

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 266
Week 43
29.10.07
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.....	3
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.....	6
3.2.4	OMC.....	6
3.2.5	IREM.....	7
4	Ground Facilities.....	7
4.1	Mission Operations Centre.....	7
4.2	Ground Stations & Network.....	7
4.3	Science Ground Segment.....	7
4.3.1	ISOC.....	7
4.3.2	ISDC.....	8
5	Special Events.....	8
6	Anomalies.....	8
7	Future Milestones.....	8
8	Appendix.....	9
8.1	Overview of Revolutions.....	9
8.2	Consumables.....	9
8.2.1	Detailed Fuel Book-keeping.....	9
8.3	Detailed Satellite Information.....	10
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 20/10/2007 – 26/10/2007.....	10
8.3.2	SPI Operations.....	14
8.3.3	IBIS Operations.....	20
8.3.4	JEM-X Operations.....	24
8.3.5	OMC Operations.....	26
8.3.6	IREM Operations.....	28

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	
J. Dodsworth OPS-OA	1	J. Louet SCI-P	1
	1		1
	1	ESTEC / PG	
M. Schmidt	1	G. Sarri	
R. Southworth	1		
F. Di Marco	1	ESTEC/RSSD	1
F. Cordero	1	M. Kessler SCI-SD	
M. Walker	1	C. Winkler	
P. Lippi	1	A. Parmar	
R. Lemme	1		
S. Fahmy	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	
K.J. Schulz	1	F. Ravera	1
M.A. Larsen	1		1
		PI / Instrument Teams	1
M. Butkovic	1	J. P. Roques – SPI	1
D. Heinzer	1	G. La Rosa – IBIS	
U. Feucht	1	P. Ubertini – IBIS	
Shift - Coord	1	S. Brandt – JEM X	1
Scheduling Office	1	E. De Miguel - OMC	1
T. Beck	1	W. Hajdas – IREM	
J. Wardill	1		
M. Unal	1	JPL / Goldstone	1
P. Maldari	1	D. Holmes	1
		J. Valencia	1
		Jesse Velasco	1
Redu		DSN - MPSETD	1
B. Demellenne			1
ESAC	1		
P. Kretschmar			1
V. Gomez SCI-O			1
E. Kuulkers	1		1
C Gonzales	1		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 20.10.07 until 26.10.07 (both dates inclusive) and covers the revolutions 613, 614 and 615.

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), two hexagonal dithers of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), two Custom Pointings of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), and two raster dithers 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 started on 11/10/2007. The 4th, 5th and 6th eclipse passages were nominal from an AOCS point of view.

As part of the AOCS preparation for the Winter 2007 eclipse season, were verified 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.

Three slews were missed from TL, during the observation period, due to a problem on STR search/track process and problems on IMCS.

The fuel consumption over the period between 20/10/2007 and 26/10/2007 was 0.0630 Kg. The remaining propellant is in the order of 144.0472 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

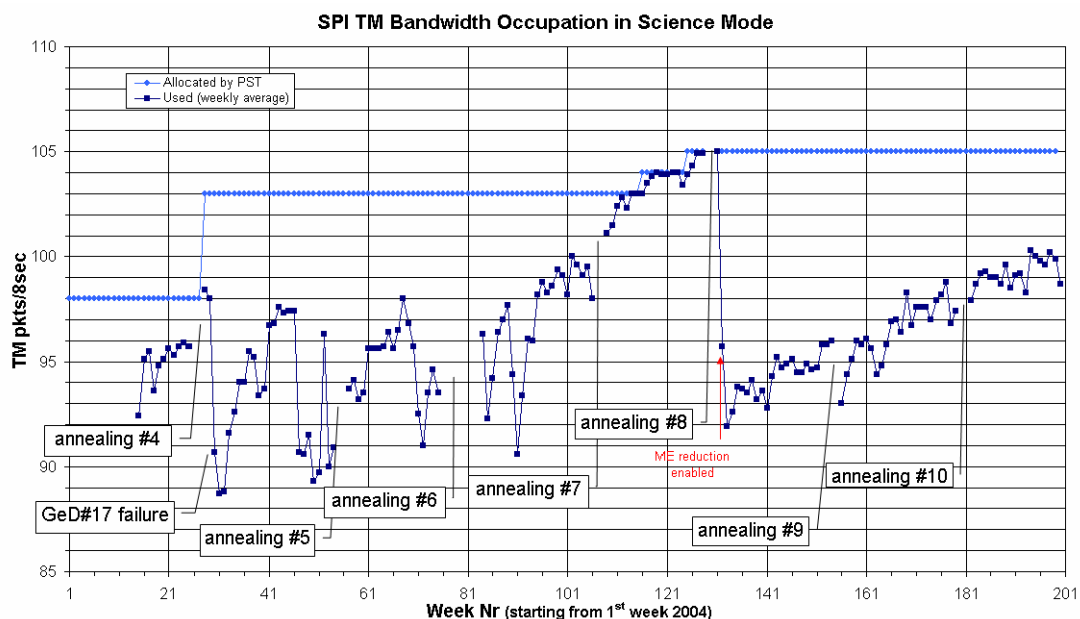
3.2.1 SPI

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 98.7 packets/cycle.

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.

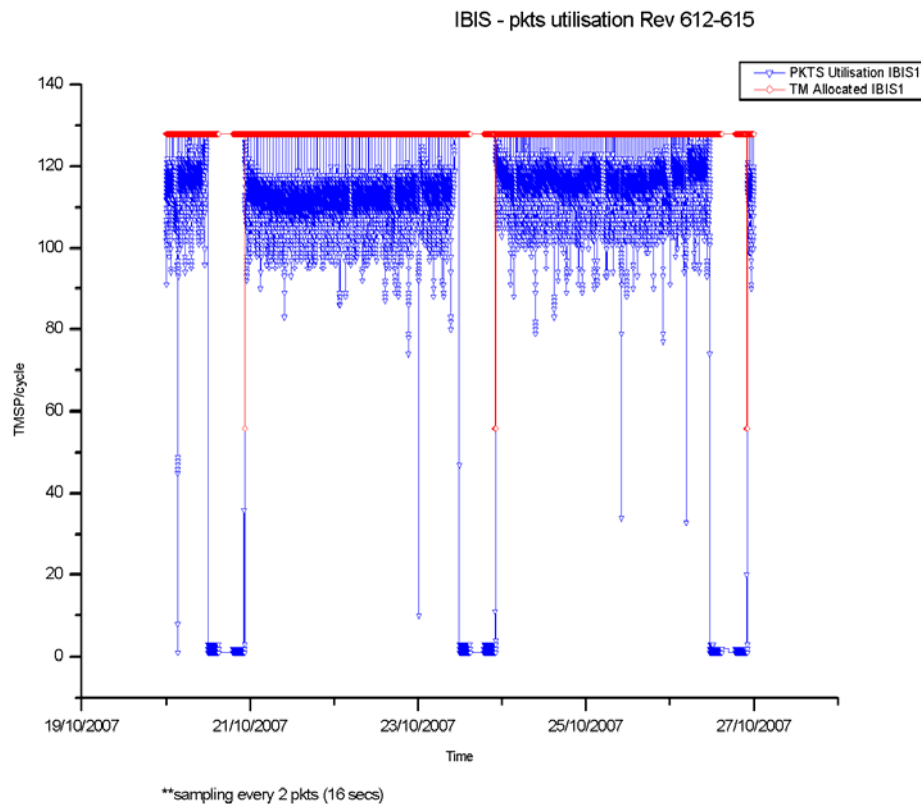
3.2.2 IBIS

The overall status of the unit is nominal.

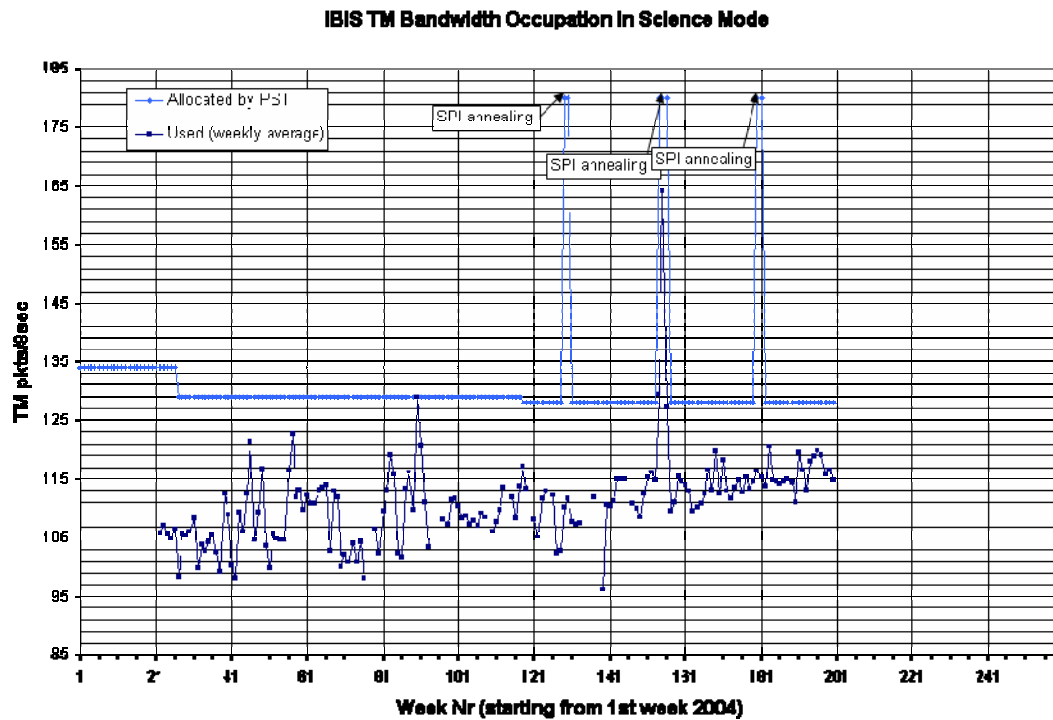
During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 114.82 TMPS/cycle, down 1.82 on last week.

During the reporting period IBIS operations for eclipse continued to be executed nominally, except for some commanding problems as reported in the IBIS daily report below.

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, 174 of the 175 planned science pointings for OMC were executed nominally, 1 was lost.

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 sun was blank all week, 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 very good this week. No pointings were missed from the Timeline due to ground problems. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was very good this week. There was, however, one incident where the Command Verifier crashed, without impact. 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, 3 occasions of small TM drops from Redu, 2 of which required manual uplink of EDs to rejoin the Timeline, 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 received for Revolutions 620-622. Revolutions up to 622 have been planned and send to MOC, but new PSFs have been received for the last two and ISOC may want to redo these to incorporate the roll-angle stepping.

TSFs for Revolutions 616-618 have been received.

2. Observation status

ECS for Revolutions 604-607 have been received and processed.

3. ISOC Science Data Archive

A status meeting has been held on 25 Oct. Work is progressing normally. An update of the INVITE tool is in testing.

4. ISOC system

Still working with Version 16.0, an update to include roll-angle stepping for the 5*5 patterns is being tested in detail.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 29/10/2007:

- Latest Standard Analysis completed: observation 05200710002 (Galactic disk, Revolution 607) on 29/10/2007.
- Latest products archived: observation 05200010010 (Galactic Bulge region, Revolution 602) on 17/10/2007.
- Latest observation products sent to the observer: observation 05200010010 (Galactic Bulge region, Revolution 602) on 18/10/2007.

5 Special Events

6 Anomalies

There were no problems reported that impacted operations:

There were no new anomaly reports entered into the ARTS system this week.

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 613

The observations in revolution 613 consisted entirely a raster dither of SS433 (RA 19:11:49.56, DEC +04:58:57.6), lasting ~57.0 hours.

Revolution 614

The observations in revolution 614 began 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. They continued with a Custom Pointing of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), lasting ~44.0 hours. Finally a raster dither of the Galactic Plane Region 1 (RA 18:04:41.75, DEC -05:04:48.4), lasting ~5.0 hours, was performed, until the end of the revolution.

