

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 259
Week 36
10.09.07
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.....	3
3.1.4	OBDH.....	4
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	4
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.....	9
8	Appendix.....	10
8.1	Overview of Revolutions.....	10
8.2	Consumables.....	10
8.2.1	Detailed Fuel Book-keeping.....	10
8.3	Detailed Satellite Information.....	10
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 25/08/2007 – 31/08/2007.....	10
8.3.2	SPI Operations.....	18
8.3.3	IBIS Operations.....	23
8.3.4	JEM-X Operations.....	26
8.3.5	OMC Operations.....	29
8.3.6	IREM Operations.....	32

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		
O. Bergogne	1	ISDC	
SPACONs	1	T. Courvoisier	1
I. Bayliss	1	R. Walter	1
G. Di Girolamo	1	N. Mowlavi	1
F. Dreger	1	ISDC Shift Team	1
G. Gienger	1		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 01.09.07 until 07.09.07 (both dates inclusive) and covers the revolutions 597 and 598.

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 two hexagonal dithers of Her X-1 (RA 16:57:49.83, DEC +35:20:32.6).

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

3 Satellite Status

3.1 Platform

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

3.1.1 AOCS

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

12 slews were missed from TL, during the observation period, due to problem with the FDS job scheduler and invalid guide star.

In preparation for the Lunar Eclipse, the IMU 1-2 were health checked, the ACC IMUs drifts evaluated and the RMU-B health checked during rev 598.

The fuel consumption over the period between 31/08/2007 and 04/09/2007 was 0.0786 Kg. The remaining propellant is in the order of 144.6674 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

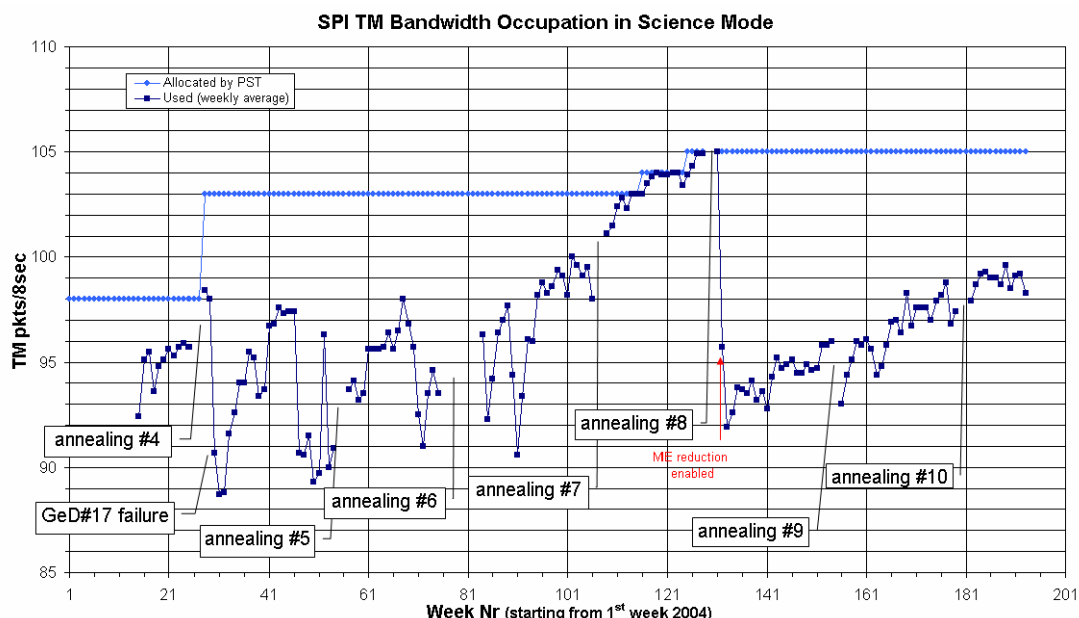
3.2.1 SPI

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 98.3 packets/cycle.

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



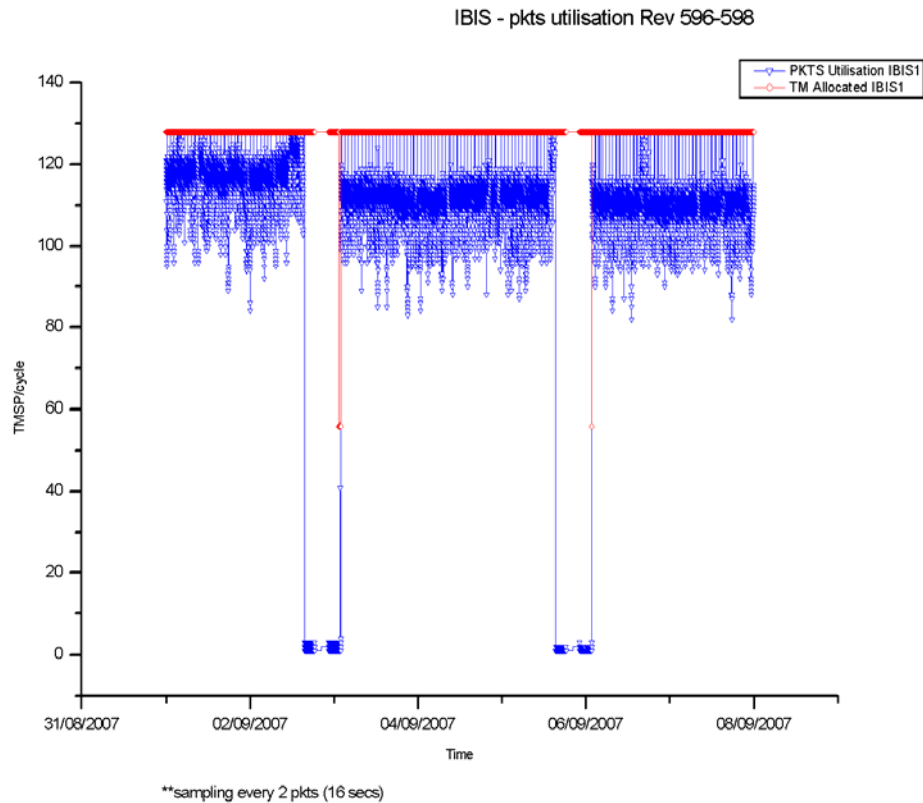
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

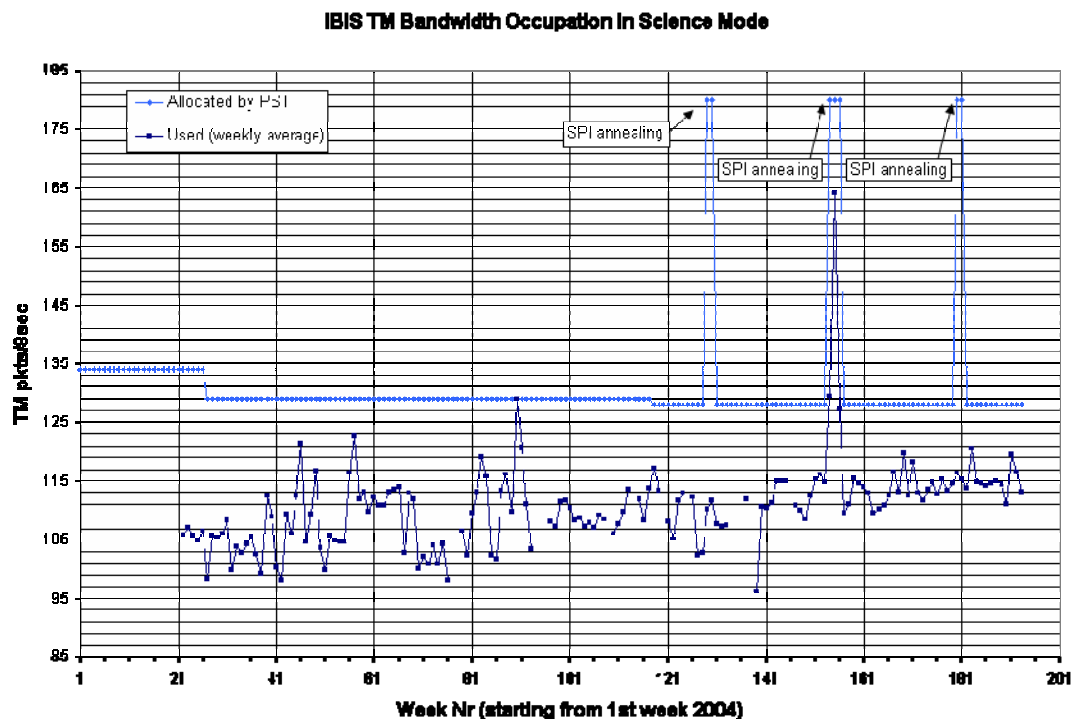
The overall status of the unit is nominal.

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 113.05 TMPS/cycle, down 3.53 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:



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, 140 of the 147 planned science pointings for OMC were executed nominally, 7 were lost.

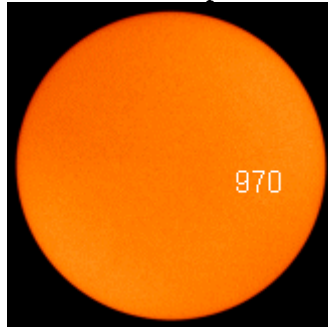
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. A tiny sunspot 970 was present throughout the week, however, it posed no threat of strong flares.



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. 12 pointings were missed from the Timeline, 5 of these were executed manually at or before the nominal time. The overall performance was still over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was not so good this week. 7 pointings were lost due to Guide star problems preventing the correct slew updates from being generated, and a further 5 slews were performed manually by the SPACON to maintain the Timeline. The overall performance was still over the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were, however, 8 occasions of TM drops from Redu, with no impact reported. The overall performance was well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSFs are available up to revolution 608.

Observations have been planned up to revolution 605, as last week - further planning will be done when the Crab calibration observations in revolution 606 are settled.

TSFs have been received up to revolution 603.

2. Observation status

ECS files have been received and processed up to revolution 586.

3. ISOC Science Data Archive

The changes for version 3.0 have been agreed. This version is slated for a release in November.

4. ISOC system

Version 16.0 has been released for testing on Monday, 03 Sep and intense testing is ongoing.

5. Problems

The problem of the Hex COP move has been fixed.

4.3.2 ISDC

Status of ISDC observation processing on 10/09/2007:

- Latest Standard Analysis completed: observation 04200730033 (Galactic disk latitude scans, Revolution 580) on 10/08/2007.
- Latest products archived: observation 04200730033 (Galactic disk latitude scans, Revolution 580) on 10/08/2007.
- Latest observation products sent to the observer: observation 04200730033 (Galactic disk latitude scans, Revolution 580) on 02/09/2007.

5 Special Events

6 Anomalies

The following problem was reported that impacted operations:

- On DoY 246, at 21:55, an AOCS command failed its PTV, and the Timeline had to be stopped. During the recovery, a command failed again, forcing a second recovery. The Timeline was then rejoined at 23:08. The impact was the loss of pointings 05970022 & 05970023.
- On DoY 247, at 19:12, another AOCS command also failed its PTV, forcing the interruption of the Timeline. During the recovery, a Start Guide Star command failed necessitating a second attempt. The Timeline was eventually rejoined at 20:24. The impact was the loss of pointing 05970043.
- On DoY 249, at 03:45, another AOCS command also failed its PTV, forcing the interruption of the Timeline. Again, during the recovery, the Start Guide Star command failed forcing a second attempt. The Timeline was eventually rejoined at 04:59. The impact was the loss of pointing 05980003.
- At 17:41, during a manual operations due to the FD updates were not arriving, a command failed. A recovery was performed and the Timeline was rejoined at 18:24. The impact was the loss of pointing 05980017.

