

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 260
Week 37
17.09.07
Routine Phase

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1 General

The Flight Control Team at MOC has compiled this report with some input provided by the Flight Dynamics Team, ISOC and ISDC.

It addresses the activities from 08.09.07 until 14.09.07 (both dates inclusive) and covers the revolutions 599 and 600.

2 Summary of Activities

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

The targets of these revolutions consisted of a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), two hexagonal dithers of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), and two raster dithers of the Galactic centre (RA 17:45:40.00, DEC -29:00:29.0).

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 Lunar Eclipse occurred on 11/09/2007. The eclipse passage was nominal from an AOCS point of view.

As results of the periodic IMUs (1-2) calibration performed on 06/09/2007, the IMUs drift corrections were updated during rev 599.

As part of the AOCS preparation for the summer eclipse season, the onboard AMD thresholds were set to their eclipse season values at the beginning of rev 599. In the same time frame were verified the AMD dead band value, the IMU timers, the load of the TT sequence to re-enable the IMU Auto Switch-Off function in the ACC and the Eclipse ACC\FDE\FCE timers.

As part of the AOCS reconfiguration after the Lunar eclipse passage, the ACC\FDE\FCE eclipse timers were stopped and the AMD thresholds were set to their non-eclipse season values during rev 600-601.

2 slews were missed from TL, but recovered about at ~ the scheduled time, during the observation period, due to problem with an invalid guide star.

The fuel consumption over the period between 05/09/2007 and 14/09/2007 was 0.0919 Kg. The remaining propellant is in the order of 144.5521 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

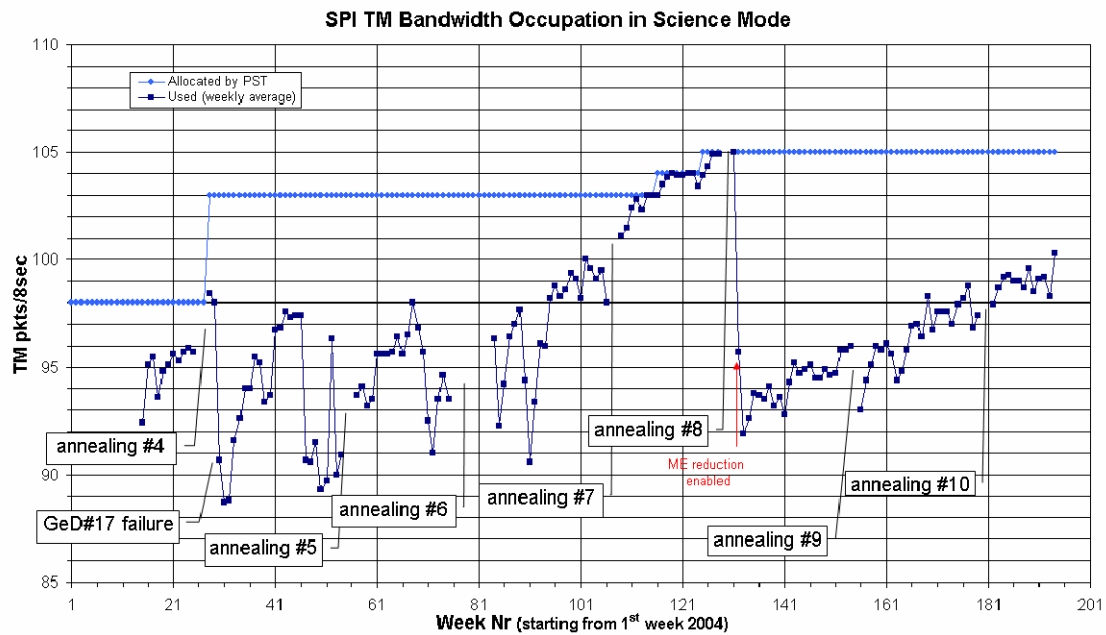
3.2.1 SPI

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. The average telemetry occupation when the TM allocation was 105 packets/cycle was 100.3 packets/cycle.

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



A penumbra-only lunar eclipse occurred during the perigee passage of revolution 599-600. These revolutions were planned as for a nominal eclipse, including setting the Broadcast Packet Eclipse times, however the depth of the eclipse was not great enough to trigger the PPDU (S/E) sequence. Therefore SPI went to Standby mode and the AFEE was switched off however the other subassemblies remained on. Nevertheless, the post-eclipse activation ED EECLEX02, along with the other SPI EDs in the Timeline for eclipse, executed nominally.

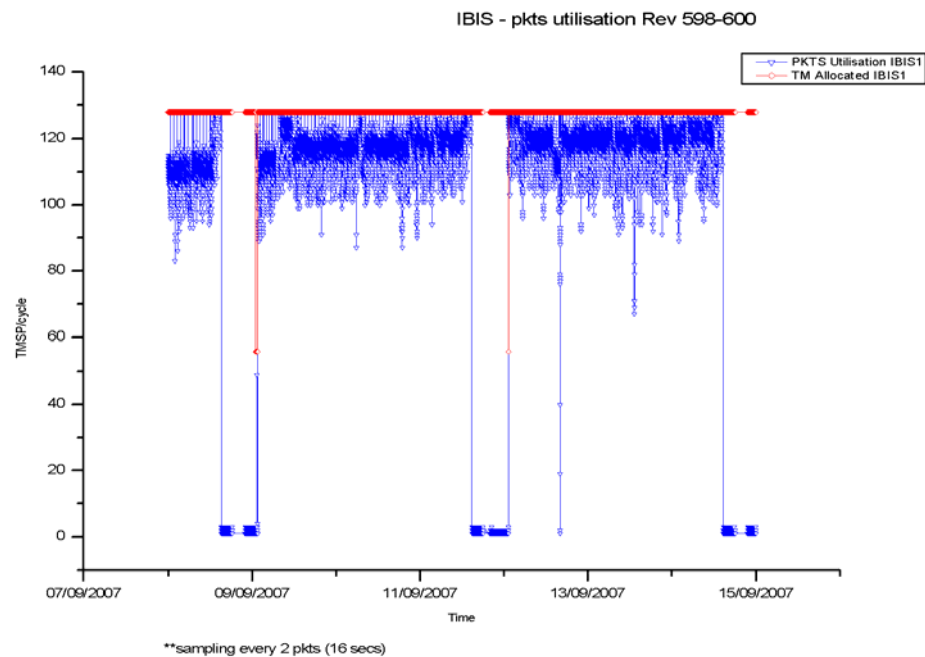
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

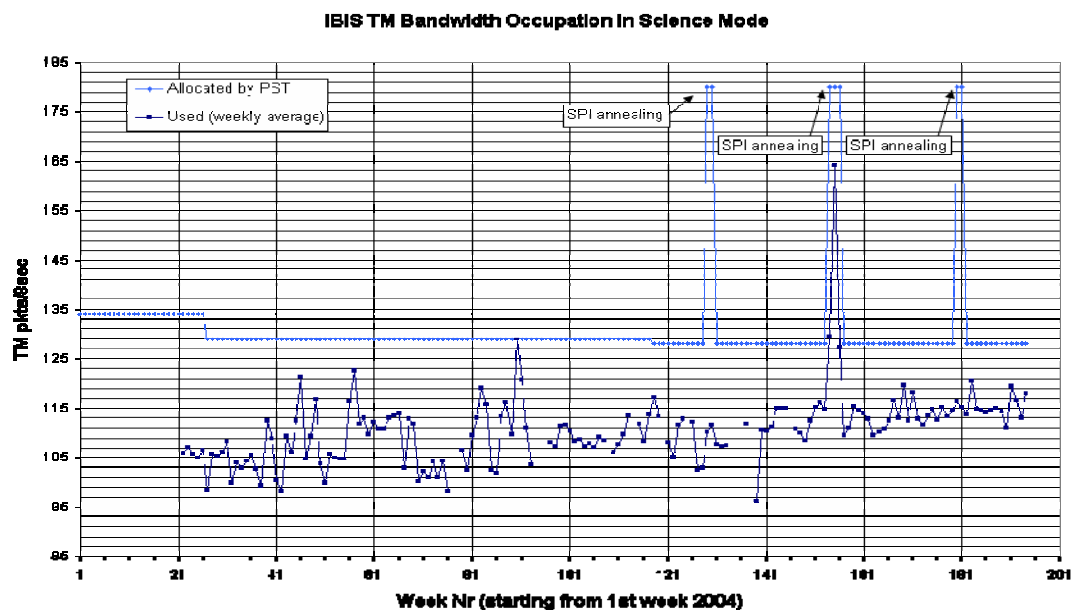
The overall status of the unit is nominal.

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 118.05 TMPS/cycle, up 5 on last week.

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:



A penumbra-only lunar eclipse occurred during the perigee passage of revolution 599-600. These revolutions were planned as for a nominal eclipse, including setting the Broadcast Packet Eclipse times, however the depth of the eclipse was not great enough to trigger the PPDU (S/E) sequence.

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.

As with the other instruments, the penumbral lunar eclipse did not affect operations.

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, all of the 139 planned science pointings for OMC were executed nominally.

As with the other instruments, the penumbral lunar eclipse did not affect operations.

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 the whole week. There was no risk of solar flares or radiation..



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 missed from the Timeline. The overall performance was nearly 100%.

4.1 Mission Operations Centre

The performance of the MOC was very good this week, with no pointings lost. There were, however, 2 occasions when the FDS slew updates failed to arrive, and also an incident at the end of revolution 600, when the spacecraft went through perigee in TCM mode, but there was no impact on scientific observations. The overall performance was nearly 100%.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were, however, 3 occasions of TM drops from Redu, and 1 occasion of the link with ISDC dropping, all with no impact reported. The overall performance was nearly 100%.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSFs are available up to revolution 609.

Observations have been planned up to revolution 606.

Due to a short Moon constraint in revolution 606, the Crab observations had to be finally be moved to revolution 605 leading to replans of 604 (perigee entry) and 605.

TSFs have been received up to revolution 604.

2. Observation status

ECS files for revolutions 587-589 have been received and processed.

3. ISOC Science Data Archive

A status meeting this week confirmed the development schedule with a minor release (INVITE update) end September and a major release end November.

4. ISOC system

Version 16.0 and especially PGT has been tested in depth by inside and selected outside testers. The issues found have largely been addressed already, the formal release is expected for the end of the month.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 17/09/2007:

- Latest Standard Analysis completed: observation 04200730050 (Galactic disk latitude scans, Revolution 584) on 17/09/2007.

- Latest products archived: observation 04200730050 (Galactic disk latitude scans, Revolution 584) on 17/09/2007.

- Latest observation products sent to the observer: observation 04200730033 (Galactic disk latitude scans, Revolution 580) on 02/09/2007.

5 Special Events

6 Anomalies

There were no problems reported that impacted operations this week.

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

AR id	Date Created	Subject	Segment	Status
INT-2950	2007-09-13	No TM on B-Chain with connected VC-0 TM on INCTRB	IMCS	Pending
INT-2951	2007-09-13	Invalid Guide Star (ID 2601-00719) failed Search/Track process	FDS	Pending
INT-2952	2007-09-13	REDU - Queue overflow on TMP1	ESA Stations	Closed
INT-2953	2007-09-17	TM drop VC-0/7 from REDU	ESA Stations	Closed
INT-2954	2007-09-14	Procedurals error when recovering RWB activity		Pending
INT_SC-203	2007-09-05	JEM-X CSSW Anomalies observed	Payload	Pending

7 Future Milestones

The following activities are foreseen in the next few weeks.

- Eclipse season begins on 11th October 2007, at the beginning of revolution 610.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 599

The observations in revolution 599 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 hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. Finally, a raster dither of the Galactic centre (RA 17:45:40.00, DEC -29:00:29.0), lasting ~47.4 hours was performed, until the end of the revolution.

Revolution 600

The observations in revolution 600 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 raster dither of the Galactic centre (RA 17:45:40.00, DEC -29:00:29.0), lasting ~53.2 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 105; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2007-08-21T23:55:52.000Z	144.8257	F	Automatic TM processing.
2007-08-23T09:56:35.000Z	144.8116	F	Automatic TM processing.
2007-08-24T23:43:36.000Z	144.8014	F	Automatic TM processing.
2007-08-26T09:14:27.000Z	144.7798	F	Automatic TM processing.
2007-08-27T23:33:27.000Z	144.7710	F	Automatic TM processing.
2007-08-29T09:32:35.000Z	144.7580	F	Automatic TM processing.
2007-08-30T23:22:23.000Z	144.7460	F	Automatic TM processing.
2007-09-01T09:23:55.000Z	144.6994	F	Automatic TM processing.
2007-09-02T23:07:59.000Z	144.6898	F	Automatic TM processing.
2007-09-04T08:59:23.000Z	144.6674	F	Automatic TM processing.
2007-09-05T22:52:39.000Z	144.6570	F	Automatic TM processing.
2007-09-07T08:44:11.000Z	144.6440	F	Automatic TM processing.
2007-09-08T22:55:43.000Z	144.6280	F	Automatic TM processing.
2007-09-09T07:31:28.000Z	144.5960	F	Automatic TM processing.
2007-09-11T22:58:39.000Z	144.5837	F	Automatic TM processing.