Revolution 615

The observations in revolution 615 began with a Custom Pointing of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), lasting ~42.4 hours. This was followed by a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), lasting ~5.6 hours. Finally a raster dither of the Galactic Plane Region 1 (RA 18:04:41.75, DEC -05:04:48.4), lasting ~6.0 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

2007-10-04T06:22:41.000Z	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.
2007-10-13T06:06:00.000Z	144.1817	F	Automatic TM processing.
2007-10-14T20:53:48.000Z	144.1645	F	Automatic TM processing.
2007-10-16T05:36:57.000Z	144.1420	F	Automatic TM processing.
2007-10-17T20:51:57.000Z	144.1282	F	Automatic TM processing.
2007-10-19T05:57:52.000Z	144.1102	F	Automatic TM processing.
2007-10-20T20:48:28.000Z	144.1076	F	Automatic TM processing.
2007-10-22T05:09:12.000Z	144.0864	F	Automatic TM processing.
2007-10-23T20:42:28.000Z	144.0775	F	Automatic TM processing.
2007-10-25T04:59:19.000Z	144.0498	F	Automatic TM processing.

This report was generated Fri Oct 26 08:00:17 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, 20/10/2007 – 26/10/2007

The AOCS operations were executed from the Automatic Timeline.

During this period, 57 Open Loop Slews, 125 Closed Loop Slews and 5 Momentum Biases were executed.

3 slews (2 CSL, 1 OSL) were missed from TL, during the observation period, due to STR search/track process fail and problem on IMCS command verifier task.

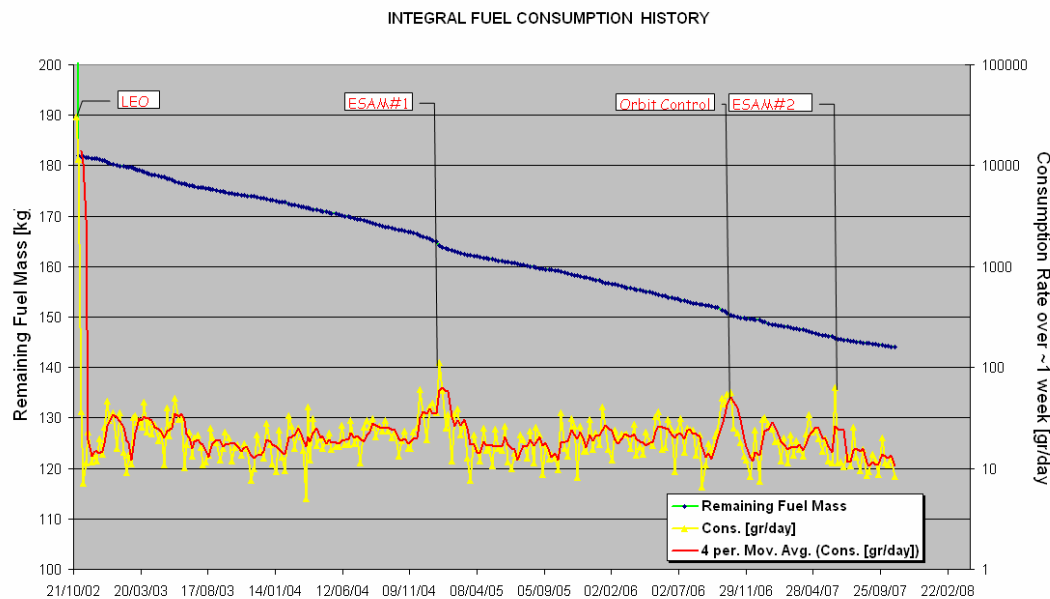
This is equivalent to $\sim 1.6\%$ of the total number of slews planned (183).

Orbit Control

No update.

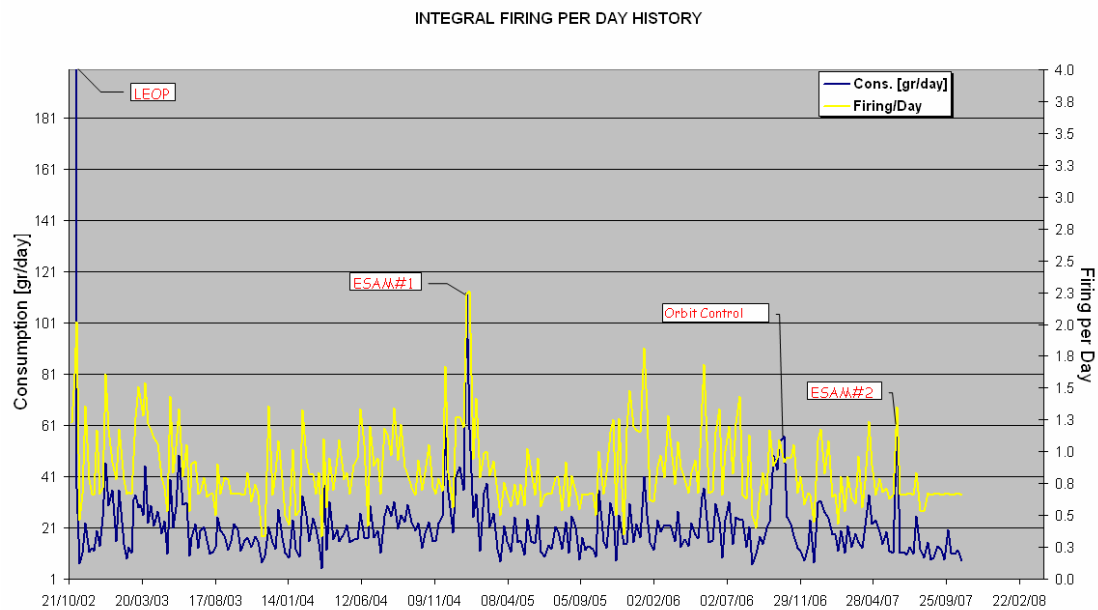
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 26/10/2007 is reported in the plot below.



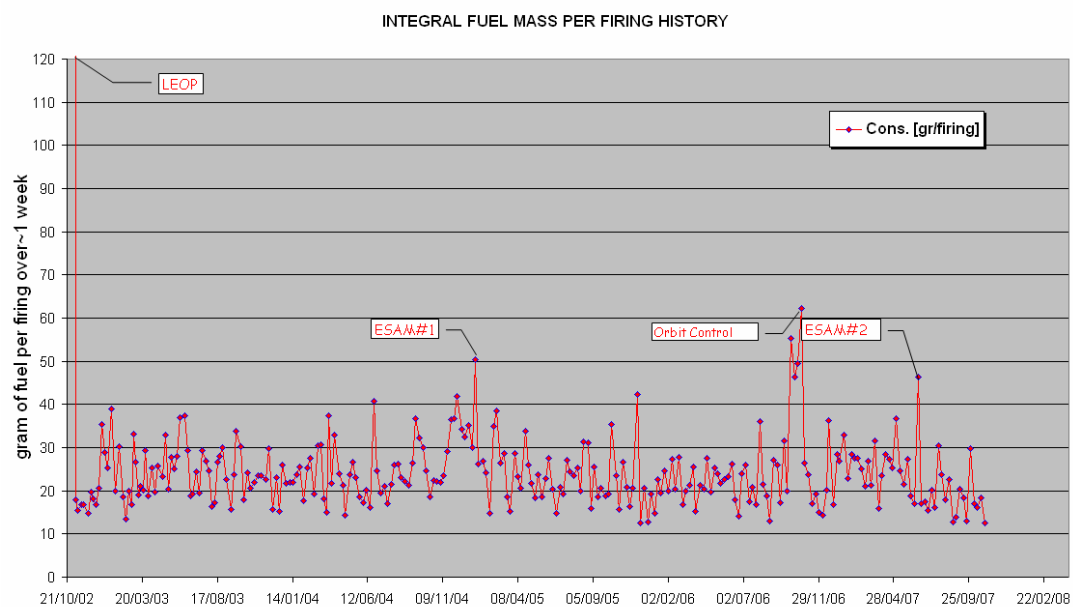
The plot above consider the ESAM fuel consumption spread over period of ~ 1 week.

The firing per day over the period between 01/11/2002 and 26/10/2007 is reported in the plot below.



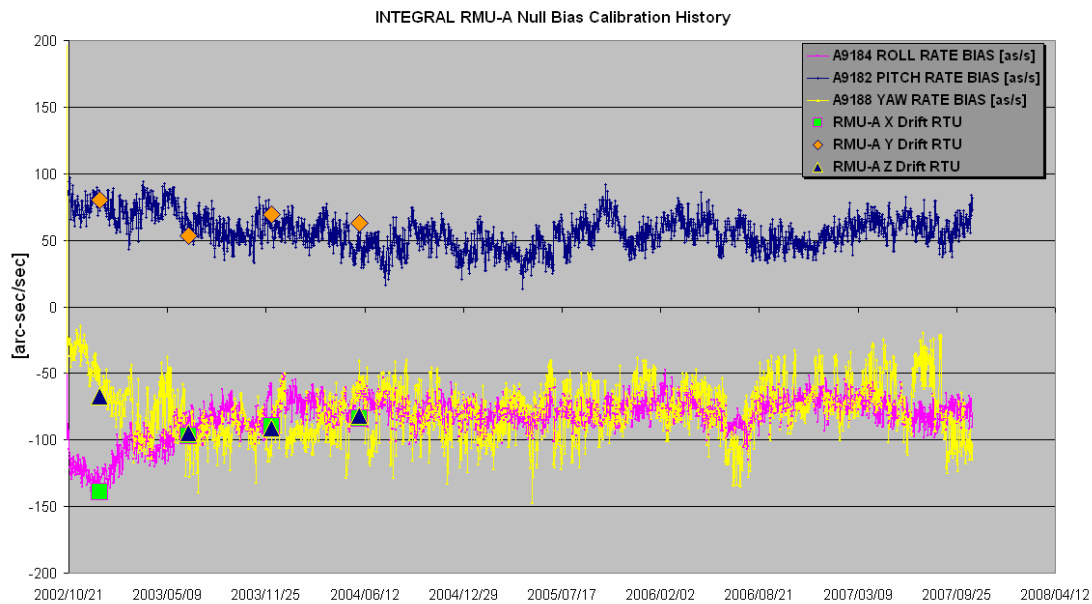
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 26/10/2007 is reported in the plot below.



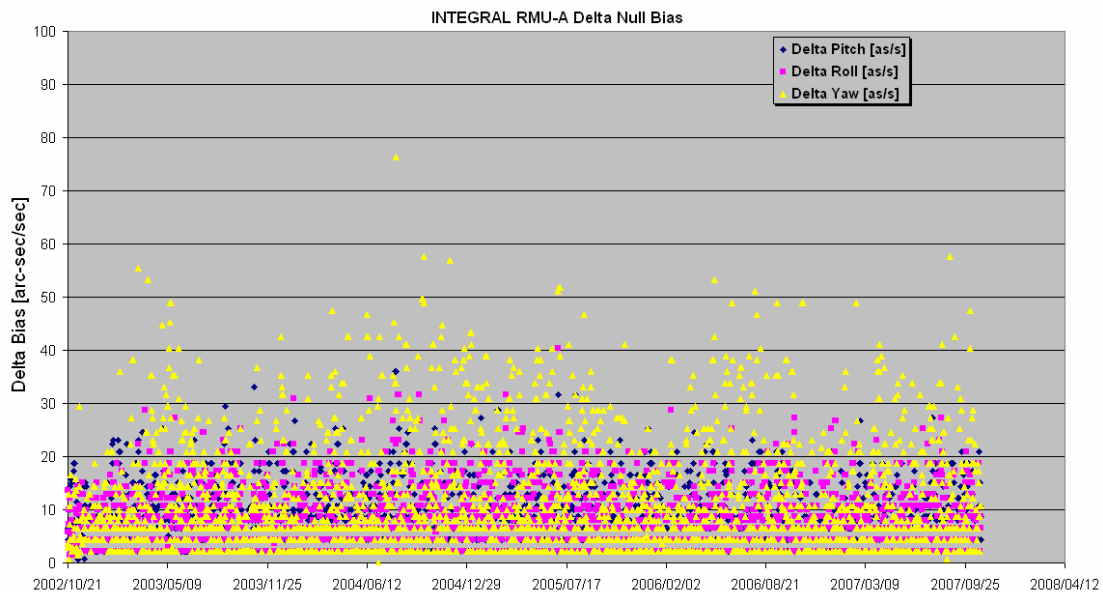
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 26/10/2007 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 26/10/2007 is reported in the plot below.



