearly 100%.

4.1 Mission Operations Centre

The performance of the MOC was excellent this week. No pointings were lost to MOC related issues.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. No pointings were lost, there was, however, three occassions of link drops or bad packets from Redu, and one occasion when the links with ISDC briefly dropped, all without impact.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSFs have been received for revolutions 737-739.

Revolutions 731 and 732 have been replanned due to TOO observations of the SGR/AXP 1E 1547.0-5408 and the Black Hole Transient H 1743-322. Further replanning for revolution 734ff is pending on the evolution of the source.

Updated TSFs have been received for revolutions 731 & 732.

2. Observation status

New ECS files for revolutions 720-723 have been received and processed.

3. ISOC Science Data Archive

No updates.

4. ISOC system

ISOC system v19.4.1 is still working. Work is underway for v20.

5. Problems

No new ones. Investigation on the previous problems to receive TOO messages is still ongoing.

4.3.2 ISDC

Status of ISDC observation processing on 13/10/2008:

- Latest Standard Analysis completed: observation 06200290001 (SS433, Revolution 722) on 13/10/2008.

- Latest products archived: observation 06200290002 (SS433, Revolutions 722-723) on 13/10/2008.

- Latest observation products sent to the observer: observation 05297000004 (Perseus OB2 Cloud, Revolutions 706-710) on 13/09/2008.

5 Special Events

6 Anomalies

The following problems were reported this week that impacted operations.

- On DoY 278 between 2008.278.15.07:45 and 2008.278.18.45:05, there was an IREM SEU (#68), a recovery was performed, see IREM section below for details.

The following anomaly report was entered into the ARTS system this week.

AR id	Date Created	Subject	Segment	Status
INT_SC-241	2008-10-29	IREM Anomaly: Reset of IREM_CSCI S/W #68, 04/10/2008	Payload	Pending

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 730

The observations in revolution 730 began with a Hexagonal dither of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. This was followed by 3 pointings of a Galactic disk scan, first at (RA 18:55:12.72, DEC +01:50:24.0), lasting ~16.8 hours, then at (RA 19:04:22.80, DEC +06:17:13.2), lasting ~16.8 hours, and finally at (RA 19:13:42.72, DEC +10:43:26.4), lasting ~16.8 hours, until the end of the revolution.

Revolution 731

The observations in revolution 731 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 Galactic disk scan, (RA 18:58:52.08, DEC +03:37:12.0), lasting ~16.8 hours. This was followed by a Target of Opportunity: a raster dither of 1E 1547.0-5408 (RA 15:50:55.00, DEC -54:19:20.0), lasting ~27.8 hours. Finally, another Target of Opportunity: a raster dither of H 1743-322 (RA 17:46:15.61, DEC -32:14:00.6), lasting ~5.8 hours, was executed, until the end of the revolution.

Revolution 732

The observations in revolution 732 began with a Target of Opportunity: a raster dither of H 1743-322 (RA 17:46:15.61, DEC -32:14:00.6), lasting ~23.1 hours. This was followed by 2 pointings of a Galactic disk scan, first at (RA 19:00:00.00, DEC +05:24:00.0), lasting ~15.7 hours, then at (RA 19:12:00.00, DEC +09:48:00.0), lasting ~15.7 hours, 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 108; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

```
2008-09-24T05:38:59.000Z     138.4261    F   Automatic TM processing.
2008-09-25T12:40:34.000Z     138.3998    F   Automatic TM processing.
2008-09-25T20:46:07.000Z     138.3898    F   Automatic TM processing.
2008-09-27T05:13:23.000Z     138.3669    F   Automatic TM processing.
2008-09-28T20:34:15.000Z     138.3593    F   Automatic TM processing.
2008-09-30T05:18:26.000Z     138.3379    F   Automatic TM processing.
2008-10-01T20:22:47.000Z     138.3211    F   Automatic TM processing.
2008-10-02T04:01:12.000Z     138.2808    F   Automatic TM processing.
2008-10-04T14:37:03.000Z     138.2470    F   Automatic TM processing.
2008-10-04T20:10:24.000Z     138.2343    F   Automatic TM processing.
2008-10-06T04:47:31.000Z     138.2022    F   Automatic TM processing.
2008-10-07T20:03:59.000Z     138.1892    F   Automatic TM processing.
2008-10-08T20:31:22.000Z     138.1679    F   Automatic TM processing.

This report was generated  Fri Oct 10 08:00:29 GMT 2008
```

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, 04/10/2008 – 10/10/2008

The AOCS operations were executed from the Automatic Timeline.

During this period, 140 Open Loop Slews, 99 Closed Loop Slews and 7 Momentum Biases were executed (as reported by ACC OEM).

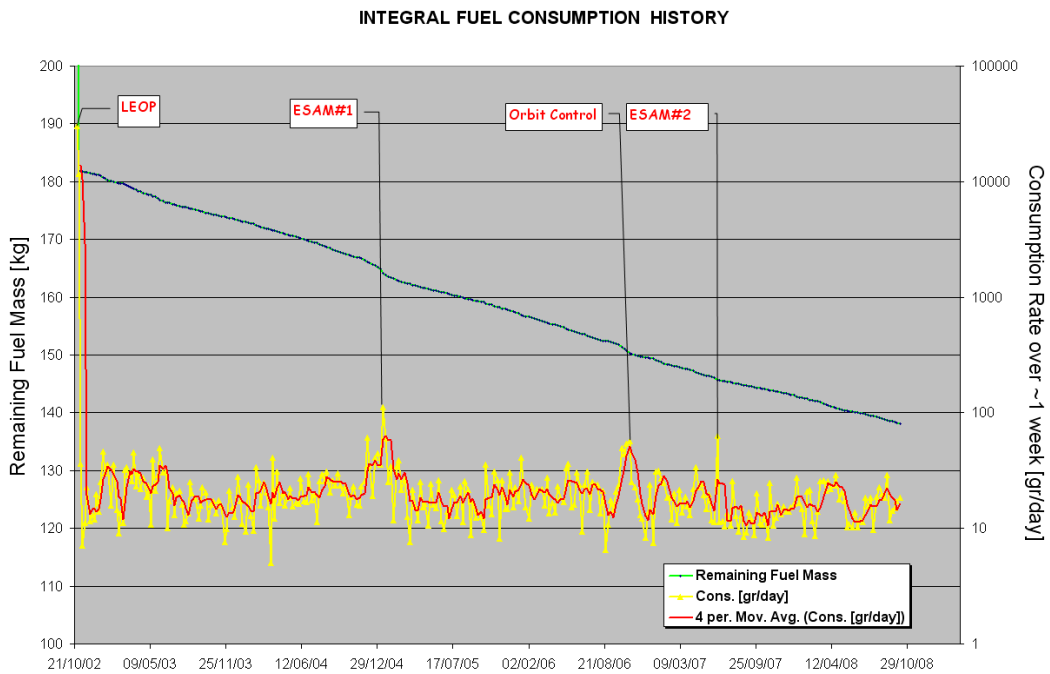
No slews were missed from TL, during the observation period.

Orbit Control

No update

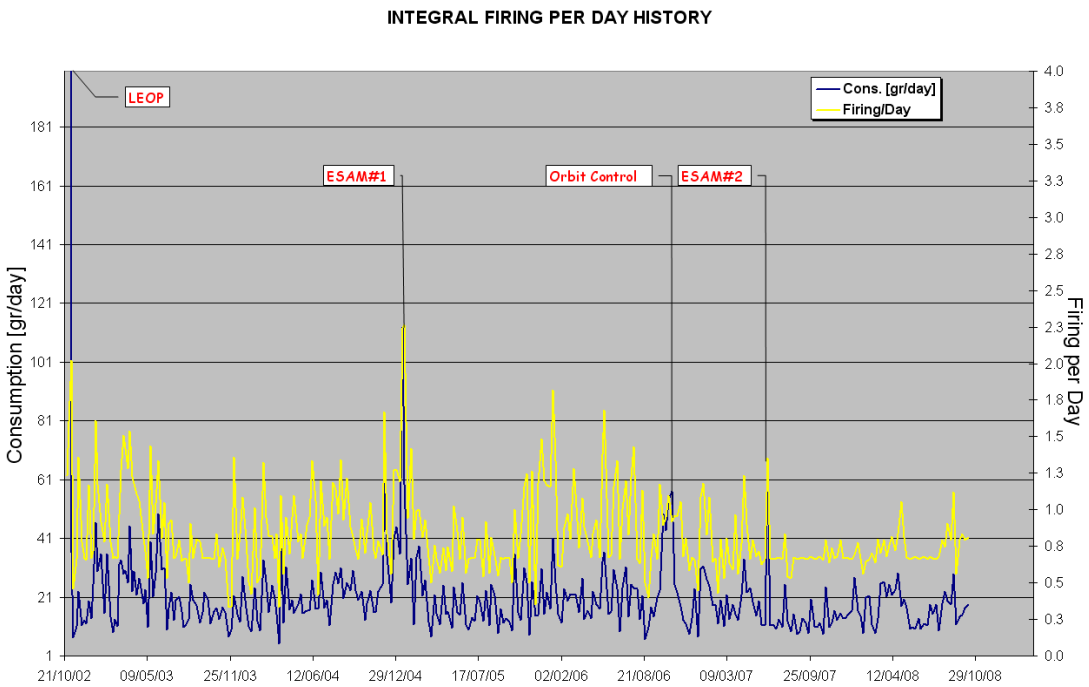
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 10/10/2008 is reported in the plot below.



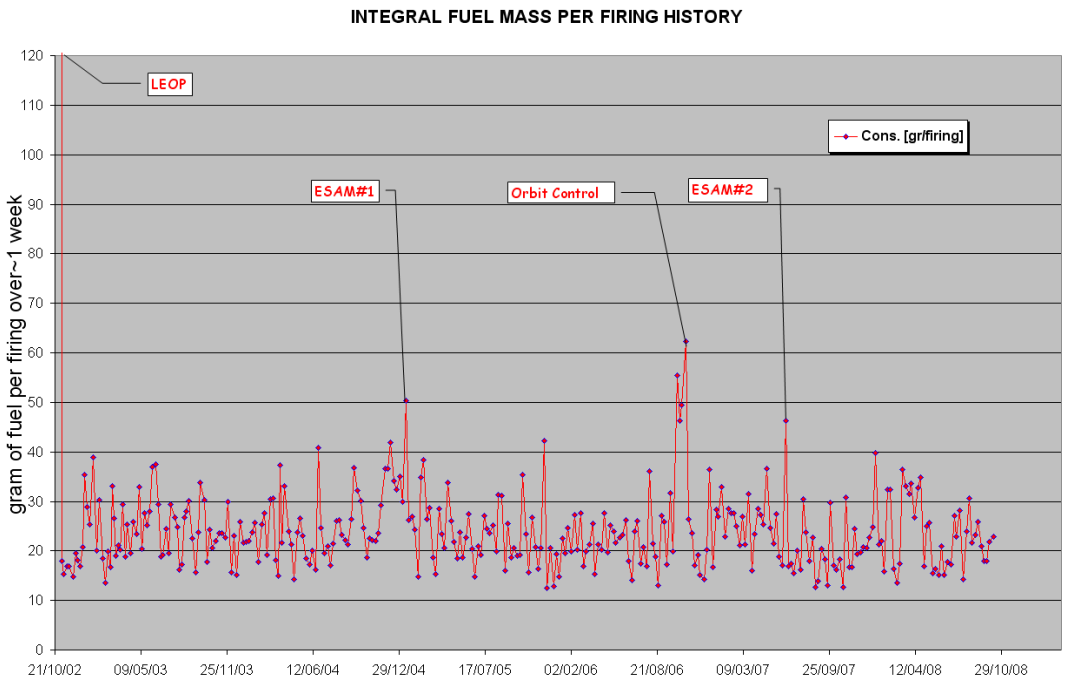
The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 10/10/2008 is reported in the plot below.