This report was generated Fri Sep 14 08:00:22 GMT 2007

8.3 Detailed Satellite Information

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

8.3.1 AOCS SUMMARY OPERATIONS REPORT, 08/09/2007 – 14/09/2007

The AOCS operations were executed from the Automatic Timeline.

During this period, 101 Open Loop Slews, 43 Closed Loop Slews and 5 Momentum Biases were executed.

2 slews (CSL) were missed from TL, but recovered about at ~ the scheduled time, during the observation period, due to problem with an invalid guide star (ID 2601-719) that forced to manually re-generate the mentioned close loop slews. The impact on the science products should be assessed by ISDC.

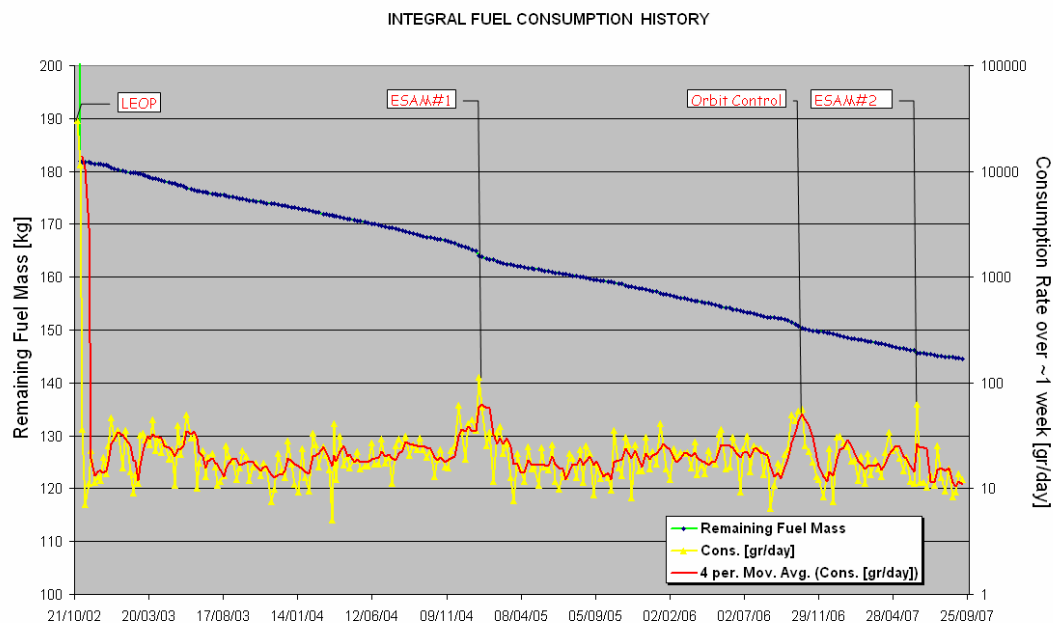
This is equivalent to ~ 1.4 % of the total number of slews planned (144).

Orbit Control

No update.

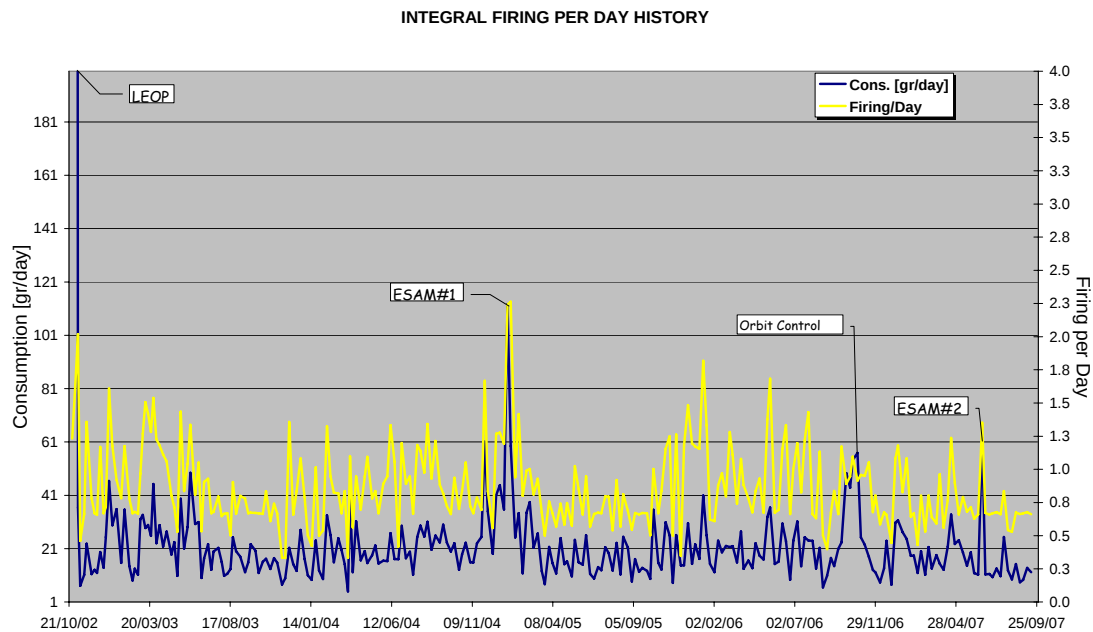
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 14/09/2007 is reported in the plot below.



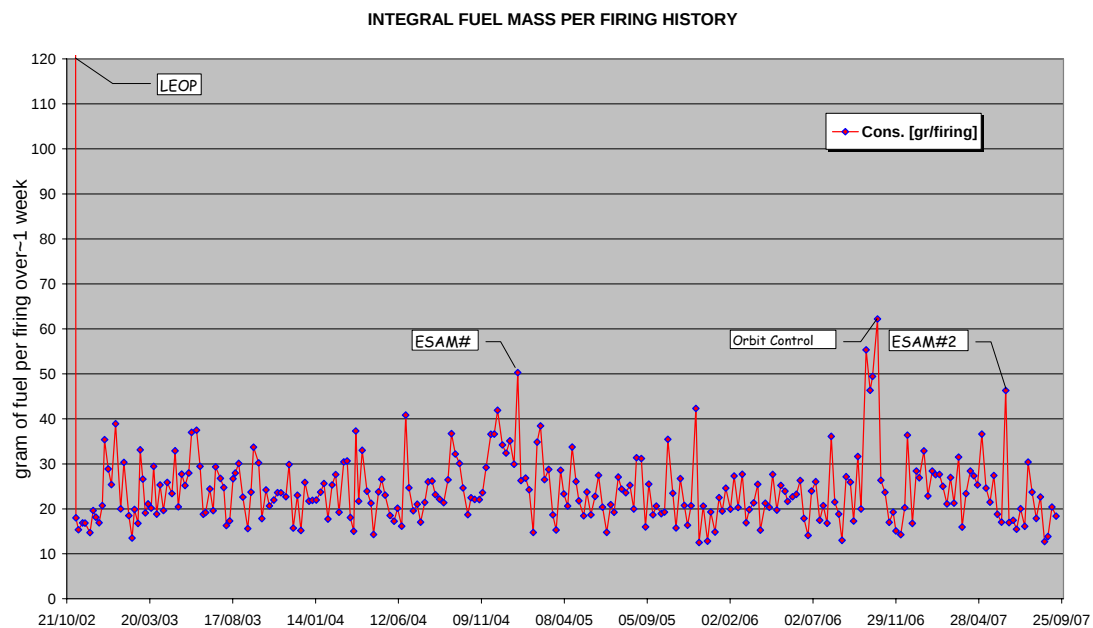
The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 14/09/2007 is reported in the plot below.



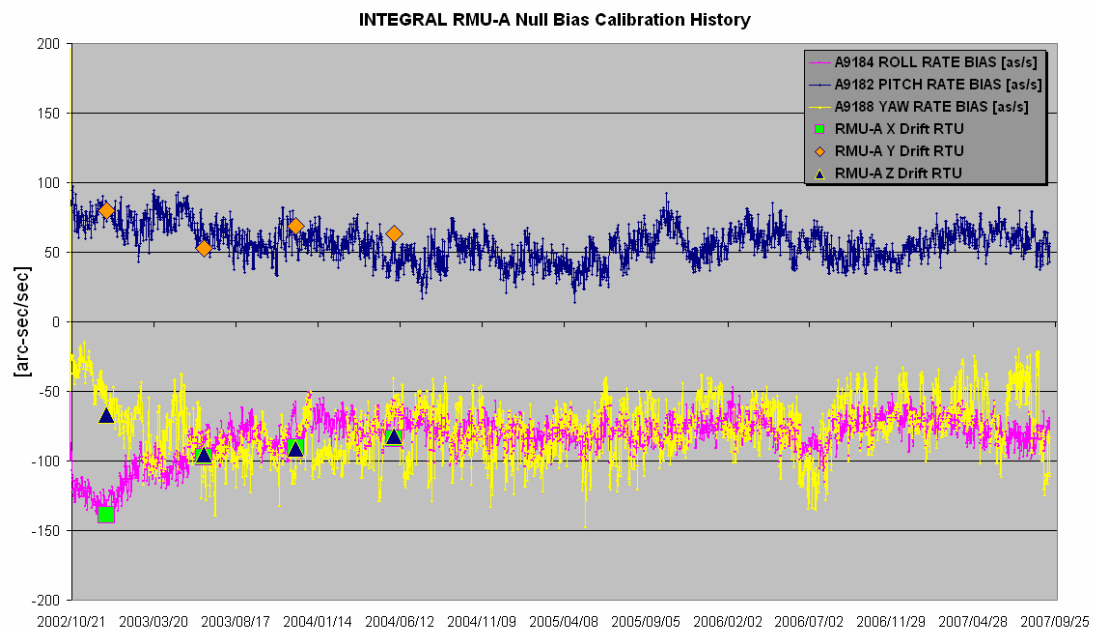
The plot above considers the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 14/09/2007 is reported in the plot below.



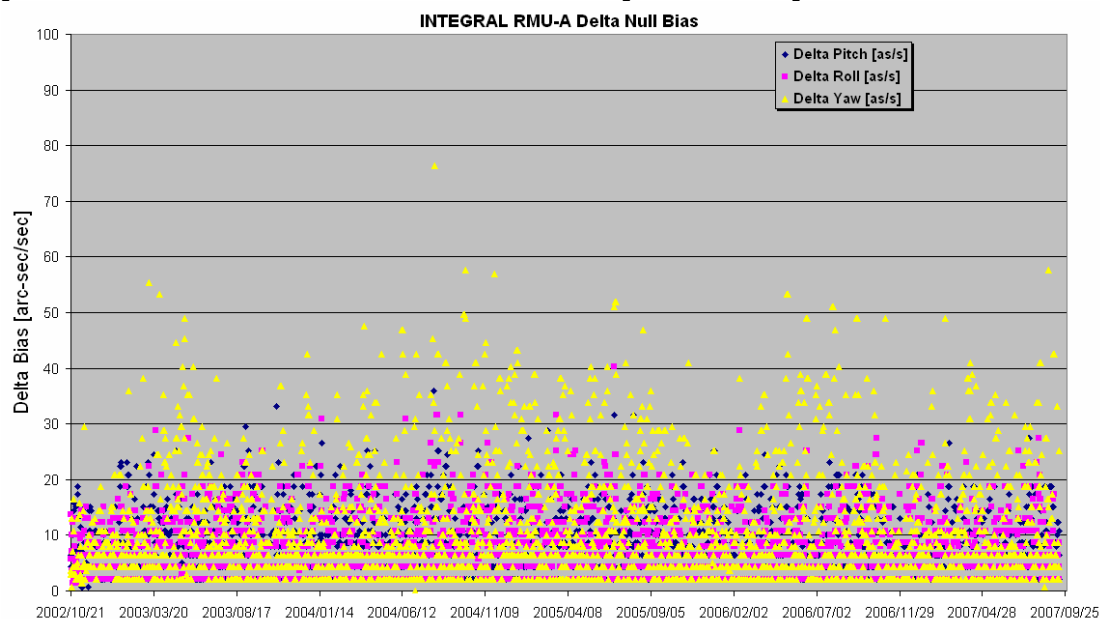
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 14/09/2007 is reported in the plot below.