20/10/2007 (Day of Year 293, Revolution 612-613)

STR Search/Track process failed: at 14:04z the S/T process for the slew ID 06120067 failed, no star found, and the slew ID 06120067 failed execution.

A manual recovery was performed from attitude of PID 06120066 to the attitude of PID 06120067.

The update of the subsequent CGS could not find the anticipated mapping after slew 06120067 but rather found the mapping after the recovery slew 06129503. The TPF update was aborted.

Doc. Title : INTEGRAL Mission Report #266
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 29/10/07

Issue : 1
Rev. : 0
Page : 13

A manual verification was performed, by using the SPACON Tool, to verify the guide star for the perigee passage and the execution of RWB at beginning of rev 613.

The following slew was missed in TL: 06120067(CSL)

Eclipse passage rev 612: the 4th eclipse operations were nominal from the AOCS point of view. Hereafter is reported a summary of the eclipse passage during rev 612:

INPUT		AOCS ECLIPSE MONITORING				Revolution: 612	
		Winter 2007				Date: 20/10/2007	
						DoY: 293	
Penumbra Start	20/10/2007 18:55	Penumbra Start:	20/10/2007 18:55:15	LOS:	20/10/2007 18:08:00		
Penumbra End	20/10/2007 19:58	Umbra Start:	20/10/2007 18:56:36	AOS:	20/10/2007 18:01:00		
Umbra Start	20/10/2007 18:58	Umbra End:	20/10/2007 19:56:11				
Umbra End	20/10/2007 19:56	Penumbra End:	20/10/2007 19:58:01				
ACC Sample Time	17/10/2007 20:41:30	Eclipse Duration:	1:02:45				
FDE Sample Time	17/10/2007 20:43:20	Eclipse Duration [sec]:	3766				
FCE Sample Time	17/10/2007 20:44:20	IMU Health Check Start	20/10/2007 12:13:00				
ACC Eclipse Counter	0	Eclipse Imminent Flag	20/10/2007 17:55:25				
ACC Eclipse Start	20/10/2007 18:57:75	ACC IMU AutoCal Start	20/10/2007 18:10:01				
ACC Eclipse End	20/10/2007 18:57:183	ACC IMU AutoCal End	20/10/2007 18:30:01				
FDE Eclipse Start	20/10/2007 18:57:184	Sun out of FSS FoV	20/10/2007 18:56:22				
FDE Left to Eclipse Start	20/10/2007 18:57:194	Sun back in FSS FoV	20/10/2007 19:56:27				
FDE Eclipse Duration	4544						
FCE Eclipse Start	20/10/2007 18:57:230						
FCE Left to Eclipse Start	20/10/2007 18:57:238						
FCE Eclipse Duration	4550						
		From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
		Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]		
ACC Eclipse Start	20/10/2007 18:57:45	-1050.00	20/10/2007 18:57:36	-1059.00	-1064		
FDE Eclipse Start	20/10/2007 18:48:42	-613.00			-484	176	
FCE Eclipse Start	20/10/2007 18:48:26	-409.00			-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	20/10/2007 20:03:26	324	20/10/2007 20:04:20	357.00	360	176	
FDE Eclipse End	20/10/2007 20:02:26	265	20/10/2007 20:04:20	357.00	360	176	
ACC Eclipse End	20/10/2007 20:07:53	592	20/10/2007 20:07:44	583.00	578		
IMU	Hydlik	Execution	WRT Penumbra End [sec]				
IMU Auto Off Enable	17/10/2007 20:34:36	20/10/2007 20:09:53	712				
IMU On	20/10/2007 12:18:29	IMU H.C. Noise Roll [sec]	0.2390				
IMU Off	20/10/2007 20:09:56	IMU H.C. Drift Roll [sec]	0.1982				
IMU On Time	7:51:29	IMU Auto Cal Drift Roll [sec]	0.2292				

21/10/2007 (Day of Year 294, Revolution 613)

IMCS Command Verifier Task reported problem: at 15:34z the command verifier crashed causing the mapping after slew ID 06130020 to fail execution.

The AOCS s/s was disabled in TL at 15:56z.

The update of the slew 06130021 could not find the anticipated mapping after slew 06130020 but rather found the mapping after the previous slew 06130019. The TPF update for slew ID 06130021 was aborted.

Subsequently also the FDS did not receive TM, due to following problems on IMCS. This forced the Operator, once the FDS processors restarted by FD on-call, to manually recover from attitude of PID 06130020 to the attitude of PID 06130022.

The next slew ID 06130023 was manually updated in TL.

The AOCS s/s was enabled in TL at 17:32z.

The following slews were missed in TL: 06130021(CSL)-22(OSL)

22/10/2007 (Day of Year 295, Revolution 613)

Nothing to report.

23/10/2007 (Day of Year 296, Revolution 613-614)

Eclipse passage rev 613: the 5th eclipse operations were nominal from the AOCS point of view. Hereafter is reported a summary of the eclipse passage during rev 613:

Issue : 1
Rev. : 0
Page : 14

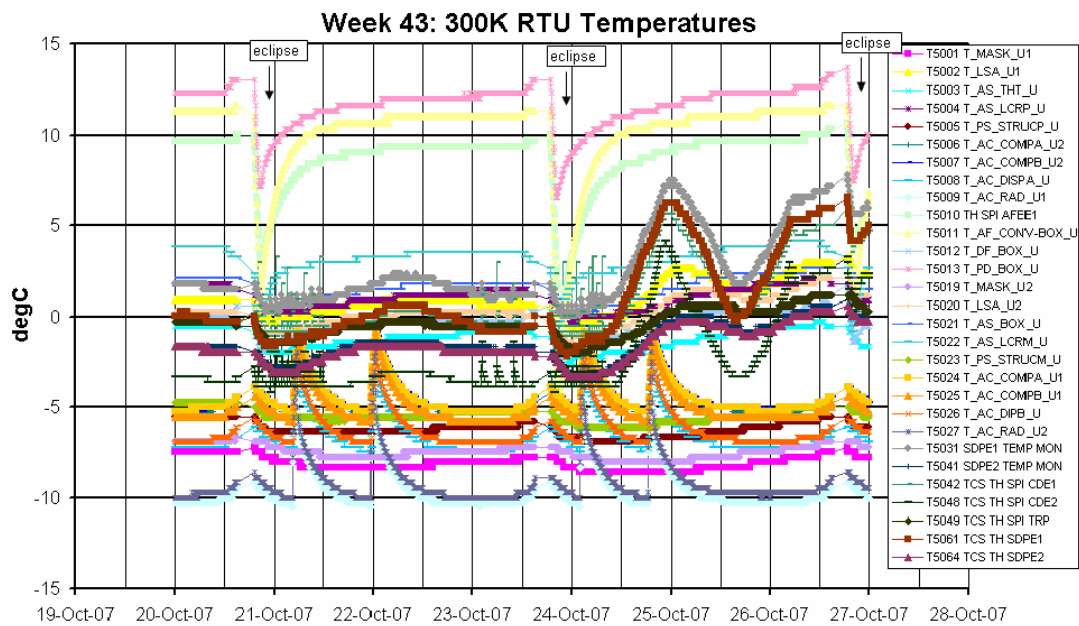
24/10/2007 (Day of Year 297, Revolution 614)

25/10/2007 (Day of Year 298, Revolution 614)

26/10/2007 (Day of Year 299, Revolution 614-615)

[illegible]

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

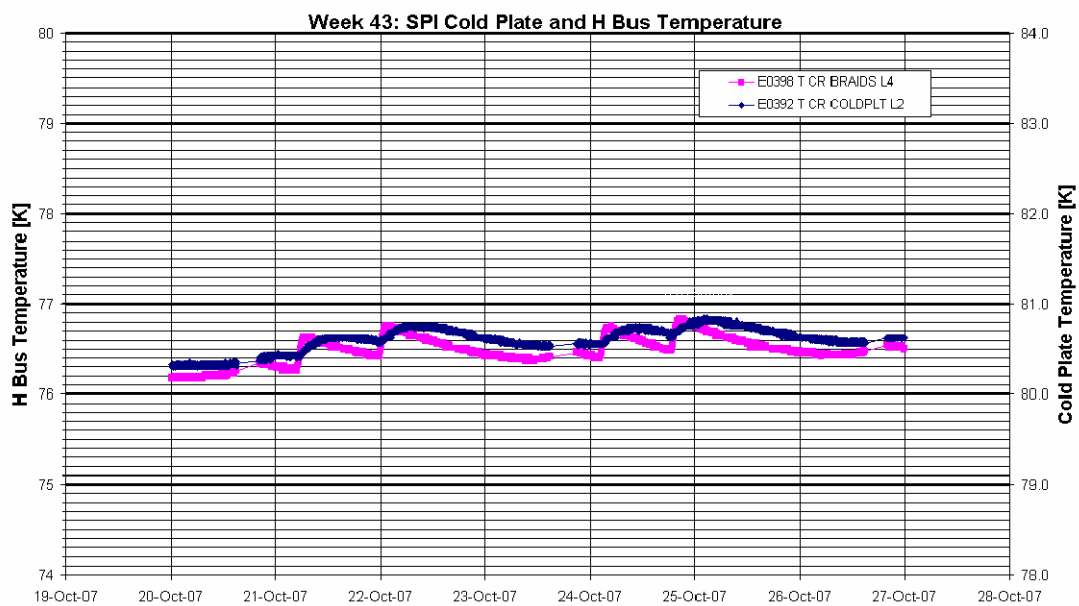


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

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

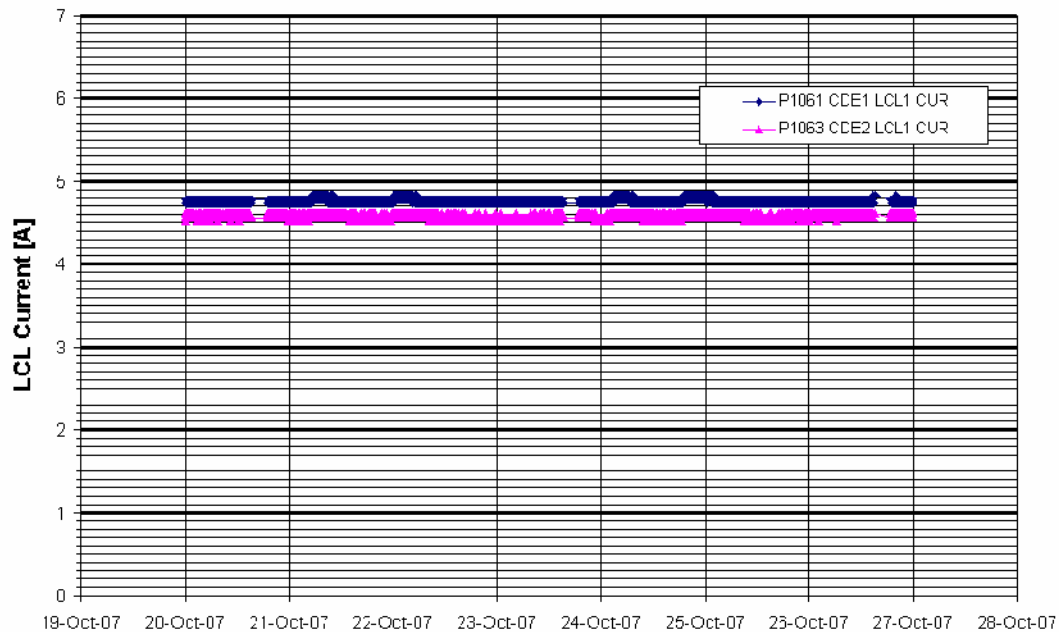
- CDE1 LCL Current = 4.77A
- CDE2 LCL Current = 4.57A