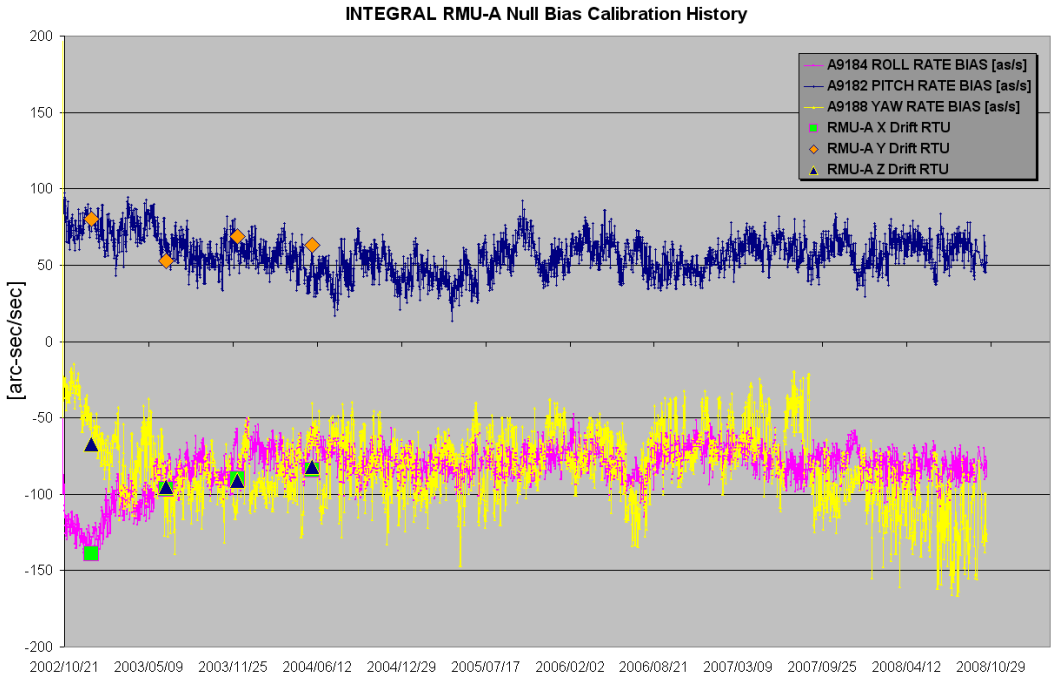
The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 10/10/2008 is shown in the plot below.

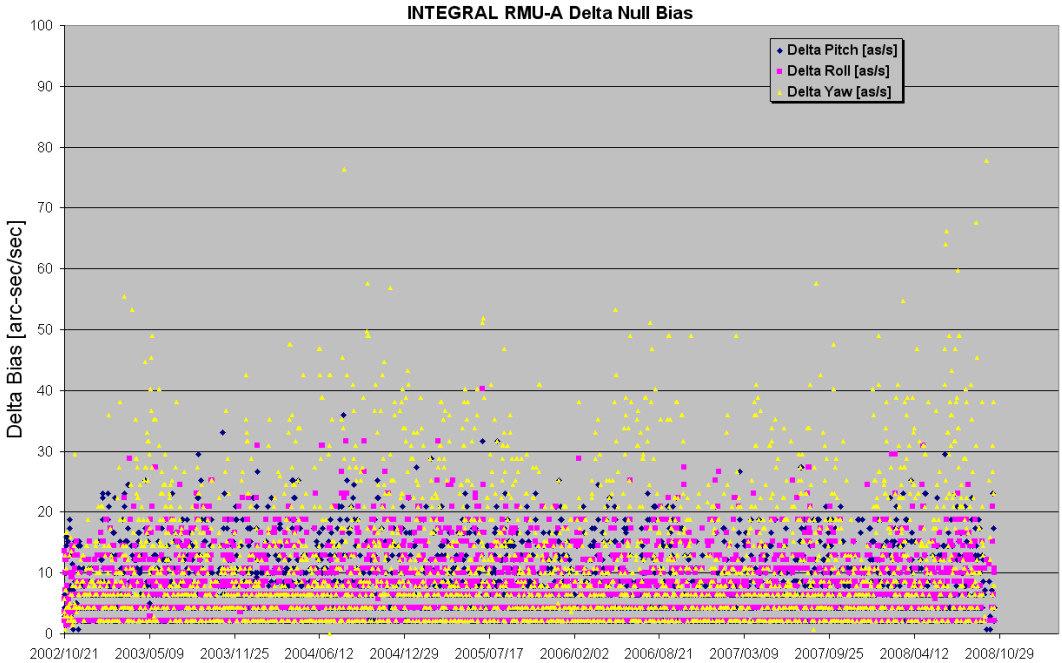


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 17/10/2008 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.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 17/10/2008 is reported in the plot below.



04/10/2008 (Day of Year 278, Revolution 729-730)

The Fifth eclipse passage operations were nominal from the AOCS point of view. Hereafter is reported summary of the eclipse passage during rev 729:

AOCS ECLIPSE MONITORING
Winter 2008

Revolution: 729
Date: 04/10/2008
DoY: 278

INPUT	
Penumbra Start	04/10/2008 18:15:58
Penumbra End	04/10/2008 19:19:21
Umbra Start	04/10/2008 18:17:10
Umbra End	04/10/2008 19:17:39
ACC Sample Time:	02/10/2008 09:52:15
FDE Sample Time:	02/10/2008 09:52:15
FCE Sample Time:	02/10/2008 09:52:15
ACC Eclipse Counter:	49281
ACC Eclipse Start:	251247
ACC Eclipse End:	256692
FDE Eclipse Start:	251666
FDE Left to Eclipse Start	203663
FDE Eclipse Duration:	4588
FCE Eclipse Start:	251710
FCE Left to Eclipse Start	202606
FCE Eclipse Duration:	4544

Penumbra Start:	04/10/2008 18:15:58	LOS:	04/10/2008 15:08:00
Umbra Start:	04/10/2008 18:17:10	AOS:	04/10/2008 18:45:00
Umbra End:	04/10/2008 19:17:39		
Penumbra End:	04/10/2008 19:19:21		
Eclipse Duration:	1:03:23		
Eclipse Duration [sec]:	3803		
IMU Health Check Start	04/10/2008 12:02:00		
Eclipse Imminent Flag	04/10/2008 17:16:18		
ACC IMU AutoCal Start	04/10/2008 17:30:44		
ACC IMU AutoCal End	04/10/2008 17:50:44		
Sun out of FSS FoV	04/10/2008 18:16:59		
Sun back in FSS FoV	04/10/2008 19:17:57		

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	04/10/2008 17:58:21	-1057.00	04/10/2008 17:58:21	-1057.00	-1064	
FDE Eclipse Start	04/10/2008 18:08:17	-461.00			-404	176
FCE Eclipse Start	04/10/2008 18:09:01	-417.00			-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	04/10/2008 19:24:45	324			360	176
FDE Eclipse End	04/10/2008 19:24:45	324			360	176
ACC Eclipse End	04/10/2008 19:29:06	585	04/10/2008 19:29:06	585.00	578	

IMU	Uplink	Execution	WRT Penumbra End [sec]
IMU Auto Off Enable	01/10/2008 20:05:22	04/10/2008 19:31:00	699

IMU On	04/10/2008 12:04:00	IMU H/C Noise Roll [as/s]	0.1995
IMU Off	04/10/2008 19:31:35	IMU H/C Drift Roll [as/s]	0.2267
IMU On Time	7:27:35	IMU Auto Cal Drift Roll [as/s]	

05/10/2008 (Day of Year 279, Revolution 730)

FDS problem during slew update: at 12:52z a problem on FDS caused the slew update to fail for slew ID 07300030.

A manual recovery was then performed and the next slew (ID 07300030) in TL updated.

No impact on TL.

06/10/2008 (Day of Year 280, Revolution 730)

Nothing to report.

07/10/2008 (Day of Year 281, Revolution 730-731)

The Sixth eclipse passage operations were nominal from the AOCS point of view. Hereafter is reported summary of the eclipse passage during rev 730:

AOCS ECLIPSE MONITORING
Winter 2008

Revolution: 730
Date: 07/10/2008
DoY: 281

INPUT	
Penumbra Start	07/10/2008 18:08:13
Penumbra End	07/10/2008 19:13:32
Umbra Start	07/10/2008 18:09
Umbra End	07/10/2008 19:11
ACC Sample Time:	04/10/2008 20:00:04
FDE Sample Time:	04/10/2008 20:04:05
FCE Sample Time:	04/10/2008 20:04:04
ACC Eclipse Counter:	0
ACC Eclipse Start:	251423
ACC Eclipse End:	256984
FDE Eclipse Start:	251842
FDE Left to Eclipse Start	251842
FDE Eclipse Duration:	4676
FCE Eclipse Start:	251886
FCE Left to Eclipse Start	251886
FCE Eclipse Duration:	4632

Penumbra Start:	07/10/2008 18:08:13	LOS:	07/10/2008 18:34:00
Umbra Start:	07/10/2008 18:09:29	AOS:	07/10/2008 15:00:00
Umbra End:	07/10/2008 19:11:46		
Penumbra End:	07/10/2008 19:13:32		
Eclipse Duration:	1:05:19		
Eclipse Duration [sec]:	3919		
IMU Health Check Start	07/10/2008 12:23:00		
Eclipse Imminent Flag	07/10/2008 17:08:33		
ACC IMU AutoCal Start	07/10/2008 17:22:59		
ACC IMU AutoCal End	07/10/2008 17:42:59		
Sun out of FSS FoV	07/10/2008 18:09:16		
Sun back in FSS FoV	07/10/2008 19:12:04		

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	07/10/2008 17:50:27	-1066.00	07/10/2008 17:50:35	-1058.00	-1064	
FDE Eclipse Start	07/10/2008 18:01:27	-406.00			-404	176
FCE Eclipse Start	07/10/2008 18:02:10	-363.00			-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	07/10/2008 19:19:22	350			360	176
FDE Eclipse End	07/10/2008 19:19:23	351			360	176
ACC Eclipse End	07/10/2008 19:23:08	576	07/10/2008 19:23:16	584.00	578	

IMU	Uplink	Execution	WRT Penumbra End [sec]
IMU Auto Off Enable	04/10/2008 19:53:05	07/10/2008 19:25:10	698

IMU On	07/10/2008 12:10:00	IMU H/C Noise Roll [as/s]	0.2213
IMU Off	07/10/2008 19:25:30	IMU H/C Drift Roll [as/s]	0.2150
IMU On Time	7:15:30	IMU Auto Cal Drift Roll [as/s]	

08/10/2008 (Day of Year 282, Revolution 731)

Nothing to report.

