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

INTEGRAL
Mission Report

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

No. 268
Week 45

12.11.07

Routine Phase

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

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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 03.11.07 until 09.11.07 (both dates inclusive) and covers the revolutions 618 and 619.

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 four raster dithers of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), an OMC Flat Field Calibration at attitude (RA 05:00:00.00, DEC -45:30:00.0), and a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0).

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

3 Satellite Status

3.1 Platform

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

3.1.1 AOCS

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

The Winter 2007 Eclipse Season was completed on 01/11/2007. The eclipse passages were nominal from an AOCS point of view.

As part of the AOCS reconfiguration after the winter eclipse season, the ACC\FDE\FCE eclipse timers were stopped and the AMD thresholds were set to their non-eclipse season values during rev 618.

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

The fuel consumption over the period between 03/11/2007 and 09/11/2007 was 0.0832 Kg. The remaining propellant is in the order of 143.8097Kg.

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

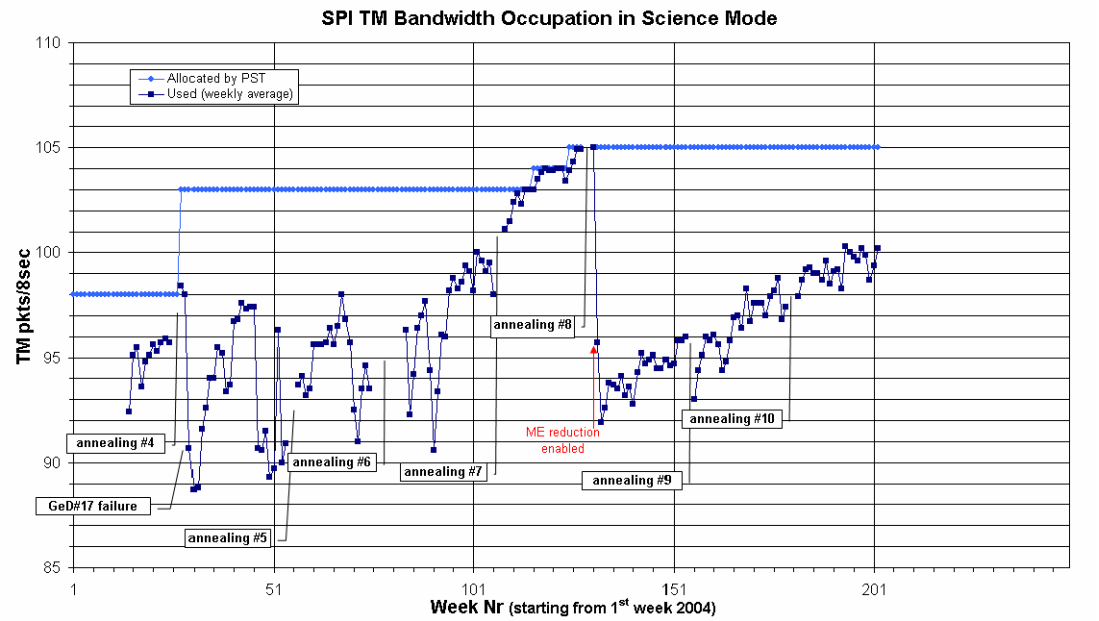
3.2.1 SPI

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 from 2007-11-06T06:40:16Z to 2007-11-06T11:25:05Z, when the TM allocation was 85 packets/cycle due to an OMC Flat Field Calibration. The average telemetry occupation when the TM allocation was 105 packets/cycle was 100.2 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.

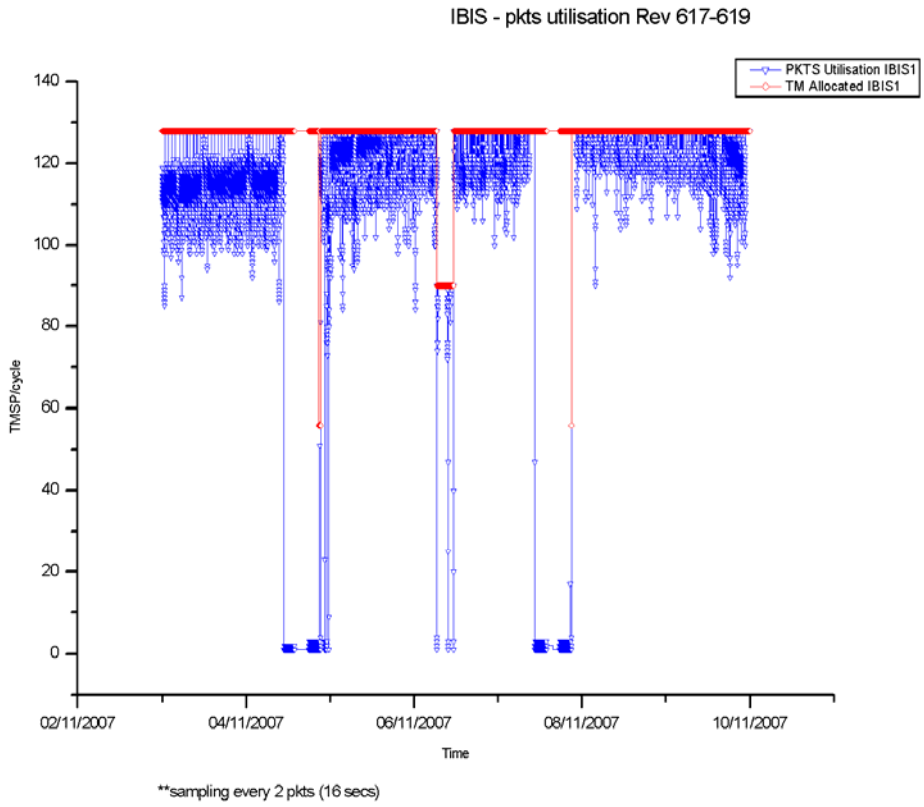
3.2.2 IBIS

The overall status of the unit is nominal.

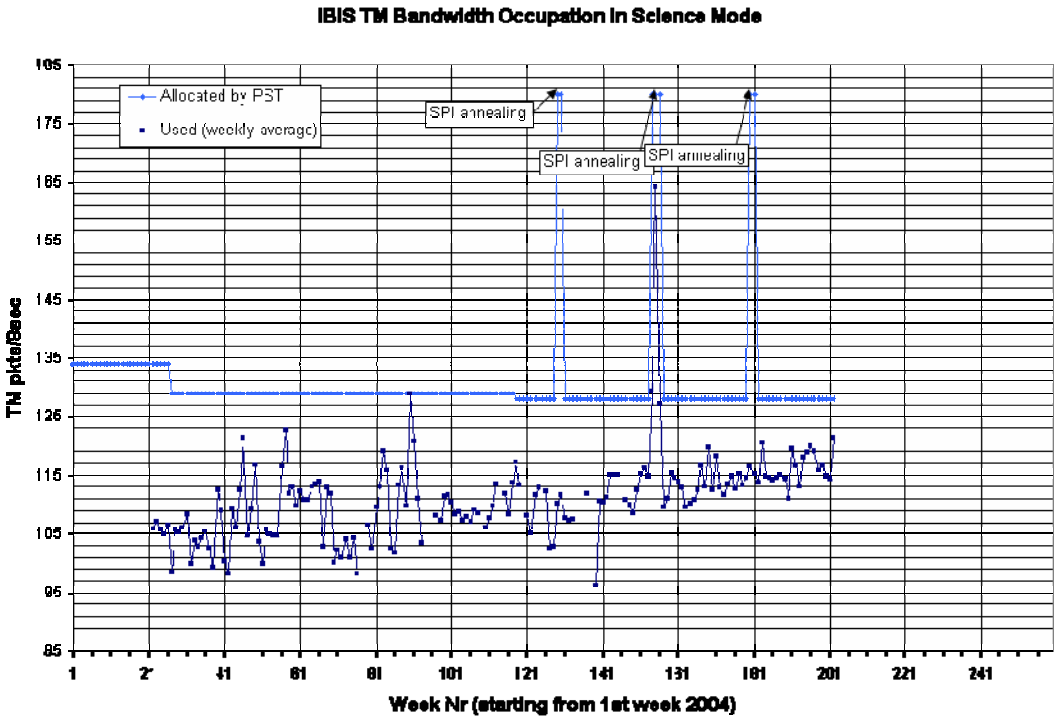
During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle, except from 2007-11-06T06:40:16Z to 2007-11-06T11:25:05Z, when the TM allocation was 90 packets/cycle due to an OMC Flat Field Calibration. The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 121.41 TMPS/cycle, up 7.03 on last week.

During the reporting period IBIS operations for eclipse continued to be 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, except during the Flat Field Calibration from 2007-11-05T08:28:00 to 2007-11-05T12:50:36, when it was 63 packets/cycle.

During this reporting period, 130 of the 131 planned science pointings for OMC were executed nominally, 1 was interrupted by an IREM SEU.

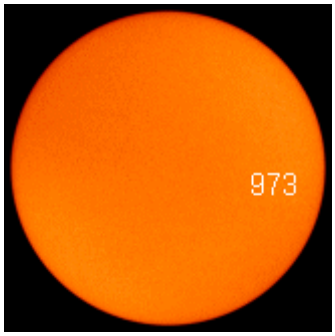
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. The sun was blank all week, except for Wednesday 7th November, when there was a small sun spot. 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, some JEMX data was lost when the command verifier died, but that was all. 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 an occasion when the Command Verifier died, which delayed JEMX going to data taking by 20 minutes, but that was all. 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, 4 occasions of small TM drops from Redu, 2 from Vil2, 1 from DSS27 and 3 from DSS24, all without impact. The overall performance was well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSFs received for revolutions 625 to 627. Revolution 622 was re-planned with the latest PSFs. Further planning has been waiting for the release of ISOC V16.0.1 with the new roll-angle stepping.

The TSFs for revolutions 619 has been received.

2. Observation status

ECS for Revolutions 608-610 have been received and processed.

3. ISOC Science Data Archive

A brainstorming meeting with scientists and developers on improvements to the ISDA user interface was held on 9 November. Work is ongoing for the next ISDA version.

4. ISOC system

The update to include roll-angle stepping for the 5*5 patterns has been successfully tested in detail and will be implemented on the operational system from 12 November.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 12/11/2007:

- Latest Standard Analysis completed: observation 05200010016 (Galactic Bulge region, Revolution 610) on 10/11/2007.

- Latest products archived: observation 04200340030 (Gamma Ray Source 1915+105, Revolution 610) on 10/11/2007.

- Latest observation products sent to the observer: observation 04200340028 (Gamma Ray Source 1915+105, Revolution 603) on 09/11/2007.

5 Special Events

6 Anomalies

The following problems were reported that impacted operations:

- On DoY 308, at 21:20, the Command Verifier died, which caused the JEMX Eds KEHVAC01 & KEDATA02 to fail. The task was immediately restarted. The impact was a twenty minute delay in the start of data-taking for that instrument.
- At 22:34:00, an IREM SEU (#56) caused OMC and IBIS to switch to safe mode. For details see the appendix.

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

AR id	Date Created	Subject	Segment	Status
INT_SC-210	2007-11-16	IREM Anomaly: Reset of IREM_CSCI S/W #56, 04/11/2007	Payload	Pending

7 Future Milestones

The following activities are foreseen in the next few weeks.

- A new imcs database is foreseen to be installed during the perigee outage on Monday 19th November 2007.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 618

The observations in revolution 618 began with a raster dither of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), lasting ~29.4 hours. This was followed by an OMC Flat Field Calibration, a staring observation at attitude (RA 05:00:00.00, DEC -45:30:00.0), lasting ~3.4 hours. Finally a return to the raster dither of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), lasting ~19.6 hours, was executed, until the end of the revolution.