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



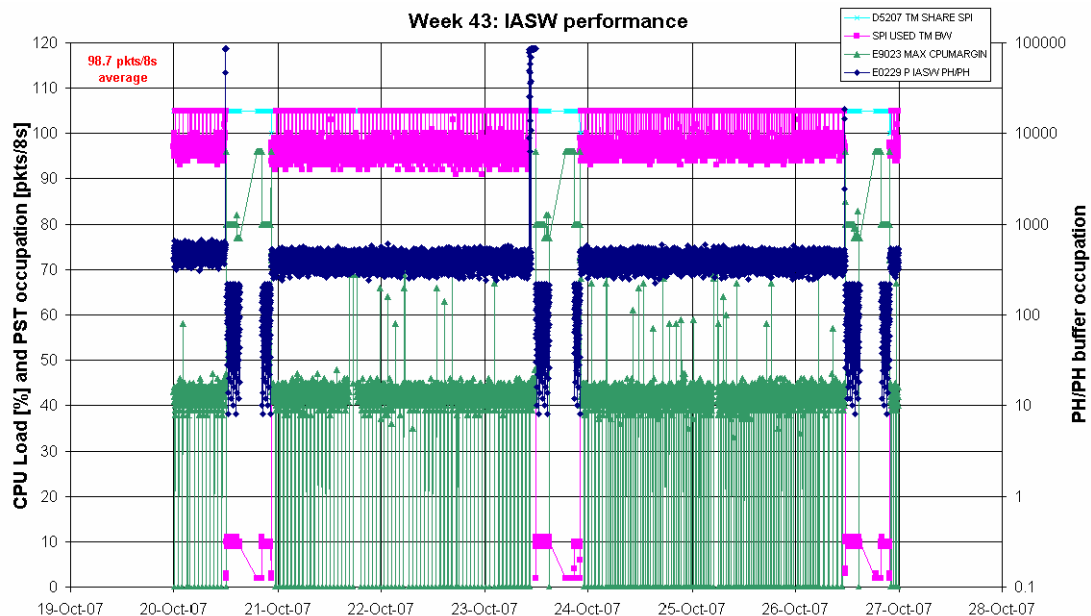
The following plot shows the evolution of the CDE currents during the reporting period.

Week 43: SPI CDE1 and CDE2 LCL Currents



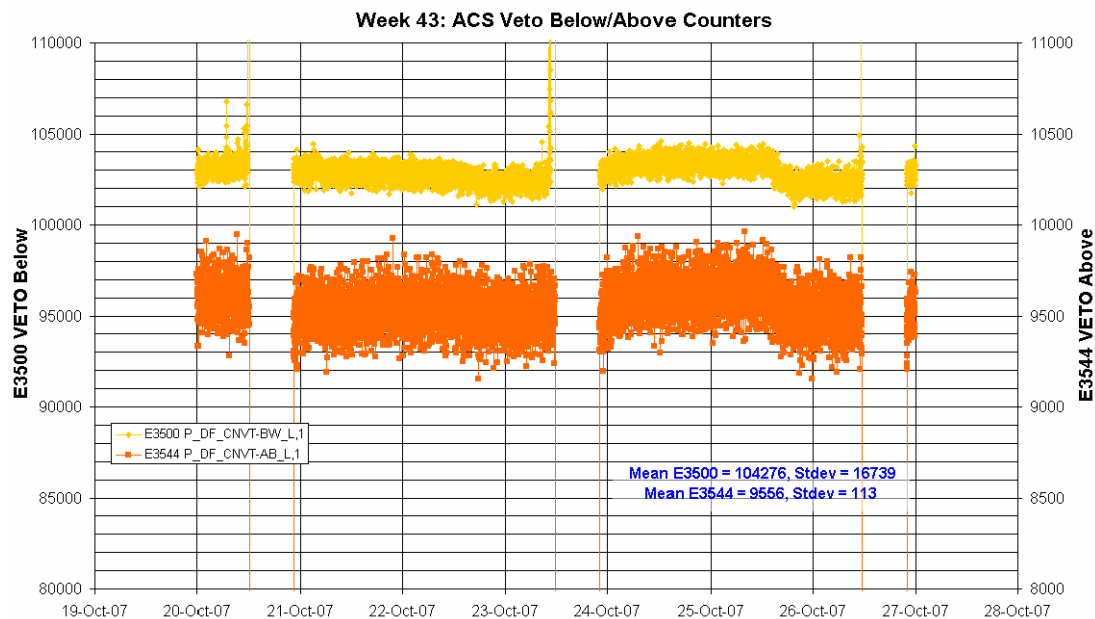
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is v433 patch #1 with the spectra scaling factor set to 8/19 SE. The average TM bandwidth occupation of SPI was 98.7 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

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



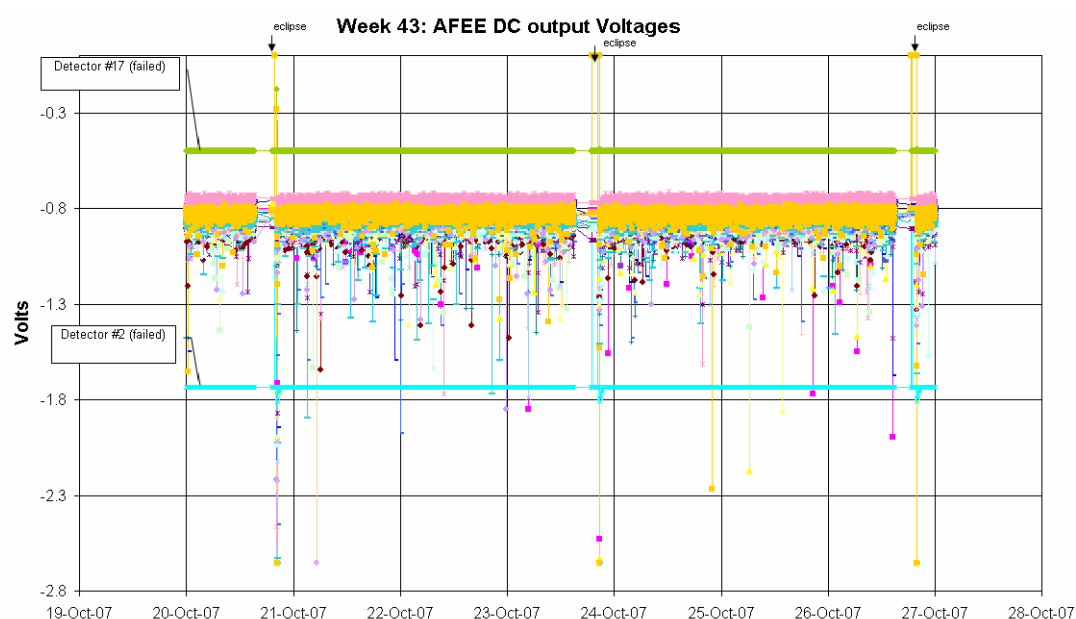
ACS: The performance of the ACS is nominal, except for FEE #81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

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

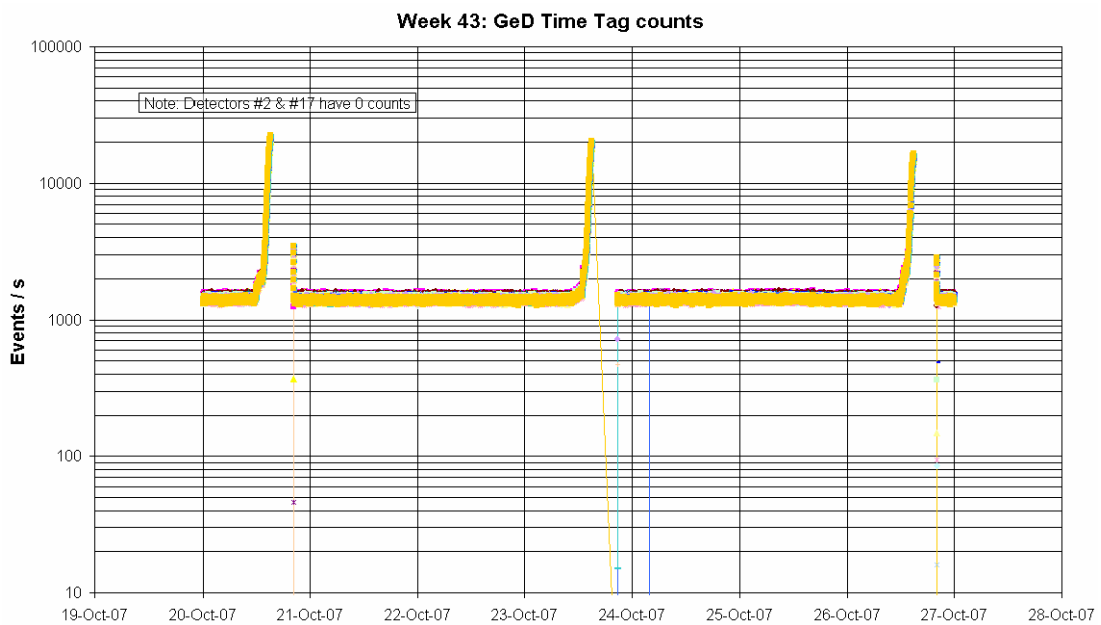
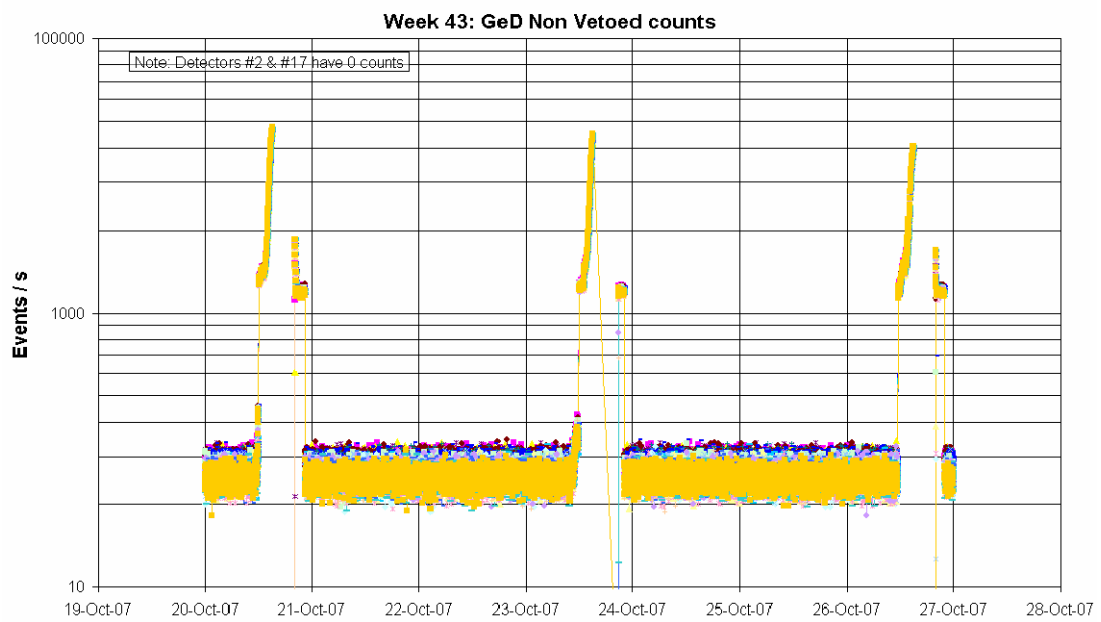


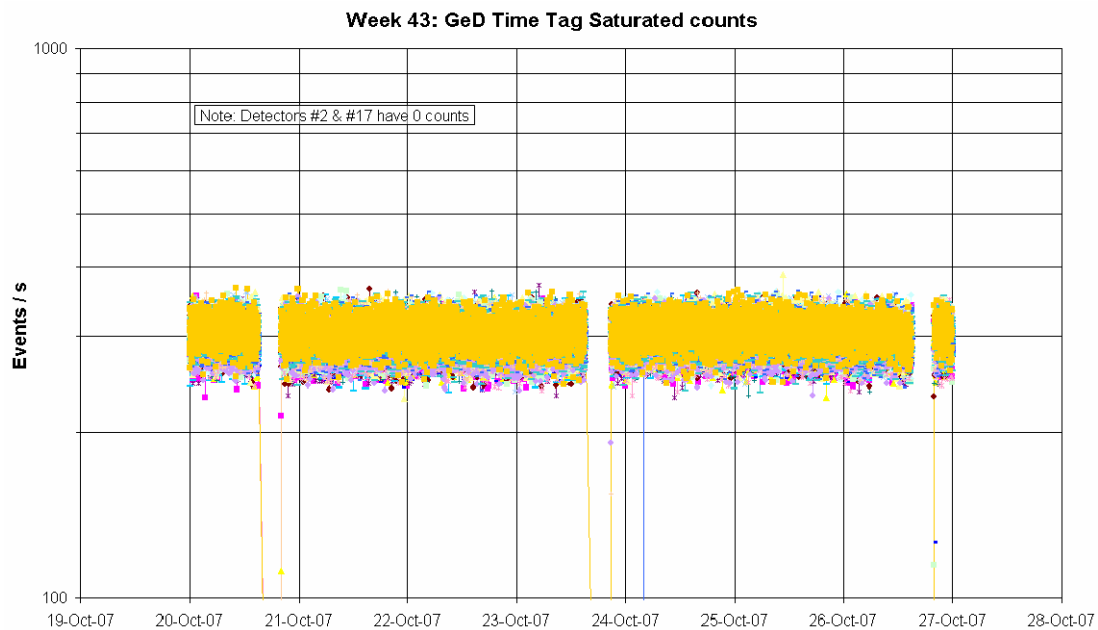
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

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.