- At 23:48, the FD update failed, the Timeline was stopped, and a manual recovery performed. The Timeline was rejoined at 01:00. The impact was the loss of pointing 05980024.
- On DoY 250, at 14:08, the FD update failed again, the Timeline was stopped, and a manual recovery performed. The Timeline was rejoined at 15:06. The impact was the loss of pointing 05980038

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

AR id	Date Created	Subject	Segment	Status
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.

- Lunar eclipse on 11th September 2007, at the end of revolution 599.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 597

The observations in revolution 597 consisted entirely of a hexagonal dither of Her X-1 (RA 16:57:49.83, DEC +35:20:32.6), lasting ~57.7 hours.

Revolution 598

The observations in revolution 598 consisted entirely of a hexagonal dither of Her X-1 (RA 16:57:49.83, DEC +35:20:32.6), lasting ~57.7 hours.

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

2007-08-14T10:51:56.000Z	144.9388	F	Automatic TM processing.
2007-08-16T00:19:20.000Z	144.9293	F	Automatic TM processing.
2007-08-17T10:39:55.000Z	144.8650	F	Automatic TM processing.
2007-08-19T00:07:11.000Z	144.8560	F	Automatic TM processing.
2007-08-20T09:38:35.000Z	144.8440	F	Automatic TM processing.
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.

This report was generated Fri Sep 7 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, 01/09/2007 – 07/09/2007

The AOCS operations were executed from the Automatic Timeline.

During this period, 67 Open Loop Slews, 81 Closed Loop Slews and 5 Momentum Biases were executed.

12 slews (CSL) were missed from TL, during the observation period, due to problem with the FDS job scheduler and an invalid guide star (ID 2601-719) that forced manual re-generation of several slews.

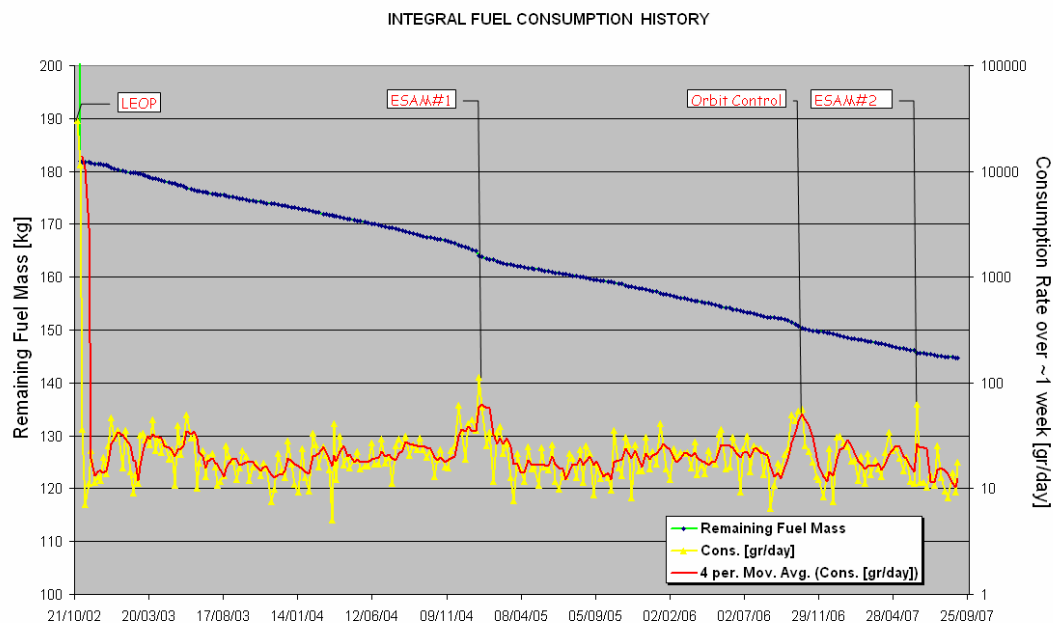
This is equivalent to ~8 % of the total number of slews planned (151).

Orbit Control

No update.

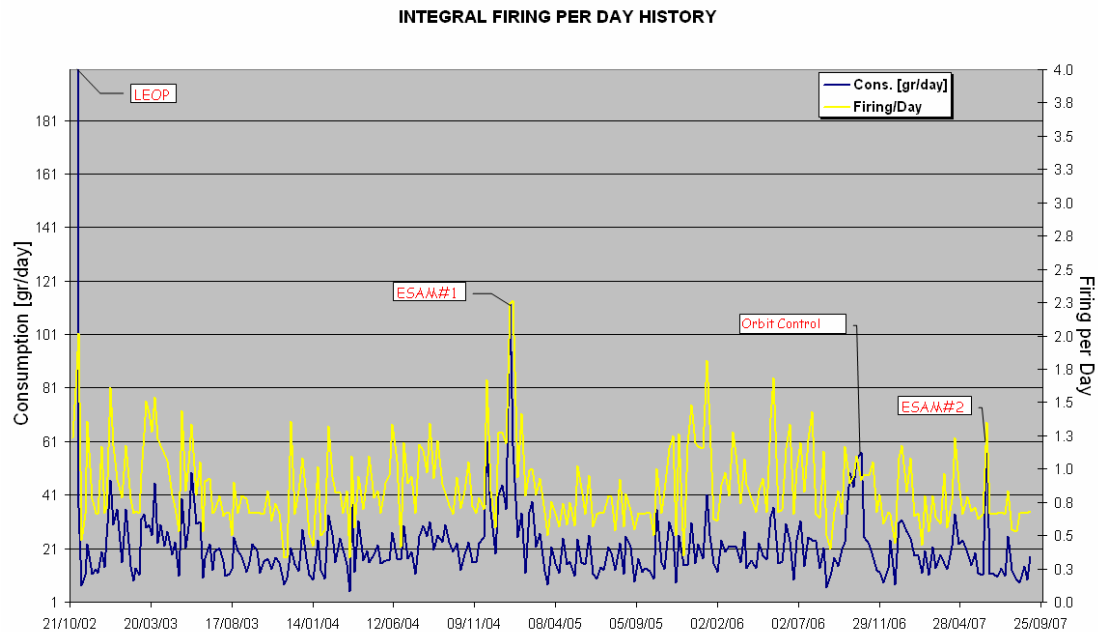
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 04/09/2007 is reported in the plot below.



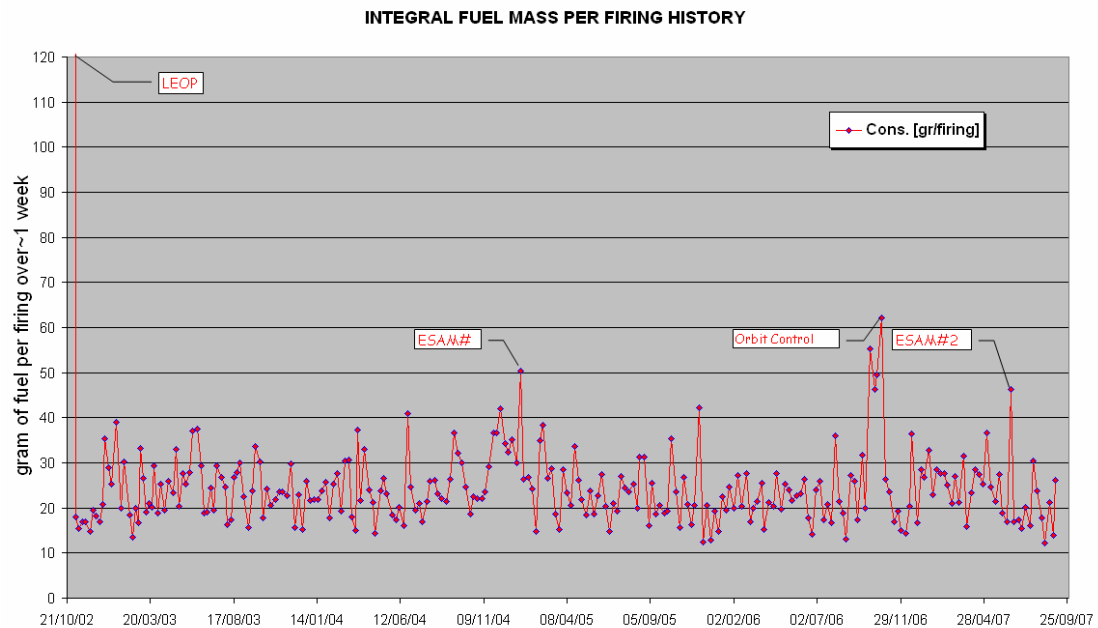
The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 04/09/2007 is reported in the plot below.



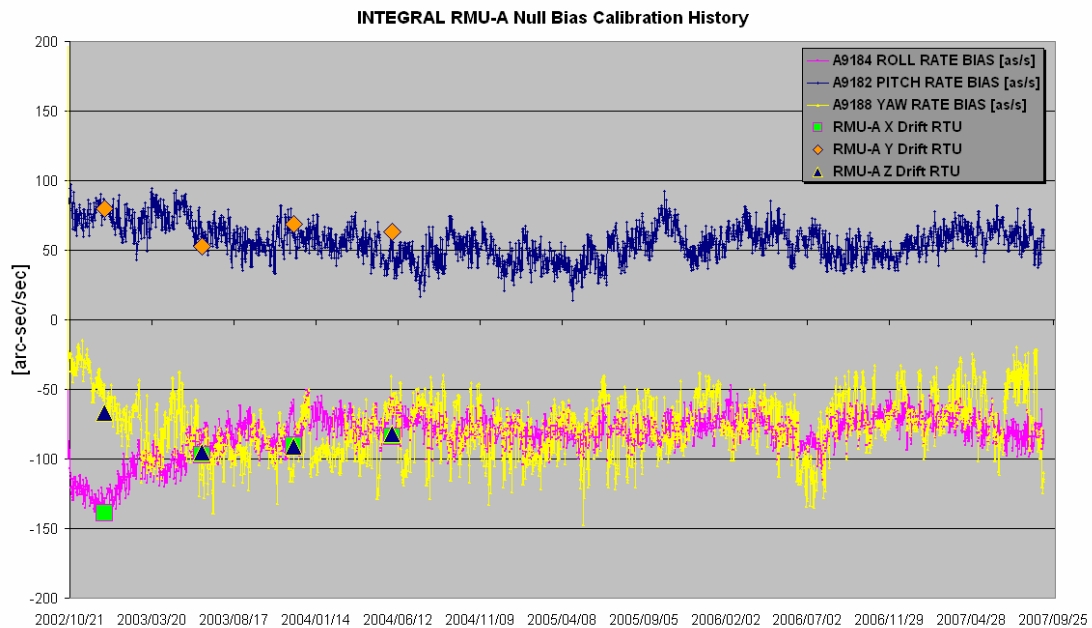
The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 04/09/2007 is reported in the plot below.

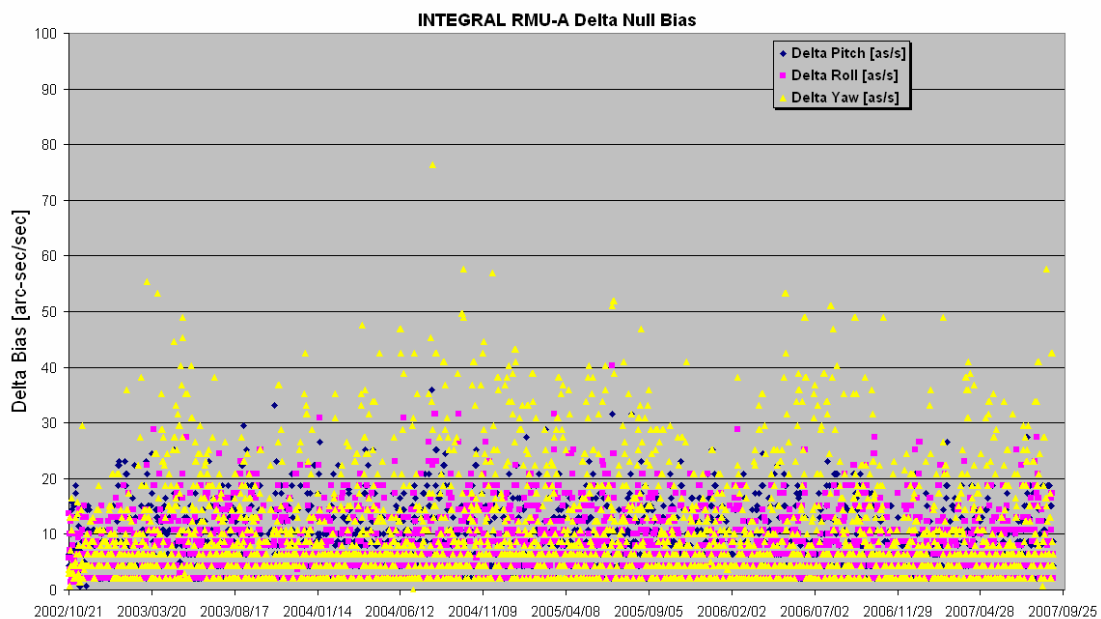


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 07/09/2007 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 07/09/2007 is reported in the plot below.