Revolution 619

The observations in revolution 619 began with a raster dither of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), lasting ~39.2 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 return to the raster dither of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), lasting ~7.8 hours, was executed, 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, except during the OMC Flat Field Calibration from 2007-11-05T08:28:00Z to 2007-11-05T12:50:36Z, when it was IBIS 90; SPI 85; JEM-X1 8; JEM-X2 0; OMC 63.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

```
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.
2007-10-26T20:31:23.000Z     144.0472    F   Automatic TM processing.
2007-10-28T04:51:03.000Z     143.9682    F   Automatic TM processing.
2007-10-29T20:14:19.000Z     143.9563    F   Automatic TM processing.
2007-10-31T05:08:30.000Z     143.9325    F   Automatic TM processing.
2007-11-01T19:37:54.000Z     143.9215    F   Automatic TM processing.
2007-11-02T03:29:15.000Z     143.8929    F   Automatic TM processing.
2007-11-04T18:30:57.000Z     143.8819    F   Automatic TM processing.
2007-11-06T03:51:50.000Z     143.8658    F   Automatic TM processing.
2007-11-07T18:22:02.000Z     143.8490    F   Automatic TM processing.
2007-11-09T03:39:34.000Z     143.8253    F   Automatic TM processing.

This report was generated  Fri Nov 9 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, 03/11/2007 – 09/11/2007

The AOCS operations were executed from the Automatic Timeline.

During this period, 71 Open Loop Slews, 73 Closed Loop Slews and 5 Momentum Biases were executed.

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

Winter Eclipse Season 2007 Summary

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

AOCS Eclipse Times — Winter 2007

Date	LOS	AOS	ACC Eclipse Imminent	Eclipse Start						Eclipse End					Eclipse Duration
				ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbra	Umbra	FSS Sun In	Penumbra	FDE/FCE	ACC	
2007-09-11	18:06:00	21:49:00	17:45:47	18:27:55	18:37:00	18:37:44	18:45:27	none	none	none	none	19:10:07	19:14:36	19:19:57	0:24:40
2007-10-11	16:00:00	19:40:00	18:38:25	19:20:17	19:30:27	19:31:11	19:38:05	19:40:56	19:41:52	19:58:06	19:59:14	20:02:20	20:07:19	20:12:06	0:24:15
2007-11-14	15:40:00	19:26:00	18:19:56	19:01:50	19:11:50	19:12:34	19:19:36	19:21:03	19:21:24	20:01:27	20:01:55	20:03:43	20:08:30	20:13:21	0:44:07