The evolution of the drift on yaw channel in these last weeks is monitored.

The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 14/09/2007 is reported in the plot below.



08/09//2007 (Day of Year 251, Revolution 598-599)

Invalid Guide Star for Search/Track process: due to an invalid star (ID 2601-719) , already identified by FD Team during rev 597, selected as guide star, several Search and Track processes during rev 598 failed, forcing slews (ID 05980052-59) uplink to stop.

In order to correct it the FD Team removed the suspected star from the list of valid guide star for slew execution. For the mentioned Slews, this star resulted to be the only guide star available for manoeuvre execution.

The Operators were therefore instructed , by Operational Instructions (#296) to verify update slew received and if not to recover the missing update, by disabling the AOCS s/s and manually generating the manoeuvre as an OSL.

The following slews were missed in TL but recovered about at the scheduled time: 05980052(CSL)-59(CSL). The impact on the science products should be assessed by ISDC.

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

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

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

Wheel Inertia:

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

Eclipse Season:

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

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

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

The uplink was performed at the beginning of rev 599 in accordance to the eclipse Wheels profile planned by FD.

09/09//2007 (Day of Year 252, Revolution 599)

Nothing to report.

10/09//2007 (Day of Year 253, Revolution 599)

IMUs drifts update: following the latest IMU 1-2 calibration, in preparation of the Lunar eclipse passage, the ACC IMUs drift corrections were updated during rev 599 at 16:01z.

The calculated drifts from FD resulted consistent with the quick evaluation performed in parallel by FCT and with the drifts history. The IMUs drift corrections were updated accordingly to the following table (source FD , TPF 0599_0001_M.DRA):

IMU-1-X= 0.2092 arcsec/sec
IMU-1-Z= 0.2838 arcsec/sec

IMU-2-X= 0.1753 arcsec/sec
IMU-2-Z= -0.0308 arcsec/sec

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

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

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

11/09//2007 (Day of Year 254, Revolution 599-600)

The first eclipse operations were nominal from the AOCS point of view. Hereafter is reported summary of the first eclipse passage during rev 599:

INPUT		AOCS ECLIPSE MONITORING Winter 2007(Moon Eclipse)		Revolution: 599
Penumbra Start	11/09/2007 18:45:27	Penumbra Start:	11/09/2007 18:45:27	Date: 11/09/2007
Penumbra End	11/09/2007 19:10:07	Umbrak Start:	none	DoY: 254
Umbrak Start	none	Umbrak End:	11/09/2007 19:10:07	
Umbrak End	none	Eclipse Duration:	0:24:40	
ACC Sample Time	10/09/2007 11:16:58	Eclipse Duration [sec]:	1480	
FDE Sample Time	10/09/2007 11:16:58	IMU Health Check Start	11/09/2007 18:10:00	
FCE Sample Time	10/09/2007 11:16:58	Eclipse Imminent Flag	11/09/2007 17:45:47	
ACC Eclipse Counter	131698	ACC IMU AutoCal Start	11/09/2007 18:00:13	
ACC Eclipse Start	243695	ACC IMU AutoCal End	11/09/2007 18:20:13	
ACC Eclipse End	246177	Sun out of FSS FoV	none	
FDE Eclipse Start	244274	Sun back in FSS FoV	none	
FDE Link to Eclipse Start	112005			
FDE Eclipse Duration	2258			
FCE Eclipse Start	244318			
FCE Link to Eclipse Start	112046			
FCE Eclipse Duration	2212			

Eclipse Timers		Actual From Telemetry		UM [sec]	LSB [sec]
Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]		
ACC Eclipse Start	11/09/2007 18:27:55	-1052.00	11/09/2007 18:27:56	-1064	176
FDE Eclipse Start	11/09/2007 18:37:00	-507.00		-484	176
FCE Eclipse Start	11/09/2007 18:37:44	-463.00		-368	176

From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
Absolute	WRT Pen. End [sec]	Absolute	WRT Pen. End [sec]		
FCE Eclipse End	11/09/2007 19:14:36	269		368	176
FDE Eclipse End	11/09/2007 19:14:36	269		368	176
ACC Eclipse End	11/09/2007 19:19:57	590	11/09/2007 19:19:53	588.00	578

IMU	Hydtek	Execution	WRT Penumbra End [sec]	
IMU Auto Off Enable	08/09/2007 22:38:08	11/09/2007 19:22:07	720	

IMU On	11/09/2007 15:10:02	IMU H.C. Noise Roll [sec]	0.3716
IMU Off	11/09/2007 19:22:07	IMU H.C. Drift Roll [sec]	0.2683
IMU On Time	4:12:05	IMU Auto Cal Drift Roll [sec]	0.3026

12/09//2007 (Day of Year 255, Revolution 600)

ACC Yaw & Pitch error: at 01:39z due to problem on the current guide star selected for PID 06000004 (double system), the STR could not fix the barycentre of the system and this caused the OTF thresholds on Pitch and Yaw axis to be exceeded.

As consequence the ACC generated the following OEMs APID 640 ID 50 <<ACC YAW OOL ERROR>> and ID 48 <<ACC PITCH OOL ERROR>> and the OTF flickered for few TM cycle affecting the pointing duration for PID 06000004. The impact on the science products should be assessed by ISDC.

13/09//2007 (Day of Year 256, Revolution 600)

Nothing to report.

14/09//2007 (Day of Year 257, Revolution 600-601)

Reconfiguration of the AOCS after the Lunar eclipse: the ACC/FDE/FCE Eclipse Timers were stopped to reconfigure permanently the S/C in sunlight, at 07:15z.

Procedurals error when recovering RWB: at 16:43z the CGS update by FDS failed because the current guide star was the only valid star for the execution of next reaction wheel biasing and no secondary guide star was available for CGS update. Current guide star used was Mi 3 at CCD location [-2708, 2235].

A second very dim star was being tracked serendipitously in slot 2 (Mi 8.4 at CCD location [-23954,-20624]) as a result of the preceding STR mapping.

At 16:48z the AOCS s/s was disabled in TL; FD on call confirmed that the reaction wheel bias could be executed from the timeline, because the actual guide star was ok for the execution of the following RWB.

At 16:50z the AOCS s/s was enabled in TL (by mistake before CGS#1 uplink from TL);

16:53z the CGS#1 from was TL executed, The S/T failed but an "invalid" (for RWB purposes) star was already present in slot#2: the CGS sequence did not stop (there is no check on star coordinates but only on star validity) and the dim star in slot#2 was loaded in slot#1 as guide star.

At 16:55z, the RWB was uplinked from TL with dim guide star and execution interrupted after few commands when realized guide star not suitable for Bias; this before RELAY 5 programming enabling the TCM (Thruster Control Mode). The AOCS was then disabled in TL.

FD on call supported the decision at the time to complete the RWB sequence by manual commanding rather than leave the spacecraft in an unknown and potentially hazardous intermediate state in Thruster Control Mode. However, in retrospect, the underlying design of the spacecraft, namely that it should be safe for 36 hours loss of coverage, regardless of interruptions to routine commanding, was not considered.

FD mentioned that the RWB is recommended before the Perigee Belt as the wheel speeds might not be safe for the Perigee Passage.

The actual consequences were not clear to the operators. The satellite would have been safe. The only impact could have been an Autonomous Momentum Dump (AMD), which would have caused only a small delay of science activities in the next revolution.

At 1713z the SOE on-call confirmed to execute the RWB again considering the advice from FD. This decision was taken about 30 minutes before LOS.

At 17:19z the manual CGS was generated and uplinked.

At 17:27z, the CGS#2 from TL (in preparation for RWB at the beginning of rev 601) was not released and a manual RWB commanded.

At 17:45z the LOS REDU caused the last two TCs of the Bias sequence, manually generated, RELAY 5 ON (enabling the IPS mode) and RESET TIMs accumulators to be not uplinked and the AOCS was left in TCM mode DCA/RGA=1/5 during the PP.

The AOCS SOE was informed afterwards. He confirmed that the situation was not critical and that the configuration safe for the Perigee Passage.

At 21:47z at AOS REDU, under the supervision of the AOCS SOE, the S/C was reconfigured to IPS mode and no impact on TL execution was reported.

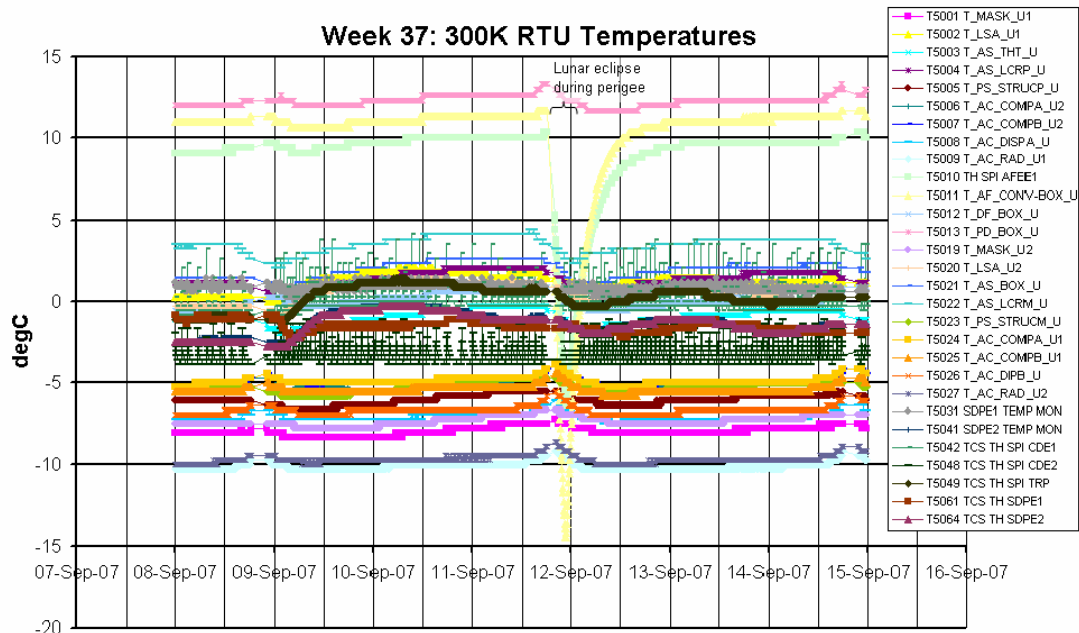
An AR (INT_2954) was raised on the problem and a guideline for similar occurrences defined.

Reconfiguration of the AOCS after the Lunar eclipse: With the end of the Lunar eclipse passage, 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		

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.

