

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 313
Week 38
22.09.08
Routine Phase

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

LIST OF CONTENTS

1	General.....	3
2	Summary of Activities.....	3
3	Satellite Status.....	3
3.1	Platform.....	3
3.1.1	AOCS.....	3
3.1.2	Power.....	3
3.1.3	Thermal.....	4
3.1.4	OBDH.....	4
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	5
3.2.3	JEM-X.....	7
3.2.4	OMC.....	7
3.2.5	IREM.....	7
4	Ground Facilities.....	7
4.1	Mission Operations Centre.....	8
4.2	Ground Stations & Network.....	8
4.3	Science Ground Segment.....	8
4.3.1	ISOC.....	8
4.3.2	ISDC.....	8
5	Special Events.....	9
6	Anomalies.....	9
7	Future Milestones.....	9
8	Appendix.....	10
8.1	Overview of Revolutions.....	10
8.2	Consumables.....	10
8.2.1	Detailed Fuel Book-keeping.....	10
8.3	Detailed Satellite Information.....	11
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 13/09/2008 – 19/09/2008.....	11
8.3.2	SPI Operations.....	17
8.3.3	IBIS Operations.....	22
8.3.4	JEM-X Operations.....	26
8.3.5	OMC Operations.....	28
8.3.6	IREM Operations.....	29

DISTRIBUTION LIST

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

1 General

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

It addresses the activities from 13.09.08 until 19.09.08 (both dates inclusive) and covers the revolutions 723, 724 and 725.

2 Summary of Activities

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

The targets of these revolutions consisted of a raster dither of SS433 (RA 19:11:49.56, DEC +04:58:57.6), a raster dither of X Per (RA 03:55:23.08, DEC +31:02:45.0), two hexagonal dithers of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), two raster dithers of the Galactic Centre (RA 17:45:40.03, DEC -29:00:28.1) 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.

In preparation for the winter 2008 eclipse season, the IMUs 1-2 were health checked, the ACC IMUs drifts evaluated and the RMU-B health checked during rev 724.

As results of the periodic IMUs (1-2) calibration performed on 18/09/2008, the IMUs drift corrections were updated during rev 725.

One slew was missed from TL, during the observation period due to problem on FDS.

The fuel consumption over the period between 13/08/2008 and 19/09/2008 was 0.1082 Kg. The remaining propellant is in the order of 138.4792 Kg.

Note: Some more information concerning the AOCS operations and the fuel budget is provided in the Appendix.

3.1.2 Power

The EPS is working nominally; available power from the arrays is of the order of 2100W.

3.1.3 Thermal

The thermal control of the satellite is working well. The temperatures are currently all within the specified operational limits.

3.1.4 OBDH

The OBDH subsystem is working flawlessly. No on-board communications problem has been identified.

The PST was over-subscribed by 3 packets, which were allocated to SPI during the Instrument window for the entire reporting period.

3.1.5 RFS

The RF subsystem is working properly. The link margin is sufficient to ensure proper TM reception and execution of commands with the ranging channel enabled.

3.2 Payload

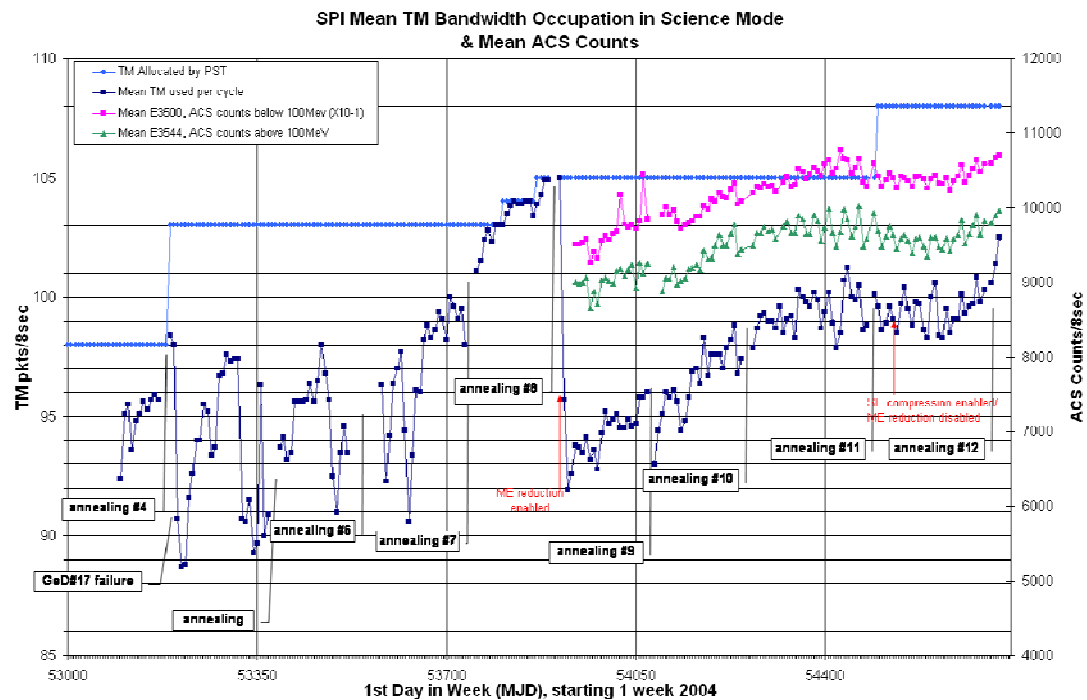
3.2.1 SPI

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

The Stirling compressors are working nominally, maintaining the Germanium detectors at 80 +/-1K since the end of annealing.