09/10/2008 (Day of Year 283, Revolution 731)

Nothing to report.

10/10/2008 (Day of Year 284, Revolution 731-732)

The Seventh eclipse passage operations were nominal from the AOCS point of view. Hereafter is reported summary of the eclipse passage during rev 731:

INPUT	
Penumbra Start	10/10/2008 18:02:00
Penumbra End	10/10/2008 19:05:15
Umbra Start	10/10/2008 18:03
Umbra End	10/10/2008 19:03
ACC Sample Time	10/10/2008 19:53:48
FDE Sample Time	10/10/2008 19:57:49
FCE Sample Time	10/10/2008 19:57:48
ACC Eclipse Counter	0
ACC Eclipse Start	251423
ACC Eclipse End	259860
FDE Eclipse Start	251842
FDE Left to Eclipse Start	251842
FDE Eclipse Duration	4544
FCE Eclipse Start	251886
FCE Left to Eclipse Start	251886
FCE Eclipse Duration	4500

AOCS ECLIPSE MONITORING
Winter 2008

Revolution:	731		
Date:	10/10/2008		
DoY:	284		

Penumbra Start:	10/10/2008 18:02:00	LOS:	10/10/2008 15:05:00
Umbra Start:	10/10/2008 18:03:24	AOS:	10/10/2008 18:28:00
Umbra End:	10/10/2008 19:03:19		
Penumbra End:	10/10/2008 19:05:15		
Eclipse Duration:	1:03:15		
Eclipse Duration [sec]:	3795		
IMU Health Check Start	10/10/2008 11:40:00		
Eclipse Imminent Flag	10/10/2008 17:02:20		
ACC IMU AutoCal Start	10/10/2008 17:16:46		
ACC IMU AutoCal End	10/10/2008 17:36:46		
Sun out of FSS FoV	10/10/2008 00:00:00		
Sun back in FSS FoV	10/10/2008 00:00:00		

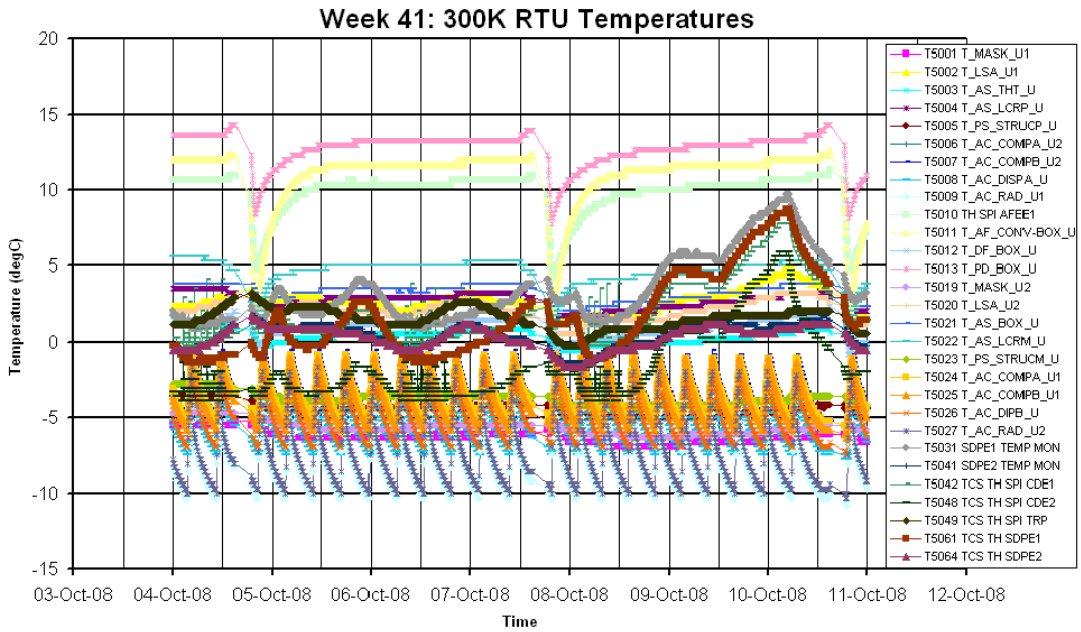
Eclipse Timers	From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
	Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]		
ACC Eclipse Start	13/10/2008 17:44:11	258131.00	10/10/2008 17:44:23	-1057.00	-1064	
FDE Eclipse Start	13/10/2008 17:55:11	258791.00			-404	176
FCE Eclipse Start	13/10/2008 17:55:54	258834.00			-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	13/10/2008 19:10:54	259539			360	176
FDE Eclipse End	13/10/2008 19:10:55	259540			360	176
ACC Eclipse End	13/10/2008 19:14:48	259773	10/10/2008 19:14:59	584.00	578	

IMU	Uplink	Execution	WRT Penumbra End [sec]
IMU Auto Off Enable	07/10/2008 19:46	10/10/2008 19:16	695
IMU On	10/10/2008 11:42:47	IMU H/C Noise Roll [as/s]	0.2049
IMU Off	10/10/2008 19:17:13	IMU H/C Drift Roll [as/s]	0.1908
IMU On Time	7:34:26	IMU Auto Cal Drift Roll [as/s]	

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.

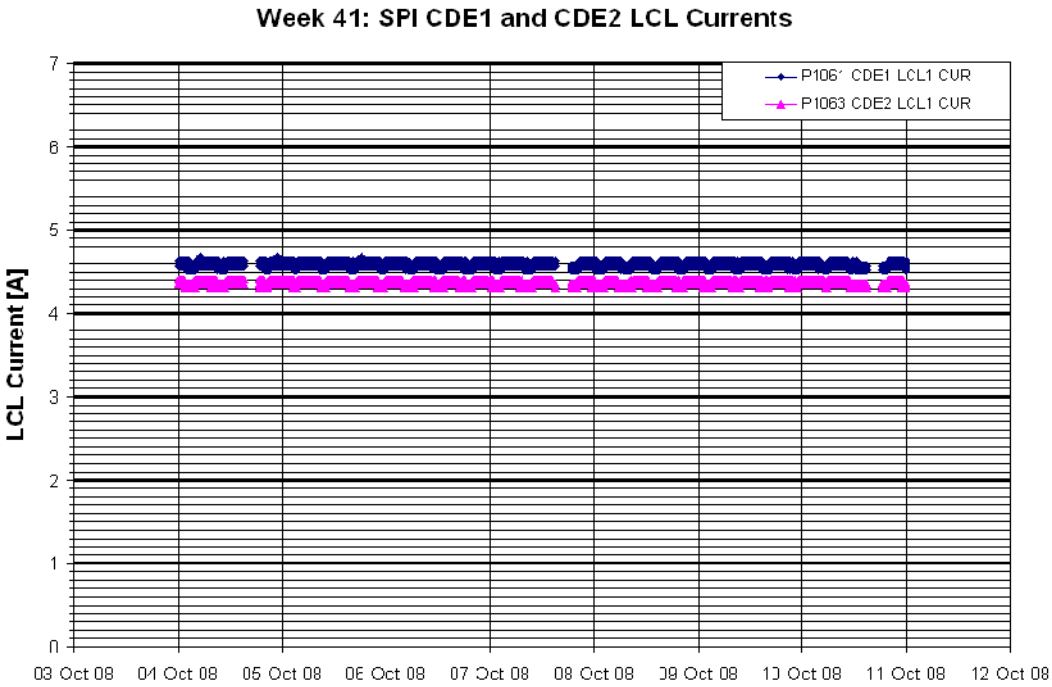


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

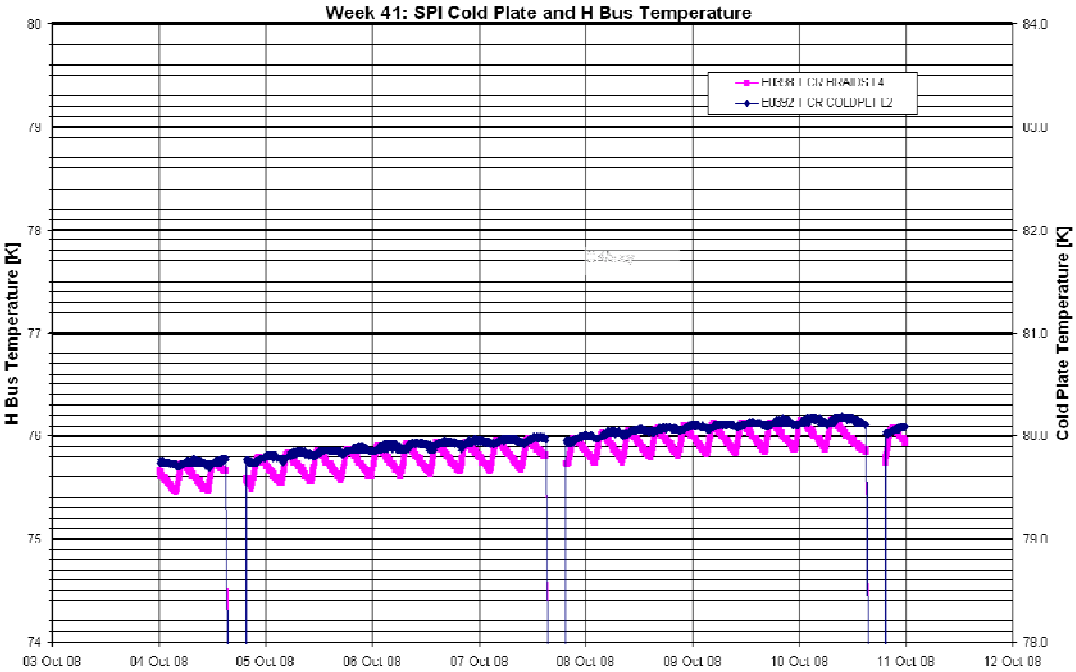
The stroke of all four compressors remained at 39 throughout the week. The average CDE LCL currents were as follows:

- CDE1 LCL Current = 4.59A
- CDE2 LCL Current = 4.36A

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



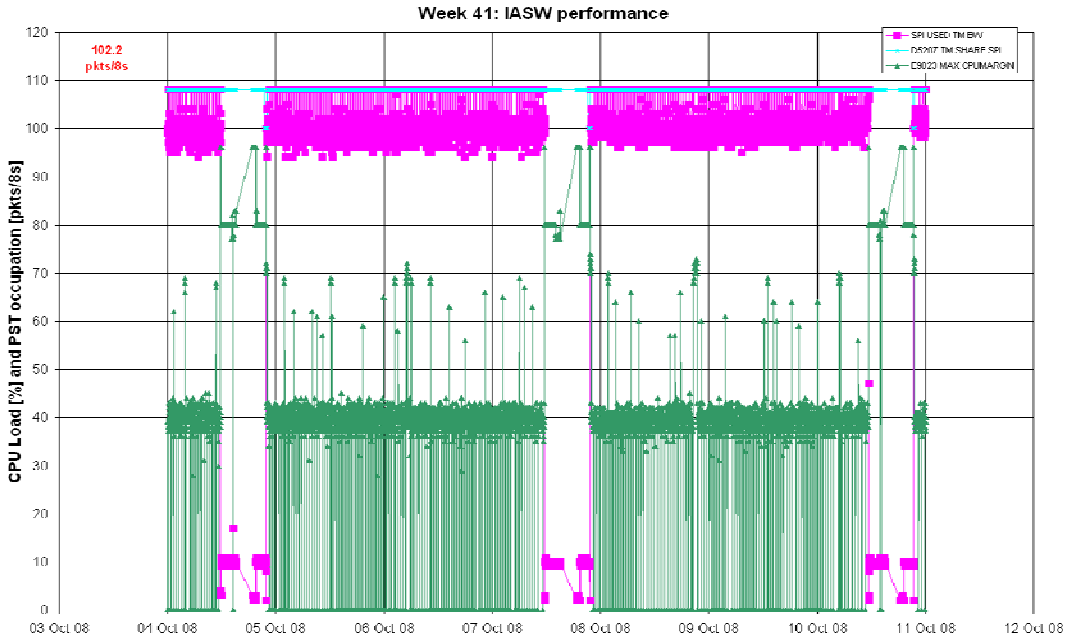
The following plot shows the evolution of the cold plate and H bus temperatures during the reporting period.