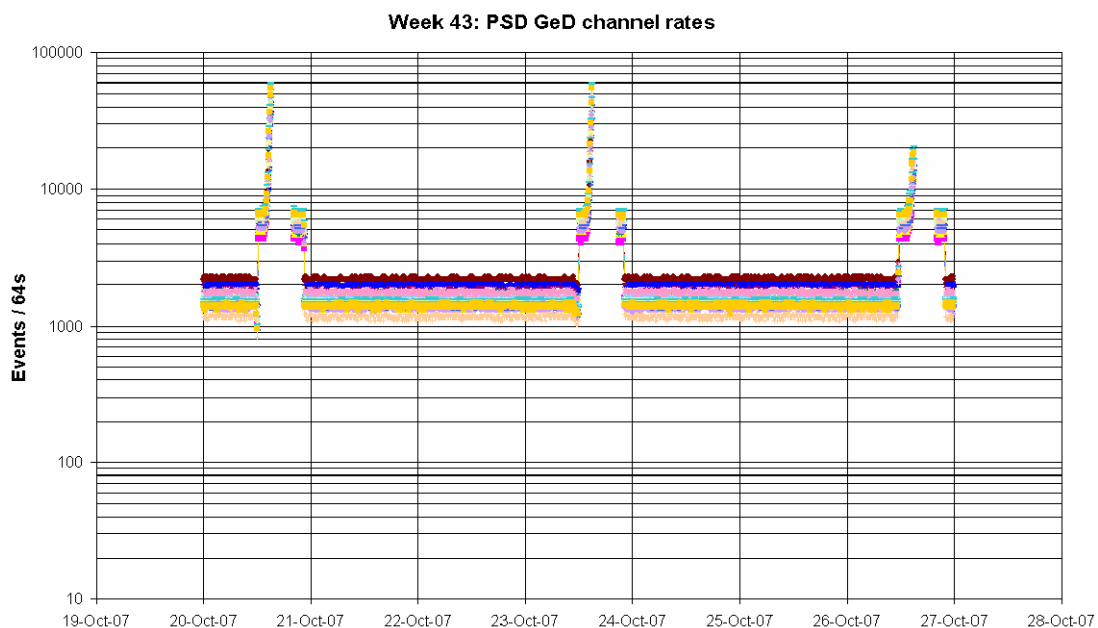


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





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:

- 4 occurrences of OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED were received during the week. As they were all single occurrences, no action was taken.
- TM parameter E2115 (Plastic Scintillator temperature) fluctuated OOL warning low several times during the week. As these were small fluctuations around the limit, not accompanied by other OOLs and all heaters were in the correct configuration, no action was taken.
- Due to high background radiation before the expected radiation belt entry of revolution 613, on 2007-10-23 at 10:22:09Z TM parameter E3500 started to

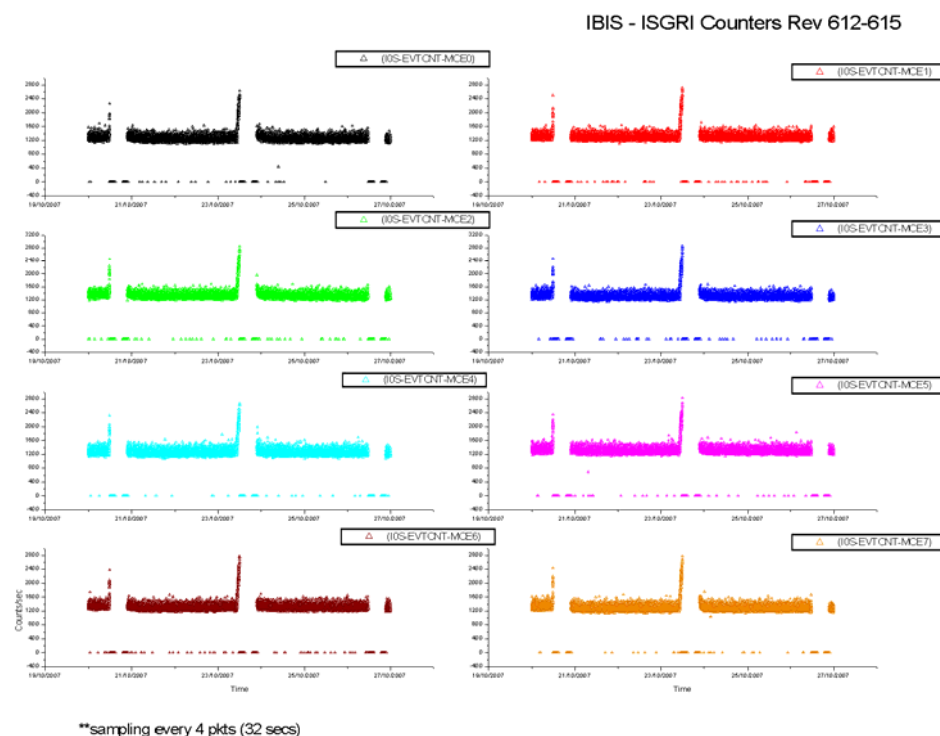
fluctuate Out of Limits High. This continued until radiation belt entry at 11:52Z.

- On 2007-10-23, due to a loss of TM/TC capability, part of the post-eclipse activation ED EECLEX02 (scheduled at 20:04:11Z) along with the EDs EEHTF_02 (scheduled at 20:33:11Z) and EESPCH01 (scheduled at 20:36:41Z) failed release from the Timeline. Once stable TM/TC capability was regained, these EDs were re-uplinked as follows:
 - 20:44:43Z ED EECLEX02 uplinked
 - 20:50:52Z ED EEHTF_02 uplinked
 - 21:22:31Z ED EESPCH01 uplinked
- On 2007-10-26 at 11:34:55Z, during the execution of ED EENTRY02 before radiation belt entry of revolution 614, TM parameters E3981-E3984; E3986; E3988; E3991-E3992 and E3995-E3996 all went OOL with value = 0. These are the Coldbox temperatures; DFEE and PSD box temperatures; VCU temperature; Heat pipe temperatures and the AFEE power supply board temperature and are all in SPID 60602. This was the first mode-change packet received during the execution of this ED and the parameters returned within limits when the next mode-change packet was received at 11:38:03Z. This is a re-occurrence of the anomaly INT_SC-205.
- On 2007-10-26 at 19:01:51Z OEM APID 1024 ID 1 EXCEPTION SPI1 FIXED POINT OVERFLOW was received. This was during the AOS_CHK window of revolution 615, when the time verification TC was sent. this OEM is sometimes received when this TC is sent and no action was taken.

8.3.3 IBIS Operations

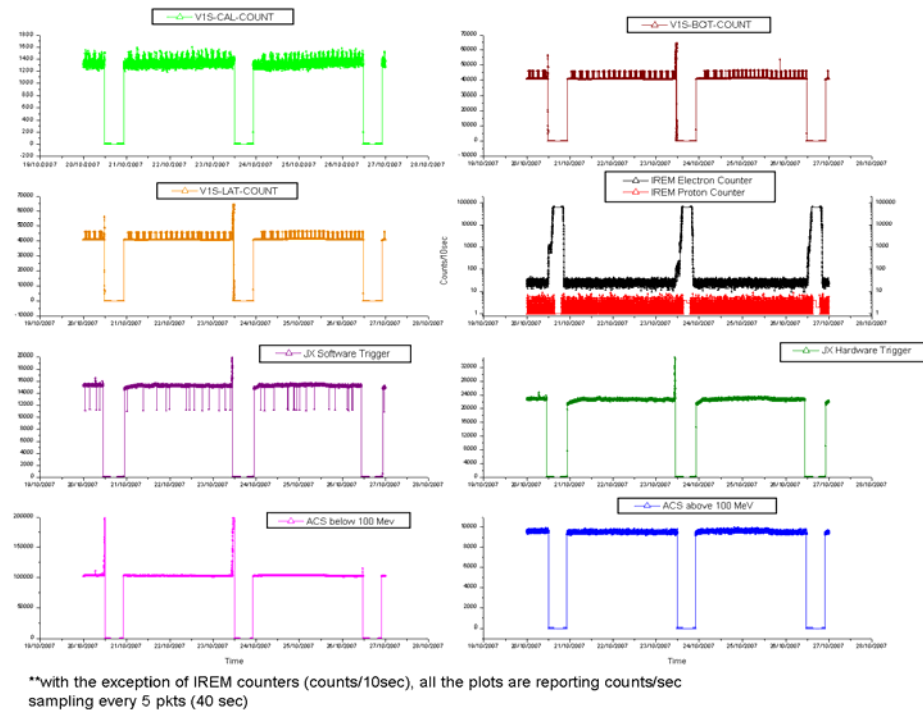
IBIS Event Counters Plots

ISGRI Counters:



VETO vs Payloads Counters:

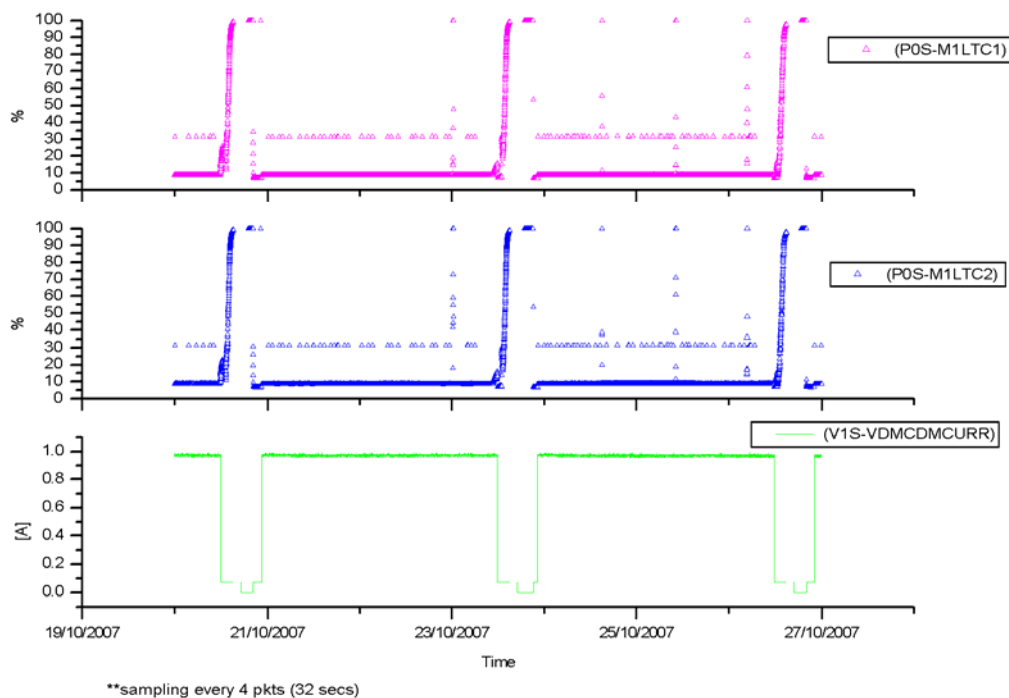
IBIS-VETO vs Payloads Counters Rev 612-615



The week was characterised by slightly high radiation before the expected radiation belt entry of revolutions 612 and 613 as reported by the payload. Note that the plots of the ACS below 100MeV and the JEM-X count rates have a smaller scale than usual and the graphs are cropped when they go off-scale.