During science operations, the instrument was kept in photon-by-photon mode with spectra TM enabled. The assigned TM bandwidth in the science observation windows was 108 packets/cycle and the average telemetry occupation was 102.5 packets/cycle.

The following plot shows the evolution of the assigned and the average occupation of the SPI TM bandwidth along with the mean ACS count rate evolution (since July 2006). As can be seen, there is a strong correlation between the evolution of the background as measured by the ACS and the overall TM bandwidth usage.



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

3.2.2 IBIS

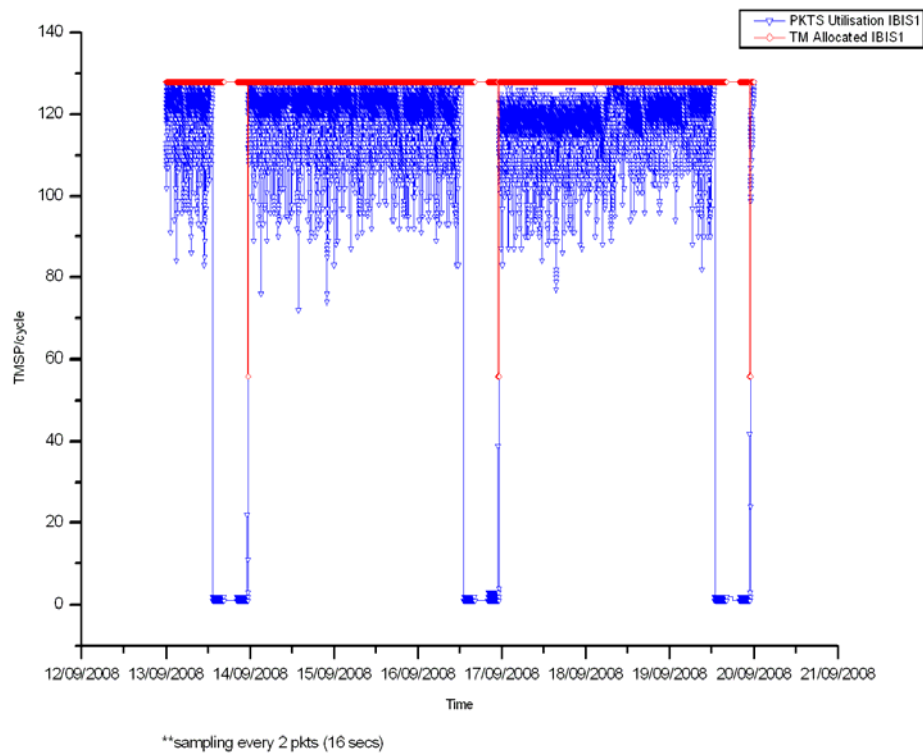
The overall status of the unit is nominal.

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

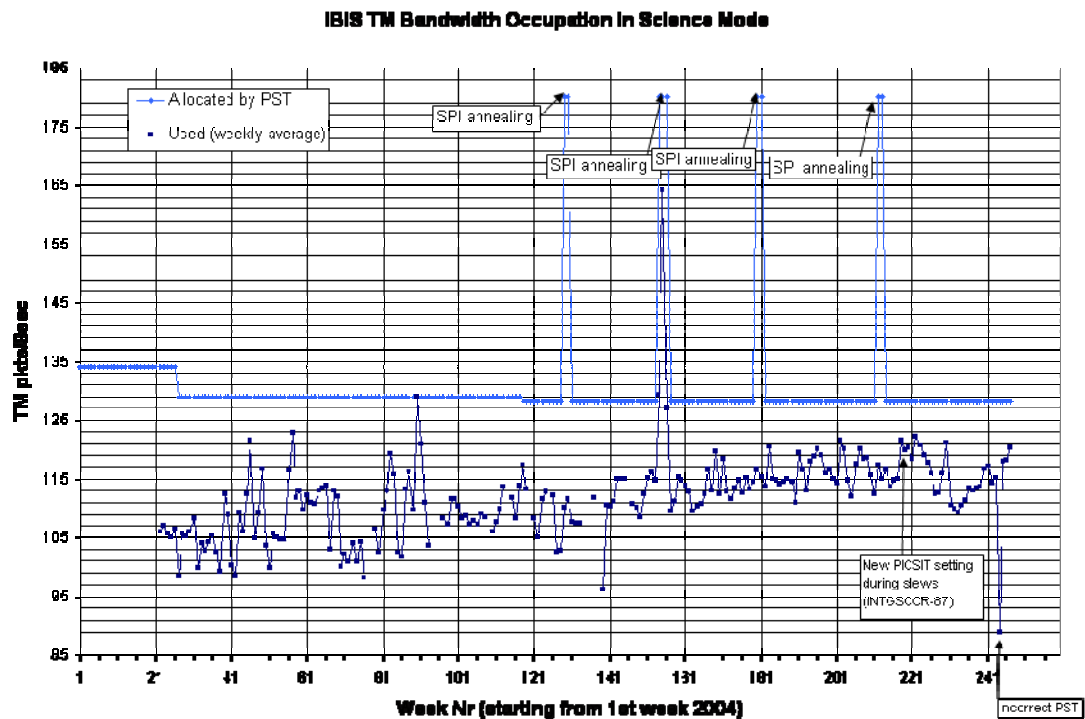
- PST allocation to IBIS above radiation belts: 128 packets/cycle
- IBIS mean bandwidth utilisation in science mode: 120.36 packets/cycle (up 2.21 on previous week)
- Percentage of TM cycles in which full bandwidth was used: 9.44%