DPE & IASW: The DPE health and IASW performance are nominal.

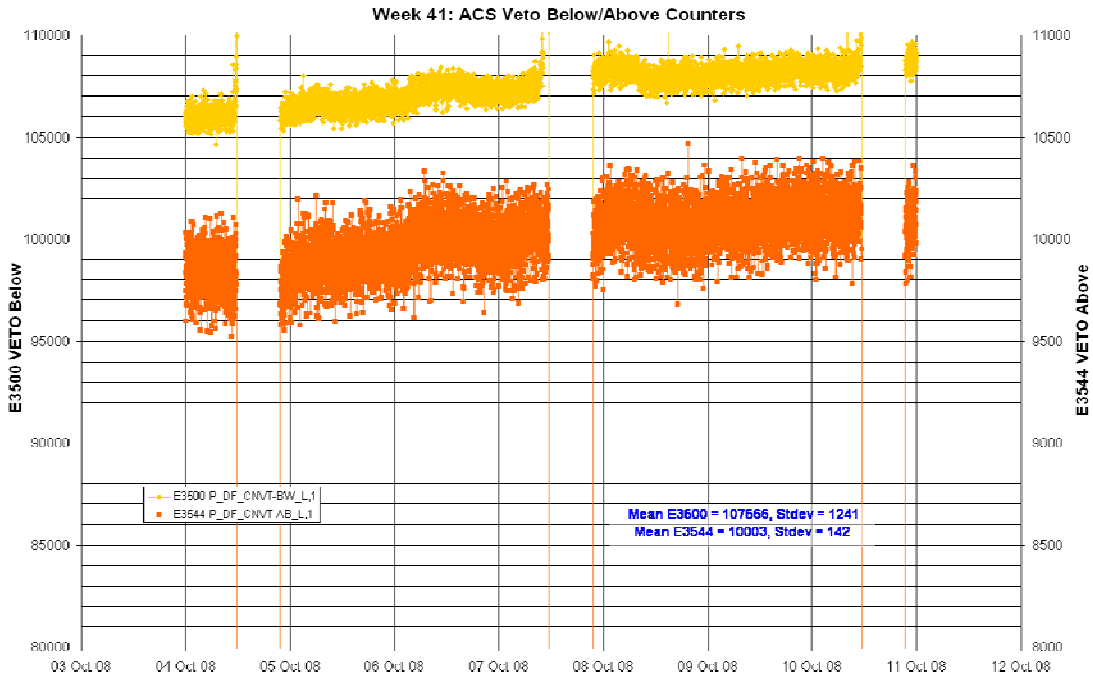
The IASW version installed is v4.3.4 with SE compression only enabled and the spectra scaling factor set to 8/19 SE. The average TM bandwidth occupation of SPI was 102.2 packets/cycle over the science window when the TM allocation was 108 packets/cycle.

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

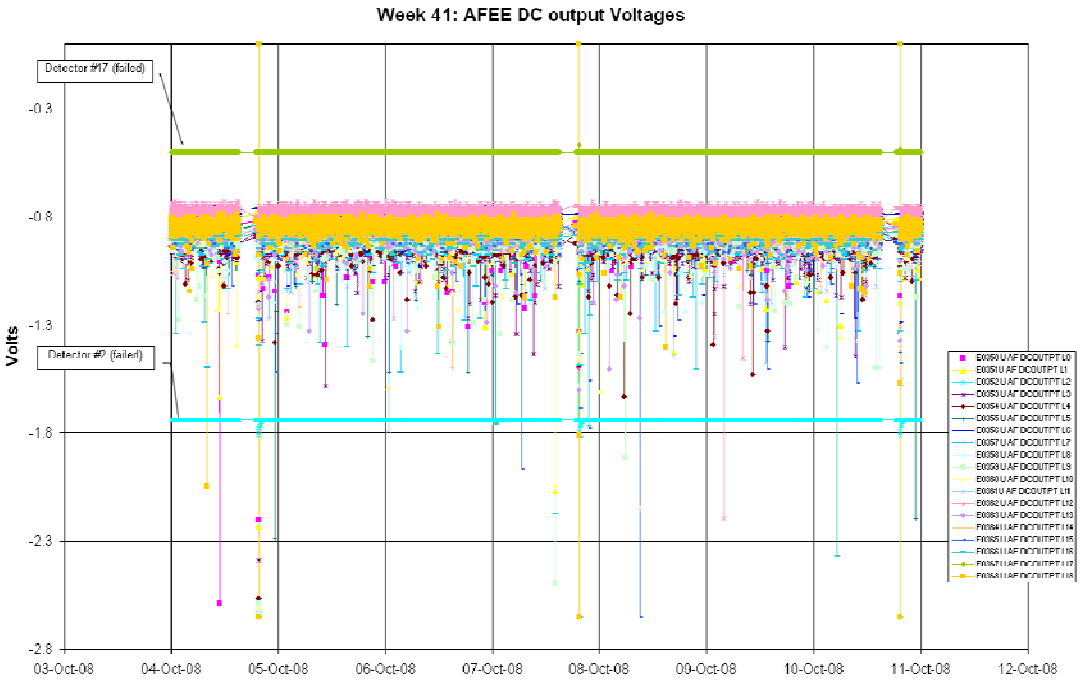


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

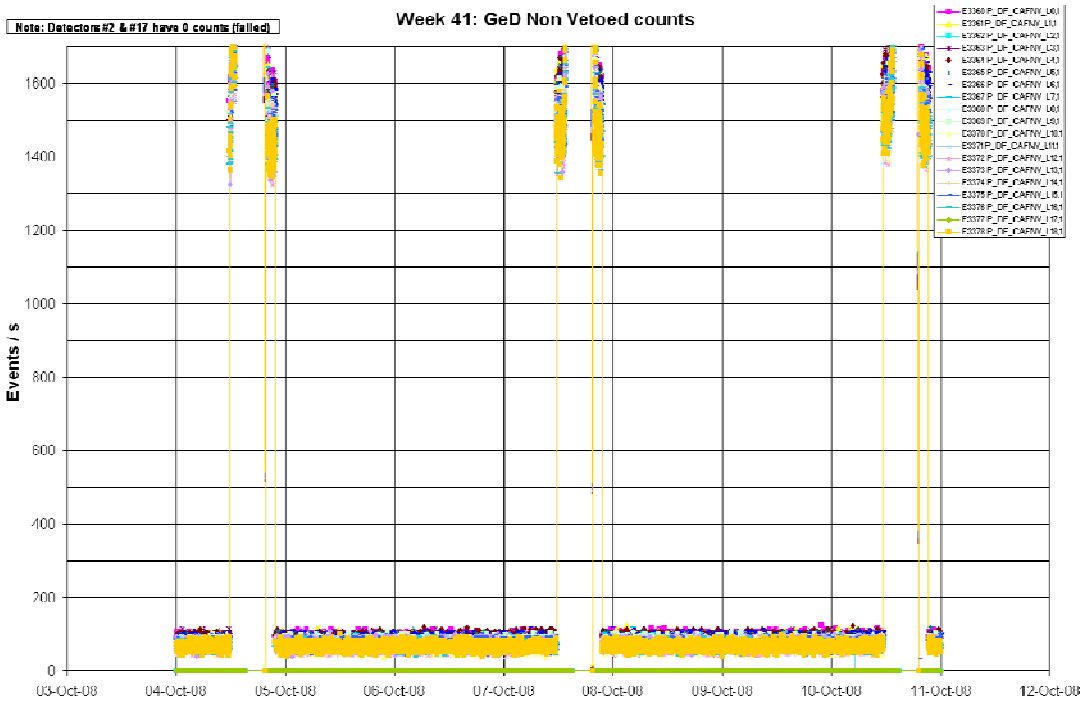
The following plot shows the ACS overall count rate evolution during the reporting period:

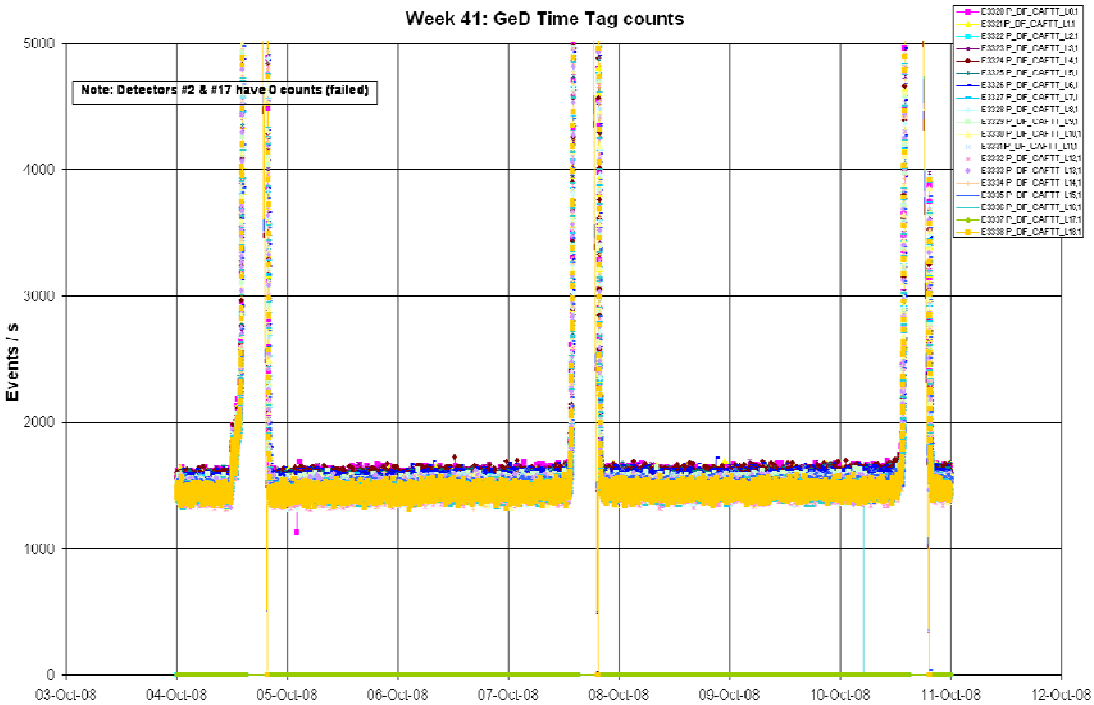


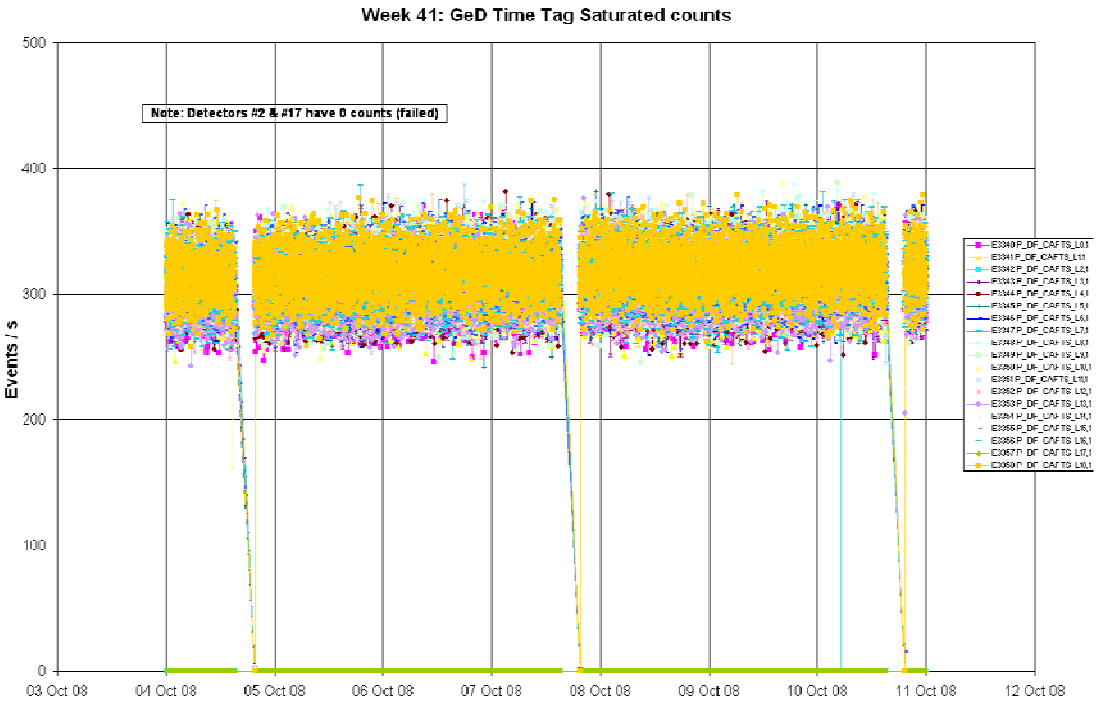
AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.



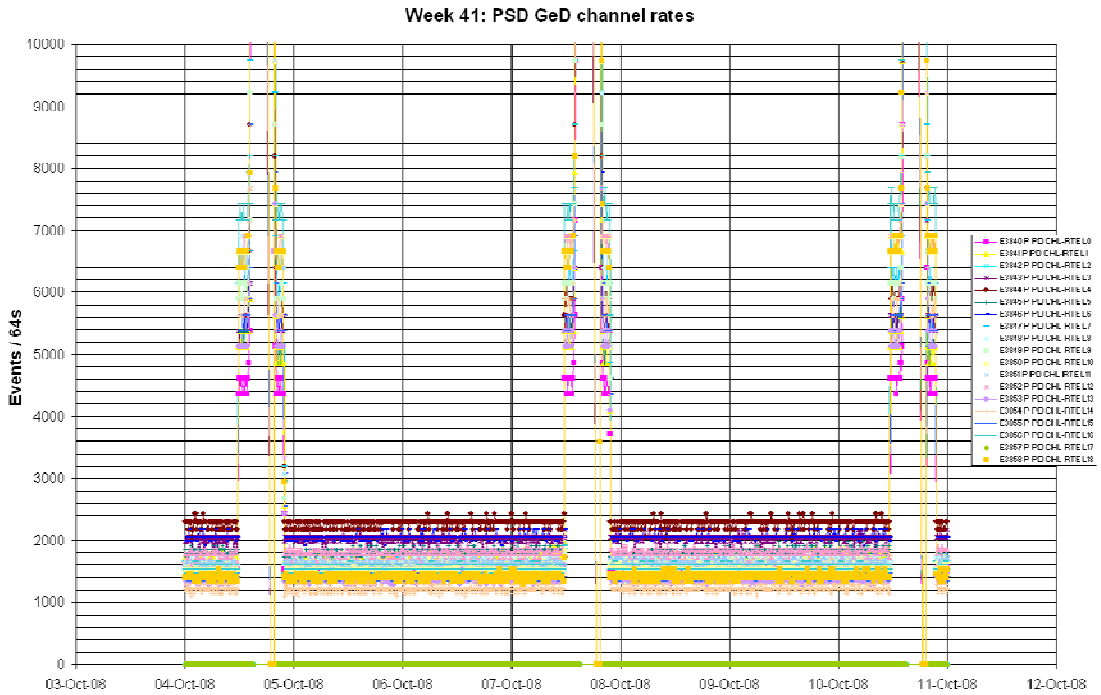
DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event count rates during the reporting period.







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



Event Log:

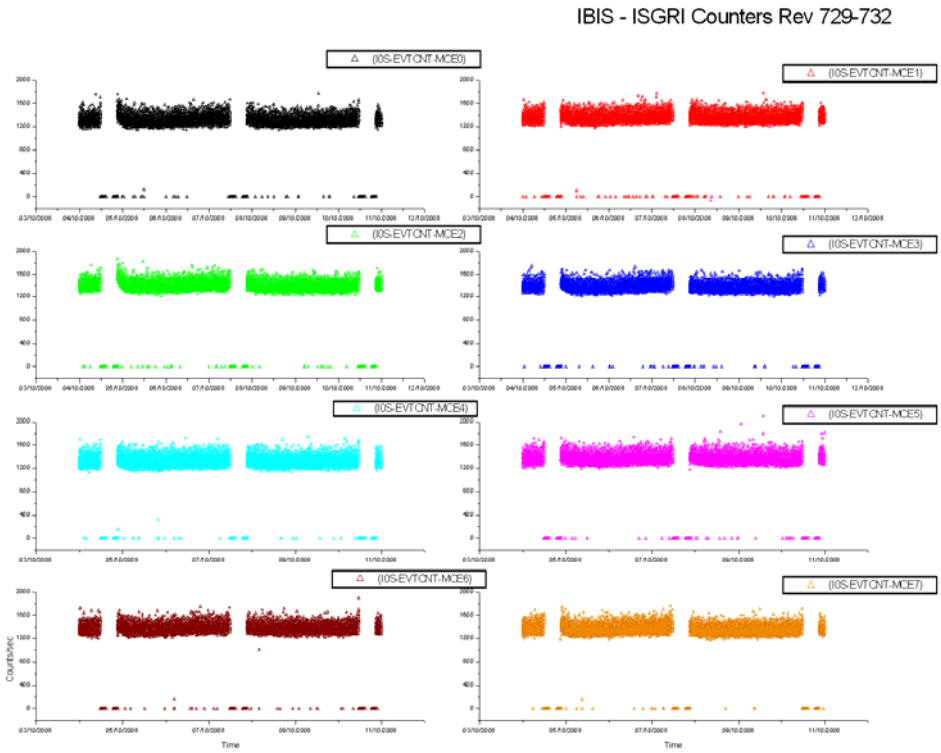
The following non-nominal event occurred on SPI over the reporting period:

- Due to slightly high radiation before the expected radiation belt entry of revolution 730, TM parameter E3500 (ACS CntVetoBelow) went OOL High on 2008-10-07 from 10:41:48Z to 11:14:04Z.

8.3.3 IBIS Operations

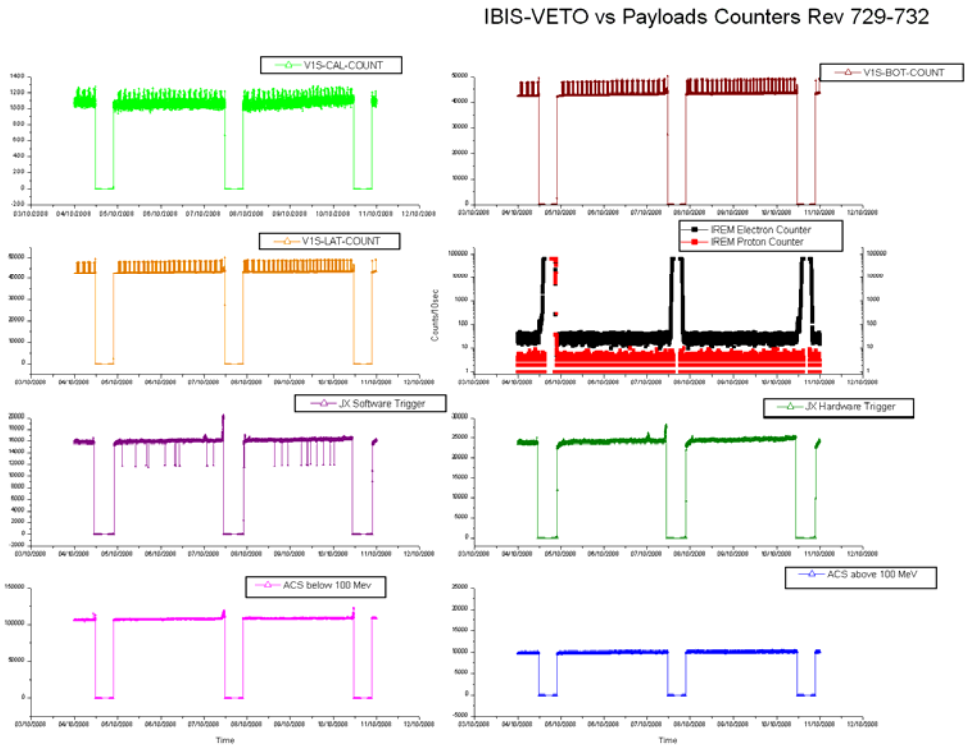
<u>IBIS Event Counters Plots</u>

ISGRI Counters:



**sampling every 4 pkts (32 secs)

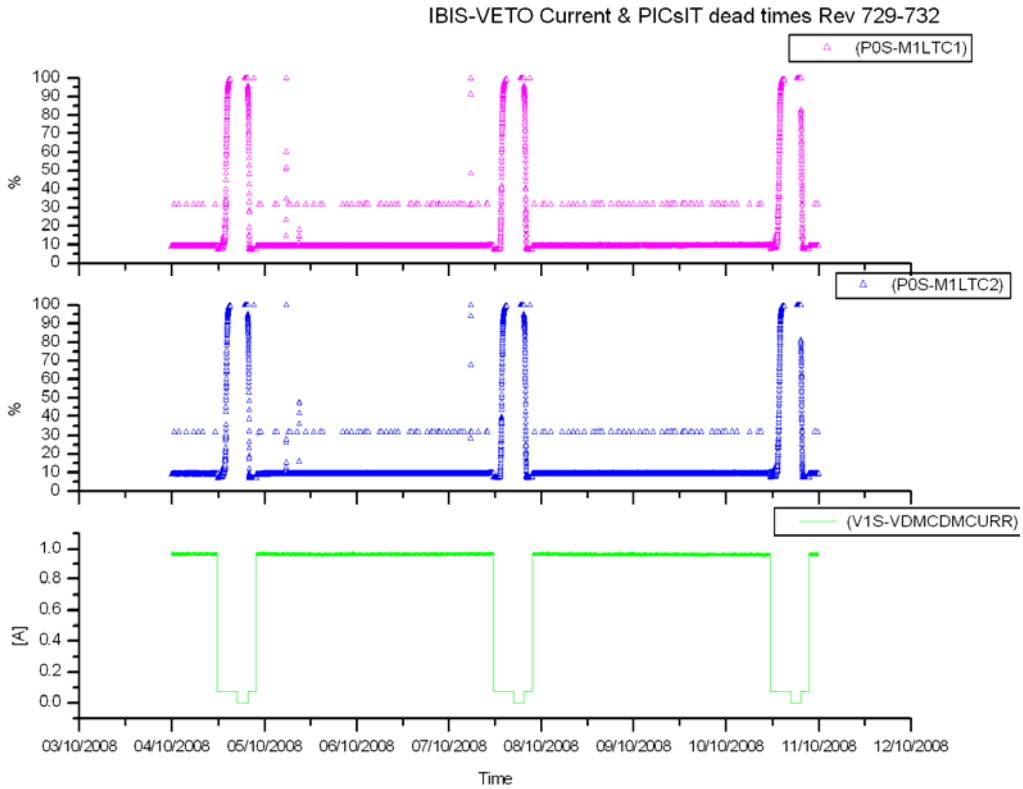
VETO vs Payload Counters:



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

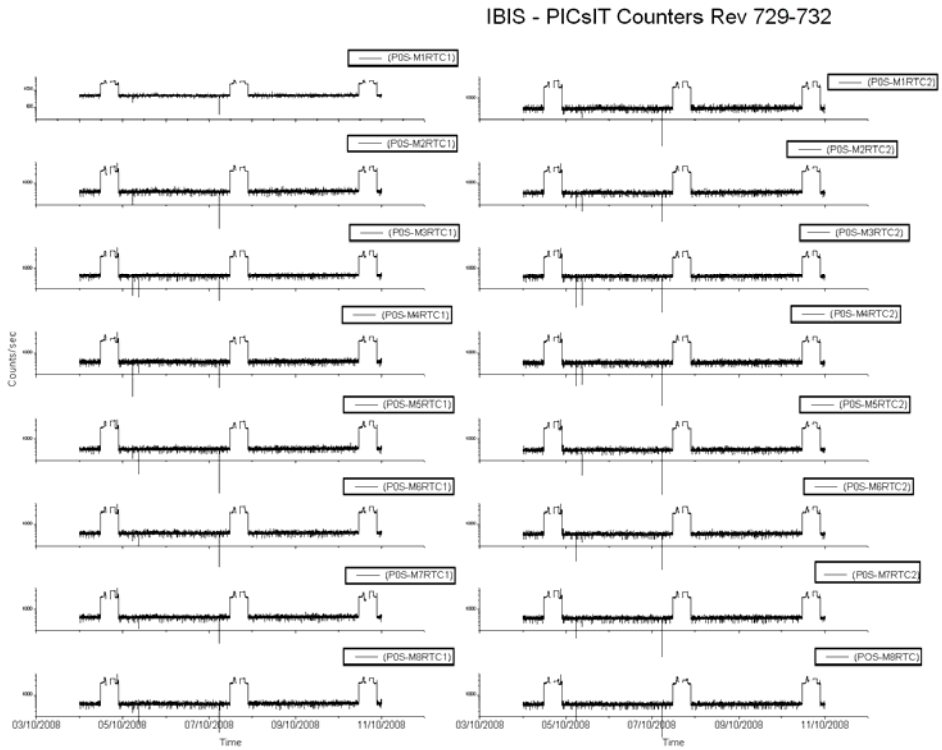
The week was characterised by low radiation as reported by the payload.

VETO Current:



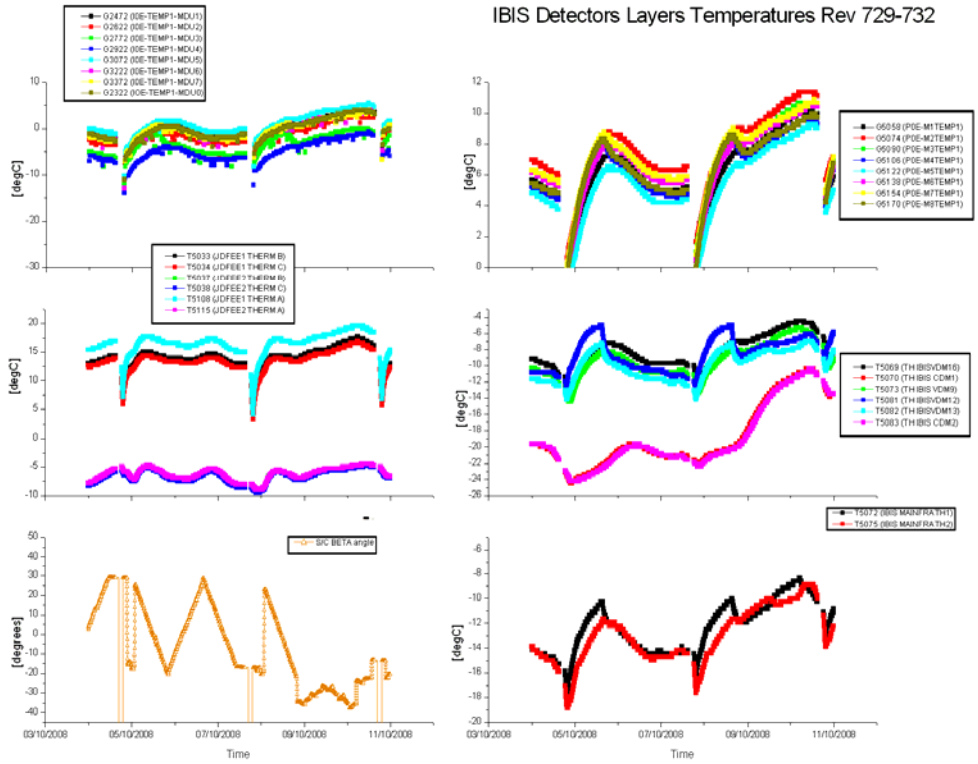
**sampling every 4 pkts (32 secs)

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.

2008-10-04 (DOY 278, Rev 729-730)

IBIS operations executed nominally.

2008-10-05 (DOY 279, Rev 730)

At 05:38:05Z the TM parameters families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semi-module FIFO error flags. At 05:40:55Z the TM parameter families G5002 and G5003 for the PDM semi-module counters started going OOL Low. As these were followed at 05:44:26Z 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 09:03:24Z the TM parameters families G5068 and G5072 failed status consistency check (value = TRUE) again. As they had returned within limits of their own accord by 09:05:00Z, no action was taken.

At 17:02:39Z TM parameter G2070 went OOL, indicating an overflow of the noisy pixel address register in MCE5. As it returned within limits of its own accord at 17:02:47Z, no action was taken.

2008-10-06 (DOY 280, Rev 730)

IBIS operations executed nominally.

2008-10-07 (DOY 281, Rev 730-731)

At 05:39:08Z the TM parameters families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semi-module FIFO error flags. At 05:39:35Z the TM parameter families G5002 and G5003 for the PDM semi-module counters started going OOL Low. As all the above parameters had returned within limits by 05:41:27Z, no action was taken.

2008-10-08 (DOY 282, Rev 731)

IBIS operations executed nominally.

2008-10-09 (DOY 283, Rev 731)

TM parameter G2070 went OOL briefly on several occasions from 01:29:43Z to 20:04:31Z, indicating an overflow of the noisy pixel address register in MCE5. As in each case it returned within limits of its own accord, no action was taken.

2008-10-10 (DOY 284, Rev 731-732)

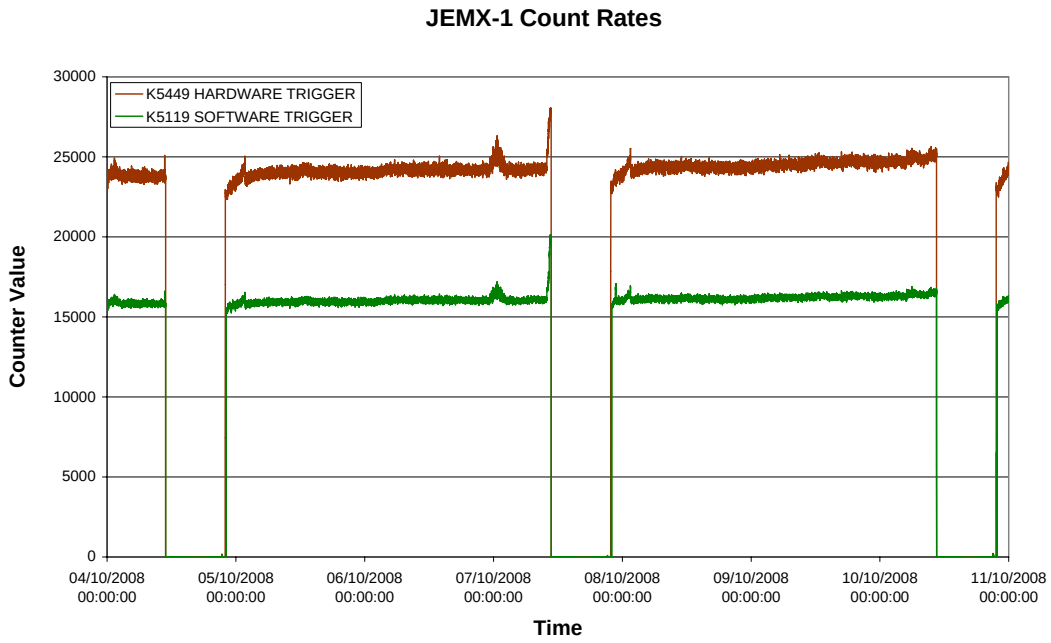
At 23:00:47Z TM parameter G2070 went OOL, indicating an overflow of the noisy pixel address register in MCE5. As it returned within limits of its own accord at 23:00:55Z, no action was taken.