01/09//2007 (Day of Year 243, Revolution 596)

Divergence in measured wheel speeds wrt the predicted values for RW#2: a problem was observed on at 06.59z on the measured speed of RW#2 (difference ~80 rpm of the measured wheel speeds wrt the predicted values.).

The wheels speeds at the time of the anomaly were:

RW2= -370 rpm (against a planned value of ~-450 rpm)

The unusual, gap in the profile of RW#2 was the result of a small momentum transfer (due to coincidental alignment effect) from RW#3 and RW#4 to the mentioned Wheel. No action was requested only a monitoring of the Wheel #2. The RW#2 speed re-entered inside limits at 07:15Z. The difference was eventually removed at the execution of the RWB (Reaction Wheel Bias) at 09:00Z

No impact on TL.

02/09//2007 (Day of Year 244, Revolution 596-597)

FDS failed CGS update: at 17:35z, the FDS failed the update of the planned CGS (Change of Guide Star). After investigations was found that the only available star was already picked as guide star after the end of the previous slew. The AOCS s/s was disabled in TL at 18:05z and the CGS not executed. At 18:23z the AOCS s/s was enabled in TL.

The planned CGS was not performed but there was no impact on Science.

03/09//2007 (Day of Year 245, Revolution 597)

Search/Track process failed due to invalid star: at 21:55z, the S/T process failed because no slew star was found in slot#2 for slew 05970022: the slew star selected (ID 2601-719) is a star of Mi 8.45 with magnitude variation of ~ 0.10 Mi, close to several clusters of galaxies (extended objects). The threshold set for the S/T was likely at the limit of the star magnitude and this caused the STR to not find the star and the slew for PID 05970022 to stop commanding (PTV failure).

A manual recovery was started at 22:02z, from attitude of PID 05970021 to the attitude of PID 05970022 but the S/T process failed again because the same star (ID 2601-719) was selected. A manual recovery was then started at 22:25z, from attitude of PID 05970021 to the attitude of PID 05970023. At 23:02z the slew ID 05970024 was manually updated in TL.

The following slews were missed in TL: 05970022(CSL) -23(CSL).

04/09//2007 (Day of Year 246, Revolution 597)

Search/Track process failed due to invalid star: at 19:12z, the S/T process failed because no slew star was found in slot#2 for slew 05970043: again the slew star selected (ID 2601-719) is a star of Mi 8.45 with magnitude variation of ~ 0.10 Mi, close to several clusters of galaxies (extended objects). The threshold set for the S/T was likely at the limit of the star magnitude and this caused the STR to not find the star and the slew for PID 05970043 to stop commanding (PTV failure).

A manual recovery was started at 19:17z, from attitude of PID 05970042 to the attitude of PID 05970043 but the S/T process failed again because the same star (ID 2601-719) was selected. A manual recovery was then started at 19:31z, from attitude

Doc. Title : INTEGRAL Mission Report #259
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 10/09/07

Issue : 1
Rev. : 0
Page : 15

of PID 05970042 to the attitude of PID 05970044. At 20:23z the slew ID 05970045 was manually updated in TL.

The following slews were missed in TL: 05970043(CSL) -44(CSL).

05/09//2007 (Day of Year 247, Revolution 597-598)

Nothing to report.

06/09//2007 (Day of Year 248, Revolution 598)

FDS failed update: at 01:00z the FDS did not perform the update of the planned first slews of the rev 0598. The job scheduler was found not running after perigee passage and was only back at around 06:54z, after FD on call action, to kick off the update for CSL 05980007.

The update for Slew ID 05980001-02-04-05-06 was manually performed.

In addition, the Search and track process failed for Slew ID 05980003 because no slew star was found in slot#2: again as in rev 597 the slew star selected (ID 2601-719) is a star of Mi 8.45 with magnitude variation of ~ 0.10 Mi, close to several clusters of galaxies (extended objects). The threshold set for the S/T was likely at the limit of the star magnitude and this caused the STR to not find the star and the slew for PID 05970043 to stop commanding (PTV failure).

A manual recovery was performed from attitude from PID 05980002 to the attitude of PID 05980004. The next slew 05980005 was manually updated in TL.

An AR (INT_2914) was already open on 04/2007 concerning this same problem with job scheduler and an action assigned to FD Team.

The following slews were missed in TL: 05980003 (CSL)-05980004(CSL)

Lunar Eclipse preparation: in preparation for the lunar eclipse on 11/09 the ACC IMU 1-2 drifts were evaluated and the RMU-B health checked during rev 598.

The calculated FD drifts (**red**) resulted consistent with the evaluation performed in parallel by FCT (**blue**) and with the drifts history.

Time(Z) 06/09/2007	IMU 1 IMU 2 Health-Check / Calibration and RMU-B Health Check	
07:00	<i>Verify the end of AOCs TL commanding</i> Disable ACC Autonomous IMU Switch Off, FCP-AOC-1051 <i>Remark for procedure AOC_1051:</i> <i>Step 2.2 the correct TC-parameters setting is A1379=INHIBIT, A1380=ENABLE, A1381=ENABLE</i> <i>Load GRD AG1600 to visualize the IMUs temperatures</i>	<u>Step 1, IMU1</u> and RMU-B PID 05980006 Start at 06:49:22Z End at 07:43:39Z
07:17:33	IMU1 Switch On, FCP-AOC-1600 <i>Remark for procedure AOC_1600:</i> <i>Step 4.2 for the SOE: remember to log the IMU time of activation in the IMU lifetime log</i>	T6009= 6.88degC T6010= 5.31 degC T6011= 26.50 degC T0052= 9.69degC T0028= 8.44 degC
07:22:45	RMU-B switch On, FCP-AOC-1902	

	IMUs warm-up time (>30 minutes)	
07:35 07:53	Set IMU Selection ACC: Set IMU1 on Roll, IMU1 on Yaw, FCP-AOC-1050 FDE: IMU1-X on Roll, NOT SELECT on Pitch, IMU1-Z on Yaw, FCP-AOC-1218	
07:56:20 07:58:09	Verify the end of AOCs TL commanding Reset IAAD Accumulators, FCP-AOC-1210 Reset FCE RMU Integrators, FCP-AOC-1254 Perform IMU-1 Drift and Noise evaluation, FCP-AOC-1623	PID 05980007 Start at 07:48:57Z End at 08:42:17Z (AOCs TL commanding start)
07:58:00 to 08:40:00	>30 minutes of data collection From TM: IMU1 Noise Roll = 0.1703 as/s IMU1 Drift Roll = 0.2133 as/s IMU1 Noise Yaw = 0.0623 as/s IMU1 Drift Yaw = 0.2833 as/s => 0.2092 as/s => 0.2838 as/s	Stable pointing: PID 05480045 T6009= 9.38 degC T6010= 5.62 degC T6011= 28.00 degC T0052= 16.54 degC T0028= 11.33 degC Altitude >90TKm
08:57	Verify the end of AOCs TL commanding Deselect IMU1 from ACC Word B, FCP-AOC-1050 <i>Set NO IMU on Roll, NO IMU on Yaw</i>	PID 05980008 Start at 08:48:32Z End at 09:41:52Z (AOCs TL commanding start)
09:03	Deselect IMU1 from FDE, FCP-AOC-1218 <i>Set NOT SELECT on Roll, NOT SELECT on Pitch, NOT SELECT on Yaw</i>	
09:09:08	Switch Off IMU1, FCP-AOC-1601 <i>Remark: report the IMU1 on-time in the log</i>	T6009=11.67 degC T6010= 6.56 degC T6011= 29.00 degC
09:16	Enable ACC Autonomous IMU Switch Off, FCP-AOC-1051 <i>Remark for procedure AOC_1051: Step 2.2 the correct TC-parameters setting is A1379=ENABLE, A1380=ENABLE, A1381=ENABLE</i>	
09:22:31	RMU-B switch Off, FCP-AOC-1903	T0052=21.25 degC T0028=14.00 degC
Thermal stabilisation after IMU1 Switch Off (> 2 hours) PID 05980009 09:05:00 – 11:15:00		
11:14	Verify the end of AOCs TL commanding Disable ACC Autonomous IMU Switch Off, FCP-AOC-1051 <i>Remark for procedure AOC_1051: Step 2.2 the correct TC-parameters setting is A1379=INHIBIT, A1380=ENABLE, A1381=ENABLE</i>	<u>Step 2, IMU2</u> PID 05980010 Start at 10:47:52Z End at 11:42:09Z
11:27:20	IMU2 Switch On, FCP-AOC-1602 <i>Remark for procedure AOC-1602: Step 2.2.1 do not requested to check if IMU1 is selected for YAW. If for any reason</i>	T6009=8.75degC

	during the calibration, the guide star is lost the controller will switch ON the IMU1: the contingency reaction foresees to switch OFF the IMU2 to avoid thermal problem Step 4.2 remember to log the IMU time of activation in the IMU lifetime log	T6010=6.56 degC T6011=28.00 degC
11:31	Set IMU Selection	
11:36	ACC: Set IMU2 on Roll, IMU2 on Yaw, FCP-AOC-1050 FDE: IMU2-X on Roll, NOT SELECT on Pitch, IMU2-Z on Yaw, FCP-AOC-1218	(AOCS TL commanding start at 11:42:09Z)
	IMUs warm-up time (>30 minutes)	
11:52:49	Reset IAAD Accumulators, FCP-AOC-1210 Perform IMU-2 Drift and Noise evaluation, FCP-AOC-1623 <i>Remark: compare with values of the previous IMU drift reported in the specific IMU drift file</i>	PID 05980011 Start at 11:47:27Z End at 12:40:47 Z (AOCS TL commanding start)
11:53:00 to 12:40:00	>30 minutes of data collection From TM: IMU2 Noise Roll = 0.1891 as/s IMU2 Drift Roll = 0.1806 as/s IMU2 Noise Yaw = 0.0565 as/s IMU2 Drift Yaw = -0.0329 as/s => 0.1753 as/s => -0.0308 as/s	Stable pointing: PID 05980011 T6009= 10.33 degC T6010= 6.56 degC T6011= 28.00 degC Altitude >112TKm
12:53	Deselect IMU2 from ACC Word B, FCP-AOC-1050 <i>Set NO IMU on Roll, NO IMU on Yaw</i>	PID 05980012 Start at 12:47:02Z End at 13:40:22 Z
13:01	Deselect IMU2 from FDE, FCP-AOC-1218 <i>Set NOT SELECT on Roll, NOT SELECT on Pitch, NOT SELECT on Yaw</i>	
13:05:09	Switch Off IMU2, FCP-AOC-1603 <i>Remark for the SOE: report the IMU2 on-time in the log</i>	T6009= 12.67 degC T6010= 7.19 degC T6011= 29.00 degC
13:10	Enable ACC Autonomous IMU Switch Off, FCP-AOC-1051 <i>Remark for procedure AOC_1051: Step 2.2 the correct TC-parameters setting is A1379=ENABLE, A1380=ENABLE, A1381=ENABLE</i>	

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 05980010-17-24) 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.