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

IBIS - TM Bandwidth Utilisation Rev 722-725



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, 228 of the 229 planned science pointings were executed nominally, 1 started late.

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, with the threat of solar flares 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 good this week. One pointing delayed to ground problems. The overall performance was well above the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. A problem with the FDS job scheduler caused a pointing to start late.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were five link drops or missing source packets reported from Redu, and one drop in the link to the isds, all without impact.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

A new PSF has been received for revolution 731.

Revolutions 727 and 728 have been planned with Crab calibrations. 727 and most of 728 contain 5x5 Sequential pattern observations; a 10 ksec JEM-X dedicated staring observation has been planned in the middle of 728. During 727 and 728 both Jem-X instruments are operating.

New TSF has been received for revolutions 725.

2. Observation status

ECS files for revolution 716-718 were received and processed.

3. ISOC Science Data Archive

No news; usual activity (database updates).

4. ISOC system

ISOC system v19.4.1 has been released on the test system, to solve mainly the problem with the amalgamation of 5x5 Seq observations.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 22/09/2008:

- Latest Standard Analysis completed: observation 05200320003 (X Per, Revolutions 715-716) on 22/09/2008.

- Latest products archived: observation 05200320003 (X Per, Revolutions 715-716) on 22/09/2008.

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

5 Special Events

6 Anomalies

The following problems were reported this week that impacted operations.

- On DoY 259, at 06:24:36, an AOCS command (A3189 Start Guide Star) failed release owing to no guide star present. This was caused by a crash of the FDS job scheduler. A recovery was performed, and the Timeline rejoined at 06:50:55. The impact was a 15 minute delay in the start of the pointing 02730058.

The following anomaly reports were entered into the ARTS system this week.

AR id	Date Created	Subject	Segment	Status
INT-3025	2008-09-09	DSS-27 data gap (2mins) due to comms problem	NASA Station	Pending
INT_SC-235	2008-09-17	IREM Anomaly: Reset of IREM_CSCI S/W #66, 07/09/2008	Payload	Pending

7 Future Milestones

- The next crab calibration is due to start on the 25th September 2008, during revolution 727.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 723

The observations in revolution 723 consisted entirely of a raster dither of SS433 (RA 19:11:49.56, DEC +04:58:57.6), lasting ~56.0 hours.

Revolution 724

The observations in revolution 724 began with a raster dither of X Per (RA 03:55:23.08, DEC +31:02:45.0), lasting ~28.0 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. This was followed by a raster dither of the Galactic Centre (RA 17:45:40.03, DEC -29:00:28.1), lasting ~16.4 hours. Finally, a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), lasting ~6.0 hours, was executed, until the end of the revolution.

Revolution 725

The observations in revolution 725 began with a hexagonal dither of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. This was followed by a raster dither of the Galactic Centre (RA 17:45:40.03, DEC -29:00:28.1), lasting ~54.1 hours, until the end of the revolution.

Throughout these observations, all instruments were in their nominal science modes, except JEM-X2, which is switched off. The TM allocation was IBIS 128; SPI 108; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2008-08-30T04:17:37.000Z	138.8274	F	Automatic TM processing.
2008-09-01T07:47:59.000Z	138.7863	F	Automatic TM processing.
2008-09-01T21:41:44.000Z	138.7720	F	Automatic TM processing.
2008-09-02T04:02:57.000Z	138.7597	F	Automatic TM processing.
2008-09-03T05:41:32.000Z	138.7258	F	Automatic TM processing.
2008-09-04T21:28:32.000Z	138.7128	F	Automatic TM processing.
2008-09-05T03:51:44.000Z	138.6712	F	Automatic TM processing.
2008-09-07T21:18:31.000Z	138.6576	F	Automatic TM processing.
2008-09-09T06:51:31.000Z	138.6108	F	Automatic TM processing.
2008-09-10T21:08:31.000Z	138.6016	F	Automatic TM processing.
2008-09-12T06:38:11.000Z	138.5874	F	Automatic TM processing.
2008-09-13T20:52:39.000Z	138.5780	F	Automatic TM processing.
2008-09-15T06:09:55.000Z	138.5450	F	Automatic TM processing.
2008-09-16T20:41:12.000Z	138.5320	F	Automatic TM processing.
2008-09-18T05:54:03.000Z	138.5122	F	Automatic TM processing.