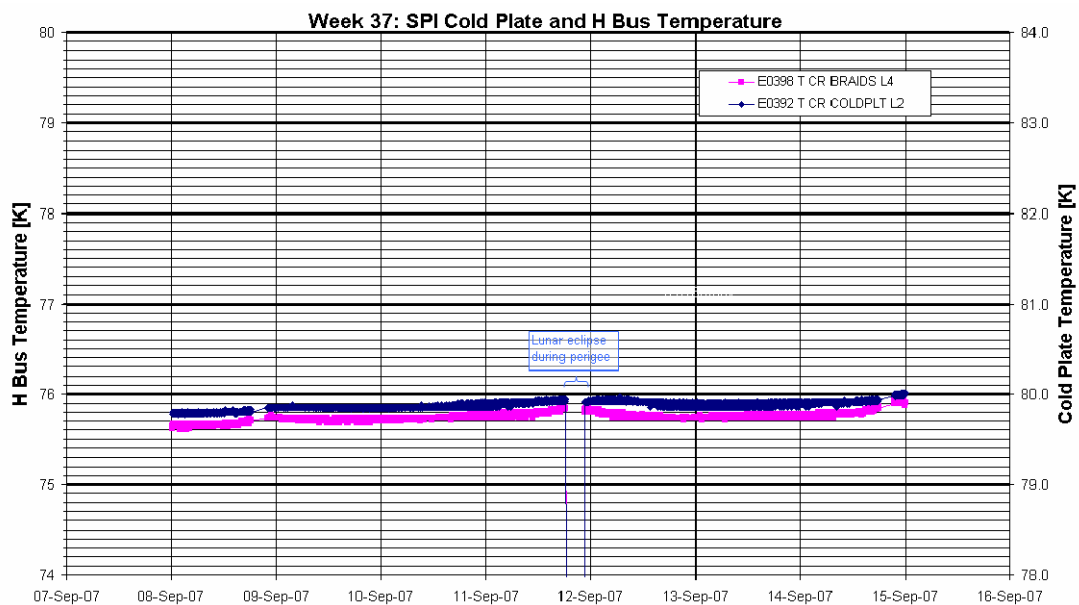


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

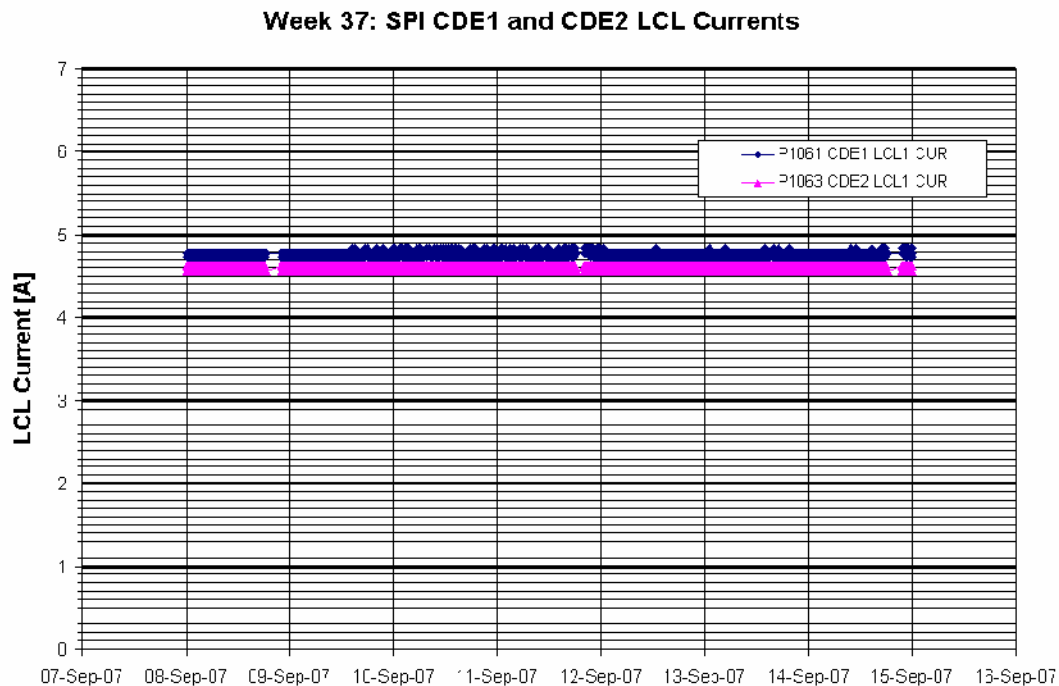
The stroke of all four compressors was set 40 throughout the week with the average CDE LCL currents as follows:

- CDE1 LCL Current = 4.77A
- CDE2 LCL Current = 4.58A

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

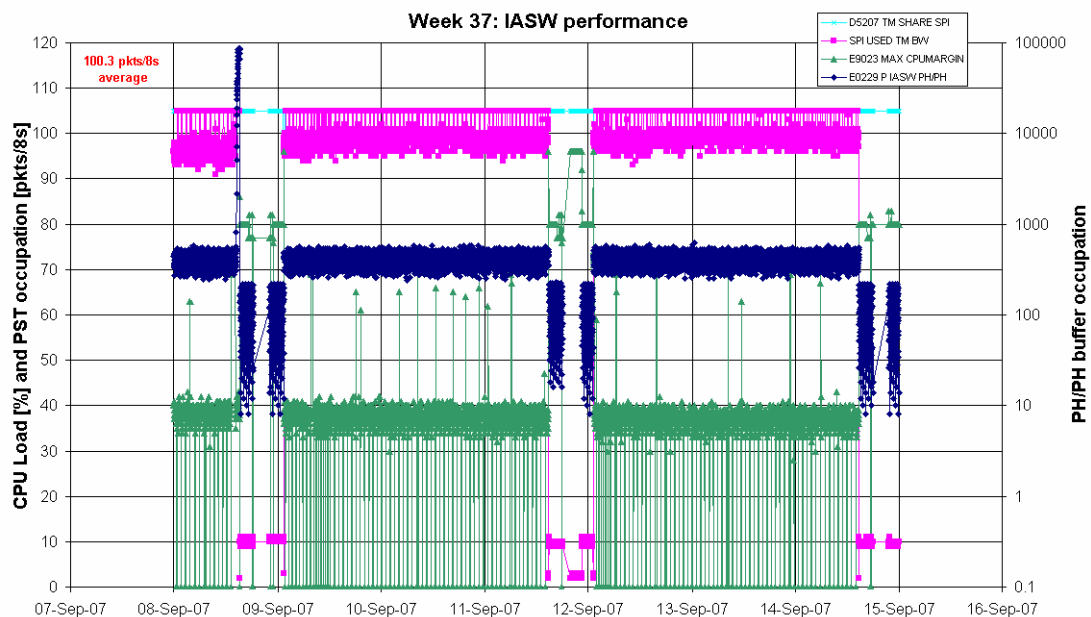


The following plot shows the evolution of the CDE currents during the reporting period.



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 9/19 SE. The average TM bandwidth occupation of SPI was 100.3 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

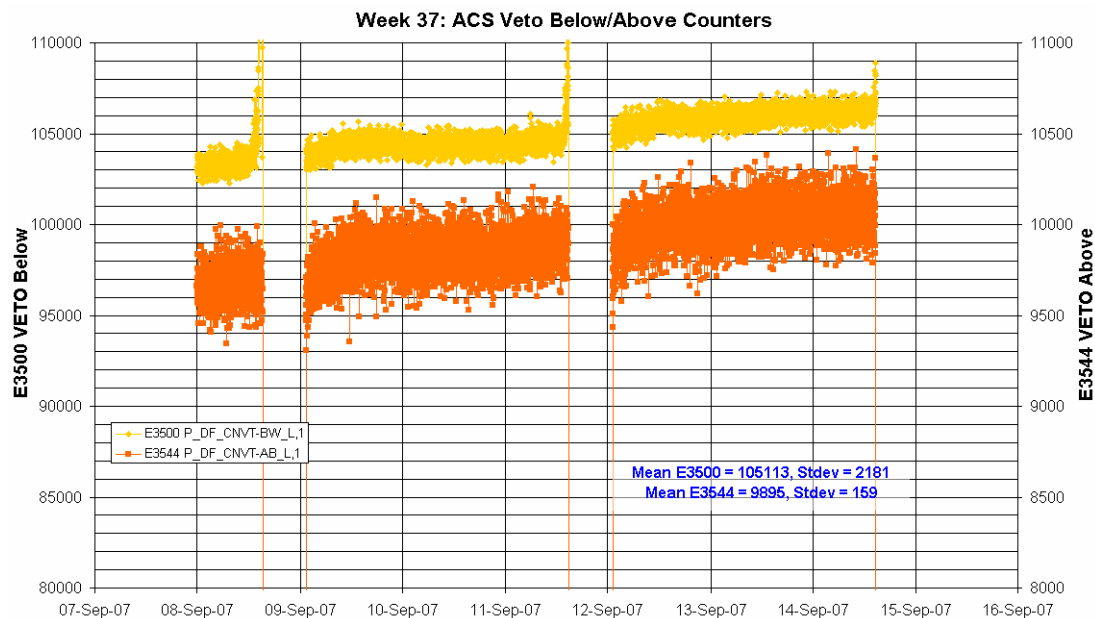
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



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).

On 2007-09-12 from 05:48:17Z TM parameter E3500 (ACS Veto Below Counter) started toggling OOL High. This parameter has been increasingly going out of limits during normal observations, as the limits were becoming marginal due to the steadily increasing mean value of the ACS counts. (The mean value of E3500 over the week was 105113 while the upper limit was 105000.) This positive trend in the ACS counts is caused by the steadily increasing background and is reflected in the positive trend of the mean TM usage of SPI as well as the mean GeD Time-tag counts. The upper limit for E3500 was therefore increased from 105000 to 110000 on the IMCS on 2007-09-12 at 12:05Z and will be updated to 115000 in the next IODB release.

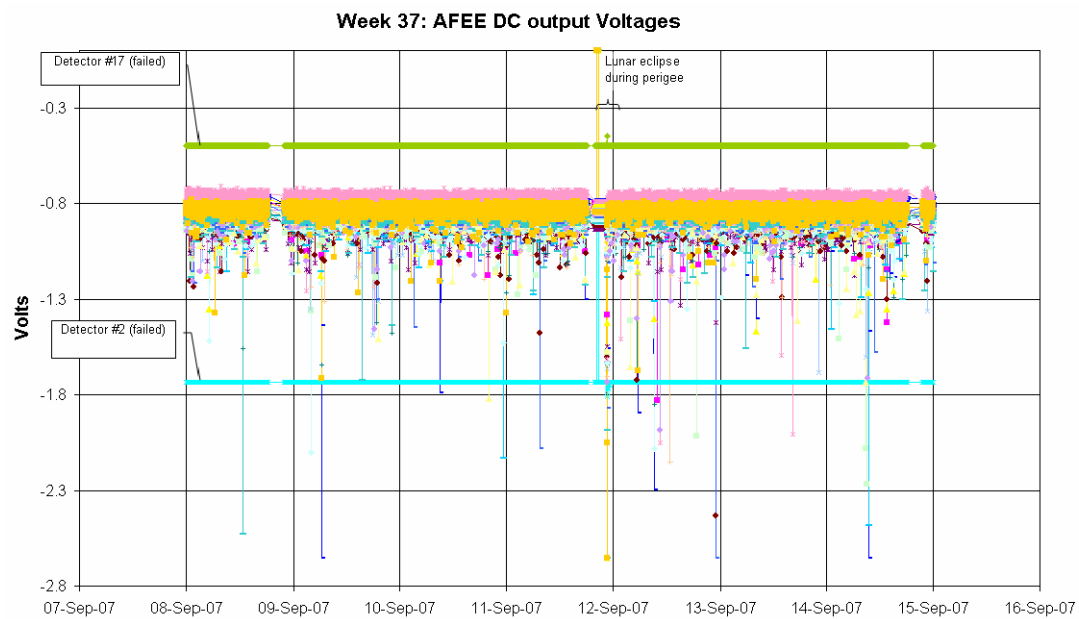
The following plot shows the ACS overall count rate evolution during the reporting period:



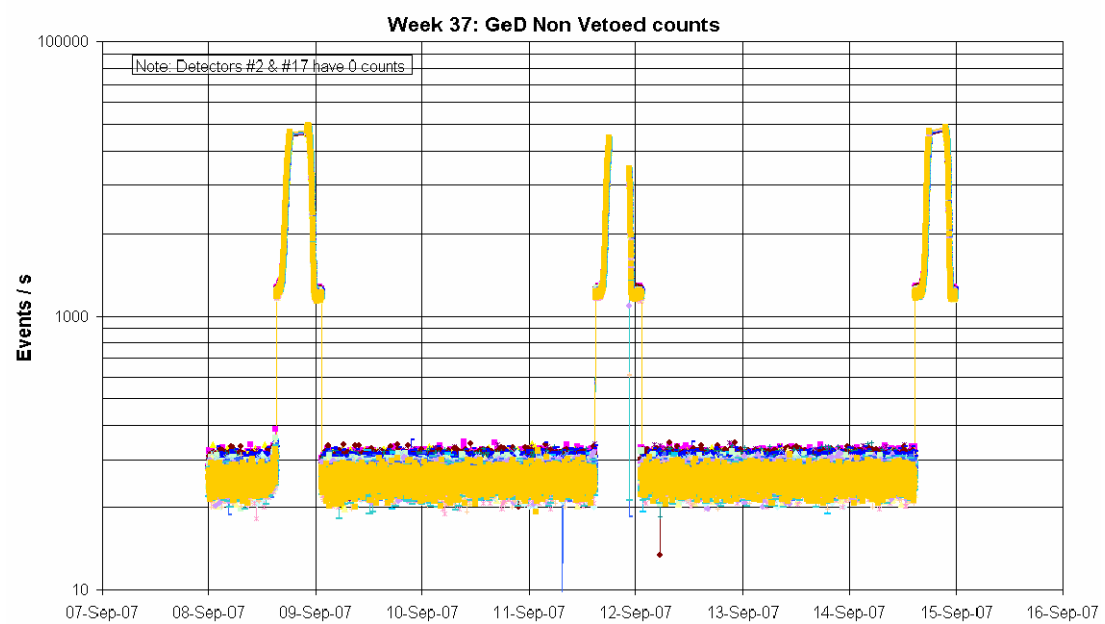
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