2007-10-17	15:43:00	19:18:00	18:06:17	18:48:17	18:57:19	18:58:03	19:05:57	19:21:03	19:07:24	19:59:47	20:01:55	20:01:41	20:05:43	20:11:25	0:55:44
2007-10-20	15:08:00	19:01:00	17:55:35	18:37:45	18:46:42	18:48:26	18:55:15	18:56:22	18:56:36	19:56:11	19:56:27	19:58:01	20:03:26	20:07:53	1:02:46
2007-10-23	15:02:00	18:51:00	17:46:22	18:28:17	18:39:17	18:40:00	18:46:02	18:47:12	18:47:23	19:49:55	19:50:12	19:51:47	19:57:56	20:01:24	1:05:45
2007-10-26	14:49:00	18:36:00	17:36:25	18:18:36	18:28:39	18:29:23	18:36:05	18:37:18	18:37:36	19:38:30	19:38:53	19:40:31	19:45:51	19:50:23	1:04:26
2007-10-29	14:22:00	18:22:00	17:27:13	18:09:13	18:20:13	18:20:57	18:26:53	18:28:31	18:28:43	19:21:44	19:22:22	19:24:04	19:30:05	19:33:46	0:57:11
2007-11-01	14:12:00	18:09:00	17:24:23	18:06:15	18:17:14	18:17:59	18:24:03	18:26:38	18:27:13	18:58:51	18:59:50	19:02:33	19:08:47	19:12:08	0:38:30

IMU1 Usage during Eclipse

IMU Usage during Eclipse Season — Winter 2007

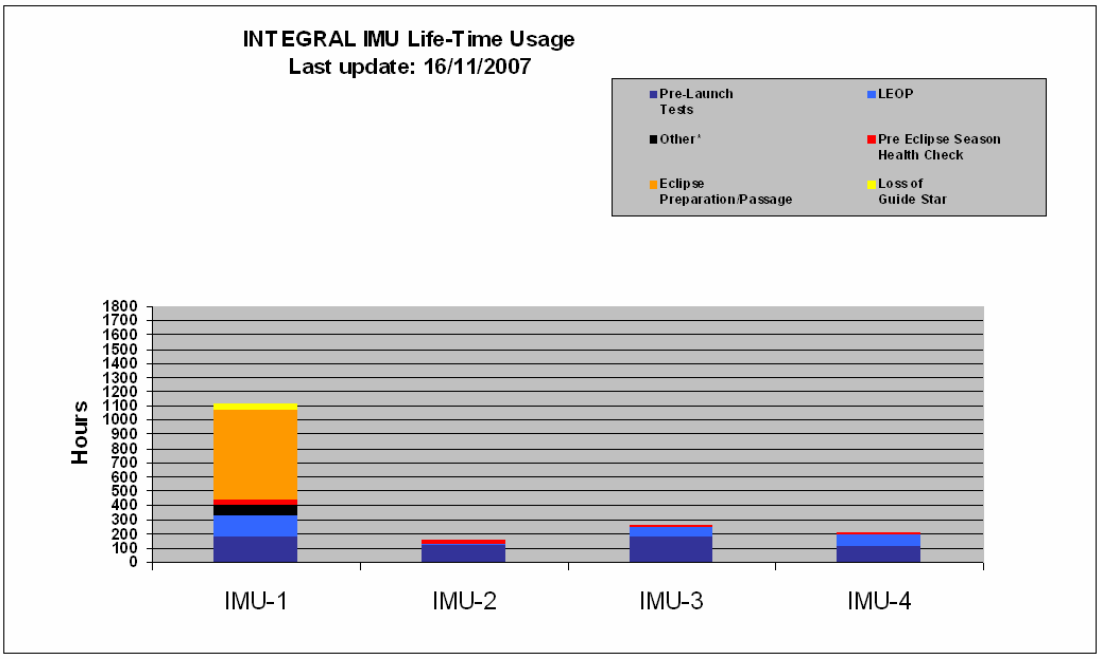
IMU On	IMU Off	From Health Check		From Auto Calibration	On Time	Accumulated On Time
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]		
2007-09-11 15:10:02	2007-09-11 19:22:07	0.3718	0.2683	0.3028	4:12:05	4:12:05
2007-10-11 12:32:32	2007-10-11 20:14:24	0.3212	0.2737	0.3077	7:41:52	11:53:57
2007-10-14 12:23:56	2007-10-14 20:15:35	0.1952	0.2833	0.3275	7:51:39	19:45:36
2007-10-17 12:32:29	2007-10-17 20:13:46	0.2223	0.2418	0.2688	7:41:17	27:26:53
2007-10-20 12:18:29	2007-10-20 20:09:58	0.2390	0.1967	0.2292	7:51:29	35:18:22
2007-10-23 12:01:57	2007-10-23 20:03:45	0.2742	0.2697	0.2292	8:01:48	43:20:10
2007-10-26 11:47:58	2007-10-26 19:52:34	0.2868	0.1717	0.2263	8:04:36	51:24:46
2007-10-29 11:19:07	2007-10-29 19:36:14	0.1974	0.2730	0.3043	8:17:07	59:41:53
2007-11-01 11:17:10	2007-11-01 19:14:39	0.1863	0.2385	0.2899	7:57:29	67:39:22

Total IMUs Life Time Usage

INTEGRAL IMU Life-Time Usage

Unit	Total [hours]	% Usage WRT 1800 hr Reserved Flight Time	Pre-Launch Tests	LEOP	Loss of Guide Star	Eclipse Preparation/Passag	Pre Eclipse Season Health Check	Other*	Last Switch-Off
IMU-1	1117.229336	62.07	175.045556	147.371944	52.288225	630.024722	31.988056	80.510833	01/11/2007
IMU-2	152.423333	8.47	123.023889	3.871111	0.000000	0.000000	25.528333	0.000000	06/09/2007
IMU-3	263.130556	14.62	175.449167	70.057500	0.000000	0.000000	16.008611	1.615278	11/04/2007