This report was generated Fri Sep 19 08:00:26 GMT 2008

8.3 Detailed Satellite Information

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

8.3.1 AOCS SUMMARY OPERATIONS REPORT, 13/09/2008 – 19/09/2008

The AOCS operations were executed from the Automatic Timeline.

During this period, 124 Open Loop Slews, 121 Closed Loop Slews and 6 Momentum Biases were executed (as reported by ACC).

1 slew (CSL) was missed from TL, during the observation period due to problem on FDS (job scheduler crash).

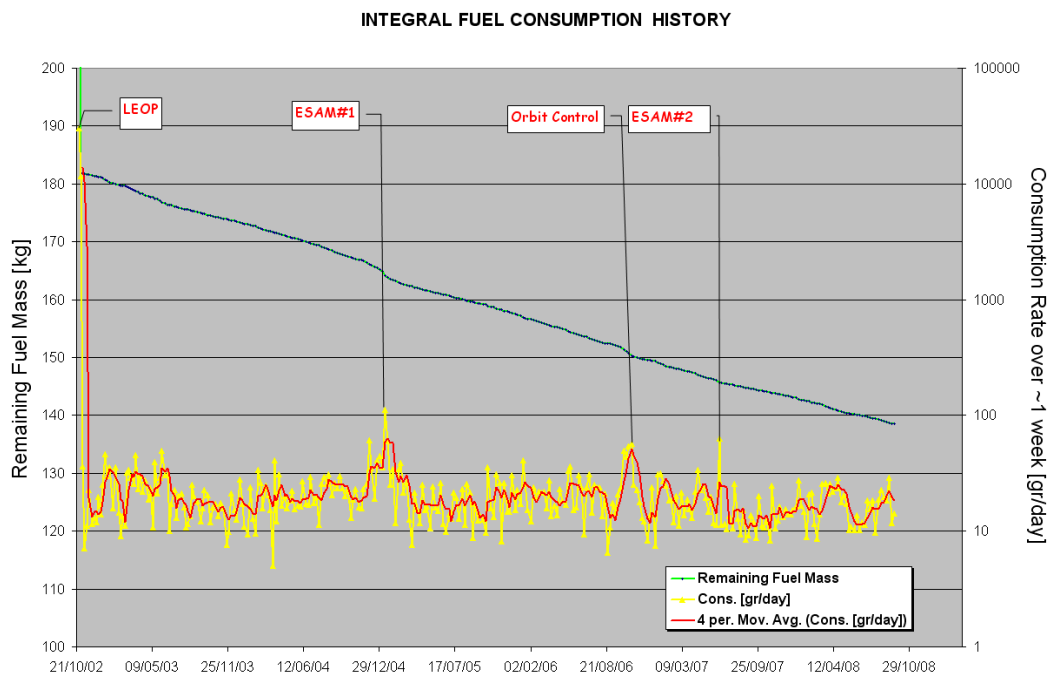
This is equivalent to $\sim 0.4\%$ of the total number of slews planned (245).

Orbit Control

No update

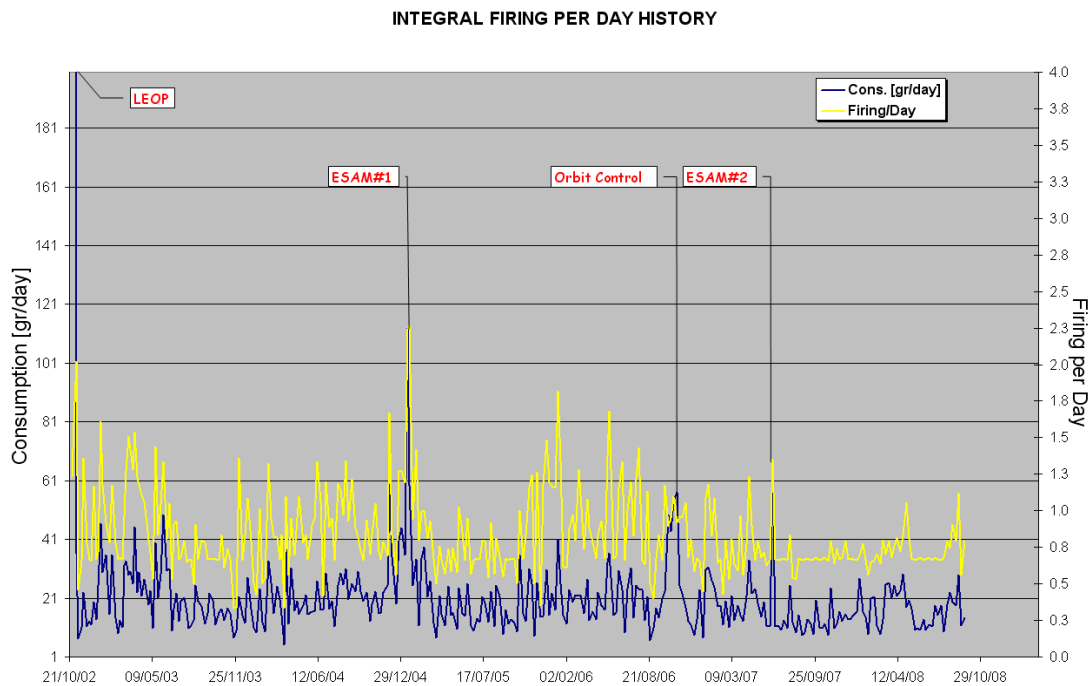
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 19/09/2008 is reported in the plot below.