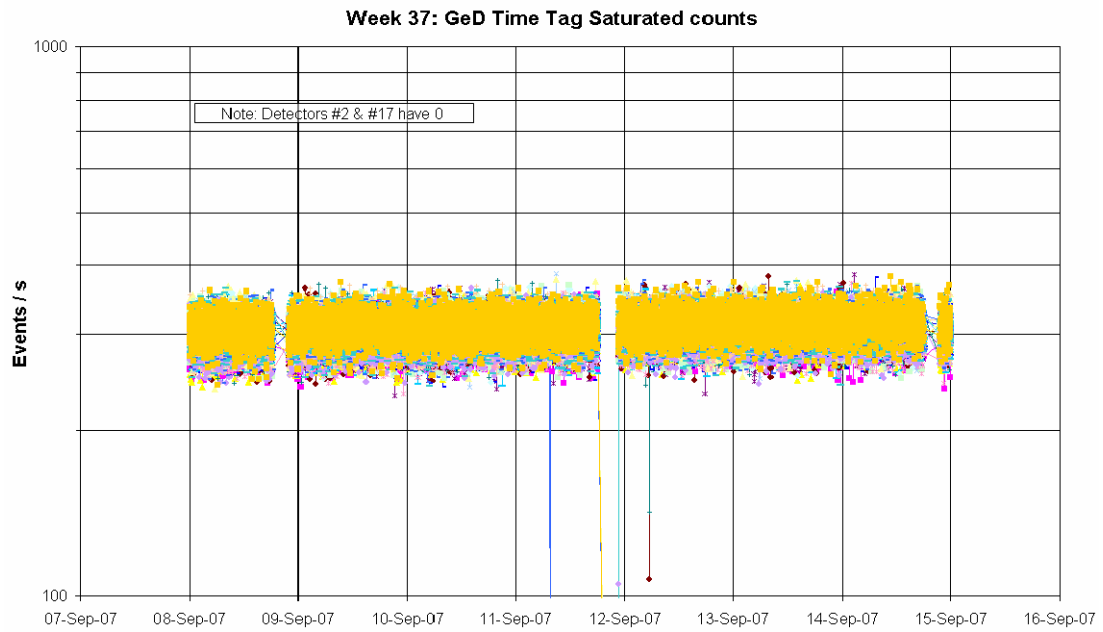
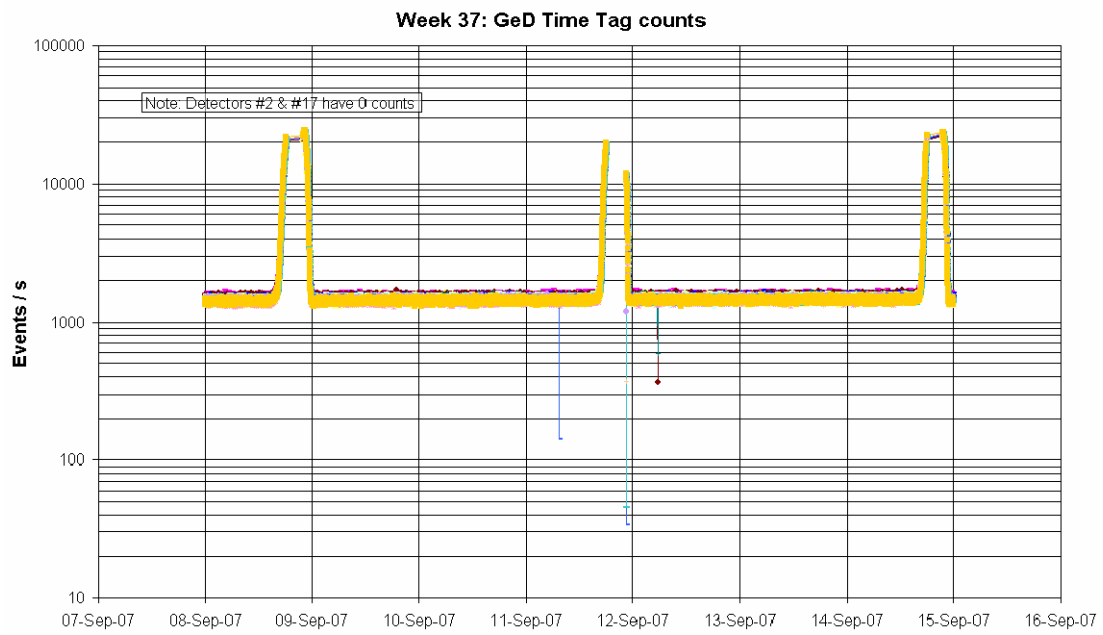
The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.

On 2007-09-11, a penumbra-only lunar eclipse occurred during the perigee passage of revolution 599-600. The AFEE was switched off during this eclipse as nominal, although the other subassemblies remained on as the depth of eclipse was not great enough to trigger the PPDU (S/E) sequence.

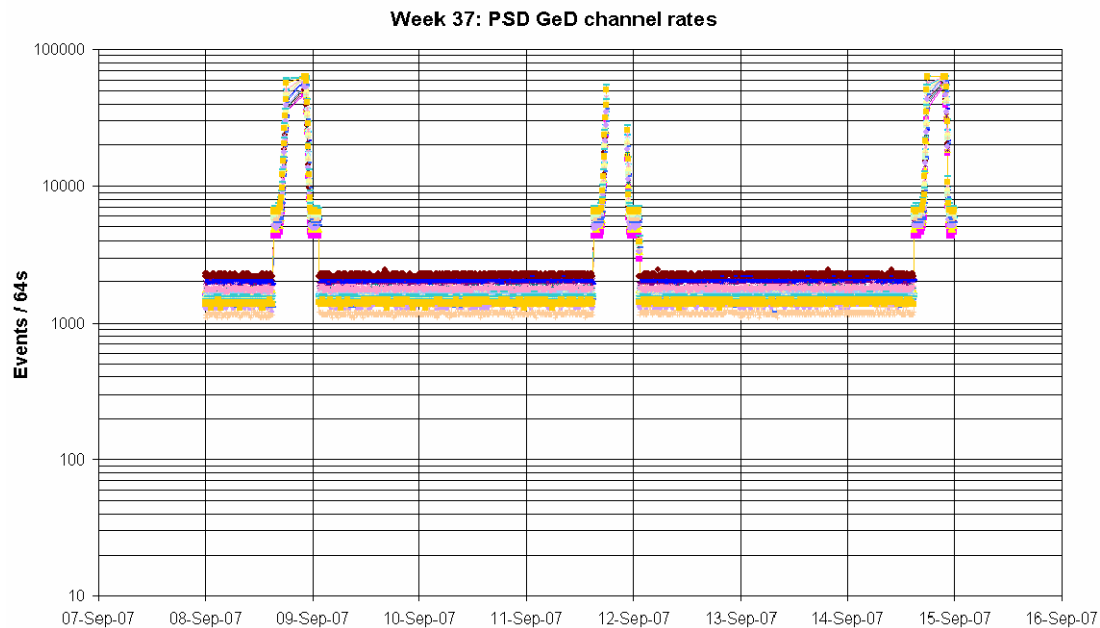


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





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:

- 104 occurrences of OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED were received throughout the week. As they were each single occurrences, no action was taken. However, as the occurrence of this OEM is becoming more frequent, the SPI PI has been consulted to check whether a modification of the spectra scaling factor may be required.
- On 2007-09-08 at 14:12:55Z TM parameter E3500 (ACS Veto Below Counter) went OOL High. This was ~1 hour before the expected radiation belt entry of revolution 598 and therefore no action was taken.
- On 2007-09-08 at 22:06:43Z, just after AOS of revolution 599, TM parameter E3824 went OOL High (value = 5.1352V). This is the PSD + 5V digital. As it returned within limits at 22:07:47Z, no action was taken.
- On 2007-09-08 at 22:11:04Z TM parameter E2115 started toggling OOL Low. This is the ACS Plastic Scintillator temperature. It returned stably within limits on 2007-09-09 at 23:15:04Z and no action was taken.
- On 2007-09-11 at 14:16:07Z TM parameter E3500 (ACS Veto Below Counter) went OOL High. This was ~40 minutes before the expected radiation belt entry of revolution 599 and therefore no action was taken.
- On 2007-09-11 at 22:13:33Z OEM APID 1024 ID 1 EXCEPTION SPI1 FIXED POINT OVERFLOW was received. This was during the AOS_CHK window of revolution 600, when the time verification TC was sent. This OEM is sometimes received when this TC is sent and no action was taken.
- As reported in the ACS section, on 2007-09-12 from 05:48:17Z TM parameter E3500 (ACS Veto Below Counter) started toggling OOL High. This parameter has been increasingly going out of limits during normal observations, as the limits were becoming marginal due to the steadily increasing mean value of the ACS counts. This positive trend in the ACS counts is caused by the steadily increasing background and is reflected in the positive trend of the

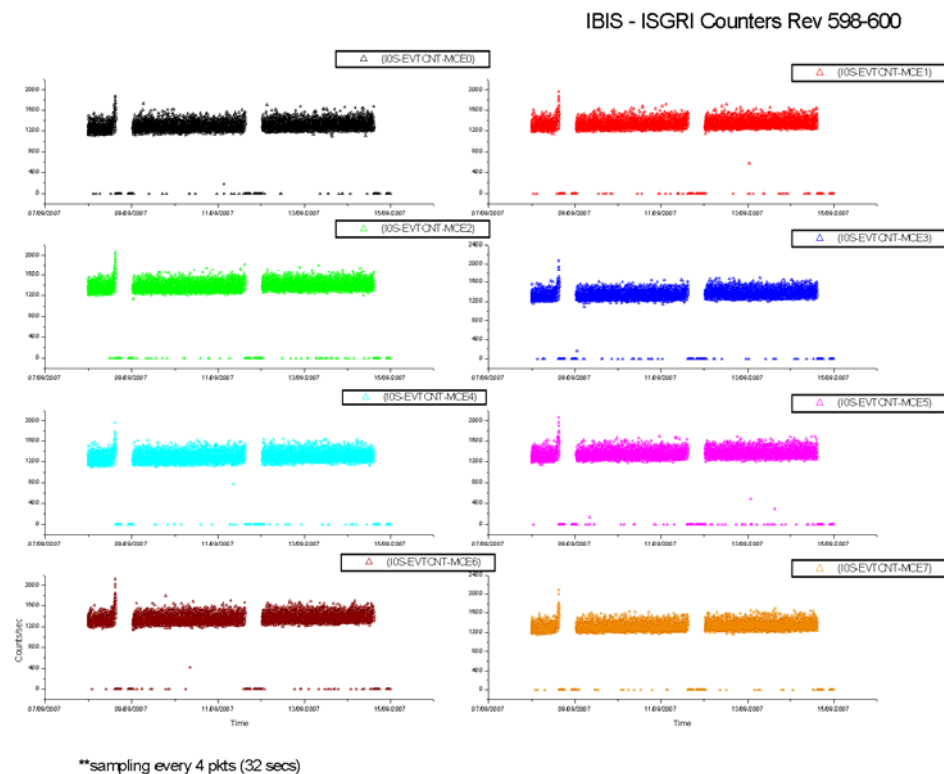
mean TM usage of SPI as well as the mean GeD Time-tag counts. The upper limit for E3500 was therefore increased from 105000 to 110000 on the IMCS at 12:05Z and will be updated to 115000 in the next IODB release.

- On 2007-09-14 at 14:44:03Z TM parameter E3826 went OOL Low (value = -5.3214V). This is the PSD - 5V analogue. This was just after radiation belt entry of revolution 600. It returned within limits when the next packet was received at 14:45:07Z and no action was taken.