8.3.4 JEM-X Operations

JEM-X Count Rates

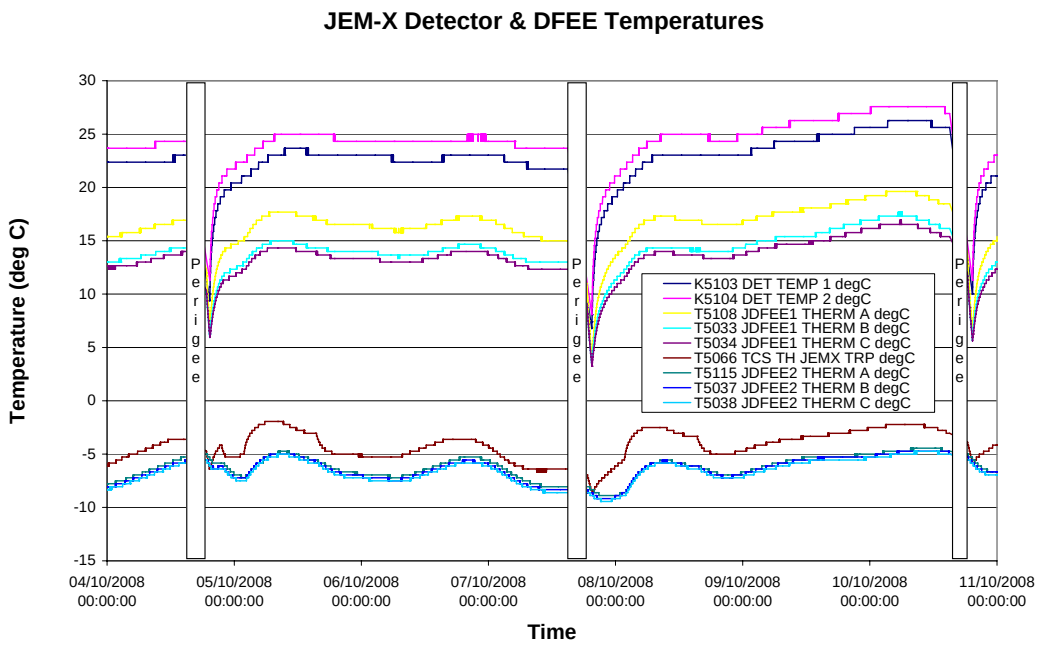
JEM-X count rates over the reporting period are displayed in the following graph[1].

[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 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].



JEM-X Daily Report

2008-10-04 (DoY 278, Rev 729)

[2] Data sampled (1 frame in 8)

From 19:22:34 to 19:23:03, parameter KD5380D was showing a False state. No action was taken, and there was no impact.

2008-10-05 (DoY 279, Rev 730) to 2008-10-06 (DoY 280, Rev 730)

JEM-X 1 operations executed nominally.

2008-10-07 (DoY 281, Rev 730)

From 19:22:34 to 19:23:00, parameter KD5380D was showing a False state. No action was taken, and there was no impact.

2008-10-08 (DoY 282, Rev 731) to 2008-10-09 (DoY 283, Rev 731)

JEM-X 1 operations executed nominally.

2008-10-10 (DoY 284, Rev 731-732)

From 19:31:01 to 19:31:22, parameter KD5380D was showing a False state. No action was taken, and there was no impact.

8.3.5 OMC Operations

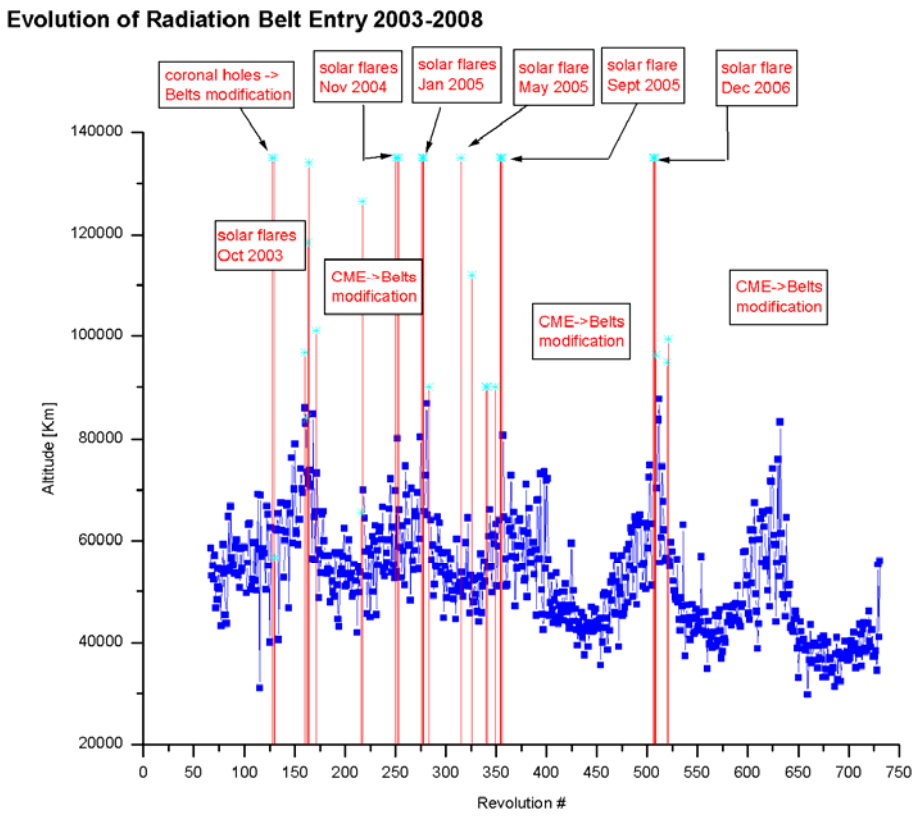
2008-10-04 (DoY 278, Rev 729) to 2008-10-10 (DoY 284, Rev 732)

Nothing to report.

On DoY 278 at 11:47:48, DoY 281 at 11:37:38 and DoY 284 at 11:26:42 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 2008.278 (04/10/2008):

At 19.30:00Z, it was observed that a local reset of the IREM CSCI S/W (SEU #68) had occurred during the perigee passage. 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 between 2008.278.15.07:45Z and 2008.278.18.45:05Z (~10000.0 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 3C80 HEX = 15488 DEC = **0**011110010000000, i.e the Ground Link OFF. 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 21:38:00Z.

The IREM automatic transition to Standard Mode did not affect the instruments as they were already in SAFE mode for the perigee passage.

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]
729	RAD_ENTR R 2008-10-04T11:47:40Z	04/10/2008 11:56:33	55324.1	04-Oct-2008 14:03:45	37922.2
730	RAD_EXIT R 2008-10-04T21:39:28Z	Not available	-	04-Oct-2008 21:03:45	45527.39
730	RAD_ENTR R 2008-10-07T11:37:35Z	07/10/2008 13:18:49	41051.6	07-Oct-2008 13:56:11	37644.32
731	RAD_EXIT R 2008-10-07T21:29:05Z	07/10/2008 20:16:33	41807.1	07-Oct-2008 20:56:11	45815.25
731	RAD_ENTR R 2008-10-10T11:26:38Z	10/10/2008 11:25:05	56049.5	10-Oct-2008 13:46:11	37631.48
732	RAD_EXIT R 2008-10-10T21:18:24Z	10/10/2008 19:58:01	40203.3	10-Oct-2008 20:46:11	45794.85

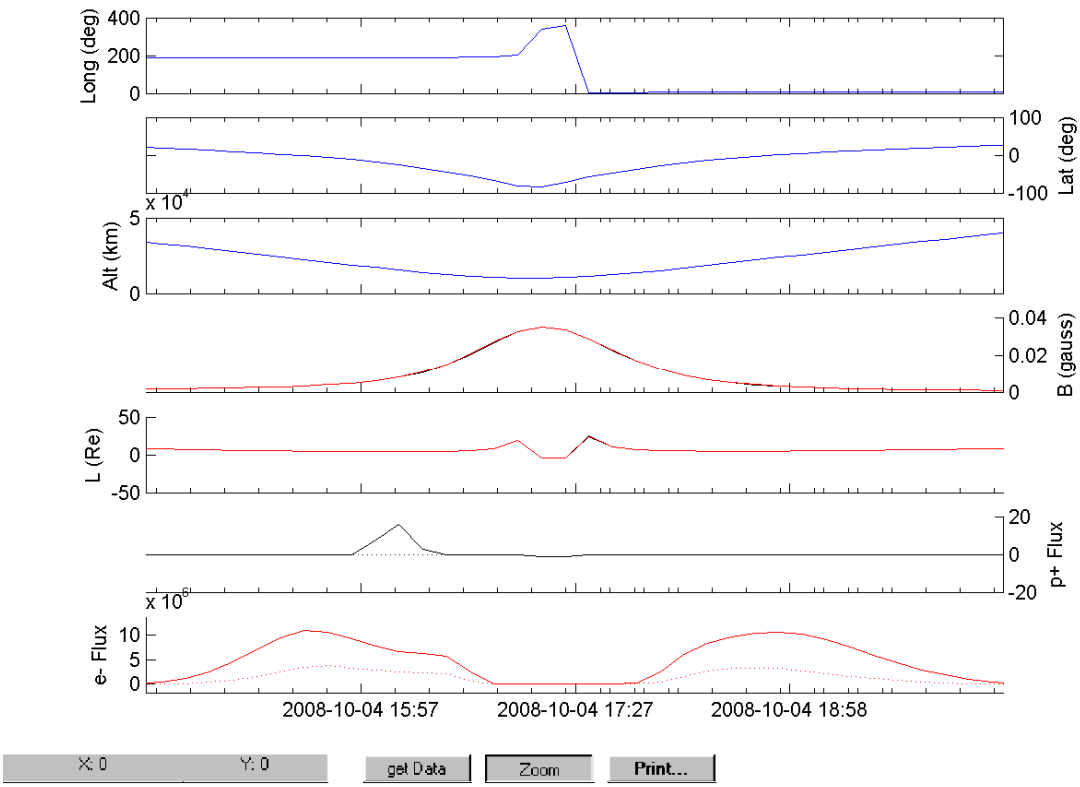
Reference
High radiation
Very small error vs reference (less than 10 minutes)
Small error vs reference (between 10 and 30 minutes)
Large error vs reference (more than 30 minutes)
* Rad belt entry time ignoring previous threshold crossings where a gap of more than 30 minutes is present.

<u>IREM radiation counters:</u>

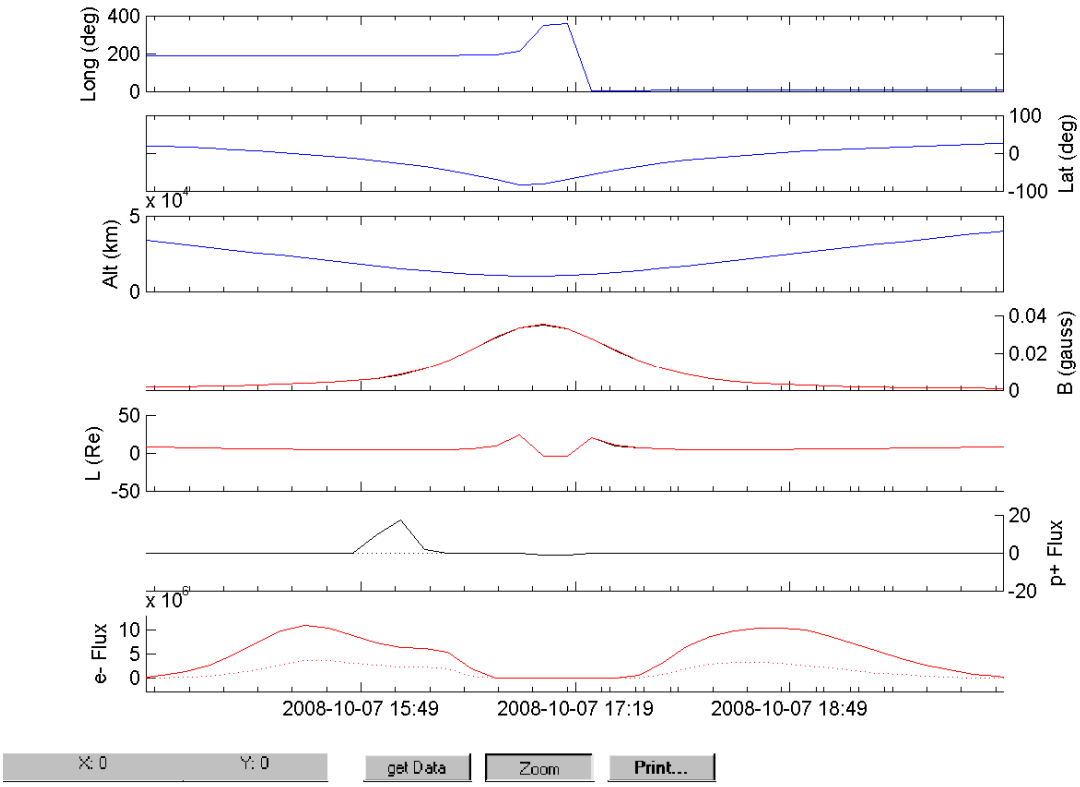
The IREM radiation counter plots are not available this week.