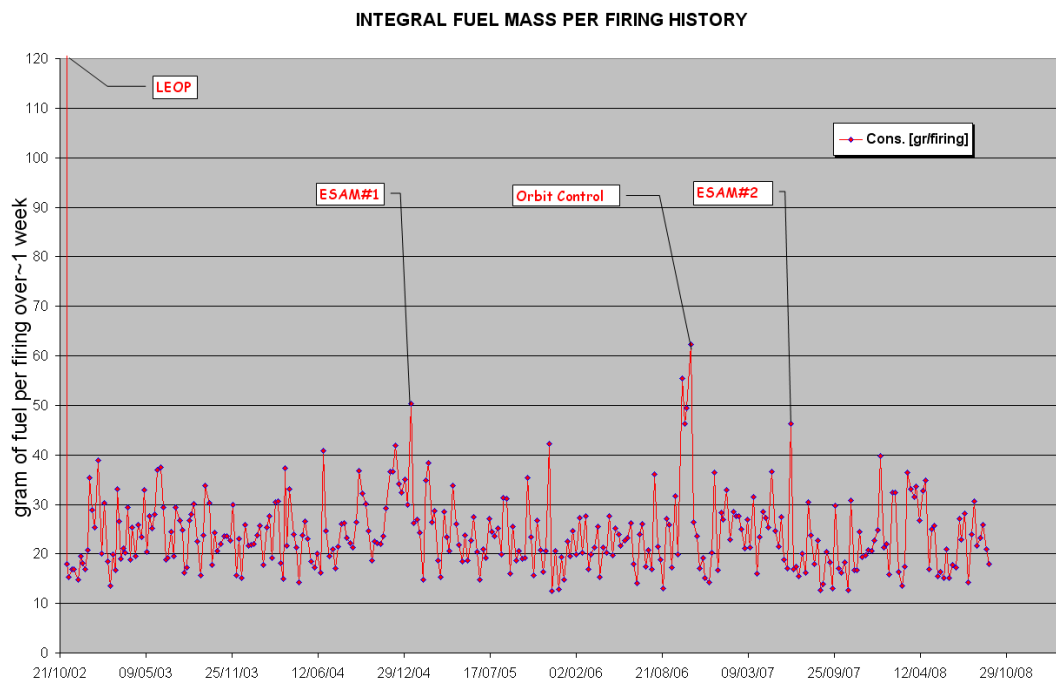
The above plot considers the ESAM fuel consumption spread over period of ~ 1 week.

The firing per day over the period between 01/11/2002 and 19/09/2008 is reported in the plot below.



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

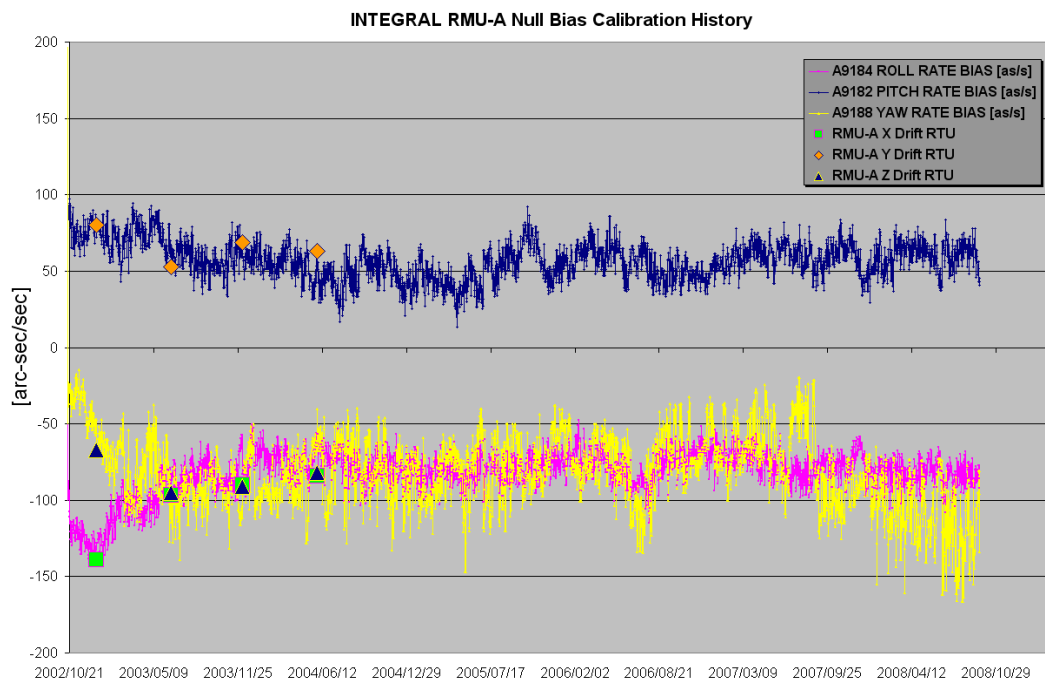
The fuel per firing over the period between 01/11/2002 and 19/09/2008 is shown in the plot below.