8.3.3 IBIS Operations

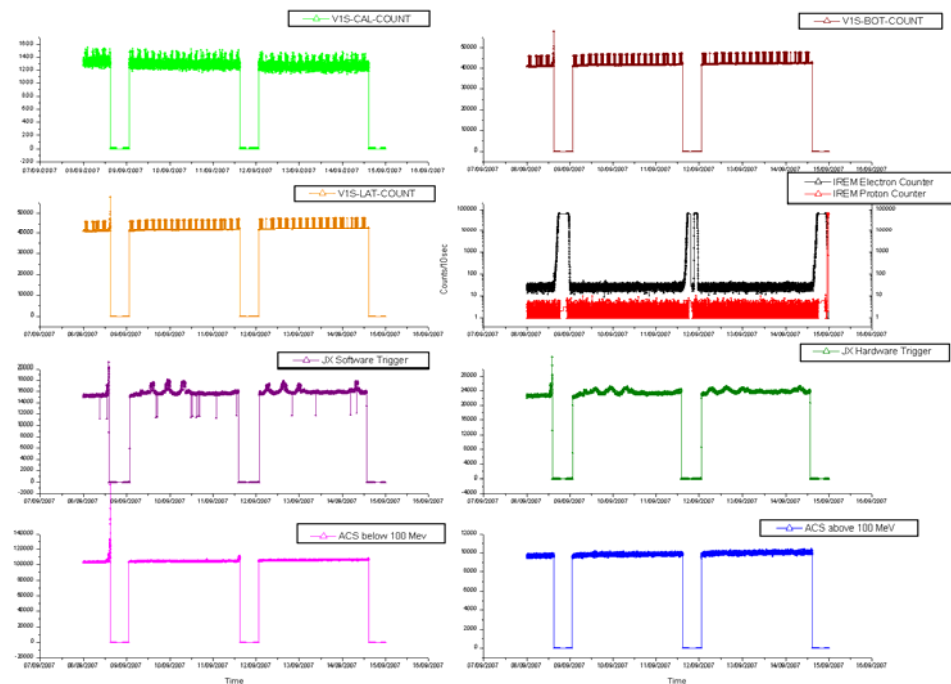
IBIS Event Counters Plots

ISGRI Counters:



VETO vs Payloads Counters:

IBIS-VETO vs Payloads Counters Rev 598-600

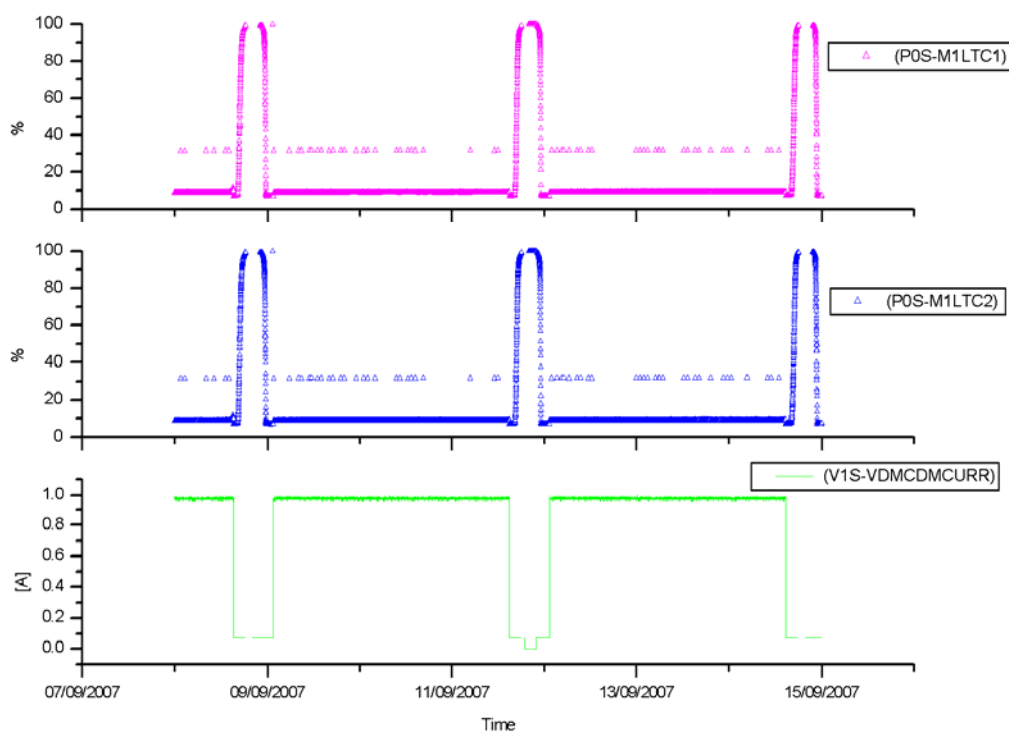


**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

The week was characterised by slightly high radiation before the expected radiation belt entry time of revolution 597 as reported by the payload.

VETO Current:

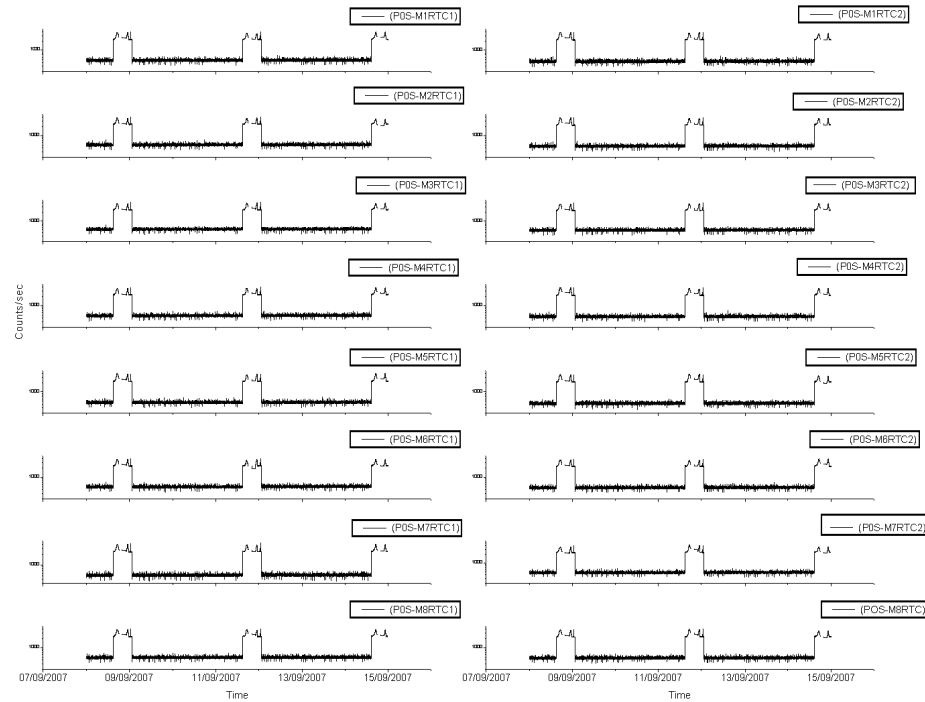
IBIS-VETO Current & PICsIT dead times Rev 598-600



**sampling every 4 pkts (32 secs)

PICsIT Counters:

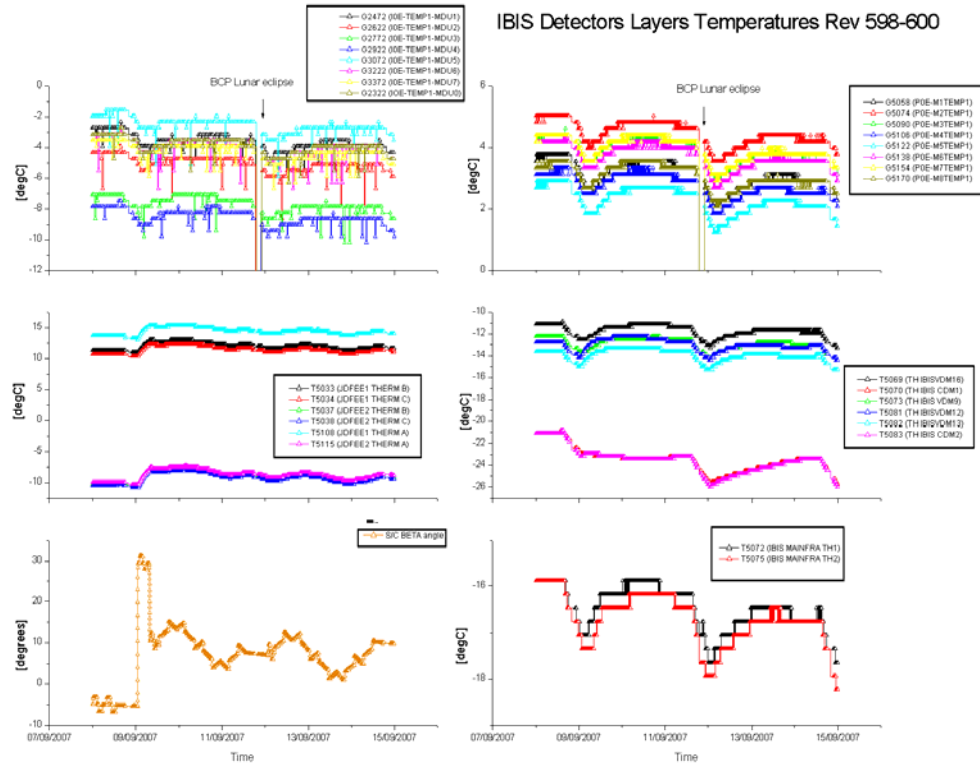
IBIS - PICsIT Counters Rev 598-600



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:

IBIS Detectors Layers Temperatures Rev 598-600



**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.

In addition, throughout the week the TM parameter G6061 (Veto calibration source counter) toggled OOL Warning Low. In each case it only remained OOL for one or two cycles and no action was taken. As this parameter increasingly continues to toggle OOL, due to the nominal radioactive decay of the calibration source, the limits for this parameter will be updated in the next IODB release.

2007-09-08 (DOY 251, Rev 598-599)

At 14:56:10Z TM parameters G6062 and G6063 (VETO bottom and lateral counters respectively) started toggling OOL High. This was just before radiation belt entry of revolution 598, at 15:10:14Z and therefore no action was taken.

At 16:49:44Z, after radiation belt entry of revolution 598, TM parameter G5079 went OOL High (value = 2.60509804V). This is the PDM2 +2.5 V. It returned within limits at 16:50:15Z and therefore no action was taken.

2007-09-09 (DOY 252, Rev 599) to 2007-09-10 (DOY 253, Rev 599)

IBIS operations executed nominally.

2007-09-11 (DOY 254, Rev 599-600)

A penumbra-only lunar eclipse occurred during the perigee passage of revolution 599-600. These revolutions were planned as for a nominal eclipse, including setting the Broadcast Packet Eclipse times, however the depth of the eclipse was not great enough to trigger the PPDU (S/E) sequence. Due to this the following actions were taken:

- As it was suspected that the PPDU(S/E) would not occur and to avoid a possible over-temperature of IBIS, the time-tagged command (loaded by ED GEDHON) to switch on the IBIS Additional Detector Heater A (TC P4205) was deleted at 12:13Z.
- At AOS REDU commanding to IBIS from the Autostack was disabled and thus the sequences GECLEX02 and GEVESP01 were not released.
- During the POST_ECLIPSE window the following were manually executed:
 - o 22:00:37Z FCP_IBIS1_0084, TC G0822 setting all the TC_para to "ON" (ECRs ON)
 - o 22:03:39Z Steps 3.2 to 3.4 of FCP_IBIS1_0228 to return PICSIT to nominal mode
 - o 22:12:10Z FCP_IBIS1_0199, step 3.1 (VETO RESTORE CTX)

IBIS operations continued nominally from the loading of the ISGRI context tables in the SATENG window onwards.

2007-09-12 (DOY 255, Rev 600)

At 14:57Z 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. When the histogram process did not start at the next pointing, the following recovery procedure was executed to force the histogram accumulation and download process to resume:

- 16:07:32Z FCP_IBIS1_0312
- 16:15:37Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

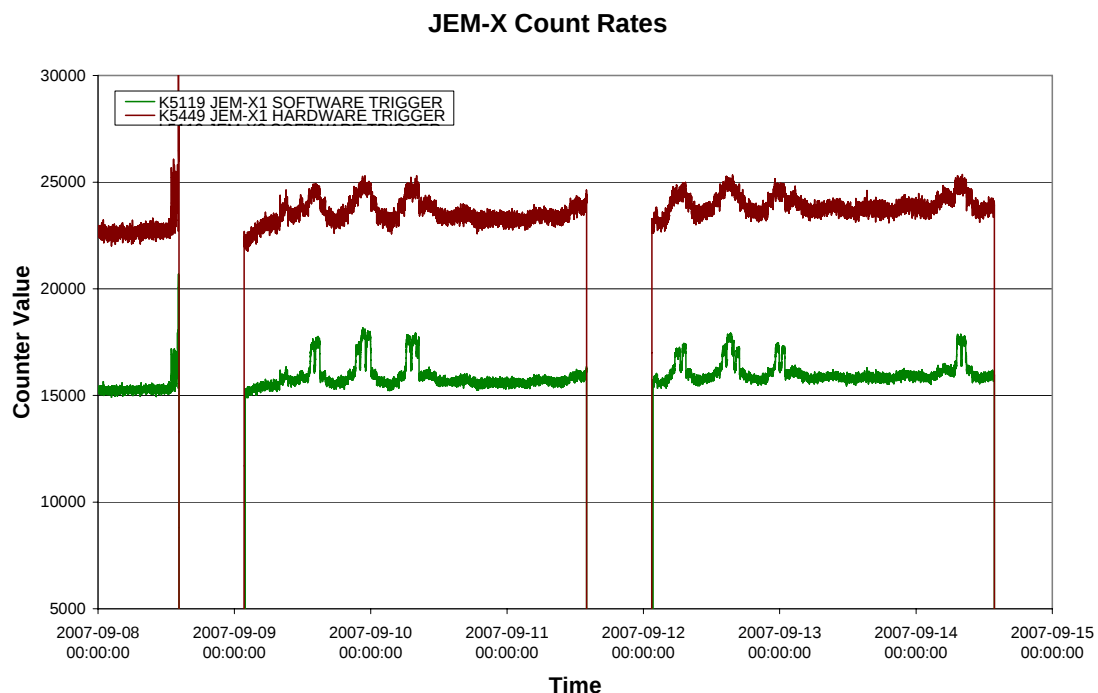
2007-09-13 (DOY 256, Rev 600) to 2007-09-14 (DOY 257, Rev 600-601)

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 graph¹.