IMU-4	206.233333	11.46	111.528889	80.834167	0.000000	0.000000	13.870278	0.000000	11/04/2007

* Other consists of operations like STR bright object test, STR window dump, Earth Observation etc.

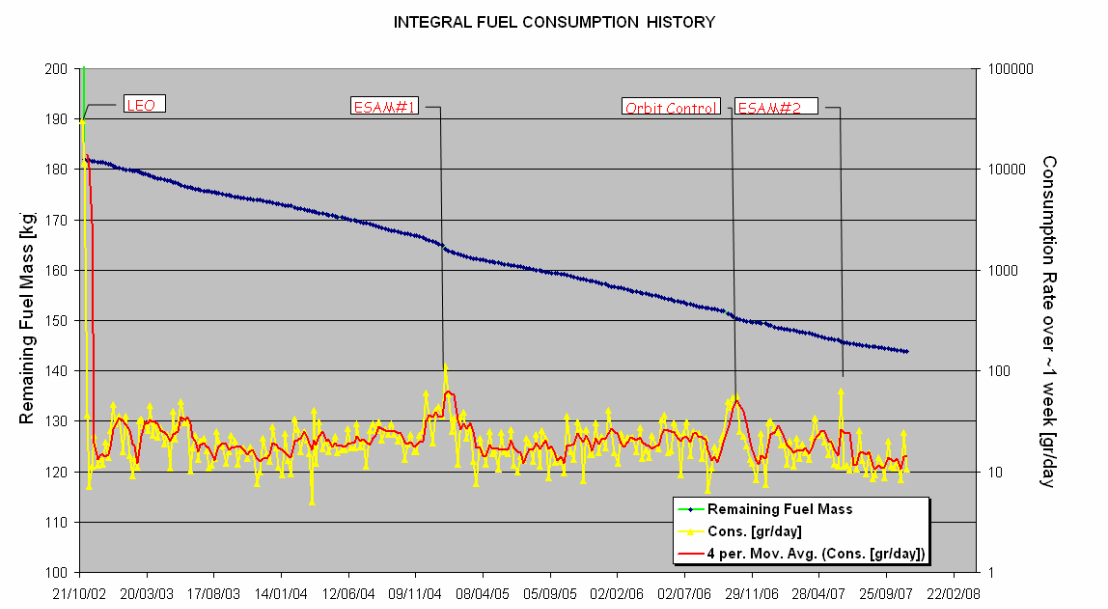


Orbit Control

No update.

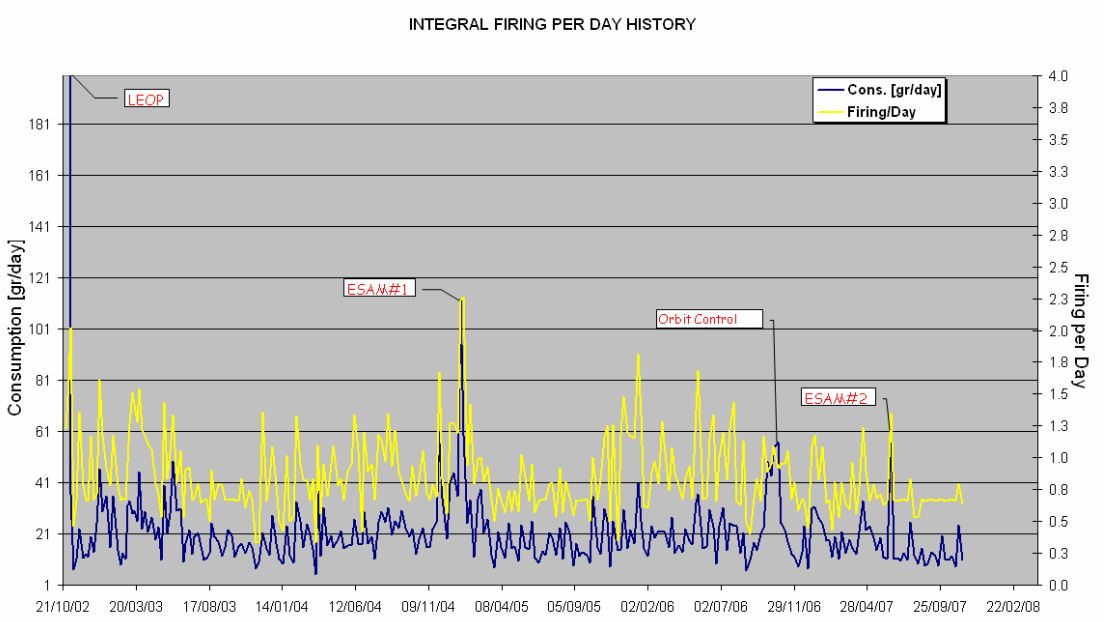
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 09/11/2007 is reported in the plot below.



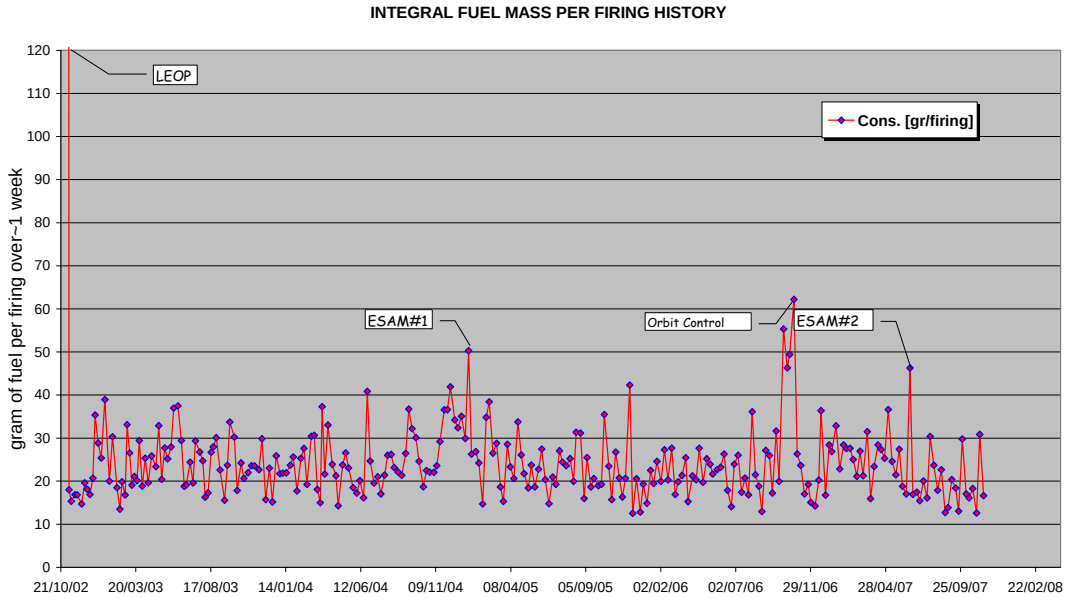
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 09/11/2007 is reported in the plot below.



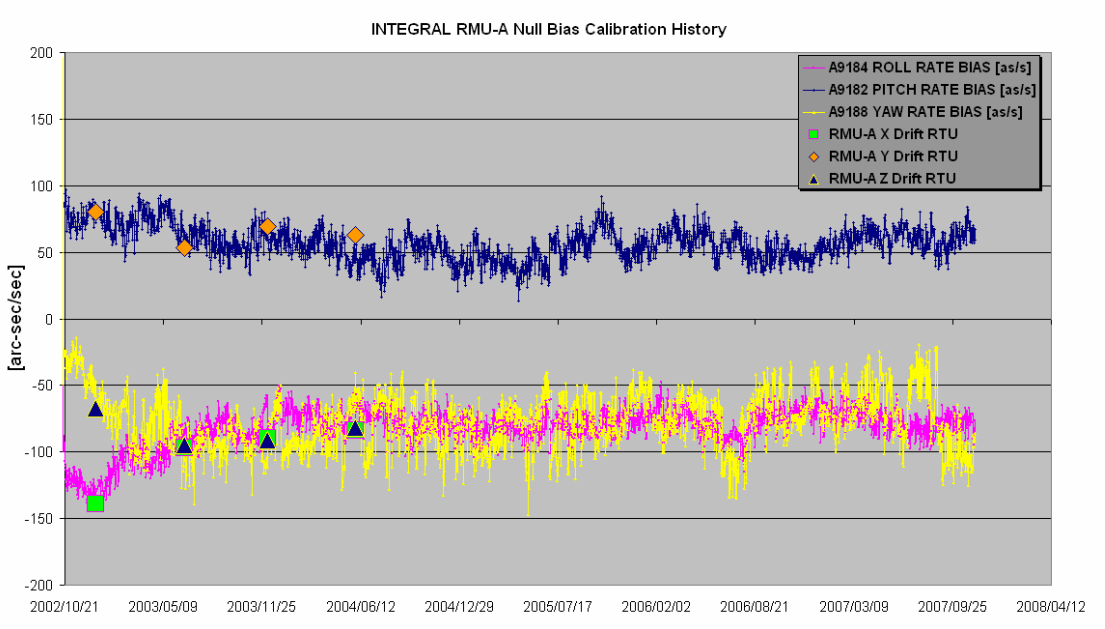
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 09/11/2007 is reported in the plot below.



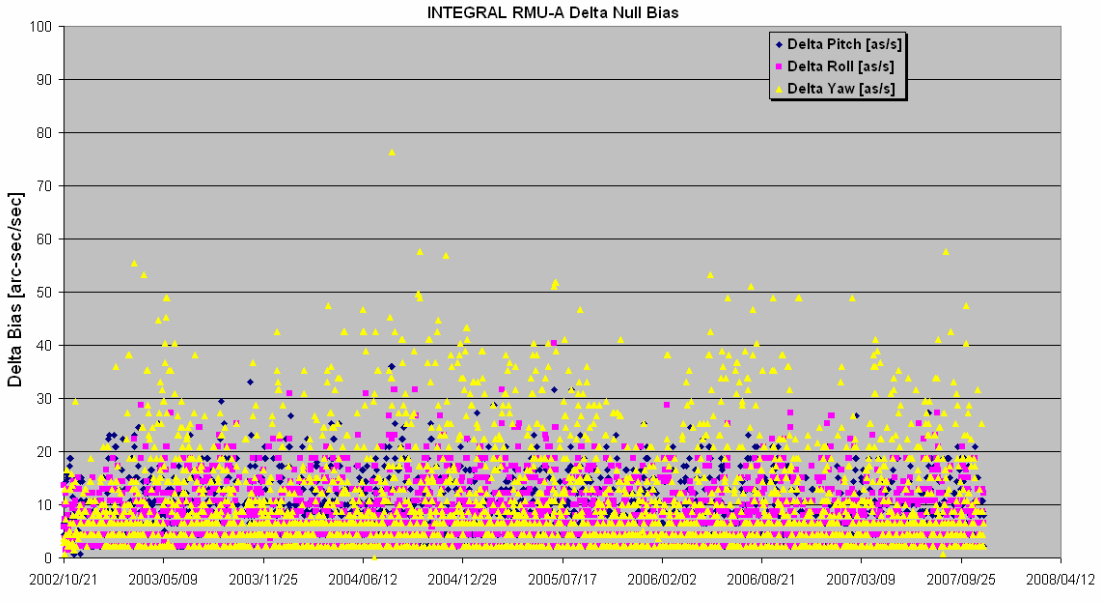
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 09/11/2007 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 09/11/2007 is reported in the plot below.



03/11/2007 (Day of Year 307, Revolution 617)

Nothing to report.

04/11/2007 (Day of Year 308, Revolution 617-618)

Reconfiguration of the AOCS after the eclipse season: With the end of the winter 2007 eclipse season, the AMD thresholds were set back to their non-eclipse season values.

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						
Sunlight Season:								
	Subset 1		Subset 2					
WSMAX	39		35.9					
WSMIN	2.2		4.8					
WSMAX	To Uplink:					In rpm:		
	X1		X2			X1	X2	
RW#1:	406.250000	rd/s	373.958333	rd/s		3879	3571	
RW#2:	399.387606	rd/s	367.641411	rd/s		3814	3511	
RW#3:	400.938401	rd/s	369.068939	rd/s		3829	3524	
RW#4:	399.388015	rd/s	367.641788	rd/s		3814	3511	
WSMIN	To Uplink:					In rpm:		
	X1		X2			X1	X2	
RW#1:	22.916667	rd/s	50.000000	rd/s		219	477	
RW#2:	22.529557	rd/s	49.155398	rd/s		215	469	
RW#3:	22.617038	rd/s	49.346265	rd/s		216	471	
RW#4:	22.529580	rd/s	49.155448	rd/s		215	469	

In the same time frame the ACC/FDE/FCE Eclipse Timers were stopped to reconfigure permanently the S/C in sunlight, at z.

05/11/2007 (Day of Year 309, Revolution 618)

Nothing to report.

06/11/2007 (Day of Year 310, Revolution 618)

Nothing to report.

07/11/2007 (Day of Year 311, Revolution 618-619)

Loss of guide star: at 14:48:00z a loss of the selected guide star, occurred after AOS REDU, at the beginning of rev 619.

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

A manual recovery (change of guide star) was then performed at 18:00z to select a more suitable guide star for the coming RWB at the beginning of rev 619.