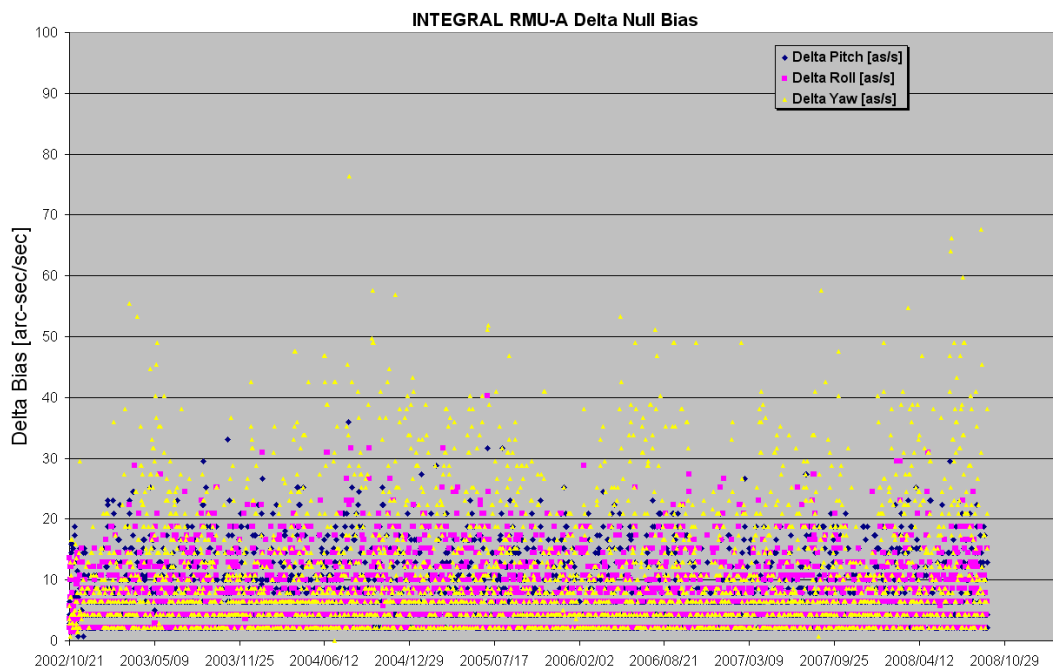
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 19/09/2008 is reported in the plot below.

The evolution of the drift on yaw channel is under constant monitoring but the values are still well within the specs. At moment the current constraints (for drift update generation) on the FDS have been relaxed to cope with the current situation.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 19/09/2008 is reported in the plot below.



13/09/2008 (Day of Year 257, Revolution 722-723)

Nothing to report.

14/09/2008 (Day of Year 258, Revolution 723)

Nothing to report.

15/09/2008 (Day of Year 259, Revolution 723)

FDS problem on job scheduler task: at 06:24z the FDS did not perform the update of the slew ID 07230058. The PTV for TC A3189 (Start Guide Star) reported this problem preventing the slew ID 07230058 to be uplinked from the Autostack.

The FDS likely reported an overload on the machine where running the job scheduler; causing the task to die. This was verified by FD later.

A manual recovery was performed from attitude of PID 07230057 to the attitude of PID 07230058.

The next slew 07230059 was manually updated in TL.

The following slew was missed in TL: 07230058 (CSL)

16/09/2008 (Day of Year 260, Revolution 723-724)

Nothing to report.

17/09/2008 (Day of Year 261, Revolution 724)

Nothing to report.

18/09/2008 (Day of Year 262, Revolution 724)

Winter 2008 Eclipse Season preparation: in preparation for the winter 2008 eclipse season the ACC IMU 1-2 drifts were evaluated and the RMU-B health checked during rev 724.

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

Time(Z) 18/09/2008	IMU 1 IMU 2 Health-Check / Calibration and RMU-B Health Check	
08:33	<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>	Step 1, IMU1 and RMU-B PID 07240063 Start at 08:27:54Z End at 08:54:32Z
08:39:48	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= 14.33 degC T6010= 11.33 degC T6011= 26.00 degC T0052= 15.77 degC T0028= 17.31 degC
09:05:17	RMU-B switch On, FCP-AOC-1902 <i>Verify the S/C X,Y,Z rates are consistent with those of RMU-A and IMU1 roll and yaw channels</i>	
	IMUs warm-up time (>30 minutes)	
	Set IMU Selection	PID 07240064