IREM Predicted Radiation Belt Passages

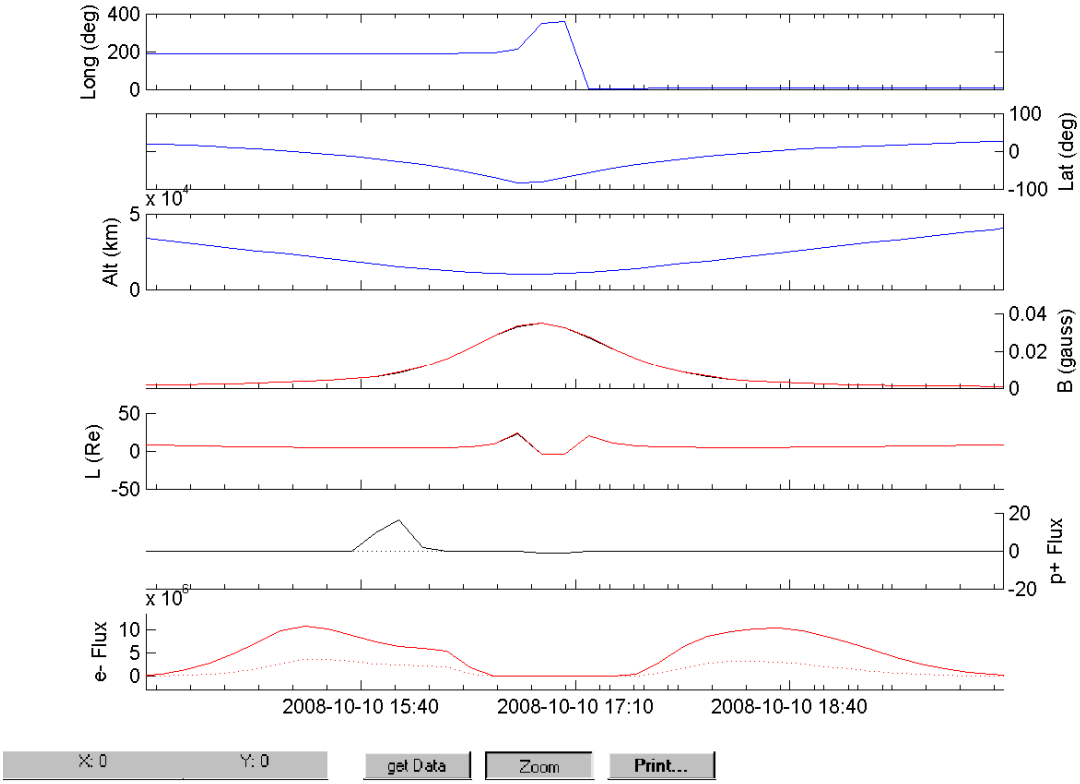
Rev 729



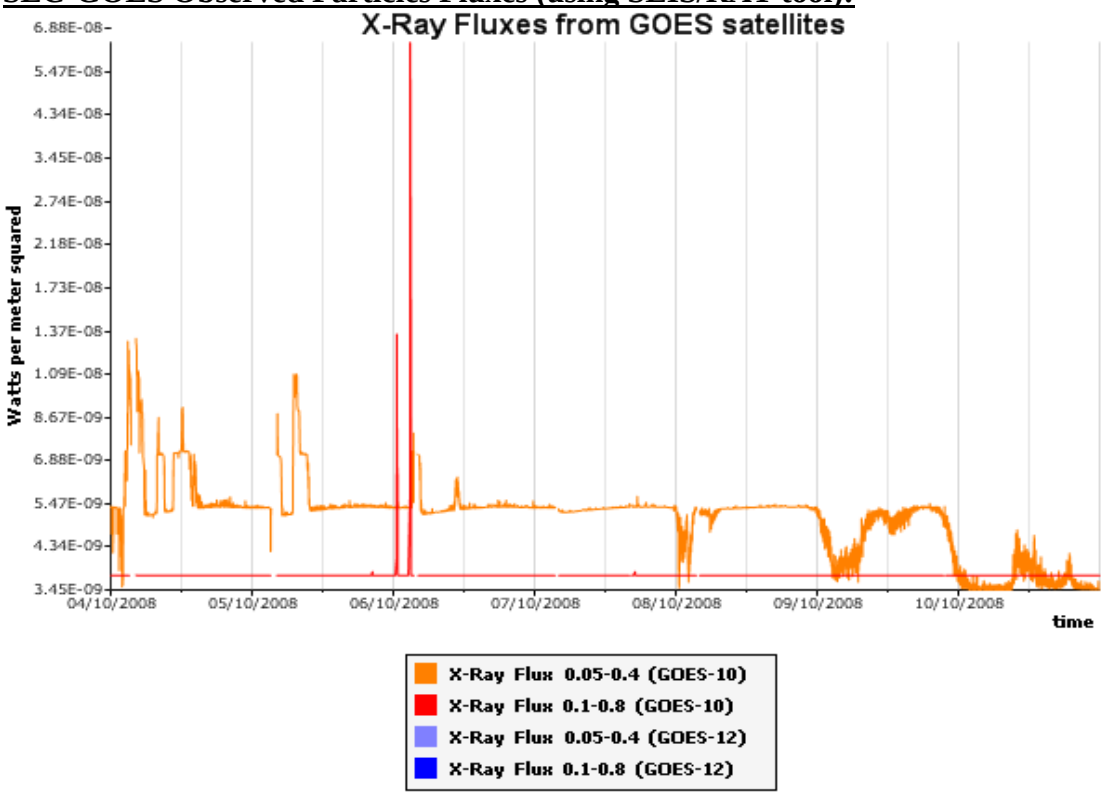
Rev 730



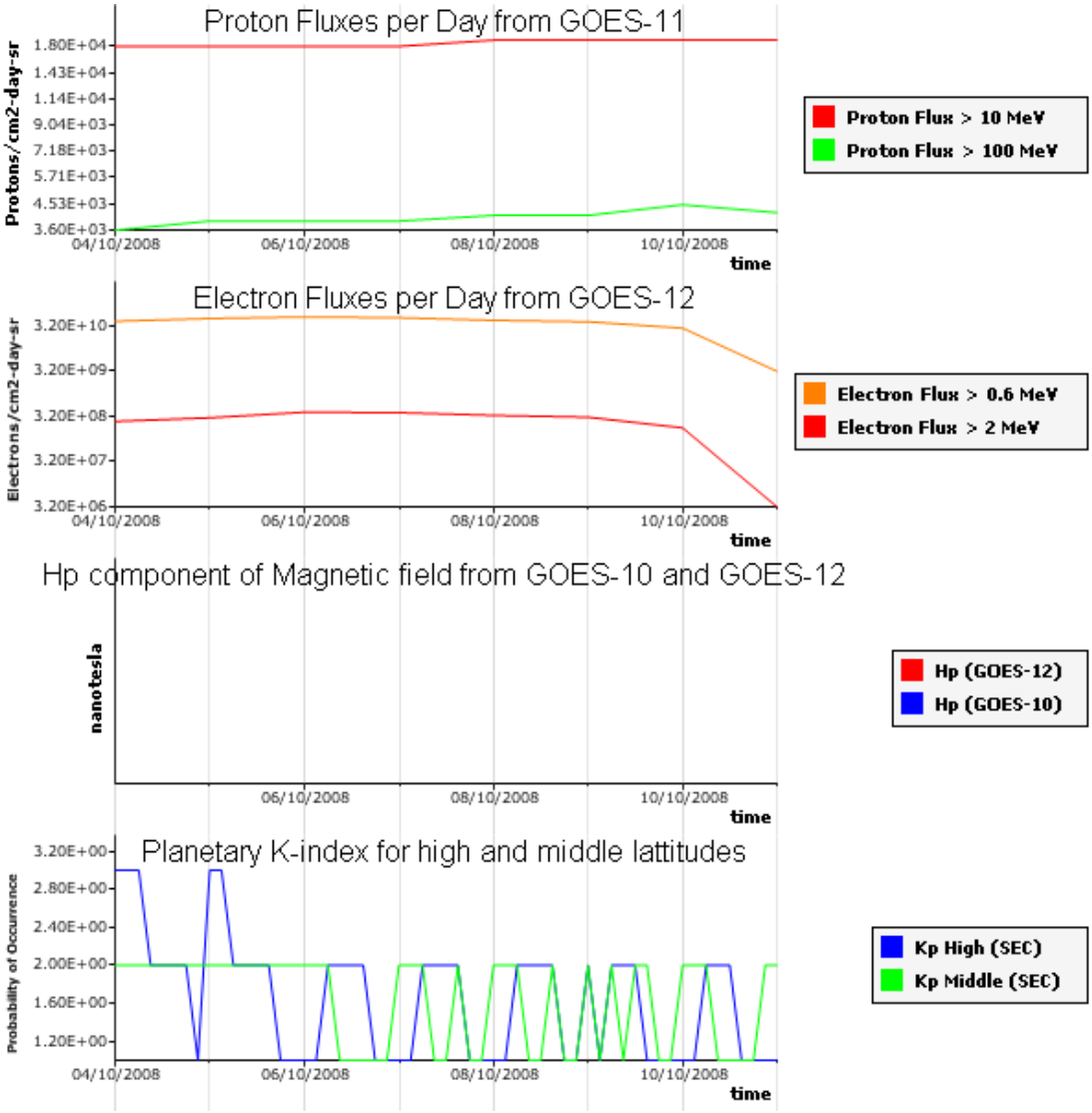
Rev 731



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



X-Ray fluxes start to be significant over 10^{-5} W/m^2 (corresponding to M-class flares). Above 10^{-4} W /m^2, they correspond to strong X-class flares.



Proton and electron flux report low radiation background.
Hp component of the Geomagnetic Field is essentially parallel to the Earth's rotation axis. A drop near 0 nT is associated with a significant variation in the magnetic field.
Kp index is based on ground magnetometers. Kp >=5 features storm-level geomagnetic activity.