No impact on TL.

08/11/2007 (Day of Year 312, Revolution 619)

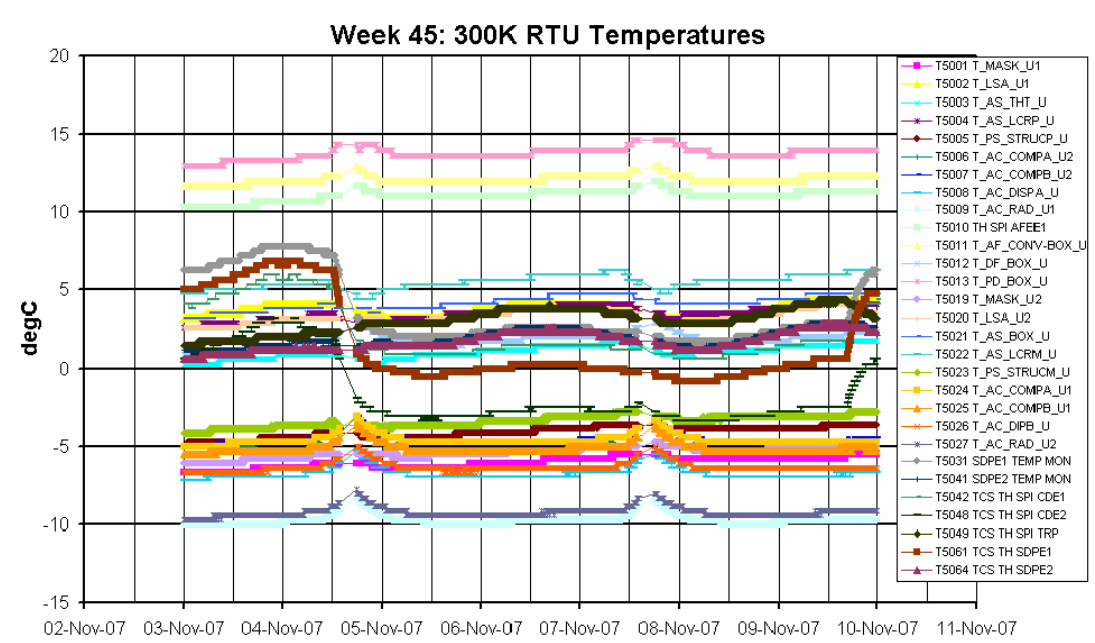
Nothing to report.

09/11/2007 (Day of Year 313, Revolution 619)

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.

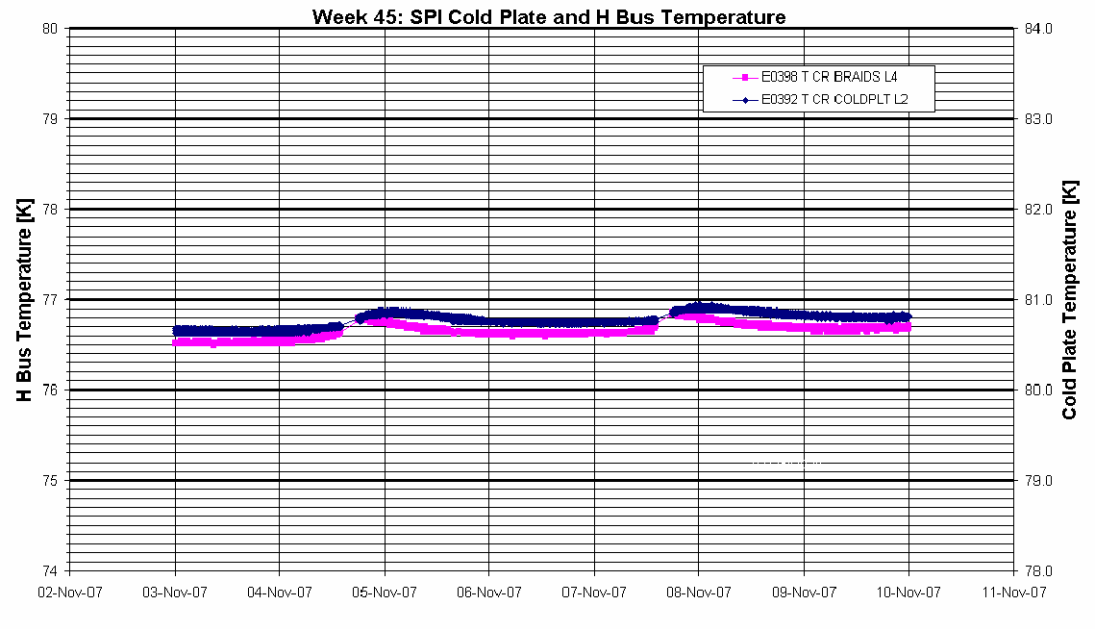


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

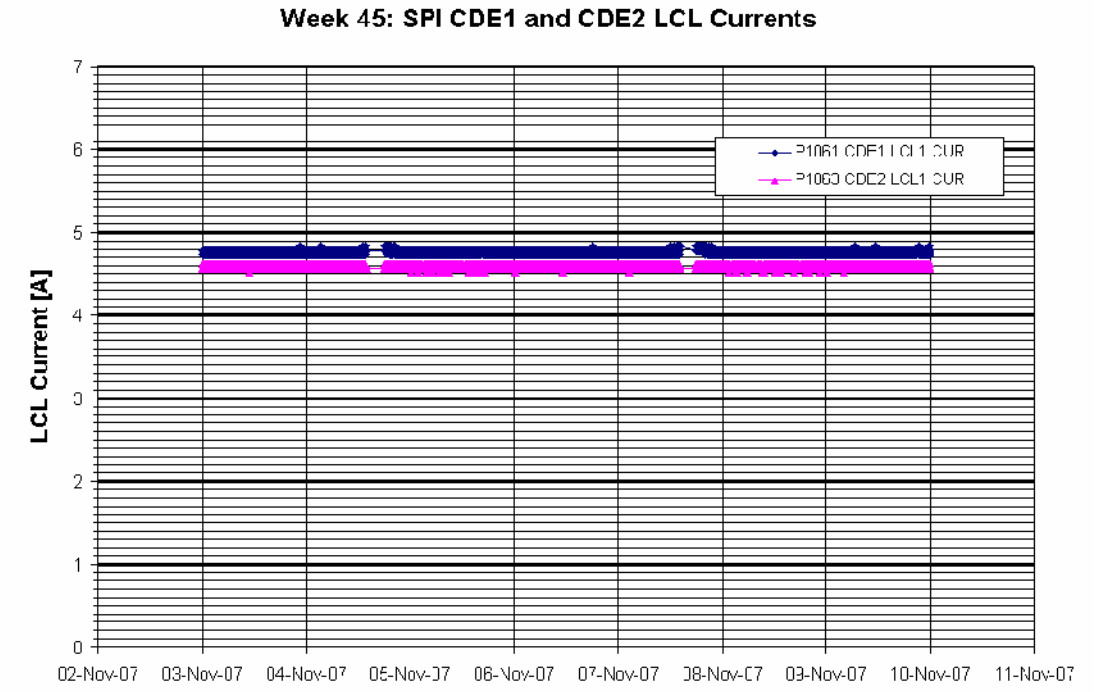
The stroke of all four compressors was set 40 throughout the week with the average CDE LCL currents as follows:

- 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.



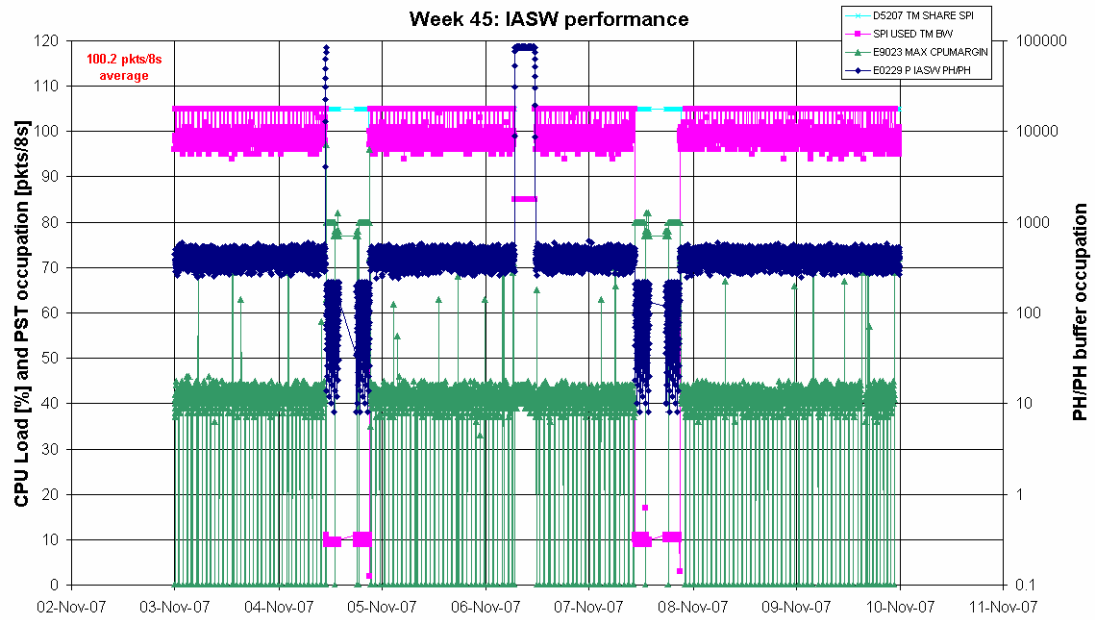
The following plot shows the evolution of the CDE currents during the reporting period.



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.

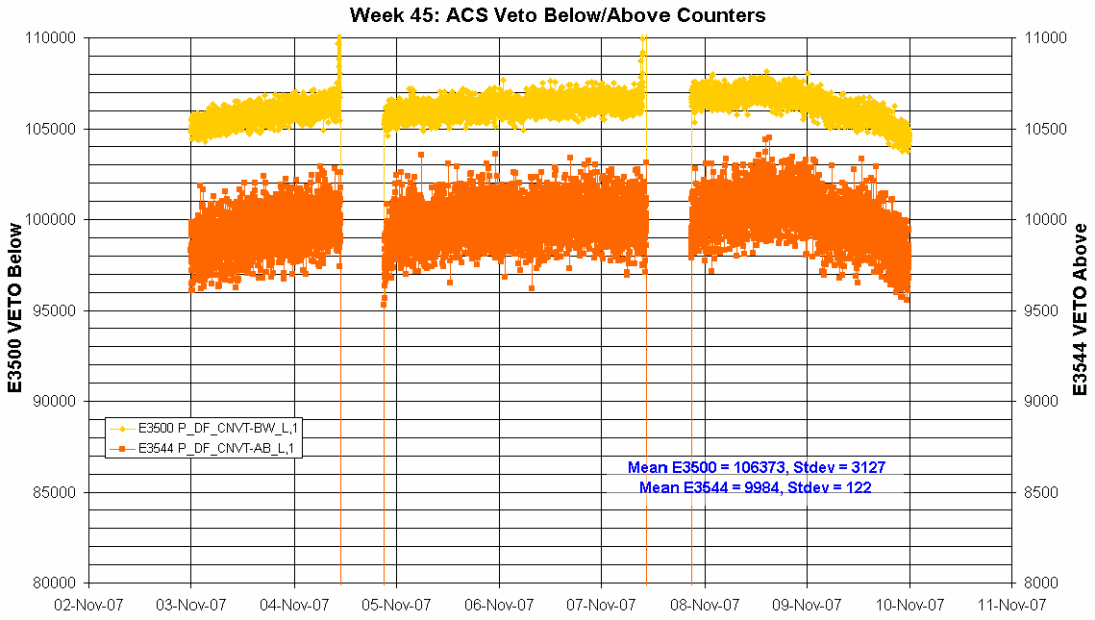
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.

Note that from 2007-11-06T06:40:16Z to 2007-11-06T11:25:05Z the TM allocation was 85 packets/cycle due to an OMC Flat Field Calibration.



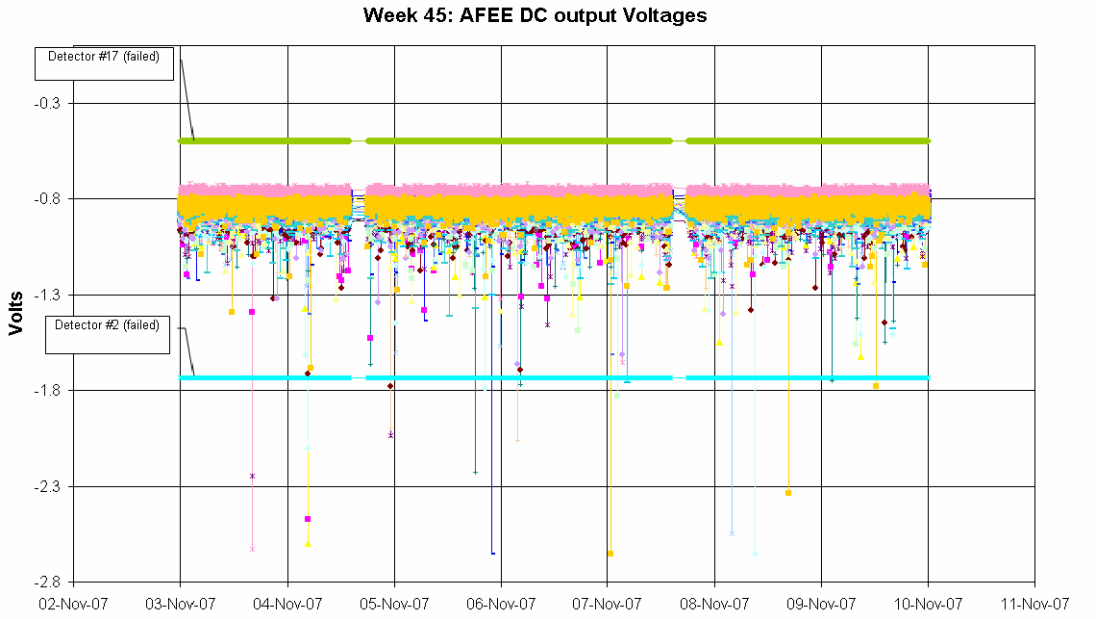
ACS: The performance of the ACS is nominal, except for FEE #81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

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

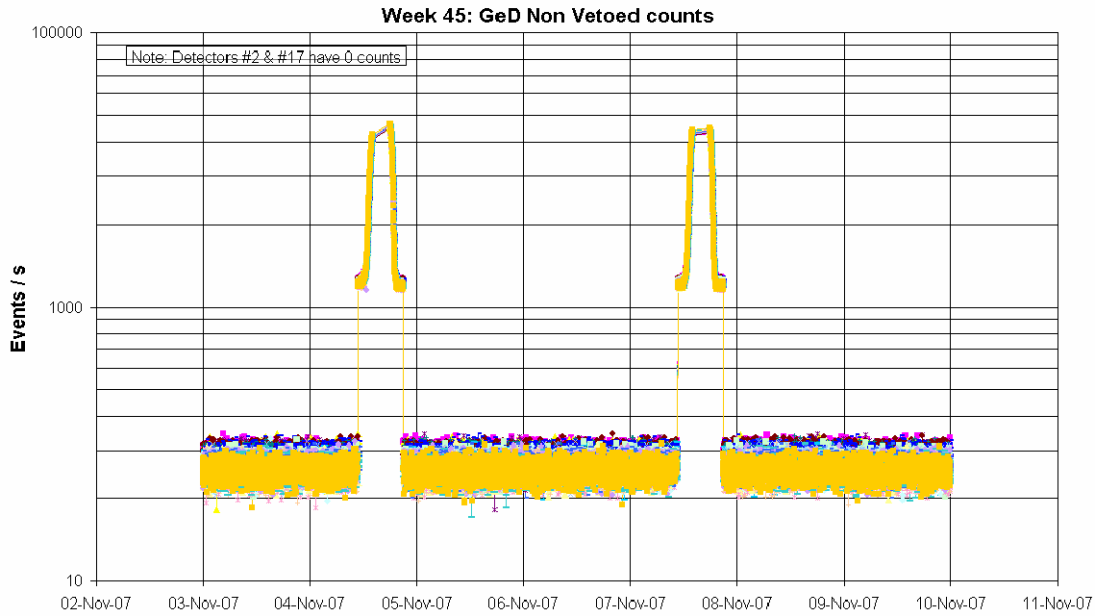


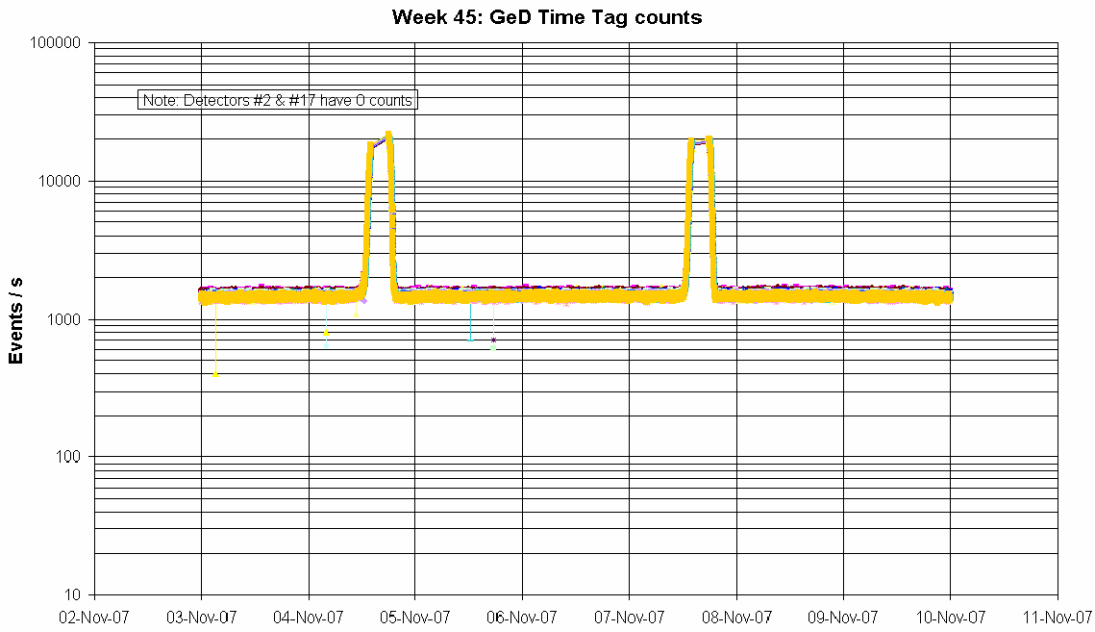
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

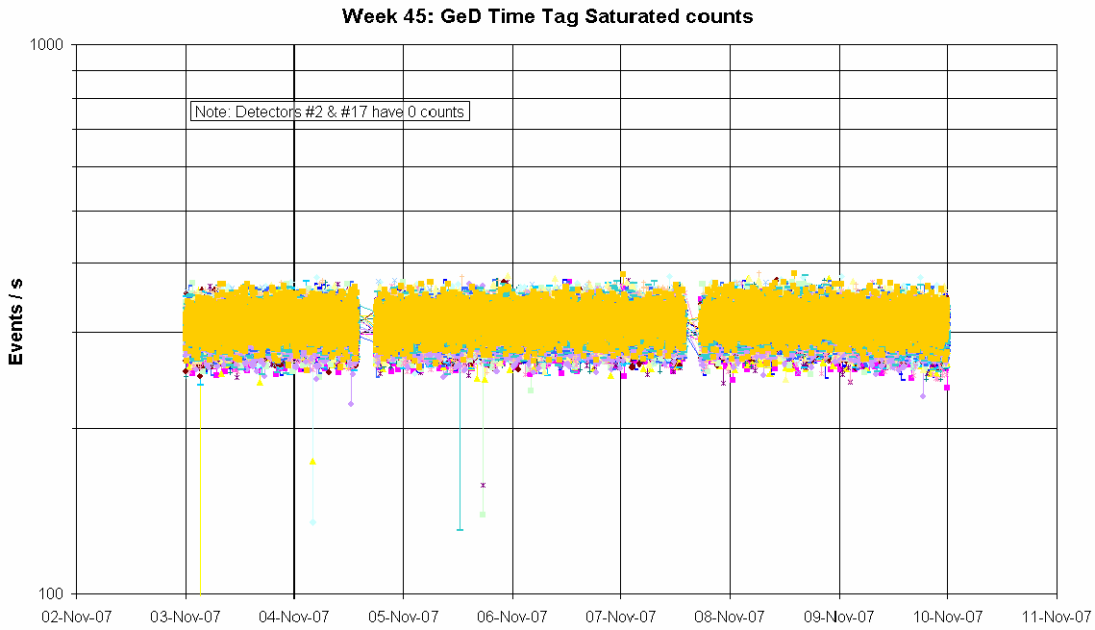
The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.



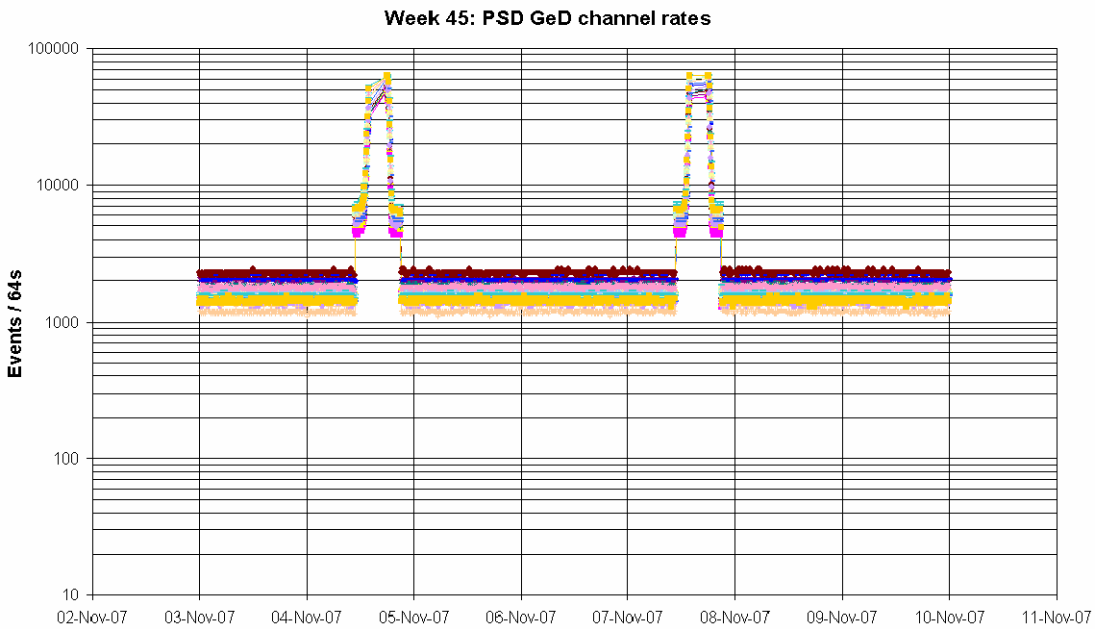
DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.







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



Event Log:

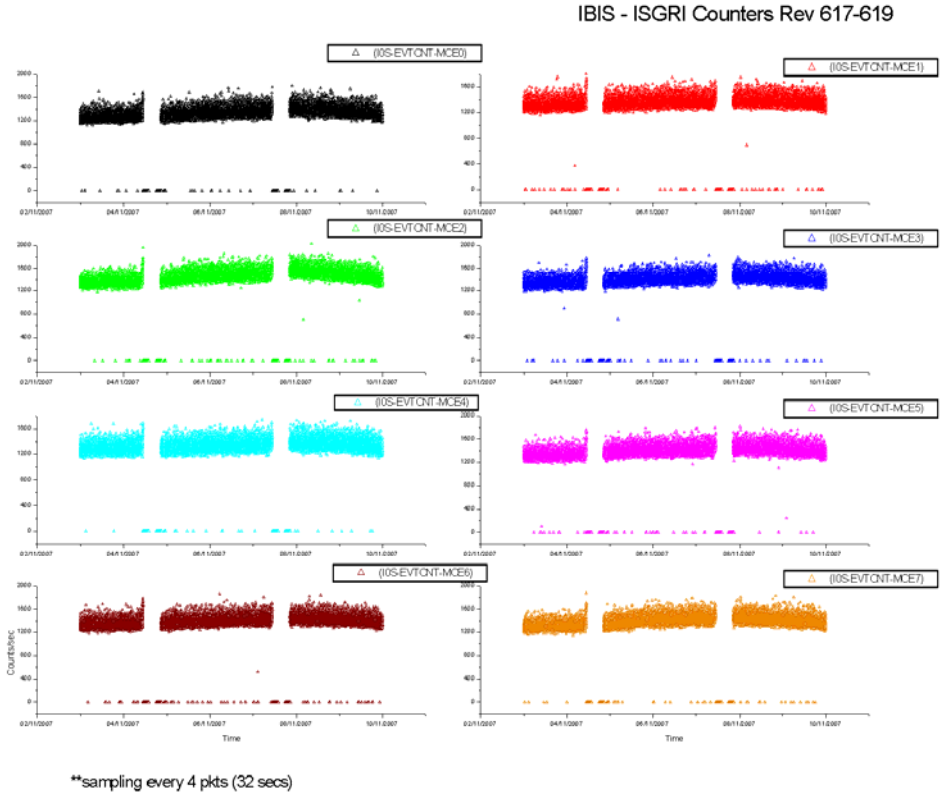
The following non-nominal events occurred on SPI during the reporting period:

- 16 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.
- Due to high background radiation conditions before the expected radiation belt entry of revolution 617, on 2007-11-04 at 10:30:24Z TM parameter E3500 went OOL High and toggled OOL until radiation belt entry, at 10:54:24Z.
- On 2007-11-06 from 11:46:08Z to 11:51:05Z, 17 occurrences of OEM APID 1024 ID 245 EXCEPTION SPI1 SPECTRA COMPRESSION OVERFLOW were received (one for each GeD), followed at 11:51:05Z by OEM APID 1024 ID 244 EXCEPTION SPI1 SPECTRA COMPRESSION NOT COMPLETED. This was about 20 minutes after the TM allocation to SPI was changed back from 85 packets/cycle (due to the OMC FFC) to 105 packets/cycle. These OEMs, indicating problems with the spectra compression due to insufficient bandwidth, are nominal following periods of low TM allocation to SPI. They stopped of their own accord and SPI operations continued nominally.