In addition, the recovery of Slew ID 05980017 failed release because by mistake the uplink of the manual manoeuvre was performed in parallel to the planned manoeuvre

failing release in the AUTOSTACK. For a known problem in the IMCS commanding when using load and dump comparison function in the conditions above, the sequence for manual manoeuvre failed release, forcing the operator to a new recovery.

The following slews were missed in TL but recovered about at the scheduled time: 05980010(CSL)-17(CSL)-24(CSL)

07/09//2007 (Day of Year 249, Revolution 598)

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 05980031-38-45) uplink to stop.

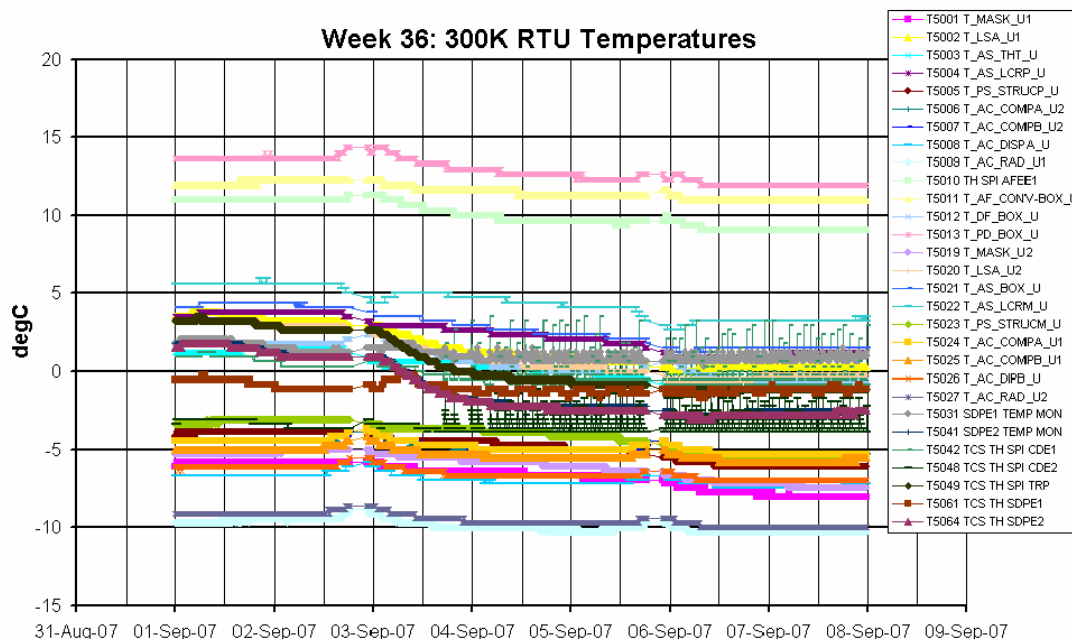
In order to correct it the FD Team removed the suspected star from the list of valid guide star for slew execution. For the mentioned Slews, this star resulted to be the only guide star available for manoeuvre execution.

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: 05980031(CSL)-38(CSL)-45(CSL)

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.

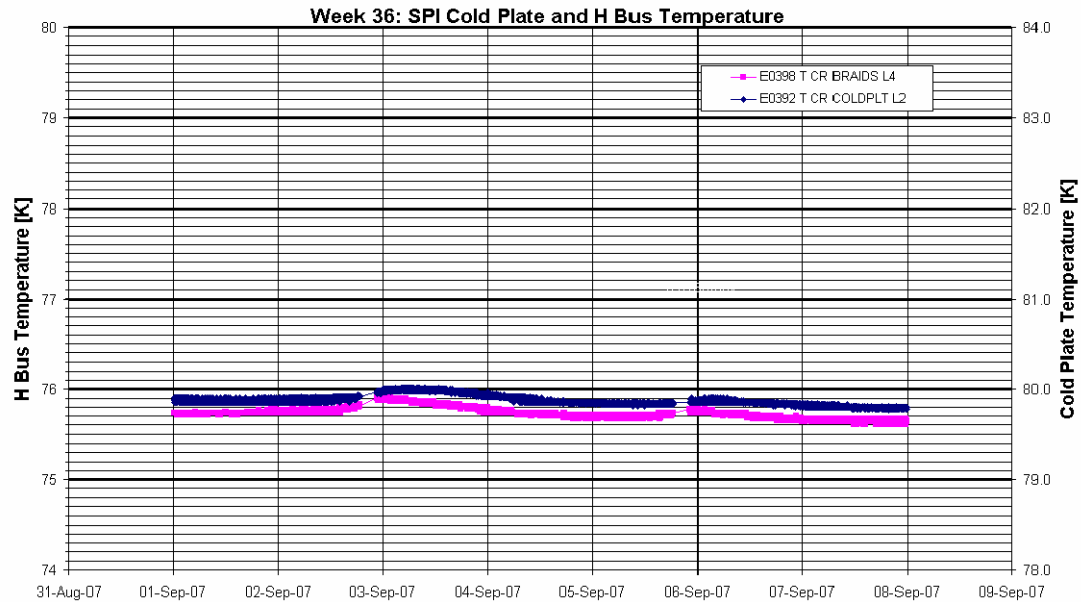


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

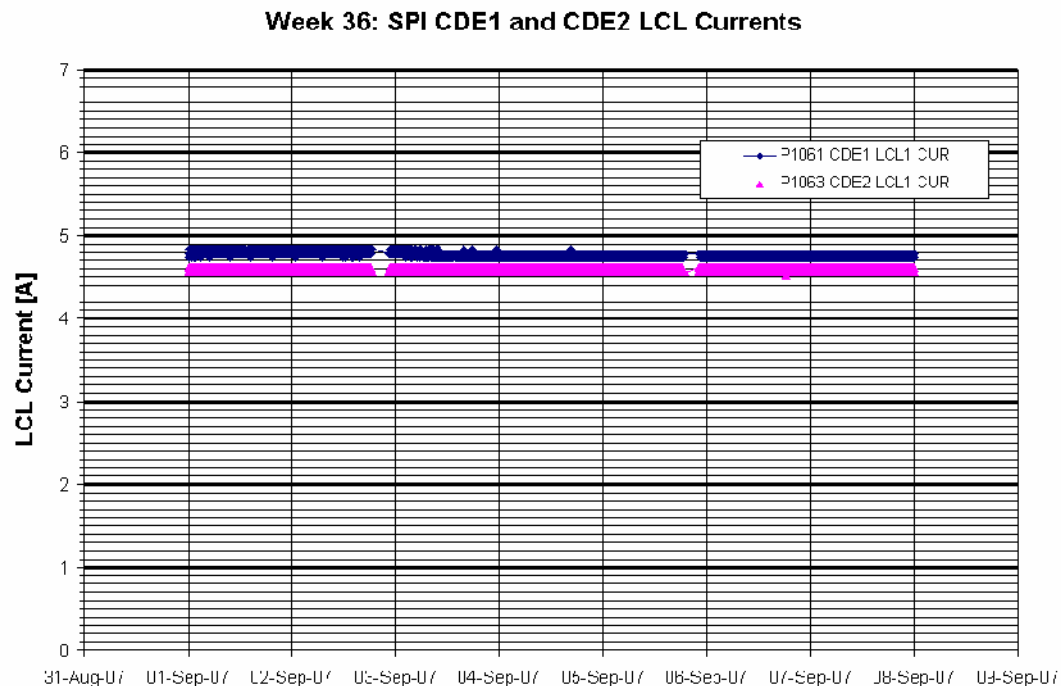
The stroke of all four compressors was set 40 throughout the week with the average CDE LCL currents as follows:

- CDE1 LCL Current = 4.78A
- CDE2 LCL Current = 4.58A

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



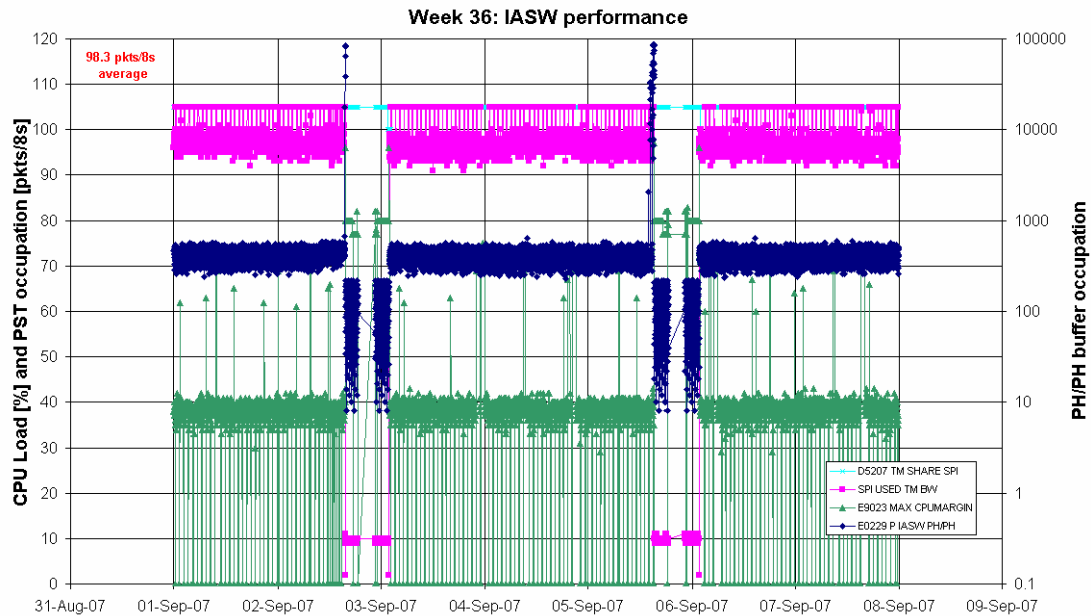
The following plot shows the evolution of the CDE currents during the reporting period.



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

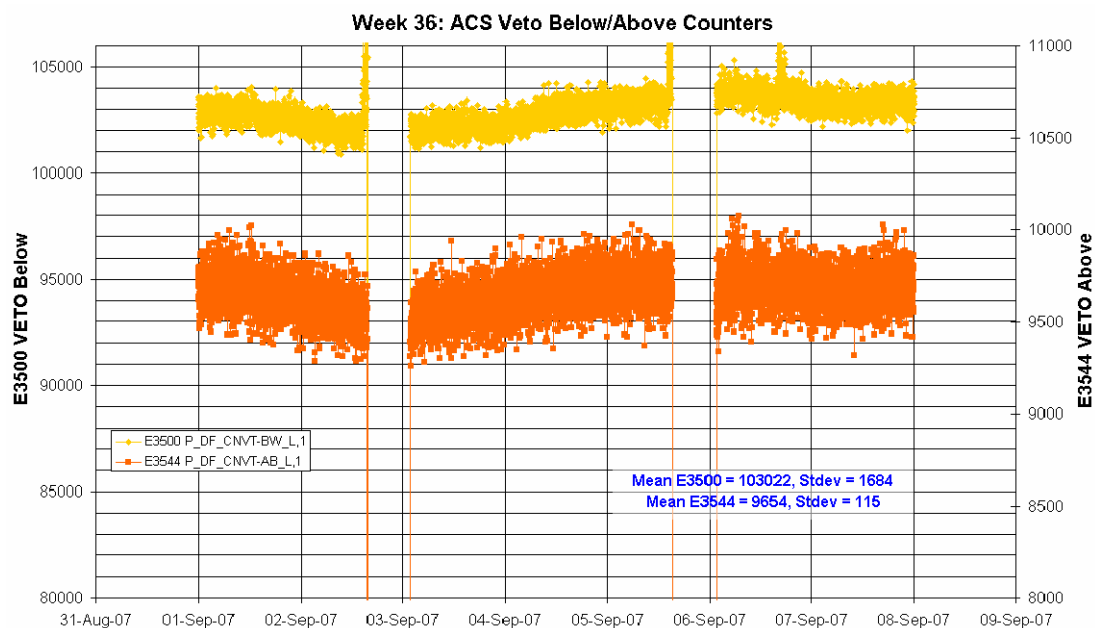
average TM bandwidth occupation of SPI was 98.3 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