09:11 09:18	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	Start at 08:59:50Z End at 09:26:28Z (AOCS TL commanding start)
09:37:09 09:37:42	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 07240065 Start at 09:31:46Z End at 09:57:27Z (AOCS TL commanding start)
09:37:09 to 10:00:00	<30 minutes of data collection From FCT: IMU1 Noise Roll = [03101] 0.3975(0.2228) as/s IMU1 Drift Roll = [0.3038]0.3043 (0.3033) as/s IMU1 Noise Yaw = [0.1705] as/s IMU1 Drift Yaw = [0.3117] as/s	Calculated by FD: => 0.3043 as/s => 0.3156 as/s Stable pointing: PID 07240065 T6009= 17.31 degC T6010= 11.67 degC T6011= 28.00 degC T0052= 18.08 degC T0028= 23.75 degC Altitude >150TKm
10:08	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 07240066 Start at 10:03:42Z End at 10:30:20 (AOCS TL commanding start)
10:13	Deselect IMU1 from FDE, FCP-AOC-1218 <i>Set NOT SELECT on Roll, NOT SELECT on Pitch, NOT SELECT on Yaw</i>	
10:19:24	Switch Off IMU1, FCP-AOC-1601 <i>Remark: report the IMU1 on-time in the log</i>	T6009= 18.08 degC T6010= 11.67 degC T6011= 26.00 degC
10:24	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>	
10:27:00	RMU-B switch Off, FCP-AOC-1903	T0052=19.62 degC T0028=26.00 degC
Thermal stabilisation after IMU1 Switch Off (> 2 hours) PID 07240067-68-69-70 10:30:00 – 13:00:00		
13:00	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 07240071 Start at 12:54:41Z End at 13:48:21Z
13:05:01	IMU2 Switch On, FCP-AOC-1602 <i>Remark for procedure AOC-1602: Step 2.2.1 is not requested to check if IMU1 is selected for YAW. If for any reason during the calibration, the guide star is lost the controller will switch ON the IMU1: then 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</i>	T6009= 13.67 degC T6010= 10.67 degC T6011= 29.00 degC
	Set IMU Selection	

13:09 13:15	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 13:48:21Z)
	IMU warm-up time (>30 minutes)	
14:01:00	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 07240072 Start at 13:54:52Z End at 14:49:29Z (AOCS TL commanding start)
14:01:00 to 14:49:00	>30 minutes of data collection From FCT: IMU2 Noise Roll = [0.4035] (0.3931) (0.414) as/s IMU2 Drift Roll = [0.1258] (0.1283) (0.1233) as/s IMU2 Noise Yaw = [0.0364] (0.0336) (0.0392)as/s IMU2 Drift Yaw =[- 0.0232] (-0.0250) (-0.0214)as/s Calculated by FD: => 0.1322 as/s => -0.0201 as/s	Stable pointing: PID 07240072 T6009= 15.77 degC T6010= 10.33 degC T6011= 24.58 degC Altitude >140TKm
15:00	Deselect IMU2 from ACC Word B, FCP-AOC-1050 <i>Set NO IMU on Roll, NO IMU on Yaw</i>	PID 07240073 Start at 14:54:47Z End at 15:48:27Z
15:03	Deselect IMU2 from FDE, FCP-AOC-1218 <i>Set NOT SELECT on Roll, NOT SELECT on Pitch, NOT SELECT on Yaw</i>	
15:05:01	Switch Off IMU2, FCP-AOC-1603 <i>Remark for the SOE: report the IMU2 on-time in the log</i>	T6009= 16.92 degC T6010= 10.33 degC T6011= 29.50 degC
15:14	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>	

19/09/2008 (Day of Year 263, Revolution 724-725)

IMUs drifts update: following the IMU 1-2 calibration, in preparation of the summer 2008 eclipse, the ACC IMUs drift corrections were updated at the beginning of rev 725.

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 0725_0001_M.DRA):

IMU-1-X= 0.3043 arcsec/sec
 IMU-1-Z= 0.3156 arcsec/sec

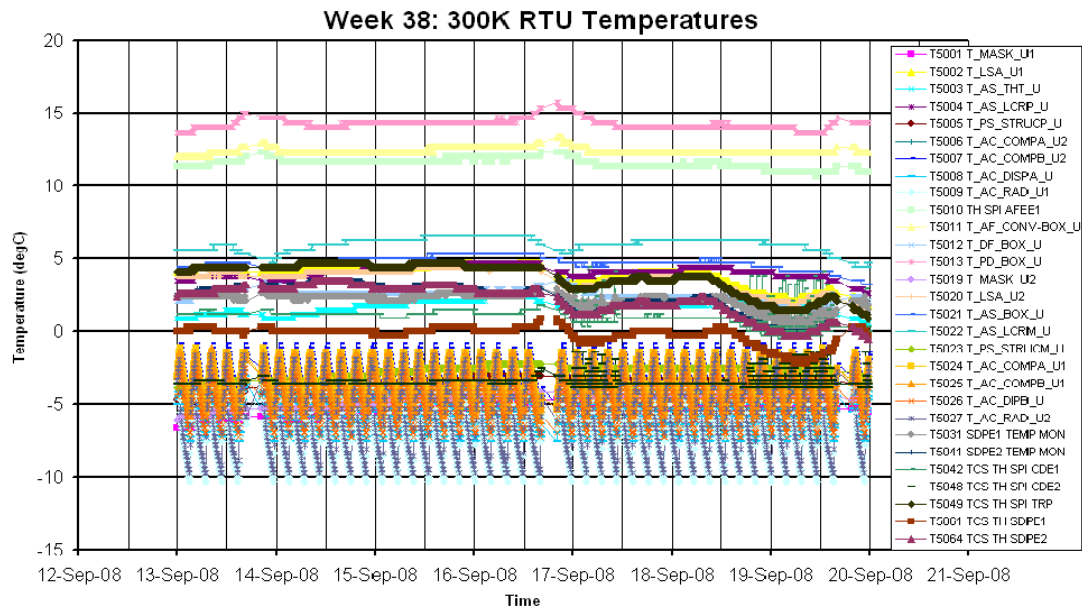
IMU-2-X= 0.1322 arcsec/sec
 IMU-2-Z= -0.0201 arcsec/sec

IMU-3-Z= 0.0.0969 arcsec/sec

IMU-4-X= 0.0079 arcsec/sec

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.