- Due to high background radiation conditions before the expected radiation belt entry of revolution 618, on 2007-11-07 at 09:44:02Z TM parameter E3500 went OOL High, remaining OOL until radiation belt entry, at 10:40:25Z.
- On 2007-11-07 at 20:51:02Z, during the reconfiguration of SPI at radiation belt exit of revolution 605, TM parameters E3825; E3826 and E3828- E3831 all went OOL with value 0. These are the PSD +/-5V analogue and some PSD board temperatures and are in SPID 60060. They returned within limits when the next packet was received at 20:52:06Z.
- From 2007-11-07 at 21:51Z to 2007-11-08 at 05:09Z the TM parameter E0392 for the cold plate temperature went OOL Warning High several times. As in each case it returned within limits after a few TM cycles no action was taken.

8.3.3 IBIS Operations

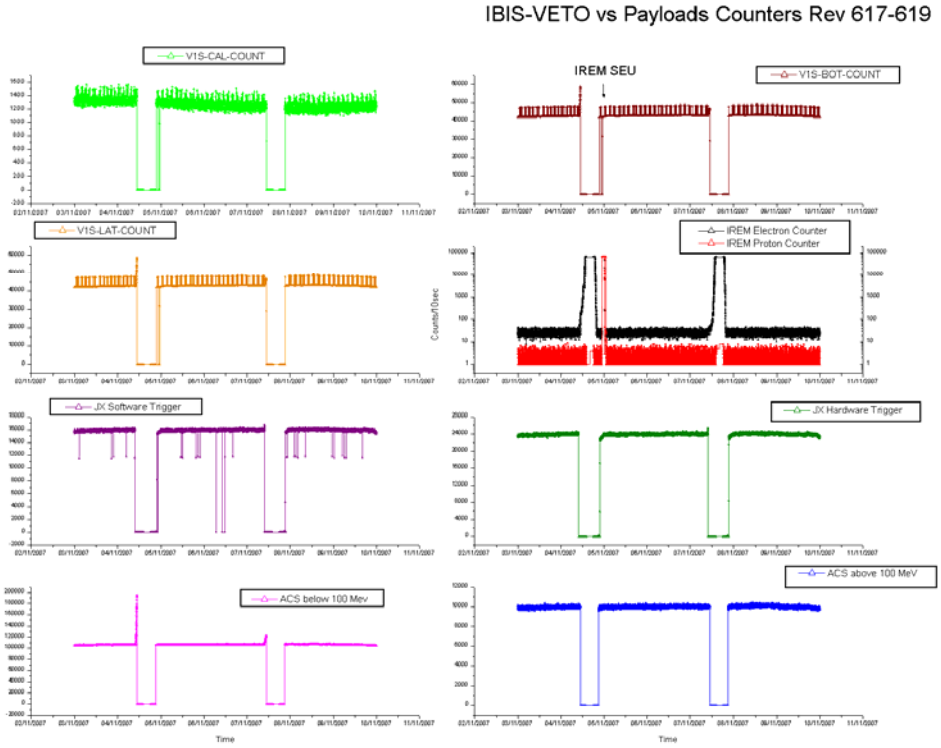
IBIS Event Counters Plots

ISGRI Counters:



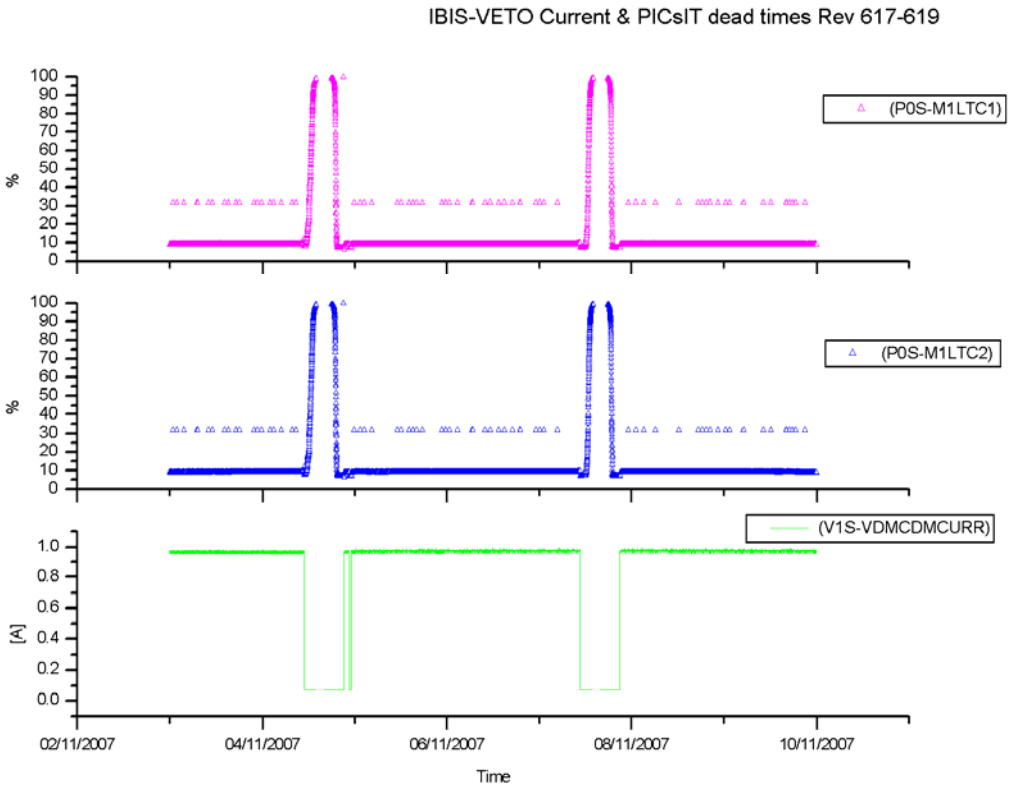
The week was characterised by high radiation before the expected radiation belt entry of revolution 617 as reported by the payload. Note that the plot of the ACS below 100MeV has a smaller scale than usual.

VETO vs Payloads Counters:



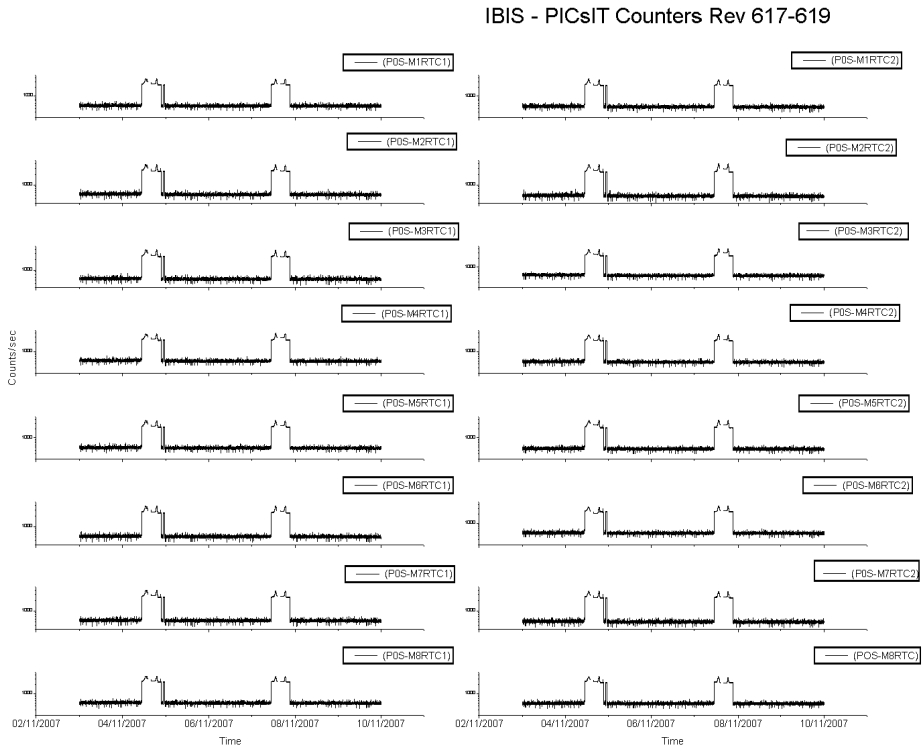
**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

VETO Current:



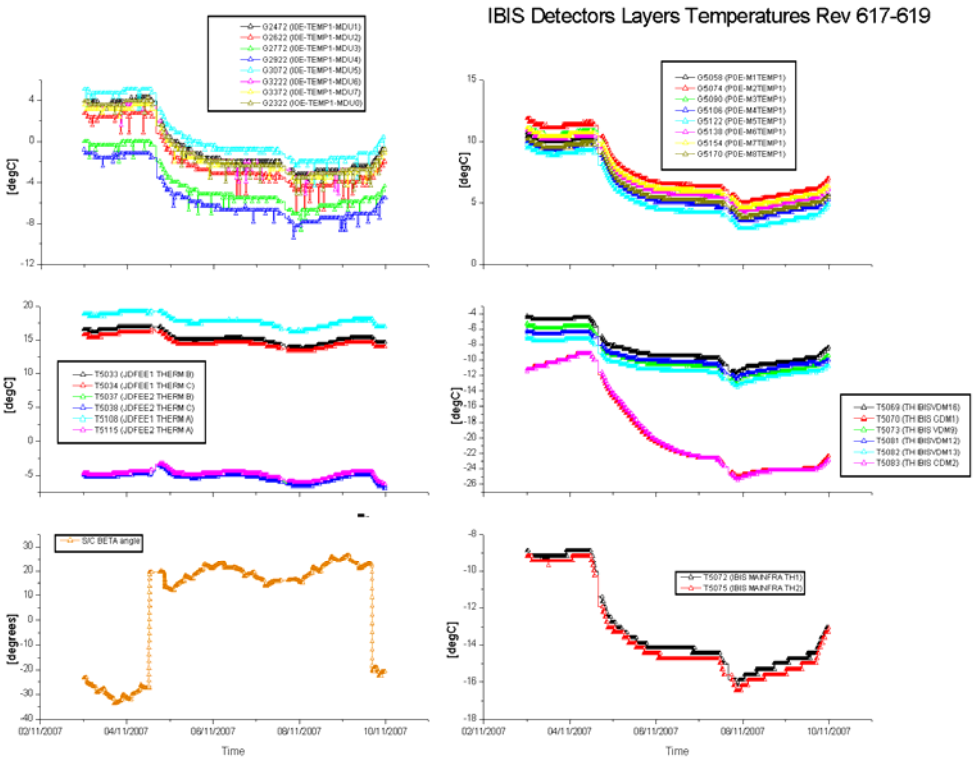
**sampling every 4 pkts (32 secs)

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.

During the week the TM parameter G6061 (Veto calibration source counter) briefly toggled OOL Warning Low several times as the Soft Low limit, which had been updated (from 1200 to 1100) on the IMCS pending the next IODB release, was set back to the previous IODB value following an IMCS restart. It was reset to the updated value, pending the release of the new IODB on the MCS.

In addition, throughout the week, TM parameter G8080 went OOL Warning High several times. This is the Valid event rate on HBRA. As at each occurrence it remained OOL for only 1 TM cycle, no action was taken. This indicates an overflow in the counters and affects only the quality of the scientific data but not the safety of the instrument.