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



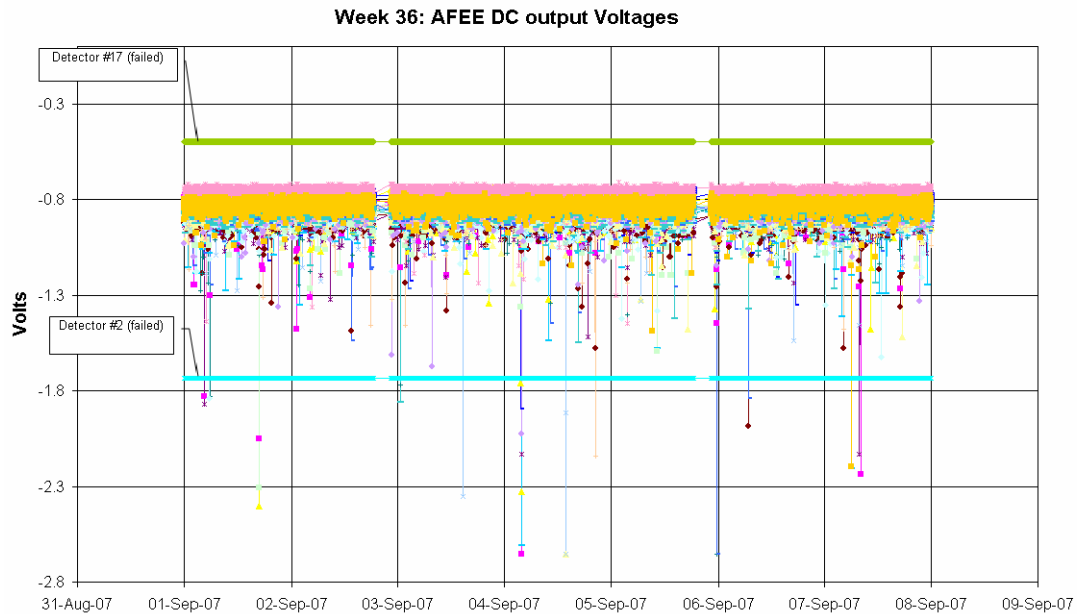
ACS: The performance of the ACS is nominal, except for FEE #81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

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

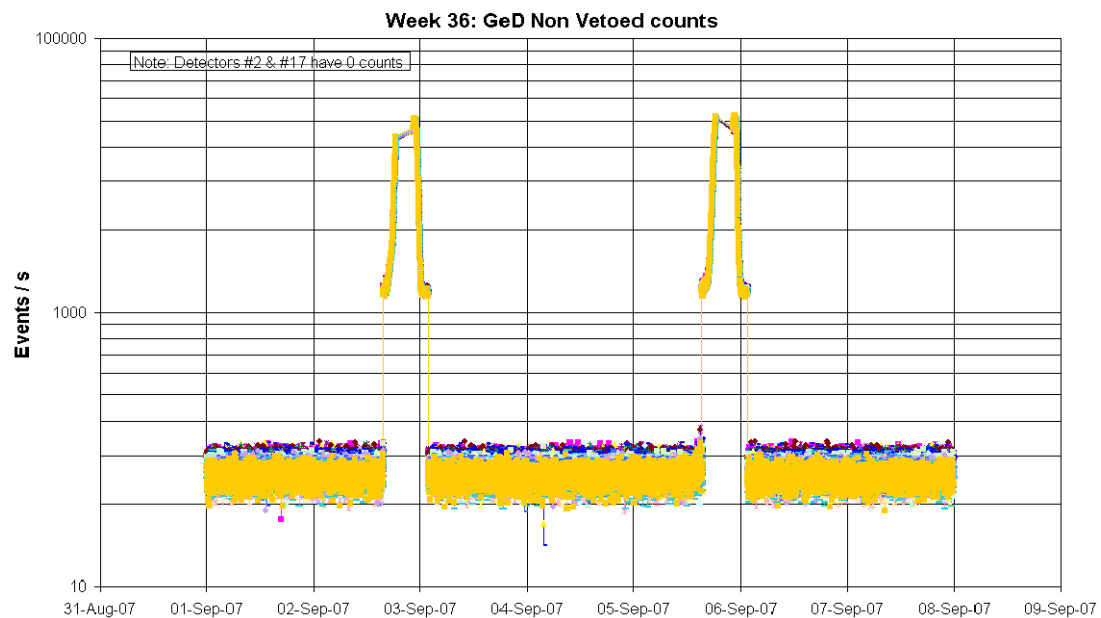


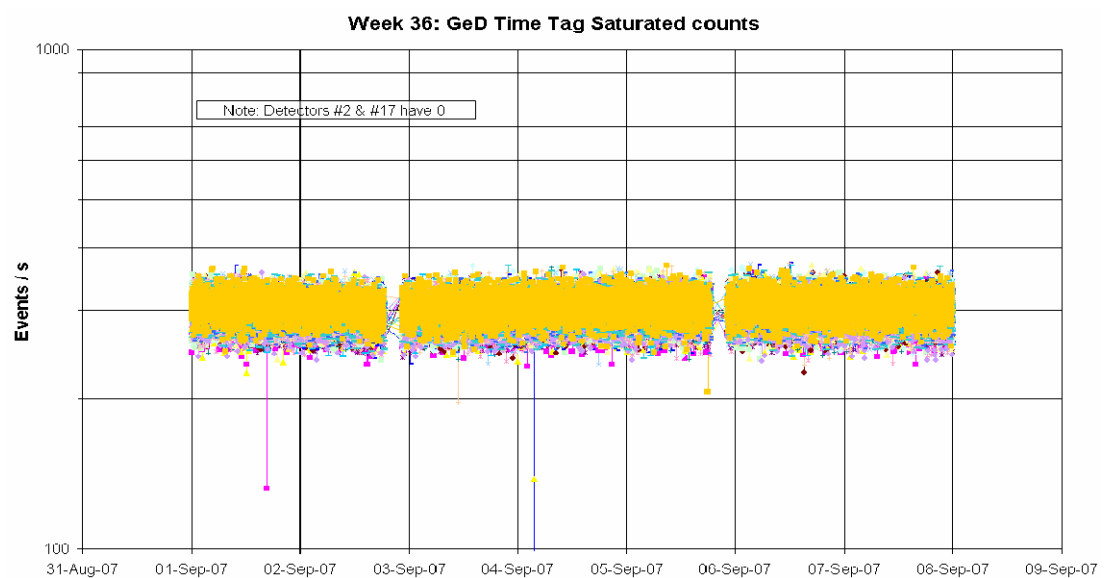
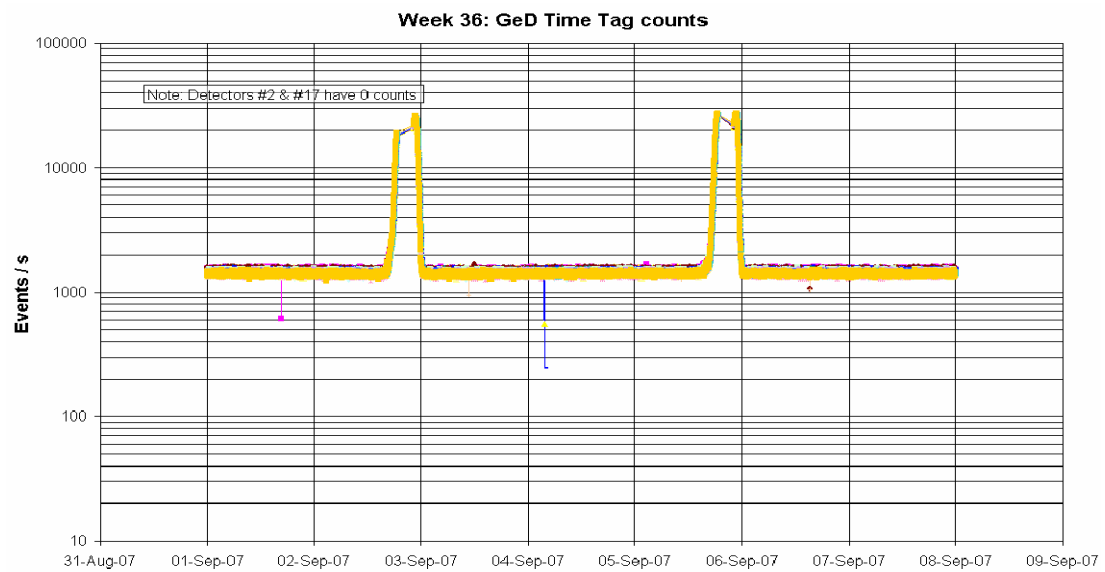
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

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.

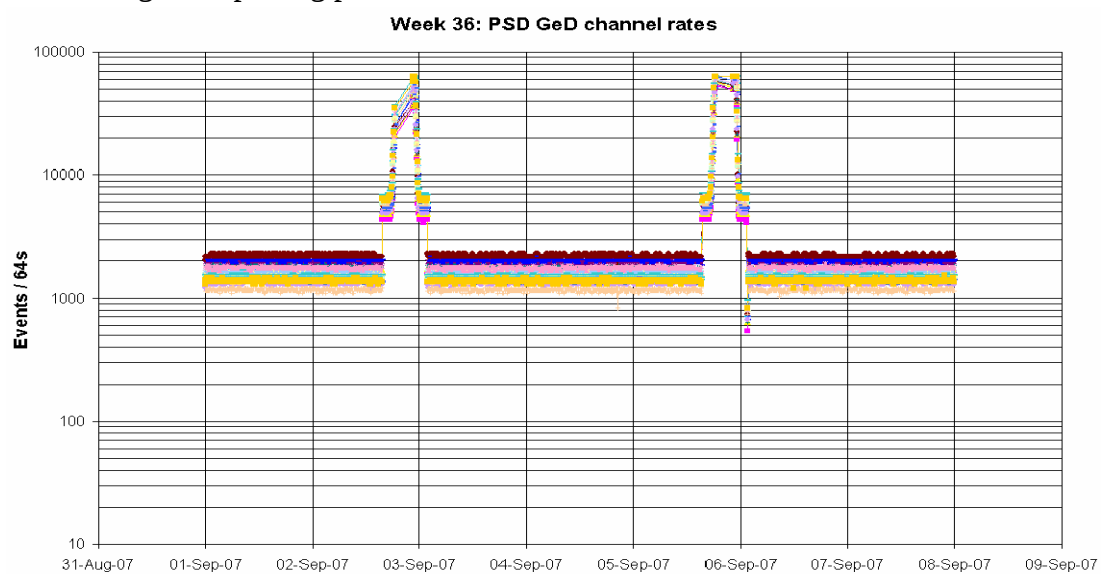


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoes, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





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



Event Log:

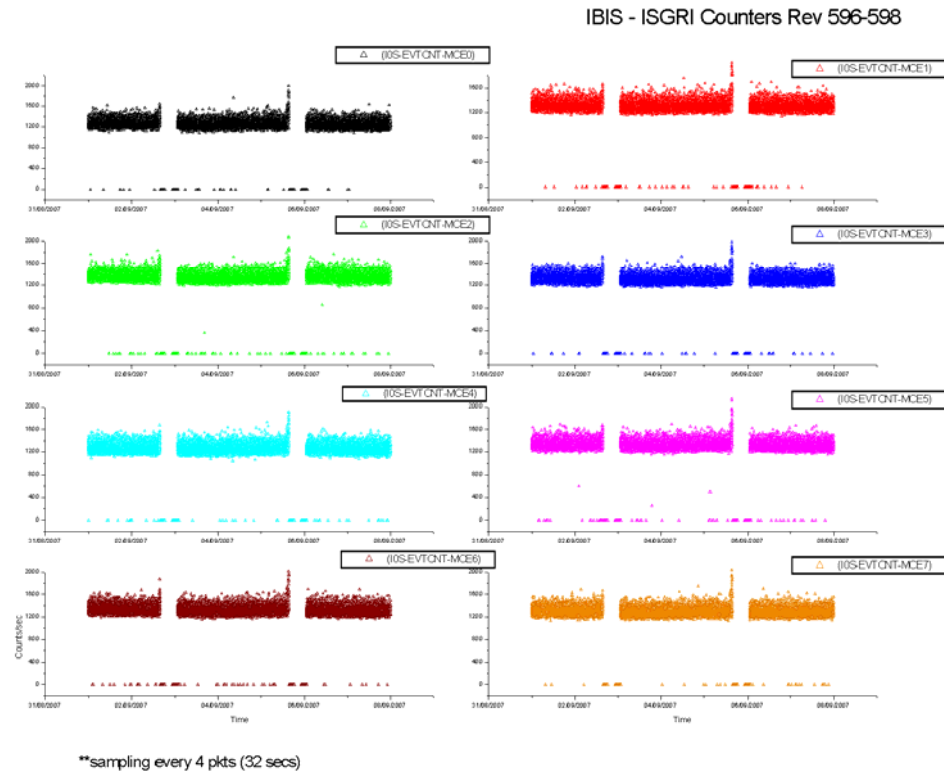
The following non-nominal events occurred on SPI during the reporting period:

- 105 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 2007-09-01 at 20:13:39Z TM parameter E3825 went OOL High (value = 5.194V). This is the PSD + 5V analogue line voltage. As it returned within limits of its own accord when the next packet was received at 20:14:43Z, no action was taken.
- On 2007-09-02 at 15:31:27Z TM parameter E3500 (ACS Veto Below Counter) went OOL High, returning within limits at 15:36:47Z. This was just before radiation belt entry of revolution 596, at 15:37:34Z.
- On 2007-09-03 at 01:56:16Z and again on 2007-09-06 at 01:37:48Z 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 shortly after radiation belt exit of revolutions 597 and 598 respectively. In both cases, the parameters returned within limits when the next packet was received. This seems to be a re-occurrence of part of the anomaly INT_SC-180, closed with IASW 4.3.3 patch 1. Investigation revealed that this also re-occurred once since IASW 4.3.3 patch 1 and a new Anomaly Report, INT_SC-205, has been opened to cover this.
- On 2007-09-05 at 14:56:39Z TM parameter E3500 (ACS Veto Below Counter) started toggling OOL High until radiation belt entry of revolution 597, at 15:23:41Z.
- On 2007-09-05 at 18:25:22Z the TM parameter E4009 S DF HSLERR L went OOL High for one TM cycle, indicating an error on the HSL. This was just at LOS of revolution 597 and no action was taken.
- On 2007-09-06 from 16:13:35Z to 16:54:55Z TM parameter E3500 (ACS Veto Below Counter) toggled OOL High. As it returned stably within limits of its own accord, no action was taken.

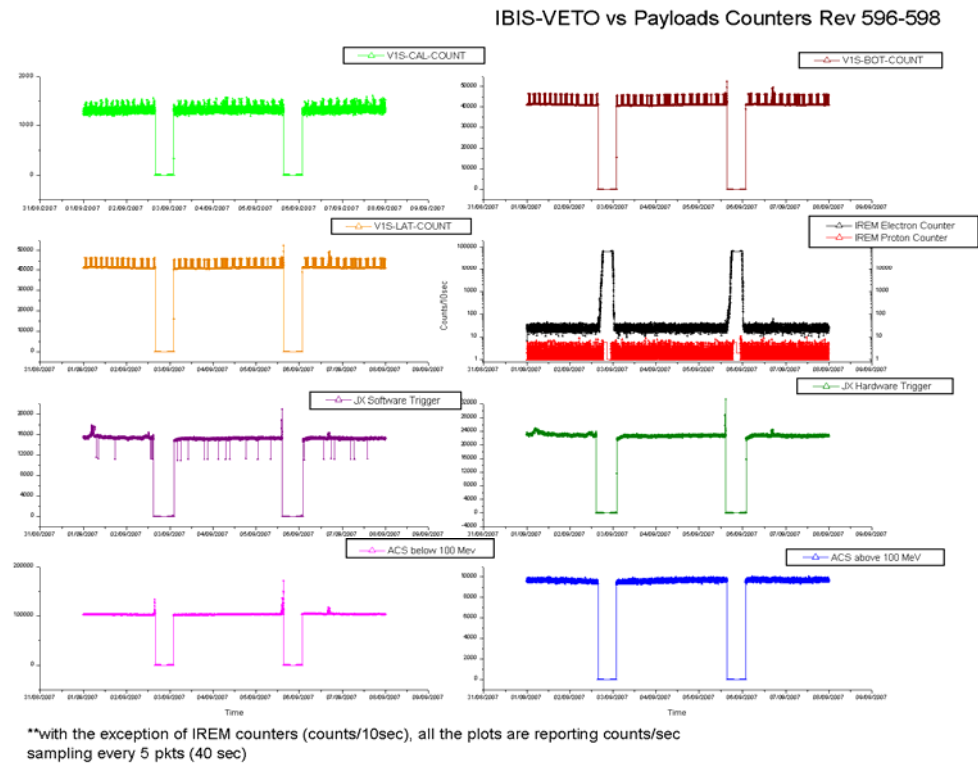
8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

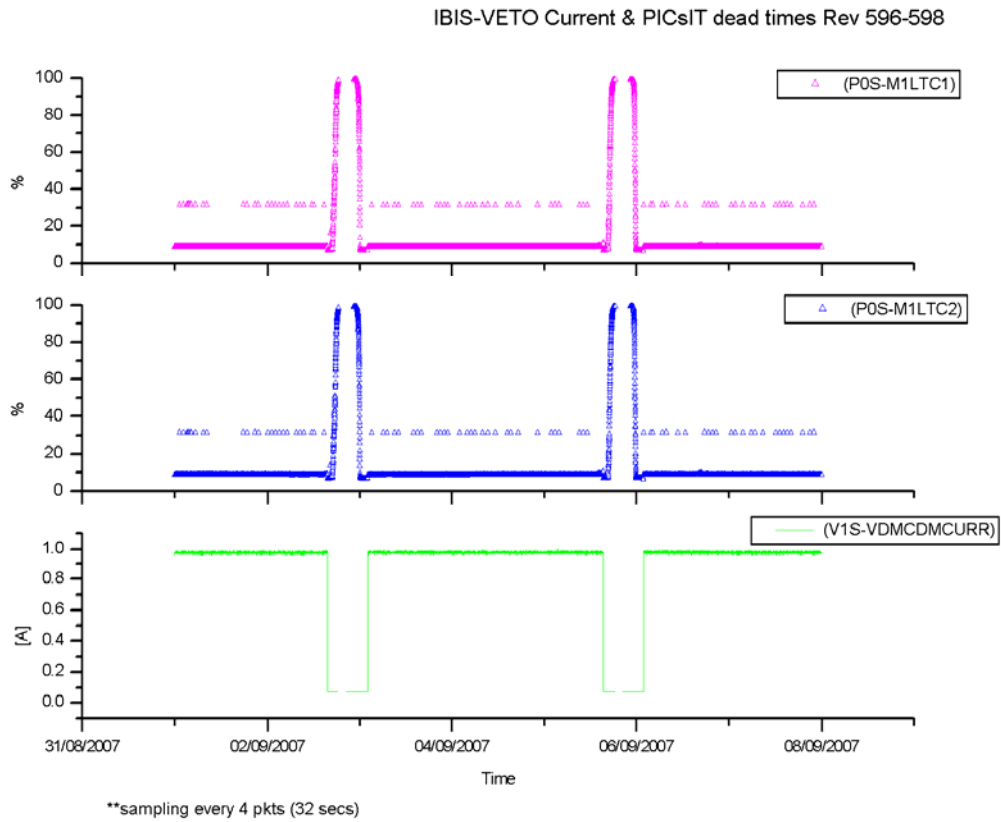


VETO vs Payloads Counters:

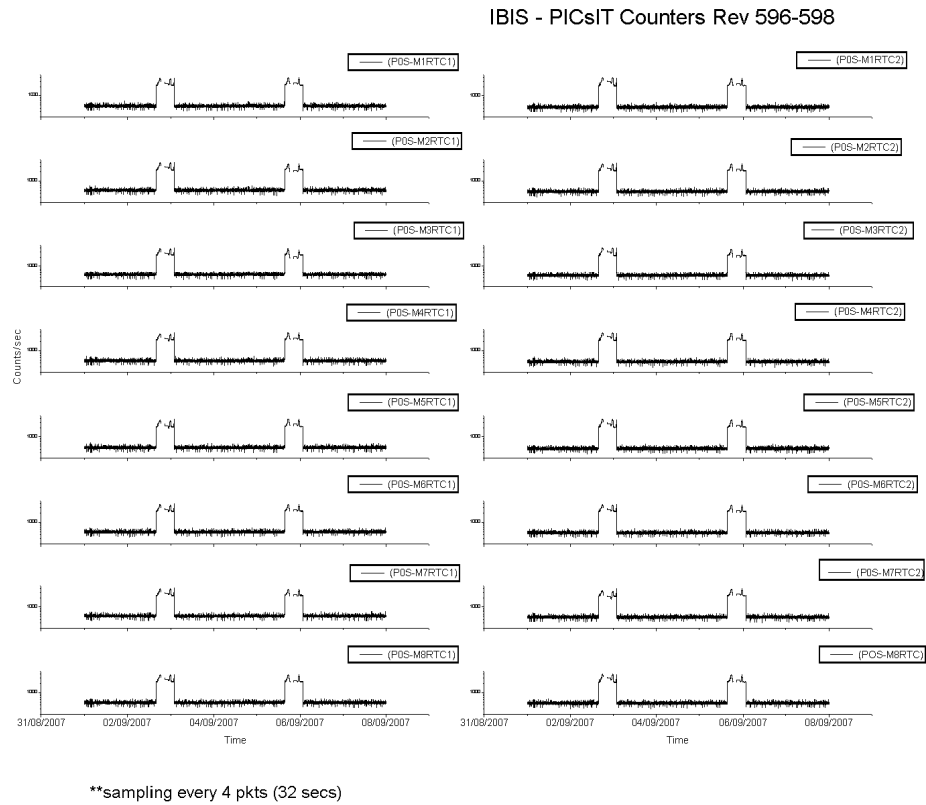


The week was characterised by slightly high radiation before the expected radiation belt entry time of revolution 597 as reported by the payload.