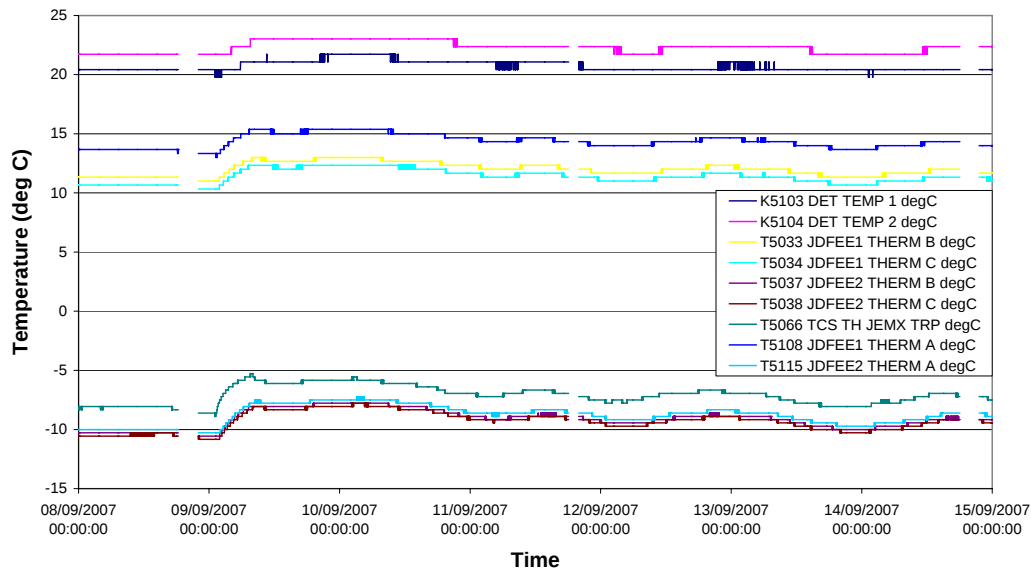


JEM-X Temperatures

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.

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

JEMX Detector and DFEE Temperatures



JEM-X Daily Report

2007-09-08 (DoY 251, Rev 598)

At 14:09:34, JEMX parameter K5449 (Hardware Trigger) exceeded its soft limits for 8 TM cycles. No action was taken and there was no impact.

2007-09-09 (DoY 252, Rev 599)

On this day, the following two anomalous OEMs were received:

2007.252.19.22.25.620	2007.252.19.22.30.922	1536	RealTime	5	EXCEPTION	
JEM-X1 EXC IACS INTERF EXID			0	0	65535 PR	N
E	E					
FIX6		0				
K9079	MESS CLASS	1				
K9080	MESS ID	5				
K9065	CSSW OPERAT ID	START				
K9066	TASK ID 8	IASW				
K9067	LOGICAL ADDRESS	4989				
2007.252.19.22.25.620	2007.252.19.22.31.023	1536	RealTime	6	EXCEPTION	
JEM-X1 EXC IACS INTERF CULP			0	0	65535 PR	N
E	E					
FIX6		0				
K9079	MESS CLASS	1				
K9080	MESS ID	6				
K9065	CSSW OPERAT ID	START				
K9066	TASK ID 8	IASW				
K9067	LOGICAL ADDRESS	19726				

No action was taken and there was no impact.

2007-09-10 (DoY 253, Rev 599) to 2007-09-11 (DoY 254, Rev 600)

JEM-X1 operations executed nominally.

² Data sampled (1 frame in 8)

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2007-09-12 (DoY 255, Rev 600)

```
2007.255.08.16.41.755 2007.255.08.16.48.386 1536 RealTime 5 EXCEPTION
JEM-X1 EXC IACS INTERF EXID 0 0 65535 PR N
E E
FIX6 0
K9079 MESS CLASS 1
K9080 MESS ID 5
K9065 CSSW OPERAT ID START
K9066 TASK ID 8 IASW
K9067 LOGICAL ADDRESS 4989
2007.255.08.16.41.755 2007.255.08.16.48.449 1536 RealTime 6 EXCEPTION
JEM-X1 EXC IACS INTERF CULP 0 0 65535 PR N
E E
FIX6 0
K9079 MESS CLASS 1
K9080 MESS ID 6
K9065 CSSW OPERAT ID START
K9066 TASK ID 8 IASW
K9067 LOGICAL ADDRESS 19726
```

No action was taken and there was no impact.

2007-09-13 (DoY 256, Rev 600) to 2007-09-14 (DoY 257, Rev 601)

JEM-X1 operations executed nominally

8.3.5 OMC Operations

2007-09-08 (DoY 251, Rev 598) to 2007-09-14 (DoY 257, Rev 600)

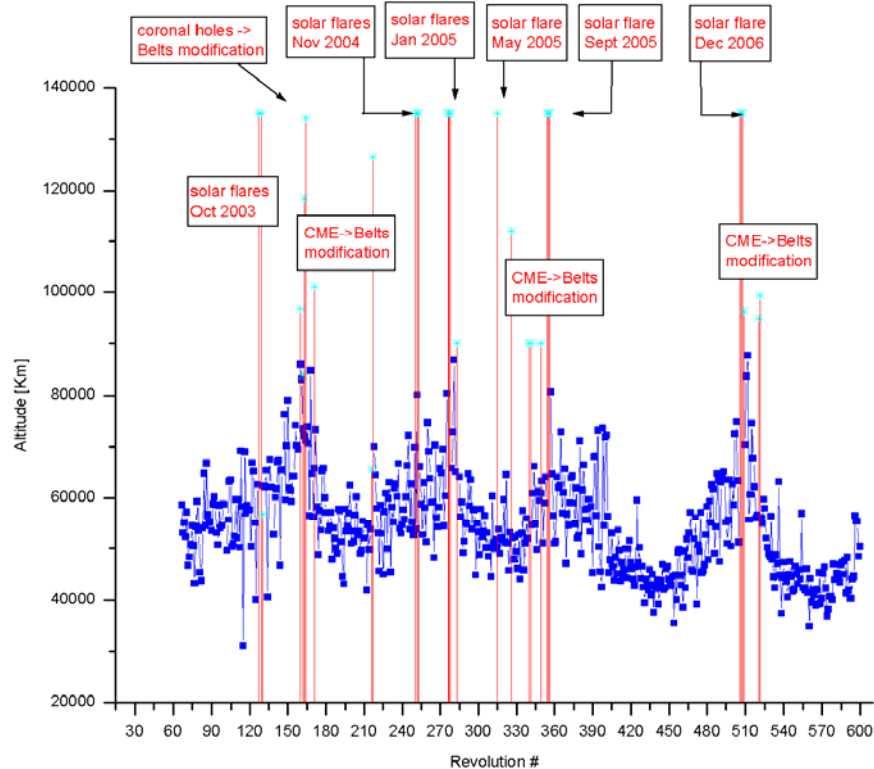
Nothing to report.

On DoY 251 at 15:10:13, DoY 254 at 14:55:57 and DoY 257 at 14:41:57 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]
598	RAD_ENTR R 2007-09-08T15:10:05Z	08/09/2007 15:12:53	55350.6	08-Sep-2007 16:30:51	44499.65
599	RAD_EXIT R 2007-09-09T01:20:39Z	08/09/2007 23:58:53	>> 33051.8	09-Sep-2007 00:10:51	43270.22
599	RAD_ENTR R 2007-09-11T14:55:54Z	11/09/2007 15:51:25	48461.2	11-Sep-2007 16:12:55	45133.77
600	RAD_EXIT R 2007-09-12T01:07:00Z	11/09/2007 23:30:37	>> 36223.4	12-Sep-2007 00:02:55	44022.17
600	RAD_ENTR R 2007-09-14T14:41:49Z	14/09/2007 15:25:40	50376.2	14-Sep-2007 16:02:55	44643.17

Reference

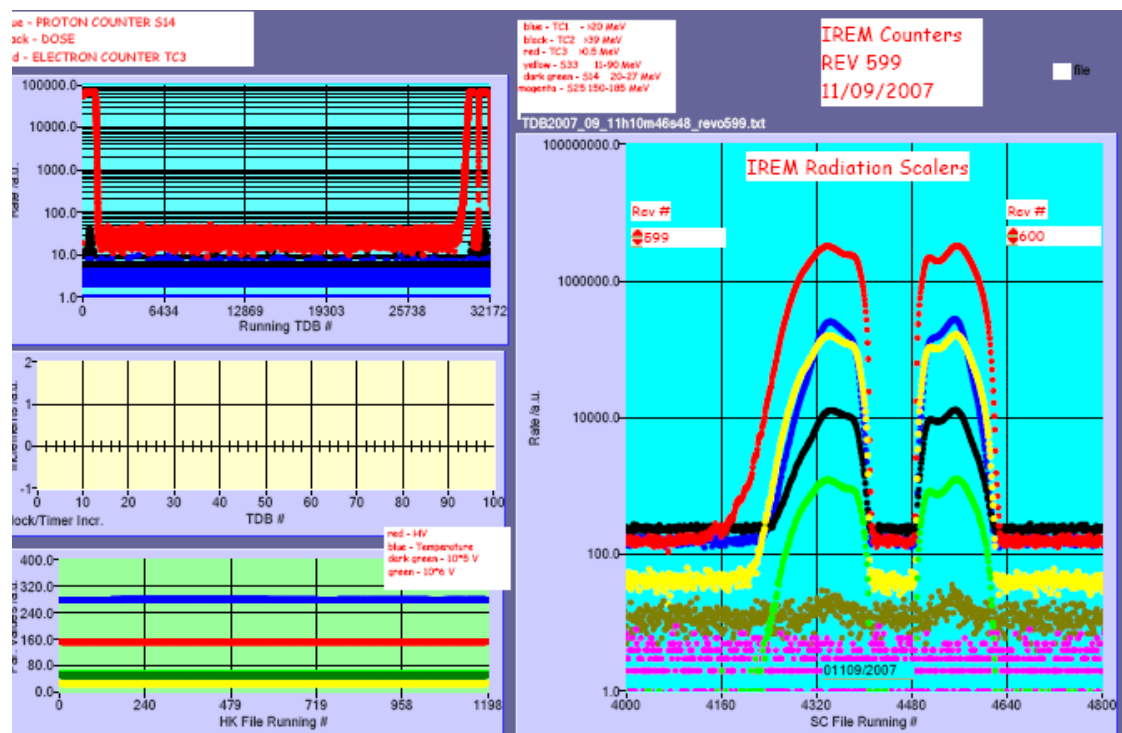
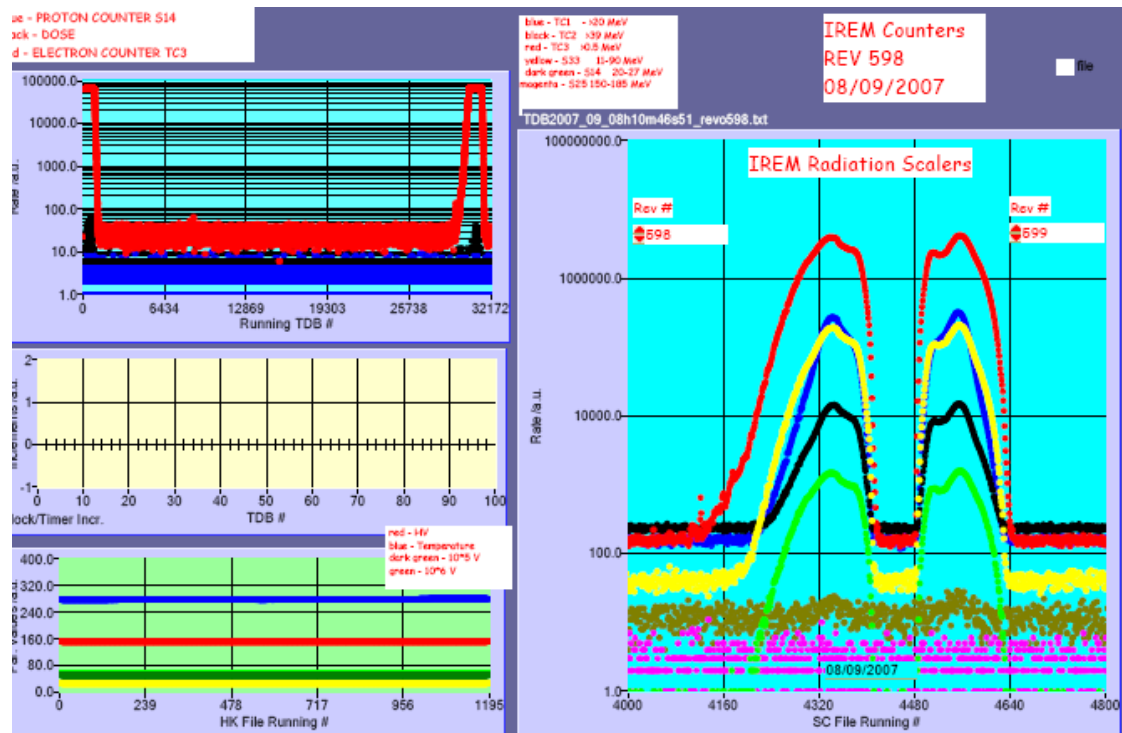
High radiation