2007-11-03 (DOY 307, Rev 617)

IBIS operations executed nominally.

2007-11-04 (DOY 308, Rev 617-618)

At 10:34:05Z, ~20 minutes before radiation belt entry of revolution 617, 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 radiation belt entry at 10:54:23Z.

Due to an IREM SEU, IBIS transitioned autonomously to Safe configuration at 22:33:58Z. It was recovered as follows:

- At 23:01:49Z FCP_IBIS1_0803 IBIS EXIT FROM SAFE MODE
- At 23:12:37Z ED GESTAN02 uplinked with the planned observation parameters and commanding to IBIS from the Timeline re-enabled.

At 23:37Z TM parameter X7500 went OOL, indicating a problem with the histogram process. The following recovery procedure was then executed to force the histogram accumulation and download process to resume:

- 23:47:49Z FCP_IBIS1_0312
- 23:50:05Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

2007-11-05 (DOY 309, Rev 618) to 2007-11-06 (DOY 310, Rev 618)

IBIS operations executed nominally.

2007-11-07 (DOY 311, Rev 618-619)

At 20:38:37Z, during the execution of the ED GEISCL03 before radiation belt exit of revolution 619, TM parameter G2097 went OOL Low (value = 0). This is the Number of events triggering the MCE7 per second. As it returned within limits at 20:39:17Z, no action was taken.

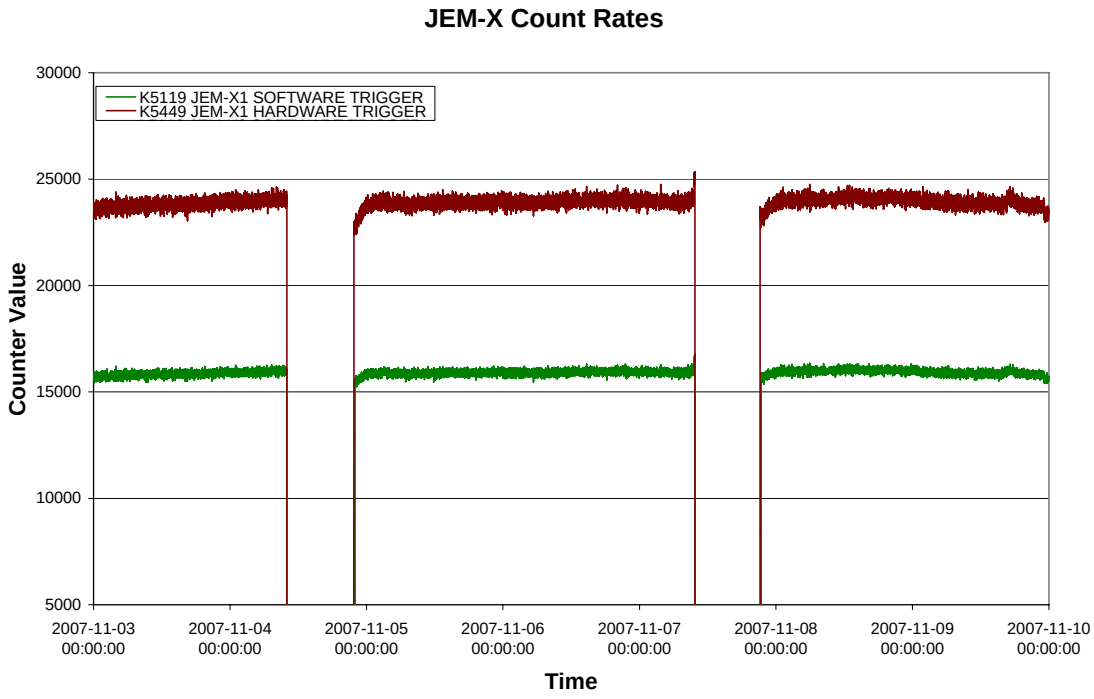
2007-11-08 (DOY 312, Rev 619) to 2007-11-09 (DOY 313, Rev 619)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

JEM-X Count Rates

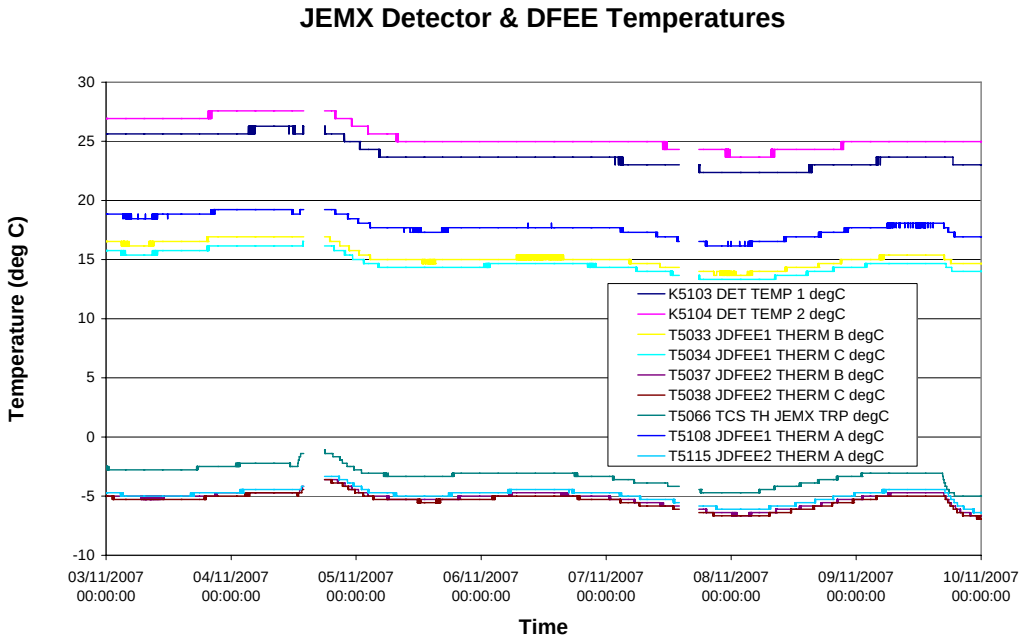
JEM-X count rates over the reporting period are displayed in the following graph[1].



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.
[2] Data sampled (1 frame in 8)



JEM-X Daily Report

2007-11-03 (DoY 307, Rev 617)

JEM-X1 operations executed nominally

2007-11-04 (DoY 308, Rev 617-618)

At 21:20, the Command Verifier died, which caused the KEHVAC01 & KEDATA02 EDs to fail. At 21:30, after recovering the task, JEMX-1 was put to SAFE using the procedure FCP_JEM1_0040, and then to setup using FCP_JEM1_0041, and then at 21:39 the KEHVAC01 ED was sent manually. JEMX was then put to data taking at 21:55 using the KEDATA02 ED. The impact was a twenty minute delay in the start of data-taking.

At 21:56:33, the TC command terminated with status UNKNOWN, this status changed 11 seconds later to UNCERTAIN_PASS, there was no impact.