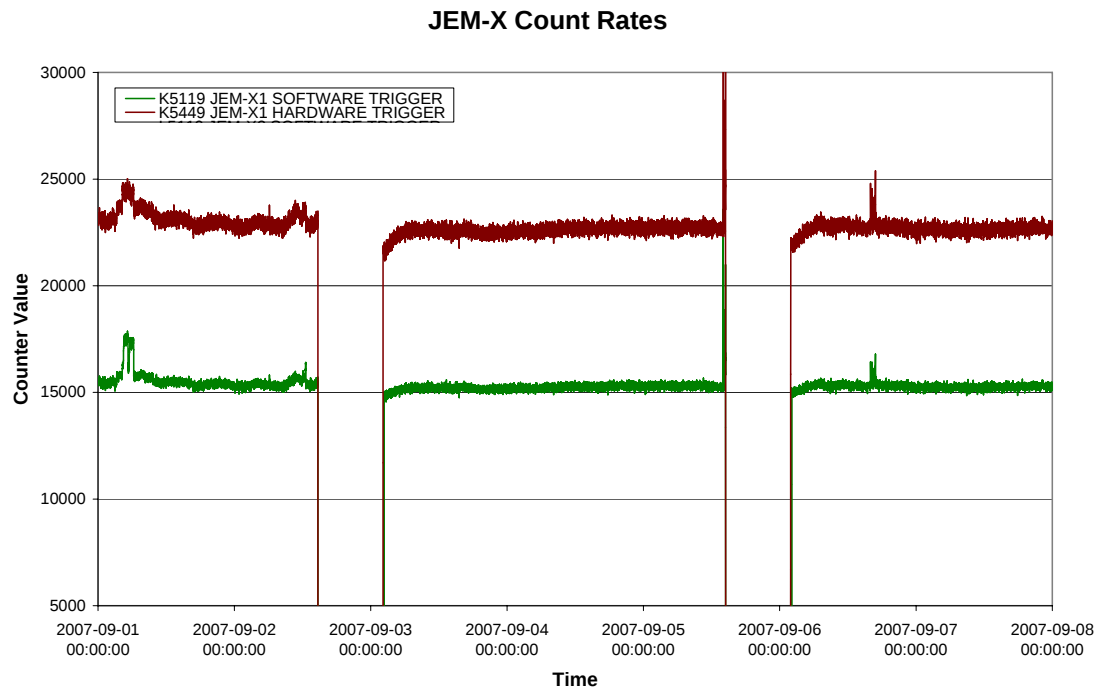
VETO Current:



PICsIT Counters:

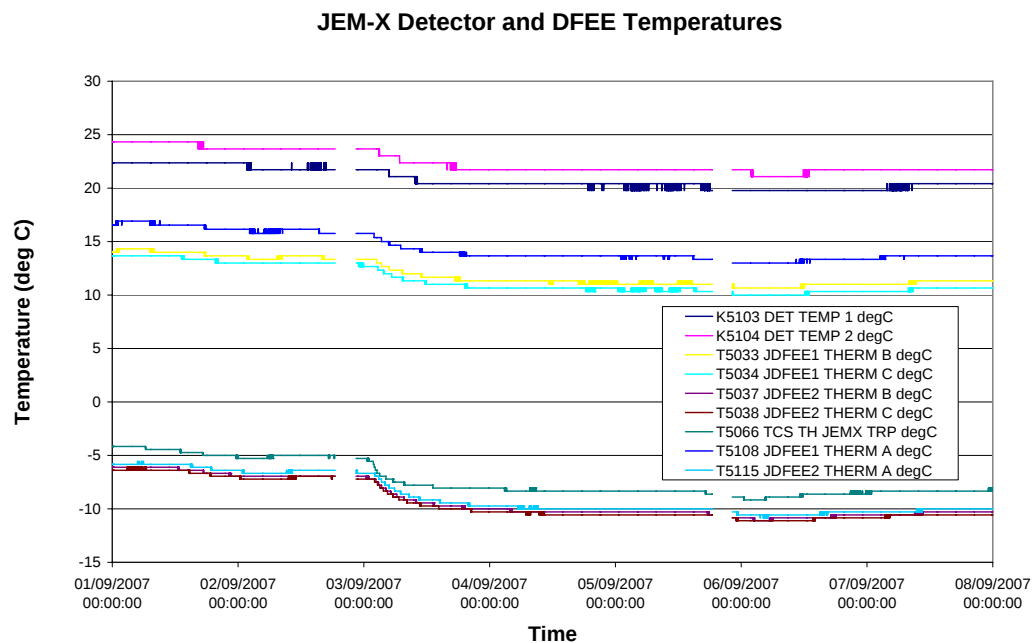


JEM-X count rates over the reporting period are displayed in the following graph¹.



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.



JEM-X Daily Report

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)

Doc. Title : INTEGRAL Mission Report #259
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 10/09/07

Issue : 1
Rev. : 0
Page : 28

2007-09-01 (DoY 244, Rev 596) to 2007-09-02 (DoY 245, Rev 596)

JEM-X1 operations executed nominally.

2007-09-03 (DoY 246, Rev 597)

On this day, the following two groups of anomalous OEMs were received, at the indicated times:

2007.246.12.04.11.308	2007.246.12.04.14.426	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E E						
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS	4989				
2007.246.12.04.11.308	2007.246.12.04.14.461	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E E						
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS	4989				
2007.246.12.04.11.308	2007.246.12.04.14.463	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E E						
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS	4989				
2007.246.12.04.11.308	2007.246.12.04.14.485	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E E						
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS	4989				
2007.246.12.04.11.308	2007.246.12.04.14.488	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E E						
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS	4989				
2007.246.12.04.11.308	2007.246.12.04.14.490	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E E						
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS	4989				
2007.246.12.04.11.308	2007.246.12.04.14.492	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E E						
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS	5336				

and

Doc. Title : INTEGRAL Mission Report #259
 Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
 Date : 10/09/07

Issue : 1
 Rev. : 0
 Page : 29

2007.246.14.31.07.313	2007.246.14.31.09.500	1536	RealTime	0	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR	N
E							
FIX6		0					
K9079	MESS CLASS	2					
K9080	MESS ID	5					
K9074	TASK ID 16	12					
K9067	LOGICAL ADDRESS	4989					
2007.246.14.31.07.313	2007.246.14.31.09.550	1536	RealTime	0	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR	N
E							
FIX6		0					
K9079	MESS CLASS	2					
K9080	MESS ID	5					
K9074	TASK ID 16	12					
K9067	LOGICAL ADDRESS	4989					
2007.246.14.31.07.313	2007.246.14.31.09.553	1536	RealTime	0	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR	N
E							
FIX6		0					
K9079	MESS CLASS	2					
K9080	MESS ID	5					
K9074	TASK ID 16	12					
K9067	LOGICAL ADDRESS	4989					
2007.246.14.31.07.313	2007.246.14.31.09.555	1536	RealTime	0	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR	N
E							
FIX6		0					
K9079	MESS CLASS	2					
K9080	MESS ID	5					
K9074	TASK ID 16	12					
K9067	LOGICAL ADDRESS	4989					
2007.246.14.31.07.313	2007.246.14.31.09.560	1536	RealTime	0	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR	N
E							
FIX6		0					
K9079	MESS CLASS	2					
K9080	MESS ID	5					
K9074	TASK ID 16	12					
K9067	LOGICAL ADDRESS	4989					
2007.246.14.31.07.313	2007.246.14.31.09.562	1536	RealTime	0	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR	N
E							
FIX6		0					
K9079	MESS CLASS	2					
K9080	MESS ID	5					
K9074	TASK ID 16	12					
K9067	LOGICAL ADDRESS	4989					
2007.246.14.31.07.313	2007.246.14.31.09.564	1536	RealTime	0	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR	N
E							
FIX6		0					
K9079	MESS CLASS	2					
K9080	MESS ID	5					
K9074	TASK ID 16	12					
K9067	LOGICAL ADDRESS	5336					

No action was taken and the messages did not reappear. There was no impact.

2007-09-04 (DoY 247, Rev 597)

JEM-X1 operations executed nominally

2007-09-05 (DoY 248, Rev 597)

At 14:03:06, 14:03:30, and 14:27:46, JEMX parameter K5449 (Hardware Trigger) exceeded its soft limits for 1, 1 and 3 TM cycles respectively. No action was taken and there was no impact.

2007-09-06 (DoY 249, Rev 598) to 2007-09-07 (DoY 250, Rev 598)

JEM-X1 operations executed nominally

8.3.5 OMC Operations

2007-09-01 (DoY 244, Rev 596) to 2007-09-02 (DoY 255, Rev 596)

Nothing to report.

2007-09-03 (DoY 246, Rev 597)

At 21:55, the AOCS commands failed release due to static PTV. A recovery had to be performed, which was completed at 23:08. The impact was the loss of pointings 05970022 & 05970023.

2007-09-04 (DoY 247, Rev 597)

At 19:12, the AOCS commands failed release due to static PTV. A recovery had to be performed, which was completed at 19:49. The impact was the loss of pointing 05970043.

2007-09-05 (DoY 248, Rev 597)

Nothing to report.

2007-09-06 (DoY 249, Rev 598)

At 03:45, the AOCS commands failed release due to static PTV. A recovery had to be performed, which was completed at 04:13. The impact was the loss of pointing 05980003.

At 17:41, the FD slew update failed to arrive. The Timeline was stopped, and a manual recovery performed. The Timeline was rejoined at about 18:15. The impact was the loss of pointing 05980017. It was at this time the following OEMs were received:

2007.249.17.43.51.958	2007.249.17.43.58.754	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					
2007.249.17.43.58.083	2007.249.17.44.06.704	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.

At 23:48, the FD update failed to arrive as foreseen due to a known problem with the guide star. A manual recovery then performed, and the Timeline rejoined at 01:00. The impact was the loss of pointing 05980024. It was at this time the following OEMs were received:

2007.250.00.41.16.972	2007.250.00.41.26.461	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					

Doc. Title	: INTEGRAL Mission Report #259	Issue	: 1
Doc. Ref.	: INT-MOC-SYS-RP-1001-OPS-OAI	Rev.	: 0
Date	: 10/09/07	Page	: 31

2007.250.00.41.23.910	2007.250.00.41.34.487	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.

2007-09-07 (DoY 250, Rev 598)

At 14:08, the FD slew update failed to arrive. The Timeline was stopped, and a manual recovery performed. The Timeline was rejoined at 15:06. The impact was the loss of pointing 05980038. It was at this time the following OEMs were received:

2007.250.15.01.33.001	2007.250.15.01.43.665	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					
2007.250.15.01.39.939	2007.250.15.01.50.675	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					

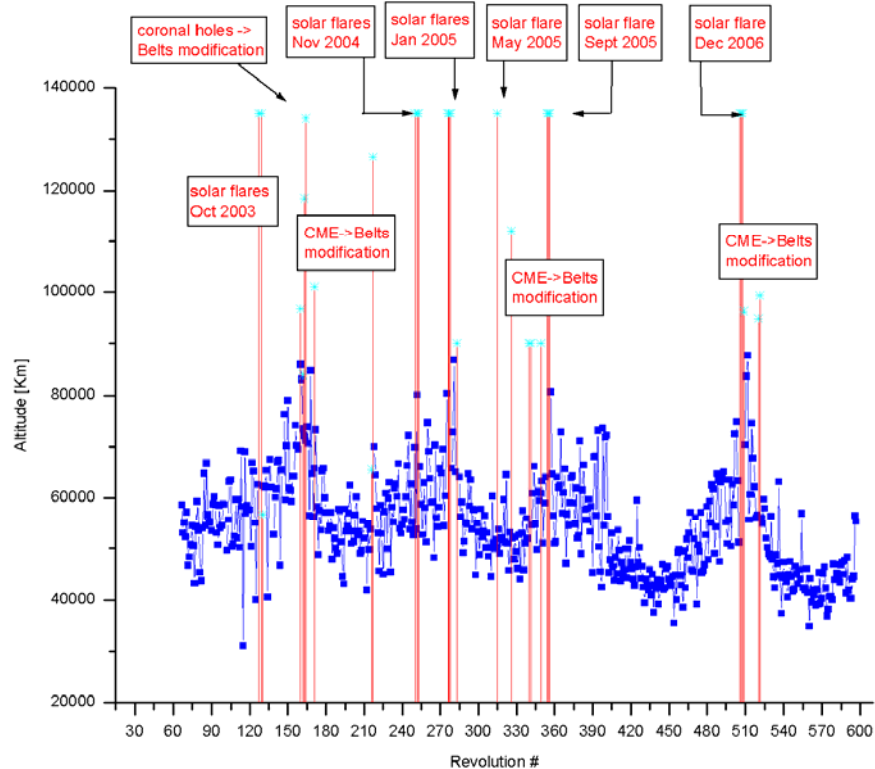
These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing.