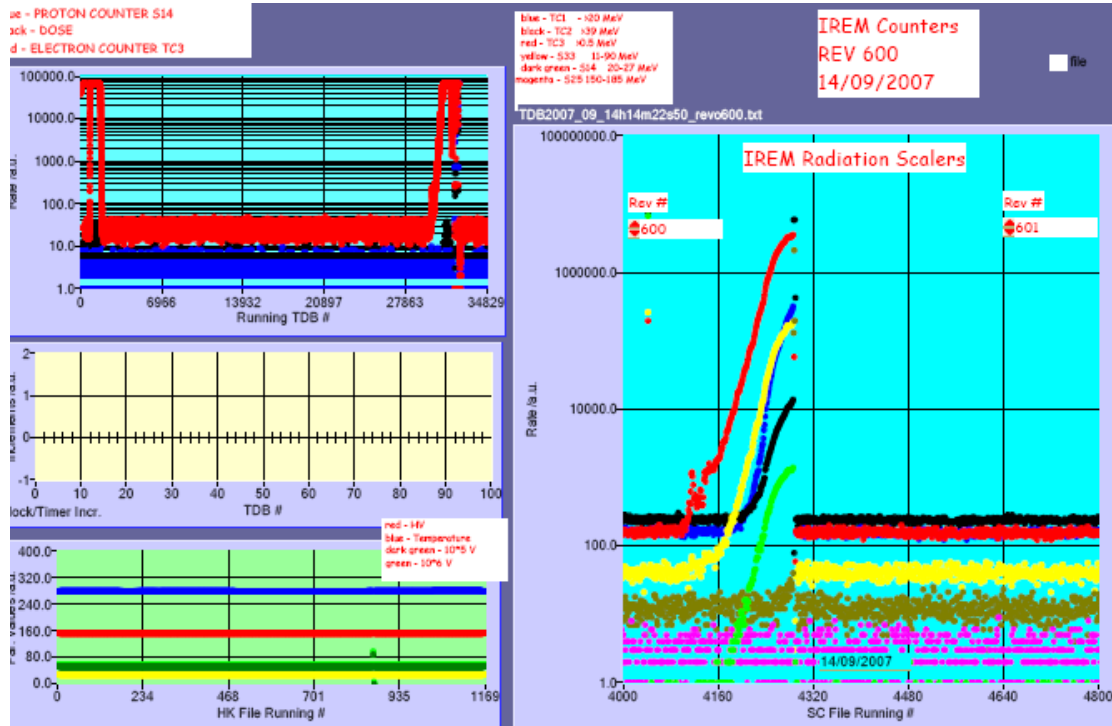
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

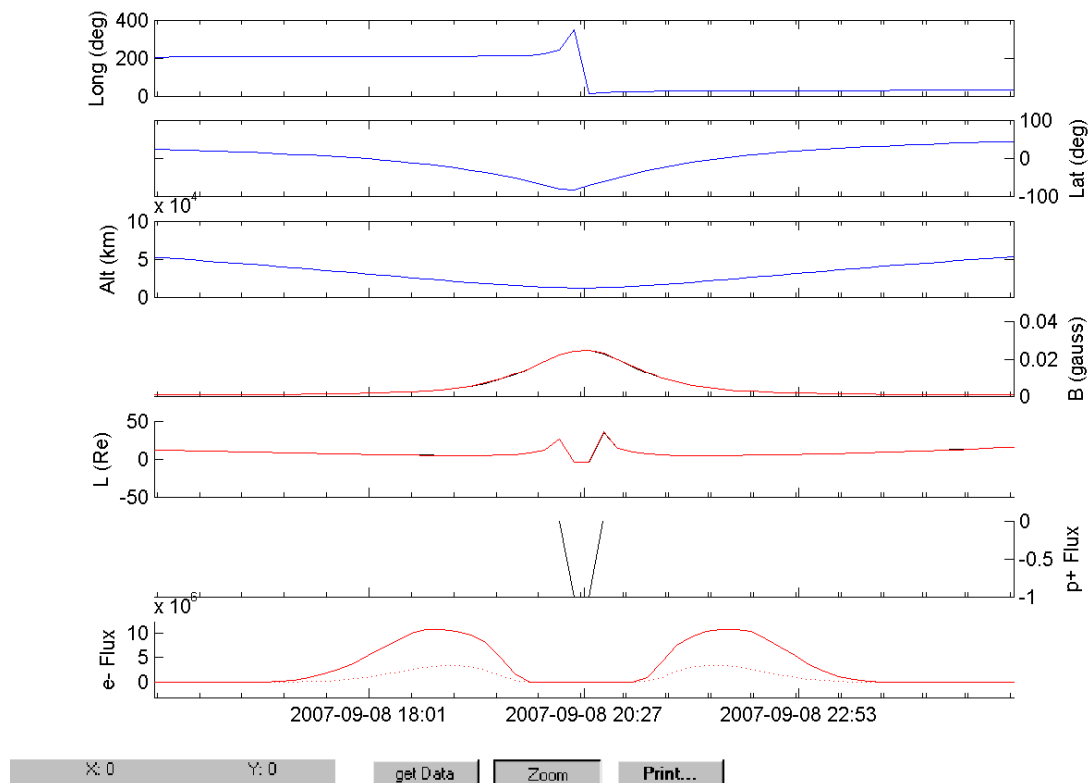
IREM radiation counters:



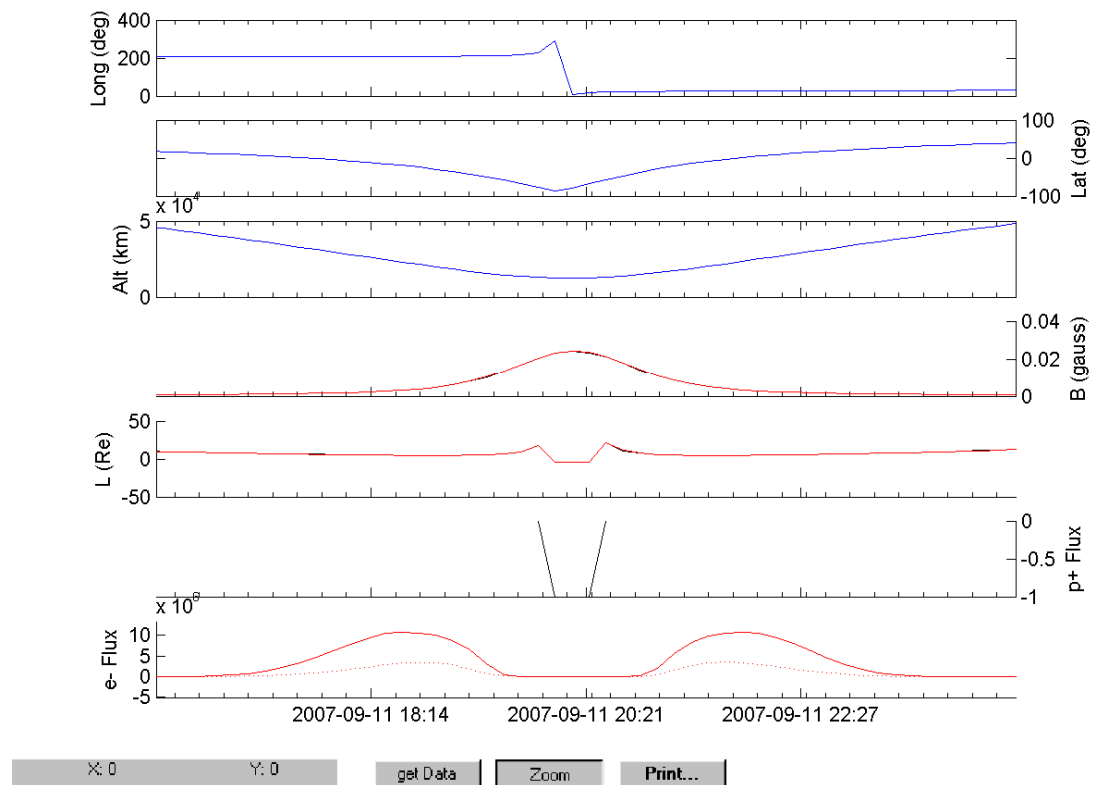


IREM Predicted Radiation Belt Passages

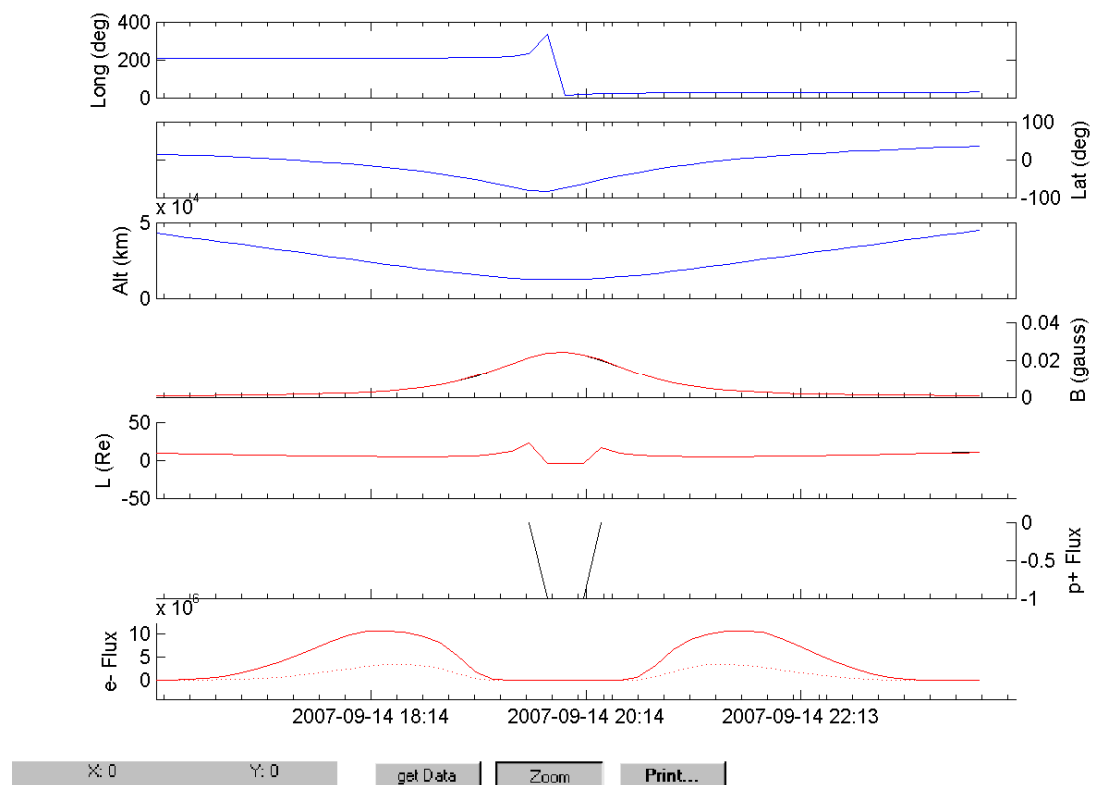
Rev 598



Rev 599



Rev 600



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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.