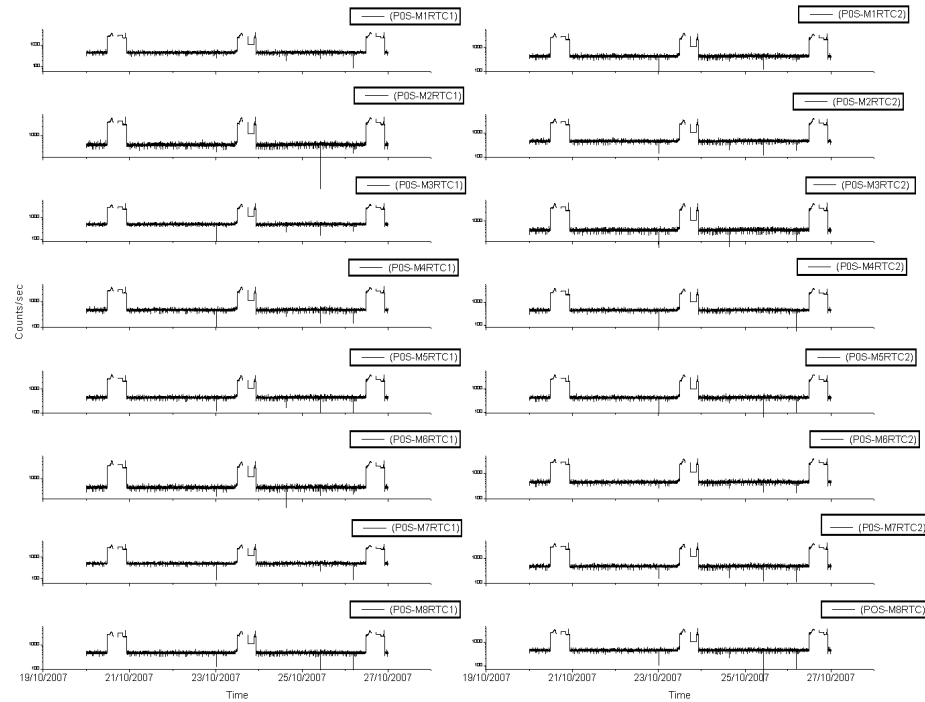
VETO Current:

IBIS-VETO Current & PICsIT dead times Rev 612-615



PICsIT Counters:

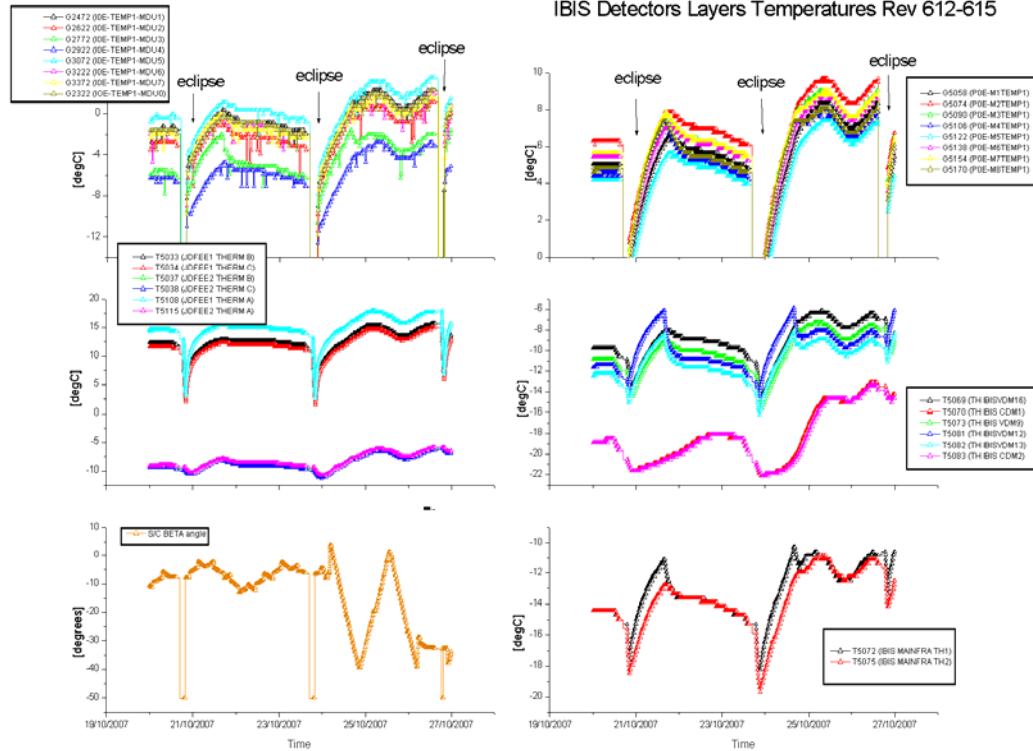
IBIS - PICsIT Counters Rev 612-615



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:

IBIS Detectors Layers Temperatures Rev 612-615



**sampling every 8 pkts (64 secs)

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.

2007-10-20 (DOY 293, Rev 612-613)

At 02:50Z TM parameter X7500 went OOL, indicating a problem with the histogram process. In fact, the downlinking of histograms had not resumed following the end of the ground station handover. The following recovery procedure was then executed to force the histogram accumulation and download process to resume:

- 03:22:19Z FCP_IBIS1_0312
- 03:24:52Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

At 11:42:52Z, ~20 minutes before radiation belt entry of revolution 612, TM parameters G6062 and G6063 started toggling OOL High. These are the VETO bottom and lateral counters respectively. These parameters continued to toggle OOL until IBIS went to Safe mode autonomously due to the high radiation conditions at 11:54:16Z. This was about 10 minutes before the planned radiation belt entry time.

2007-10-21 (DOY 294, Rev 613) to 2007-10-22 (DOY 295, Rev 613)

IBIS operations executed nominally.

2007-10-23 (DOY 296, Rev 613-614)

At 00:15:37Z, the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semimodule FIFO error flags. At 00:18:04Z the TM parameters families G5002 and G5003 for the PDM semimodule counters also went OOL (value = 0). As these were followed at 00:21:28Z 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.

Due to high background radiation before the expected radiation belt entry of revolution 613, at 10:25:56Z TM parameter G8080 (Valid event rate on HBRA) went OOL High, returning within limits at 10:26:04Z. In addition, at 10:51:00Z, ~1.5 hours before the expected radiation belt entry of revolution 613, TM parameters G6062 and G6063 started toggling OOL High. These are the VETO bottom and lateral counters respectively. At 11:08:36Z the G2013 family (number of events triggering the MCEs per second) also started toggling OOL. All these parameters continued to toggle OOL until radiation belt entry at 11:52:47Z.

At the start of revolution 614, due to a loss of TM/TC capability, part of the post eclipse ED GECLEX02 (scheduled at 20:02:51Z) along with the EDs GEVESP01 (scheduled at 20:16:11Z) and GEDHON01 (scheduled at 20:35:41Z) failed release

from the Timeline. Once stable TM/TC capability was regained these EDs were re-uplinked manually as follows about 1 hour later than planned:

- 20:59:22Z ED GECLEX02 uplinked
- 21:10:25Z ED GEVESP01 uplinked
- 21:24:13Z ED GEDHON01 uplinked

IBIS operations continued nominally.

2007-10-24 (DOY 297, Rev 614)

At 15:02:33Z, the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semimodule FIFO error flags. At 15:03:56Z the TM parameters families G5002 and G5003 for the PDM semimodule counters also went OOL (value = 0). As all these parameters had returned within limits of their own accord by 15:04:09Z, no action was taken.

2007-10-25 (DOY 298, Rev 614)

At 10:13:29Z, the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). At 10:14:52Z the TM parameters families G5002 and G5003 for the PDM semimodule counters also went OOL (value = 0). As these were followed at 10:18:49Z by OEM APID 1280 ID 132 EVENT IBIS1 IASW HEPI RESYNCHRONIZED, by which time all the above parameters had returned within limits, no action was taken.

2007-10-26 (DOY 299, Rev 614-615)

At 04:41:14.Z, the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). At 04:42:37Z the TM parameters families G5002 and G5003 for the PDM semimodule counters also went OOL (value = 0). As these were followed at 04:46:09Z by OEM APID 1280 ID 132 EVENT IBIS1 IASW HEPI RESYNCHRONIZED, by which time all the above parameters had returned within limits, no action was taken.

At 13:27:38Z, during the radiation belt passage of revolution 614-615, TM parameter G5079 started toggling OOL warning high (value = 2.60509804V). This is the PDM2 +2.5V. As it returned stably within limits at 13:41:30Z, no action was taken.

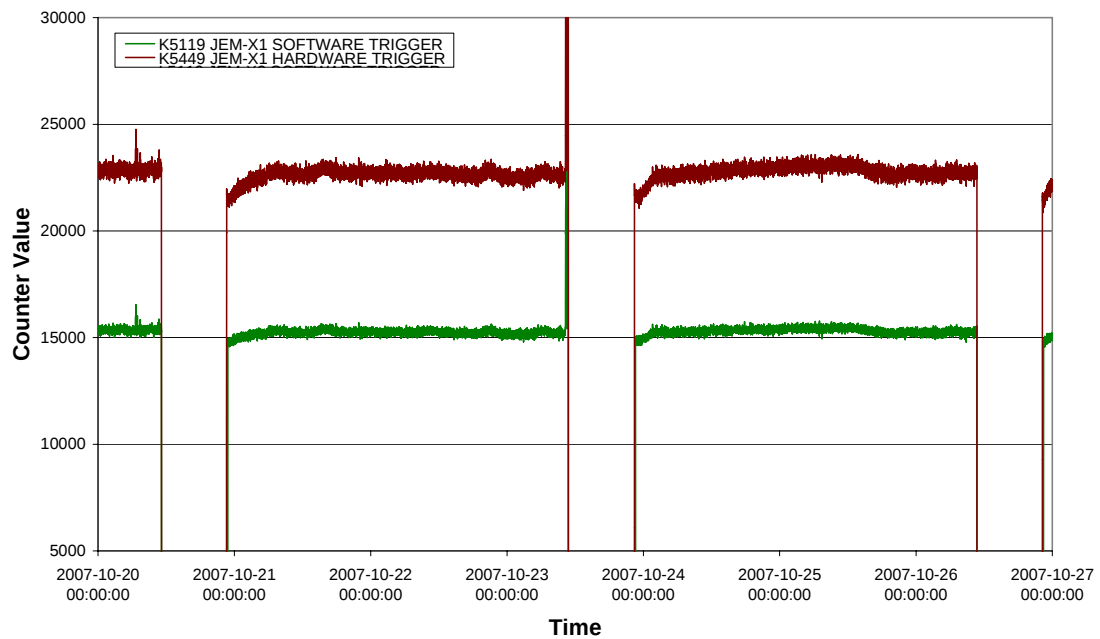
8.3.4 JEM-X Operations

JEM-X Count Rates

JEM-X count rates over the reporting period are displayed in the following graph¹.