At 22:34:41 JEMX parameters K5315, K5316 & K5317 went Out-of-Limits due to an IREM SEU (#56). There was no impact as the reaction has been disabled.

2007-11-05 (DoY 309, Rev 618) to 2007-11-09 (DoY 313, Rev 619)

JEM-X1 operations executed nominally

8.3.5 OMC Operations

2007-11-03 (DoY 307, Rev 617)

Nothing to Report.

2007-11-04 (DoY 308, Rev 617)

At 22:34:00, an IREM SEU (#56) caused OMC to switch to safe mode. A recovery was performed, and the unit was returned to Stand-by at 22:55:52. The impact was pointing 06180003 was shortened from a planned 3530 to 609 seconds.

2007-11-05 (DoY 309, Rev 618)

Nothing to Report.

2007-11-06 (DoY 310, Rev 618)

From 06.40.32 to 09.55.32 a Flat Field calibration, then from 09:56:01 to 10:28:07, a dark current calibration was performed. Both were conducted successfully.

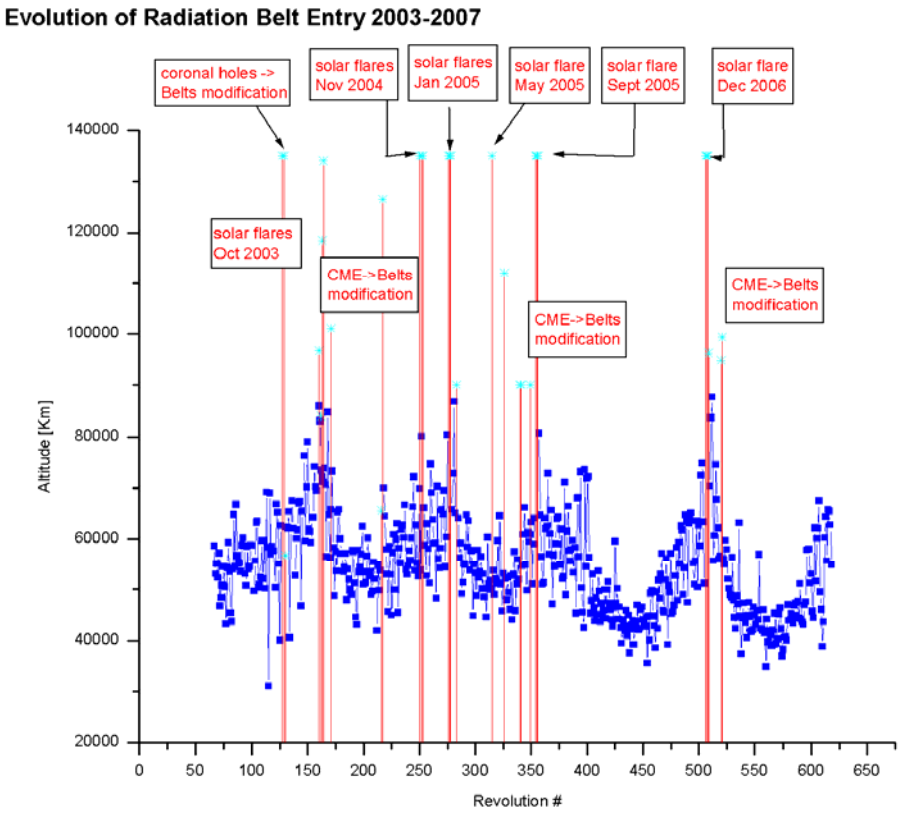
2007-11-07 (DoY 311, Rev 618) to 2007-11-09 (DoY 313, Rev 619)

Nothing to Report.

On DoY 308 at 10:54:24 and DoY 311 at 10:40:24 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 2007.308 (04/11/2007):

At 22.34.00Z, a local reset of the IREM CSCI S/W (SEU #56) 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 2007.308.22.34:00Z at 64392.2 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 22:42Z 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 01:13Z.

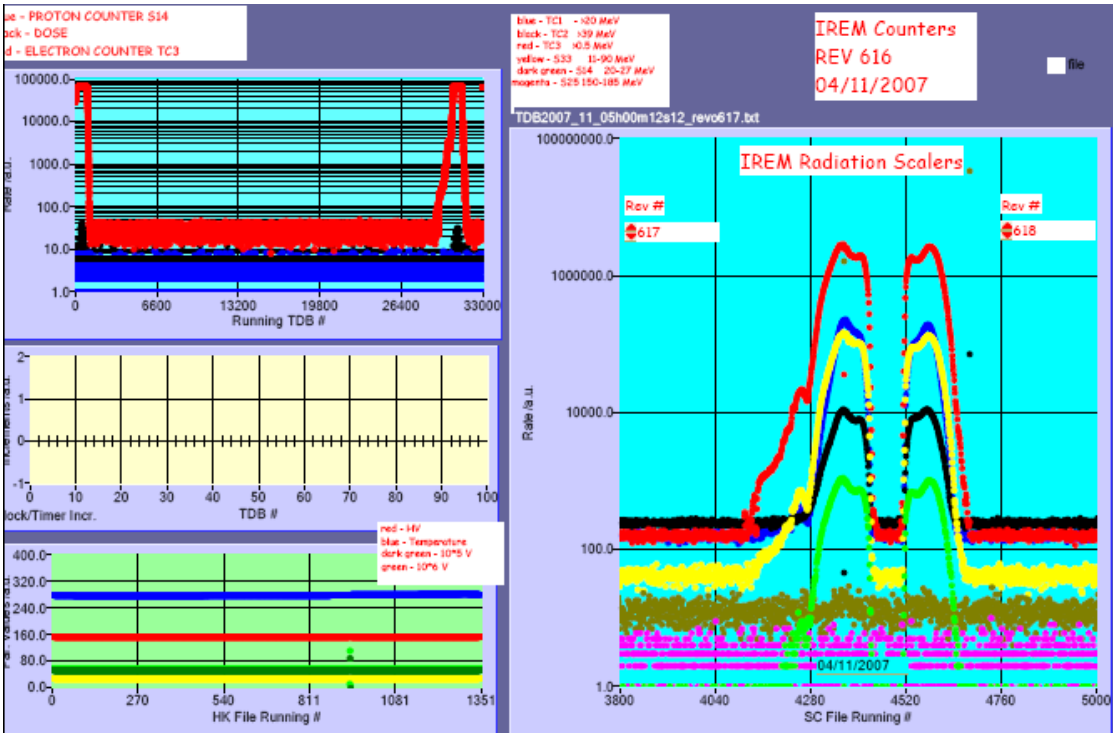
The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the PIs request. OMC was recovered at 22:55:52Z and IBIS at 23:15Z.
The cause of these S/W resets is apparently due to the unit's memory device that is sensitive to high energy radiation, as proved during test campaign on-ground.

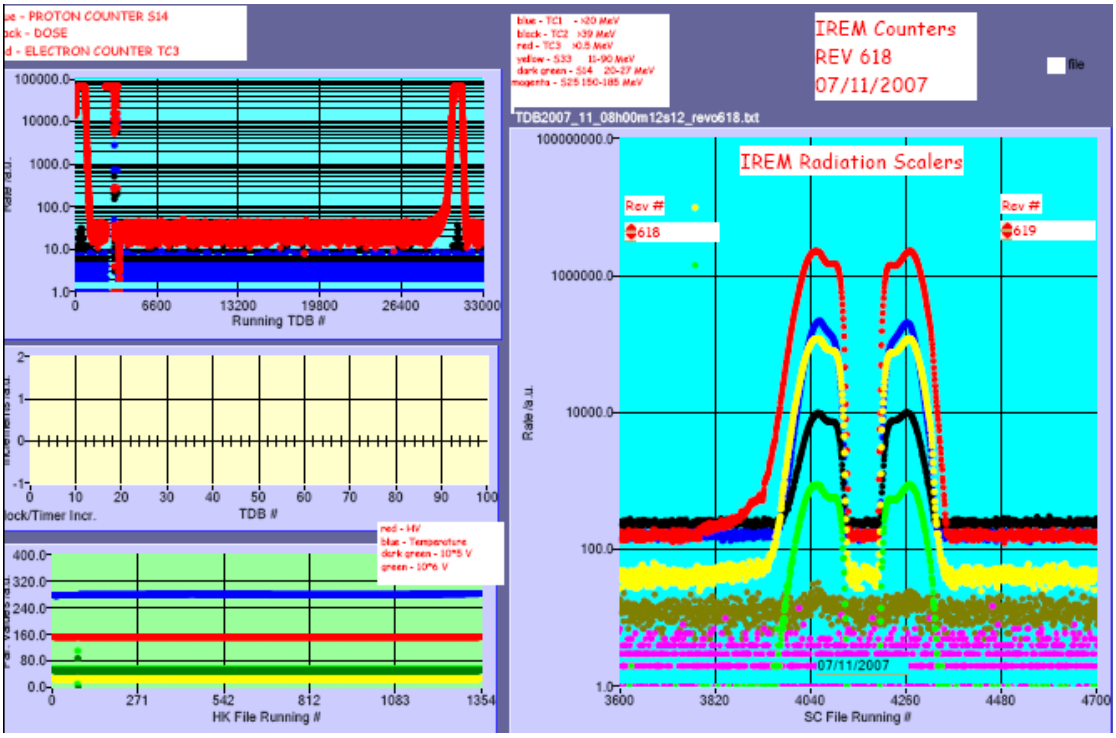
Electron Belts

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]
617	RAD_ENTR R 2007-11-04T10:54:23Z	04/11/2007 10:09:58	62771.8	04-Nov-2007 12:13:09	45113.12
618	RAD_EXIT R 2007-11-04T21:04:55Z	04/11/2007 19:38:23	>>31434.8	04-Nov-2007 20:03:09	44122.37
618	RAD_ENTR R 2007-11-07T10:40:23Z	07/11/2007 10:56:17	54850.5	07-Nov-2007 12:02:38	44831.5
619	RAD_EXIT R 2007-11-07T20:50:42Z	07/11/2007 19:11:59	>>33057.6	07-Nov-2007 19:52:38	44445.59

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)

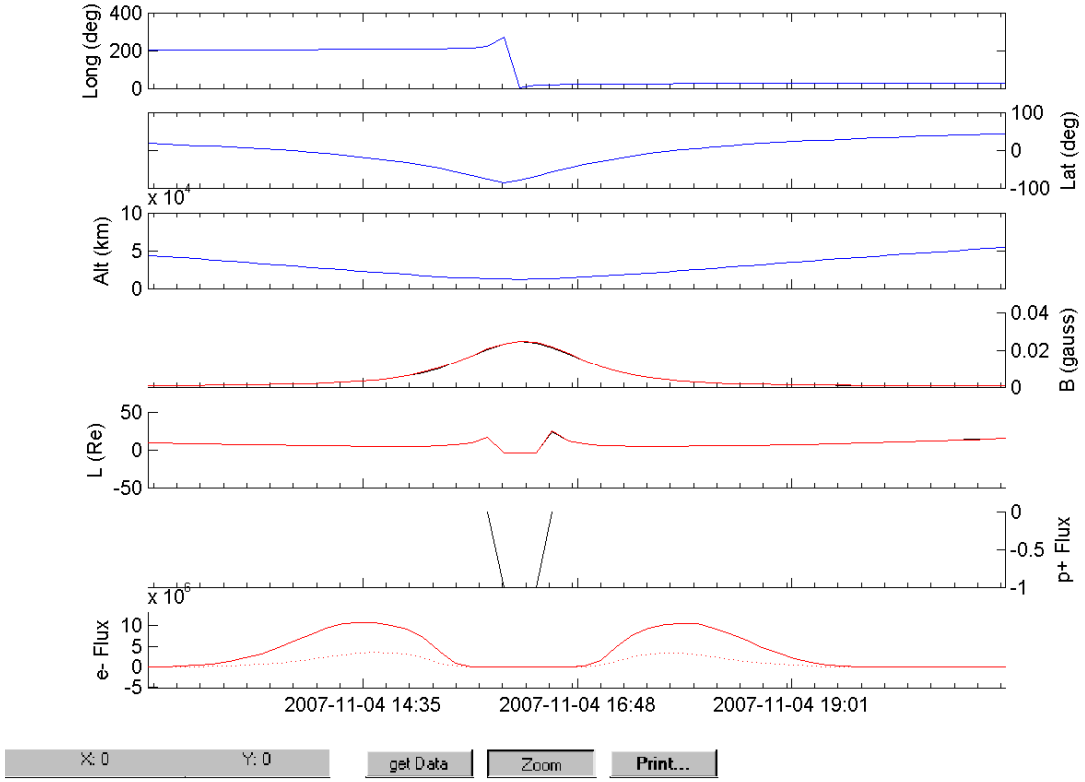
IREM radiation counters:



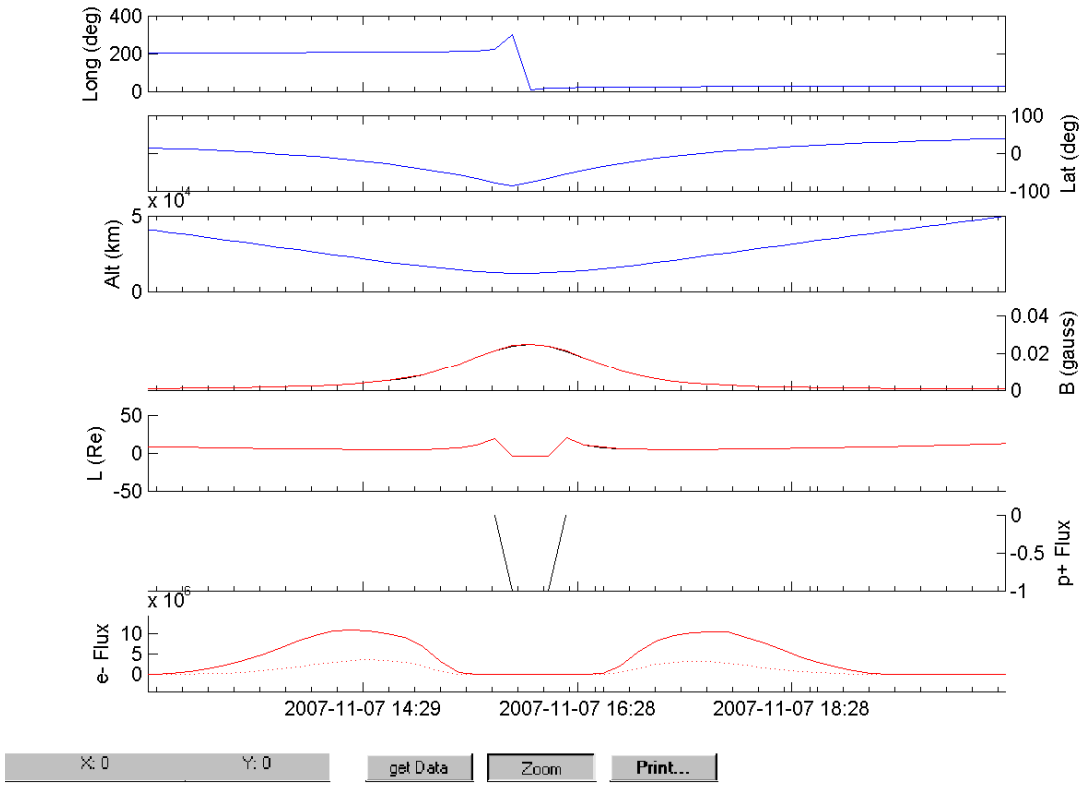


IREM Predicted Radiation Belt Passages

Rev 617



Rev 618



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.