On DoY 245 at 15:37:32 and DoY 248 at 15:23:41 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]
596	RAD_ENTR R 2007-09-02T15:37:29Z	02/09/2007 15:45:16	56514.8	02-Sep-2007 16:54:51	45123.36
597	RAD_EXIT R 2007-09-03T01:48:21Z	03/09/2007 00:37:48	>>31429.2	03-Sep-2007 00:44:51	44049.6
597	RAD_ENTR R 2007-09-05T15:23:35Z	05/09/2007 15:26:36	55280.7	05-Sep-2007 16:38:32	45438.06
598	RAD_EXIT R 2007-09-06T01:34:01Z	06/09/2007 00:15:56	>>29806.8	06-Sep-2007 00:28:32	43823.34

Reference

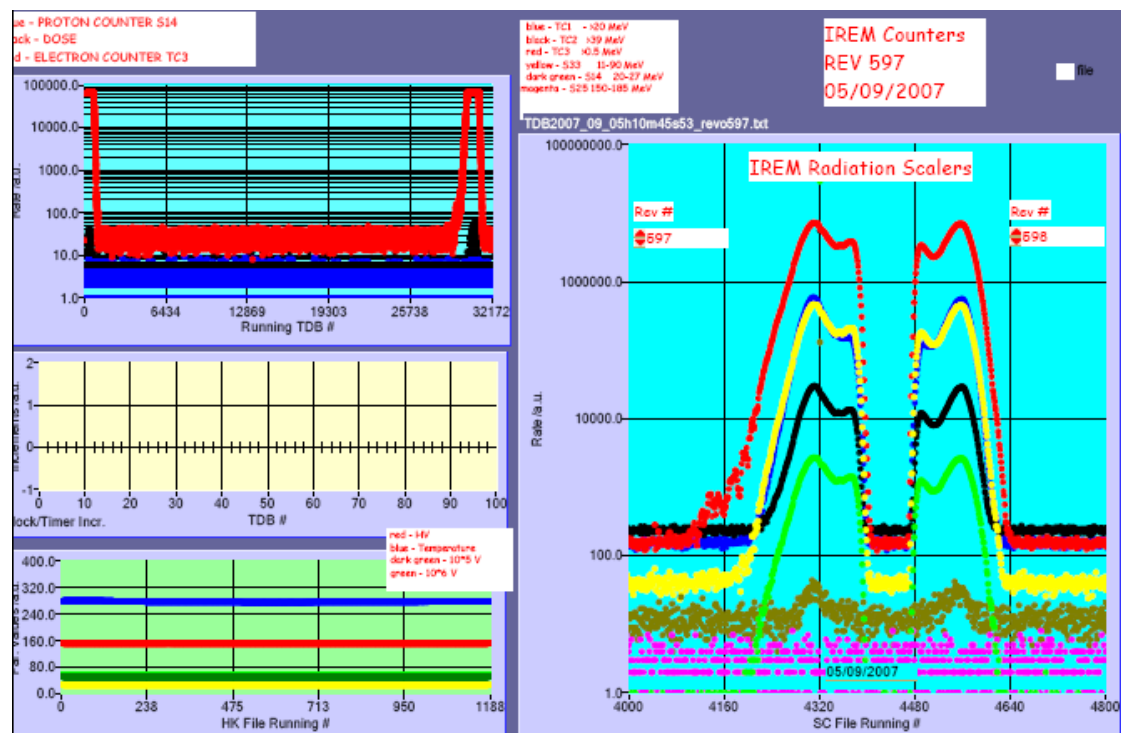
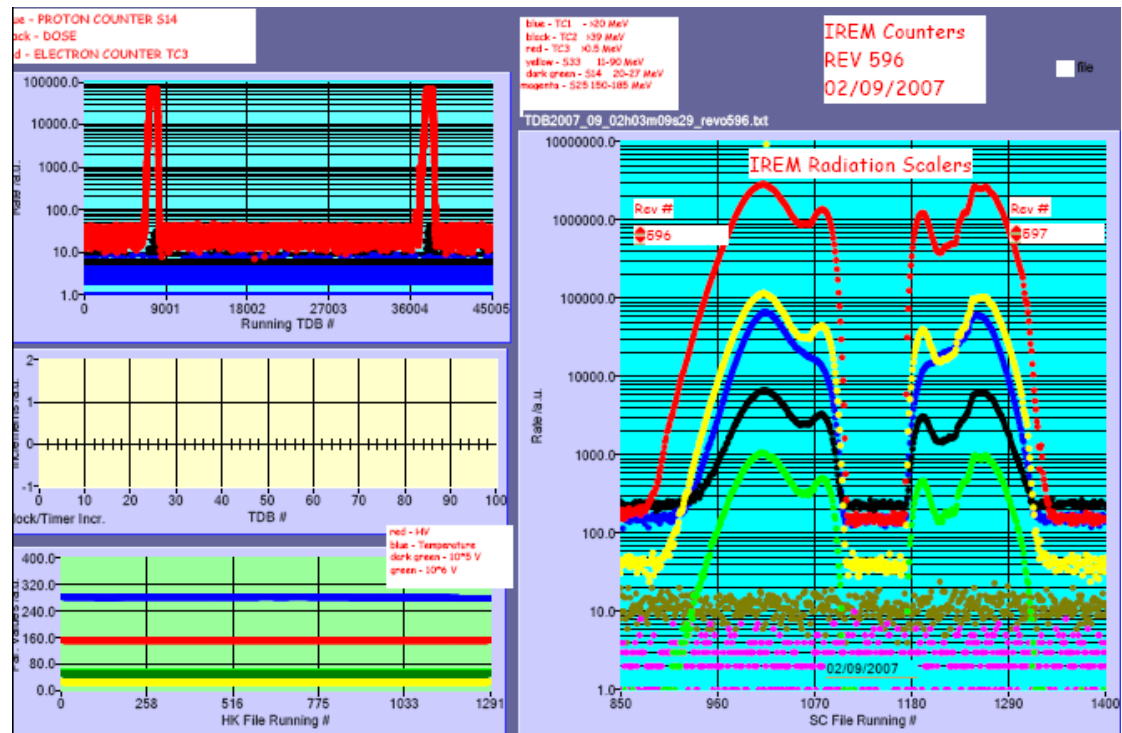
High radiation

Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

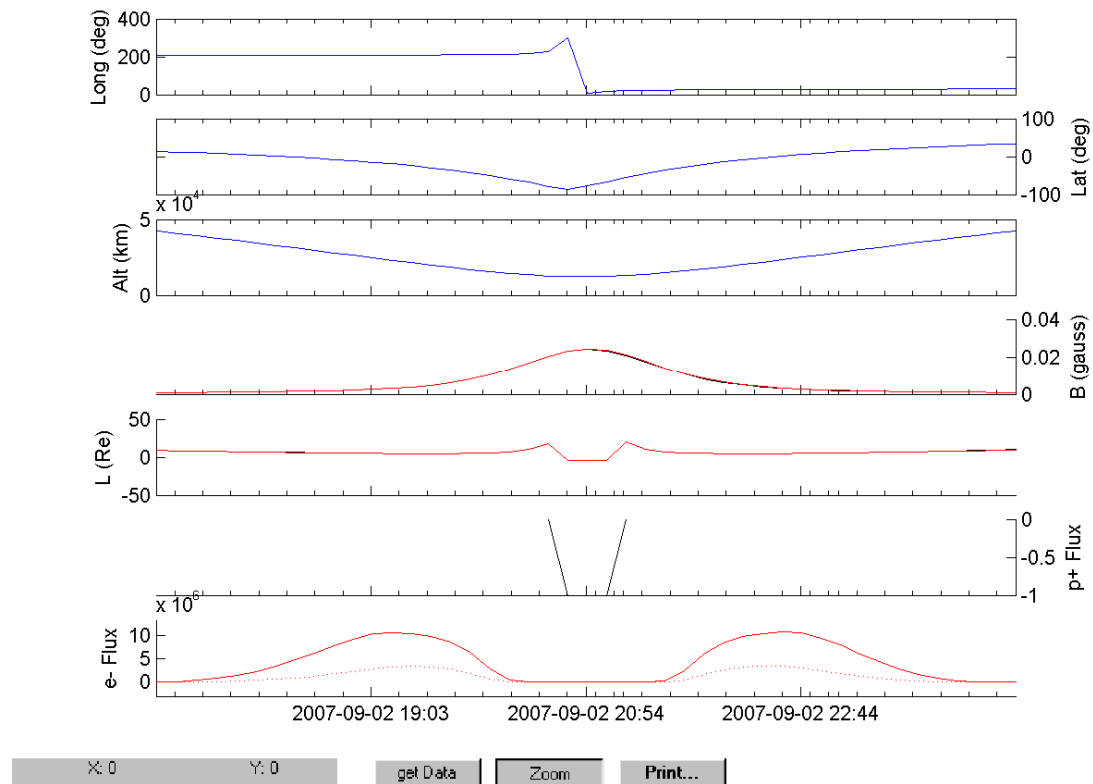
Large error vs reference (more than 30 minutes)

IREM radiation counters:

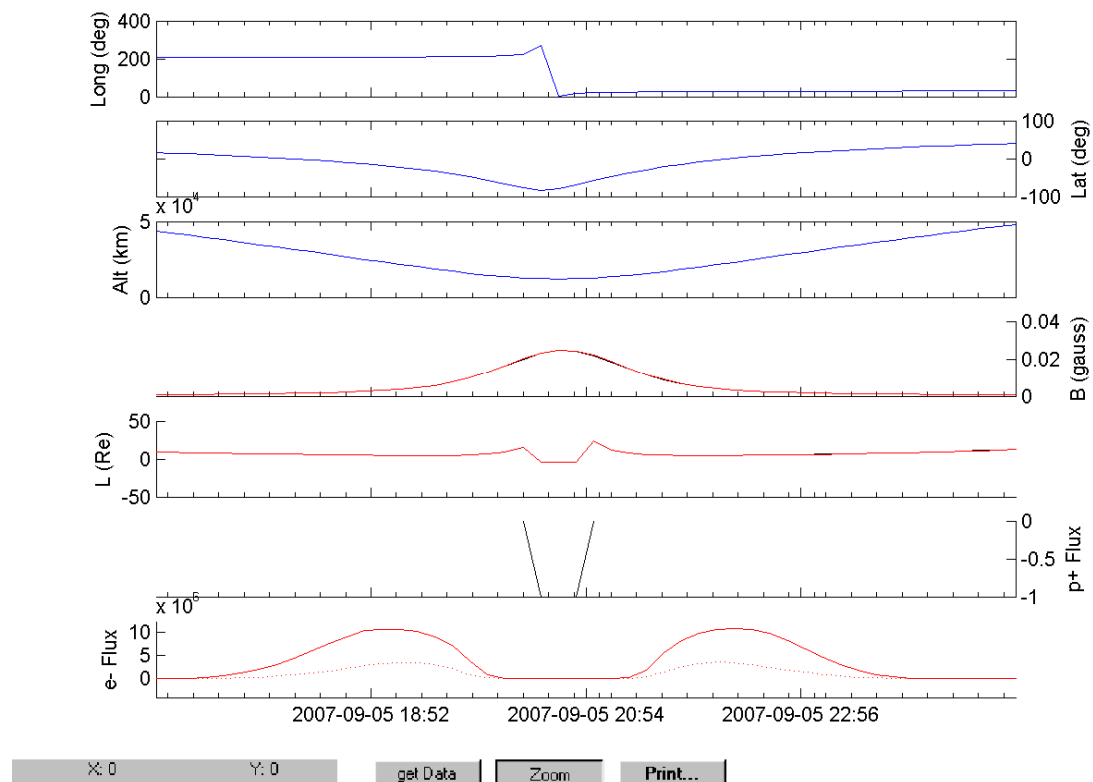


IREM Predicted Radiation Belt Passages

Rev 596



Rev 597



Doc. Title : INTEGRAL Mission Report #259
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 10/09/07

Issue : 1
Rev. : 0
Page : 35

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.