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

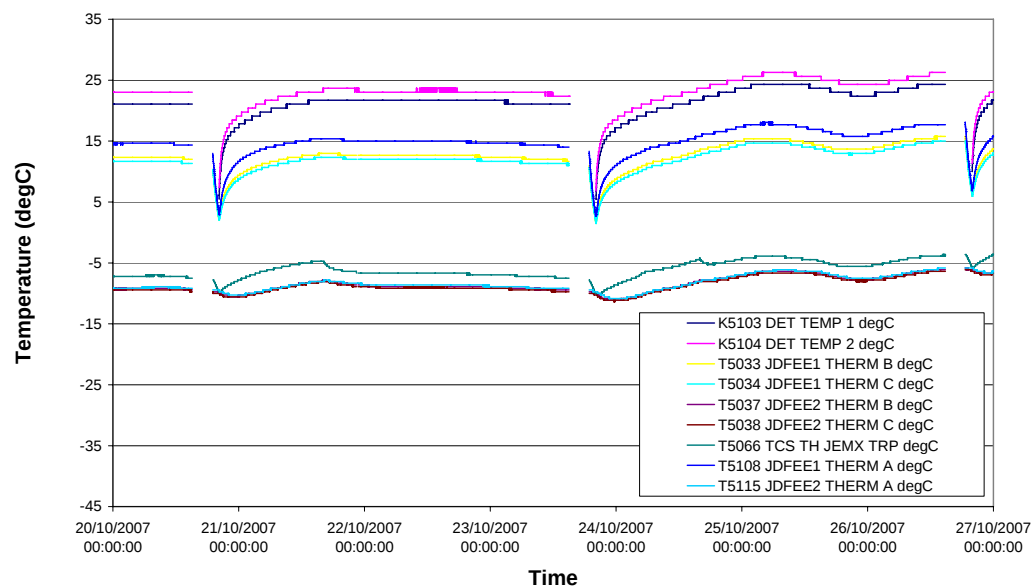
JEM-X Count Rates



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 graph².

JEM-X Detector & DFEE Temperatures



² Data sampled (1 frame in 8)

JEM-X Daily Report

2007-10-20 (DoY 293, Rev 612)

At 20:15:37, the TM parameter KD5380D (EQ SHuTDoWN LEVel) was outside nominal range for 24 seconds. No action was taken, and there was no impact.

2007-10-21 (DoY 294, Rev 613) to 2007-10-22 (DoY 295, Rev 613)

JEM-X1 operations executed nominally

2007-10-23 (DoY 296, Rev 613)

At 10:46:24, parameter K5449 (JEMX-1 Hardware Trigger), went briefly outside the upper hard limit.

At 10:46:33 and again at 10:47:04, parameter K5119 (JEMX-1 Software Trigger), went briefly outside the upper hard limit.

At 10:49:12, parameter KD5020D (EQ DFEE STATE) was outside the nominal range for 32 seconds.

At 10:58:40, parameter K5317 (RAD MONITOR 3), went briefly outside the upper hard limit.

At 20:09:38, the TM parameter KD5380D (EQ SHuTDoWN LEVel) was outside nominal range for 24 seconds.

No action was taken on any of the above events, and there was no impact.

2007-10-24 (DoY 297, Rev 614) to 2007-10-25 (DoY 298, Rev 614)

JEM-X1 operations executed nominally

2007-10-26 (DoY 299, Rev 614)

At 19:58:33, the TM parameter KD5380D (EQ SHuTDoWN LEVel) was outside nominal range for 24 seconds. No action was taken, and there was no impact.

8.3.5 OMC Operations

2007-10-20 (DoY 293, Rev 612)

Nothing to Report.

2007-10-21 (DoY 294, Rev 613)

Doc. Title : INTEGRAL Mission Report #266
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 29/10/07

Issue : 1
Rev. : 0
Page : 27

At 16:23, an FD problem forced an interruption in the Timeline. A recovery was subsequently performed, and the Timeline rejoined at 17:32 The impact was the loss of pointing 06130021. It was at this time the following OEMs were received:

2007.294.16.29.02.205	2007.294.16.29.13.272	1792	RealTime	131	TC	REJECT
REJECTED TC1			0	0	65535	PR N
E E						
2007.294.16.29.08.142	2007.294.16.29.13.316	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.

2007-10-22 (DoY 295, Rev 613) to 2007-10-26 (DoY 299, Rev 615)

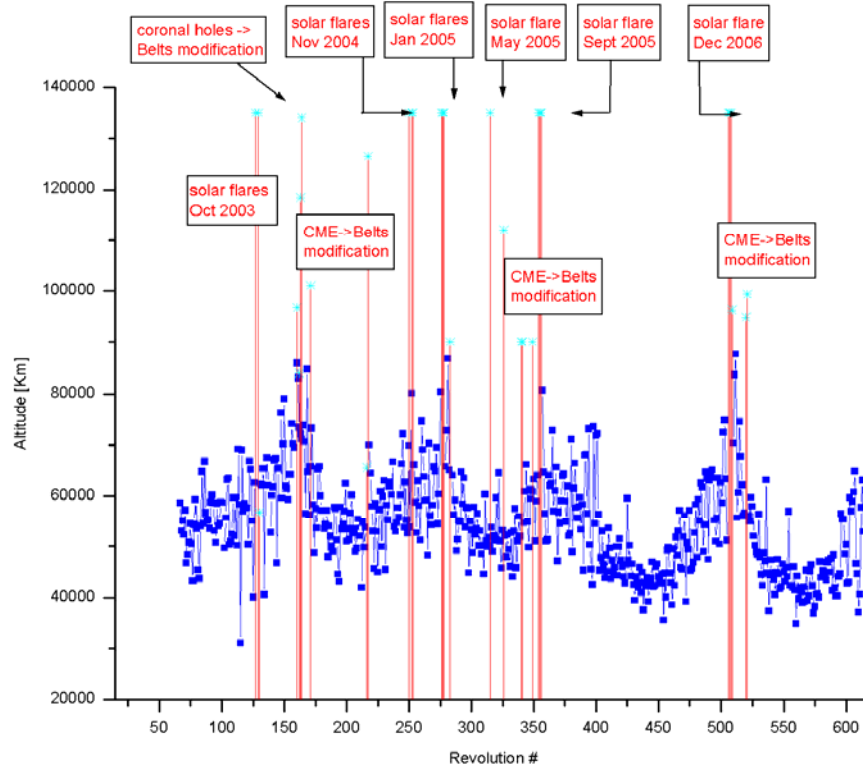
Nothing to Report.

On DoY 293 at 12:05:35, DoY 296 at 11:52:39 and DoY 299 at 11:37:35 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

Evolution of Radiation Belt Entry 2003-2007



IREM daily report

Nothing to report.

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]
612	RAD_ENTR R 2007-10-20T12:05:28Z	20/10/2007 11:52:55	57701.4	20-Oct-2007 13:22:15	45185.11
613	RAD_EXIT R 2007-10-20T22:15:58Z	20/10/2007 20:39:35	39362.2	20-Oct-2007 21:12:15	44070.26
613	RAD_ENTR R 2007-10-23T11:52:37Z	23/10/2007 11:02:55	63100.0	23-Oct-2007 13:16:21	44118.24
614	RAD_EXIT R 2007-10-23T22:03:41Z	23/10/2007 20:47:03	42377.9	23-Oct-2007 20:56:21	43562.83
614	RAD_ENTR R 2007-10-26T11:37:31Z	26/10/2007 12:01:35	52976.2	26-Oct-2007 12:56:21	44800.74
615	RAD_EXIT R 2007-10-26T21:49:01Z	26/10/2007 20:23:11	40848.9	26-Oct-2007 20:46:21	44326.34

Reference

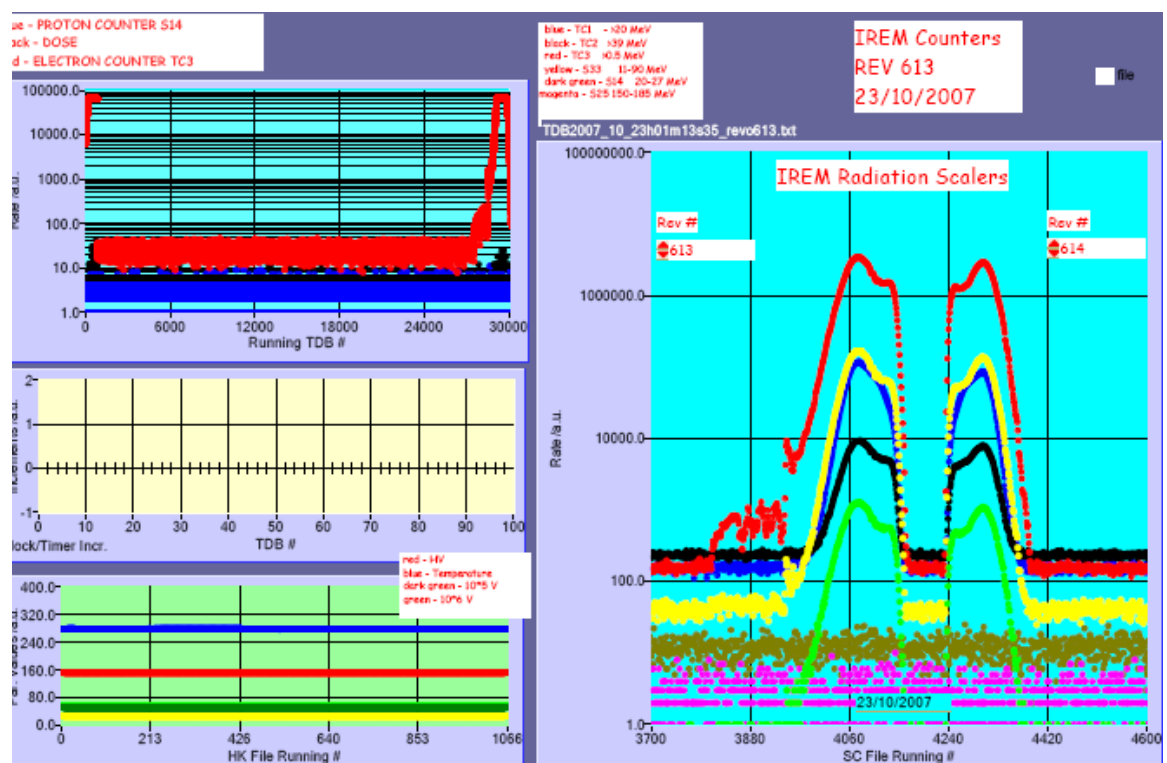
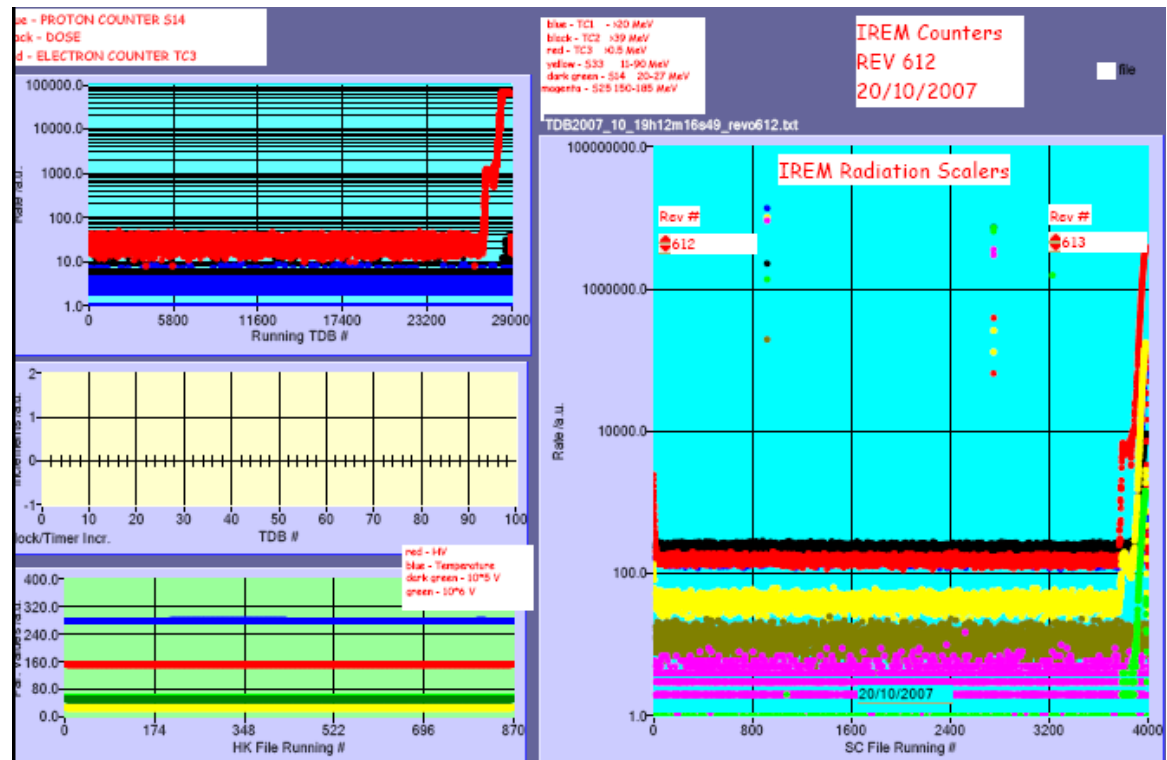
High radiation

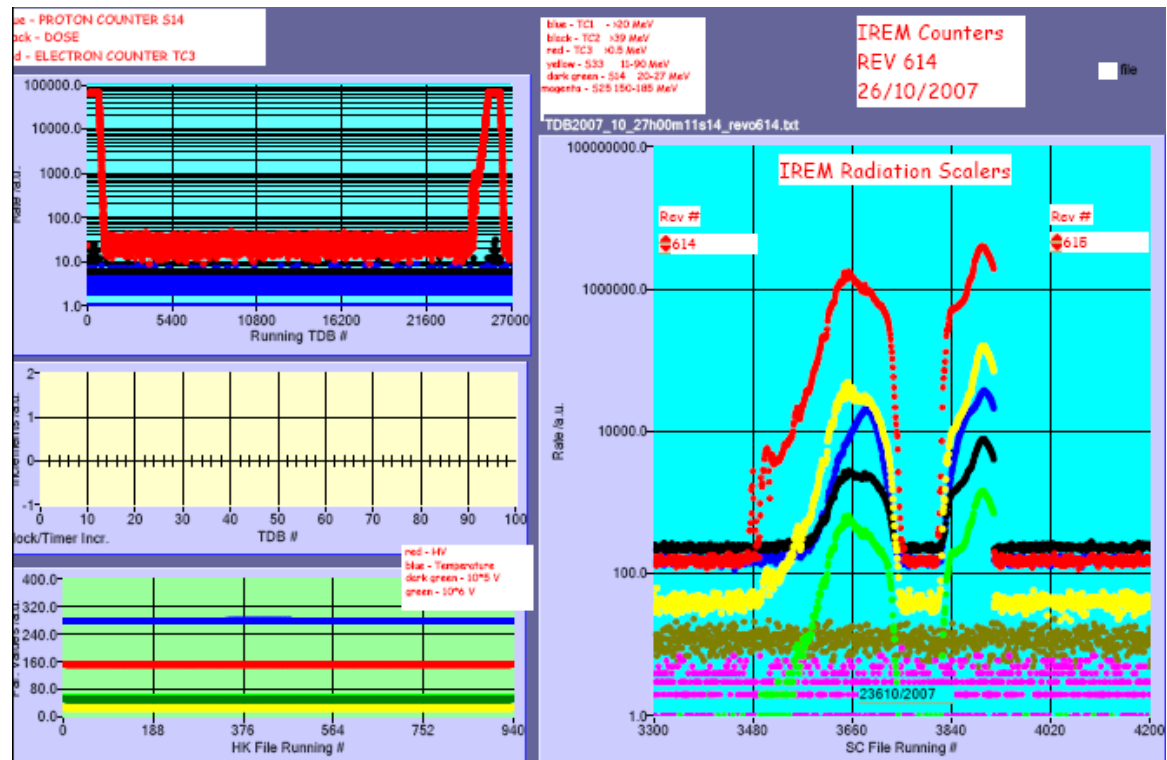
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

IREM radiation counters:

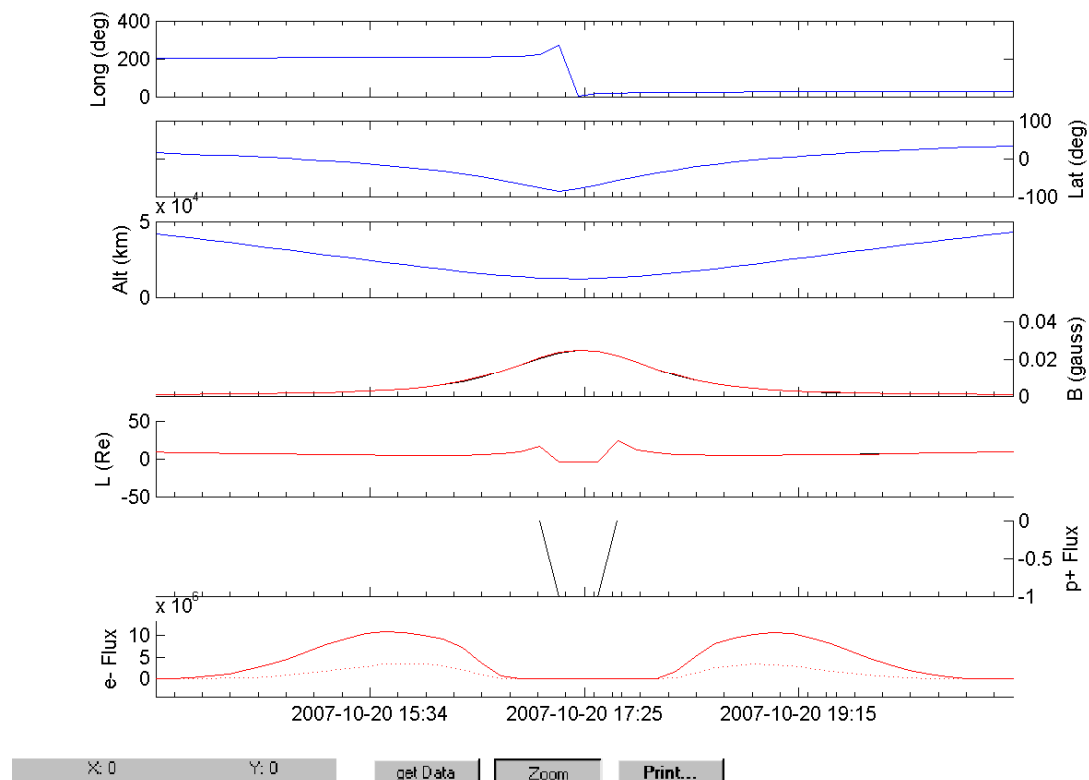




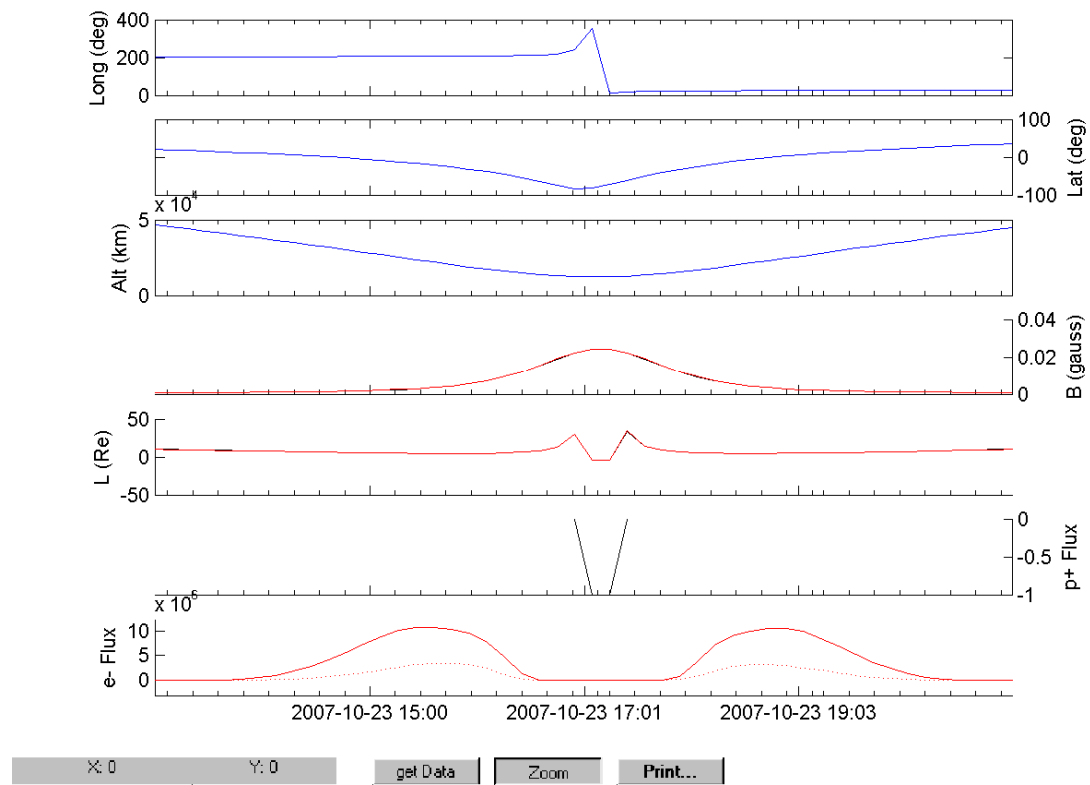
For the belt passage of revolution 612 and part of 614, no data was present.

IREM Predicted Radiation Belt Passages

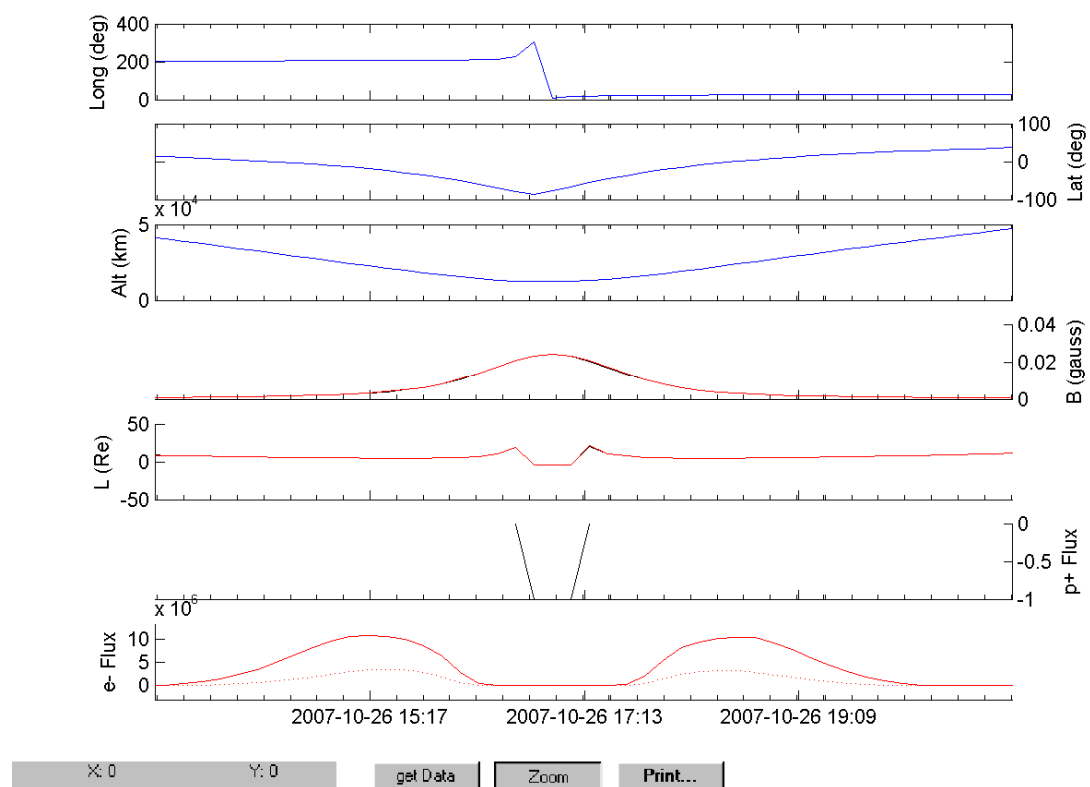
Rev 612



Rev 613



Rev 614



Doc. Title : INTEGRAL Mission Report #266
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 29/10/07

Issue : 1
Rev. : 0
Page : 32

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.