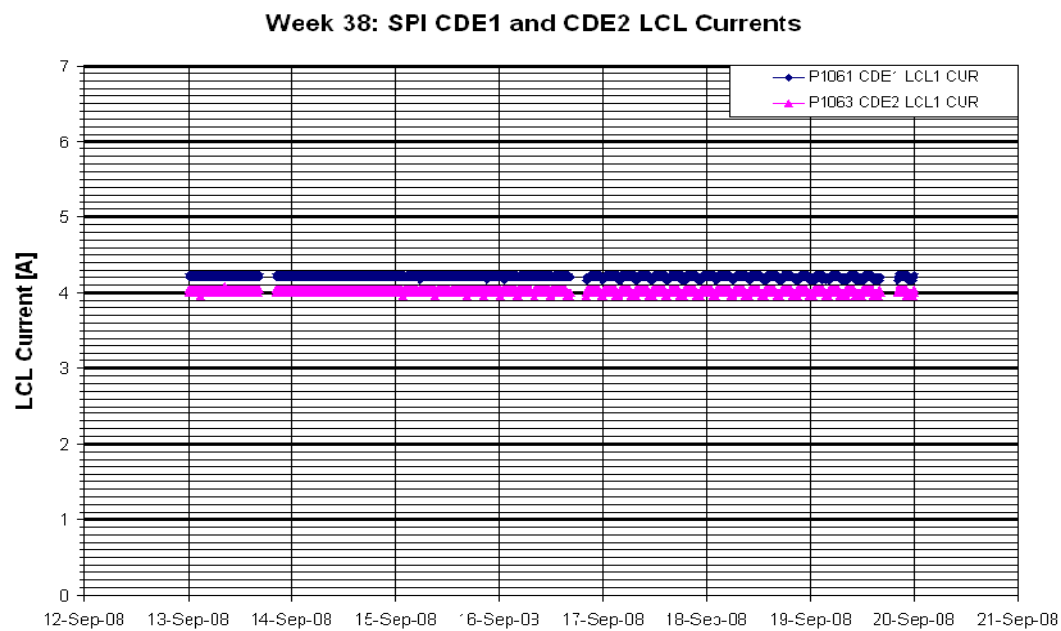


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

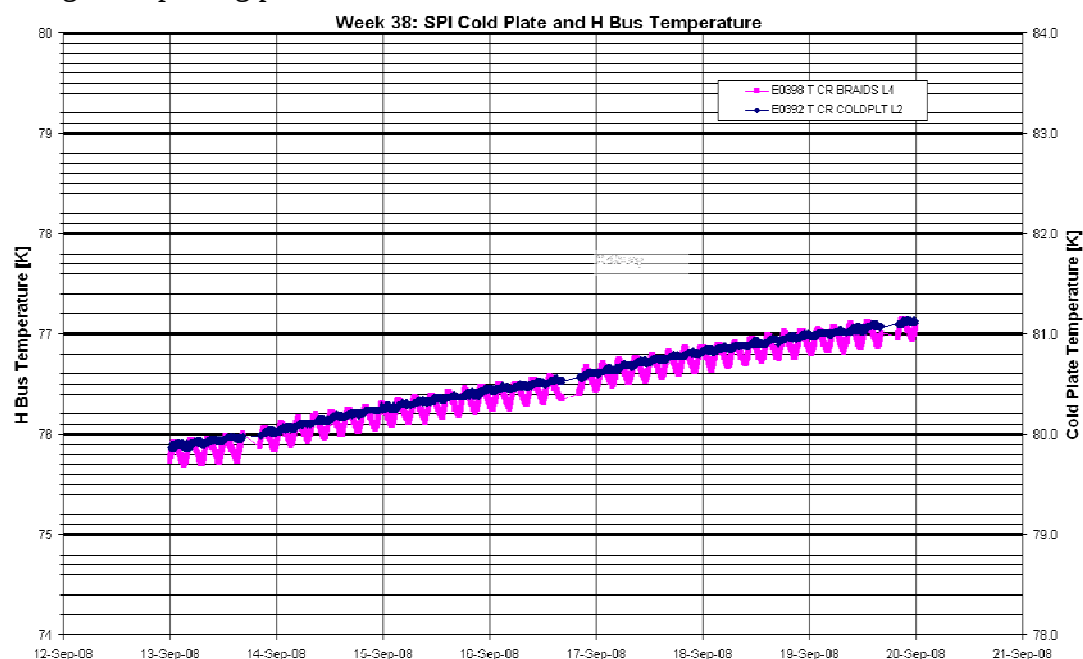
The stroke of all four compressors was set to 37 throughout the week. The average CDE LCL currents were as follows:

- CDE1 LCL Current = 4.21A
- CDE2 LCL Current = 4.01A

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



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

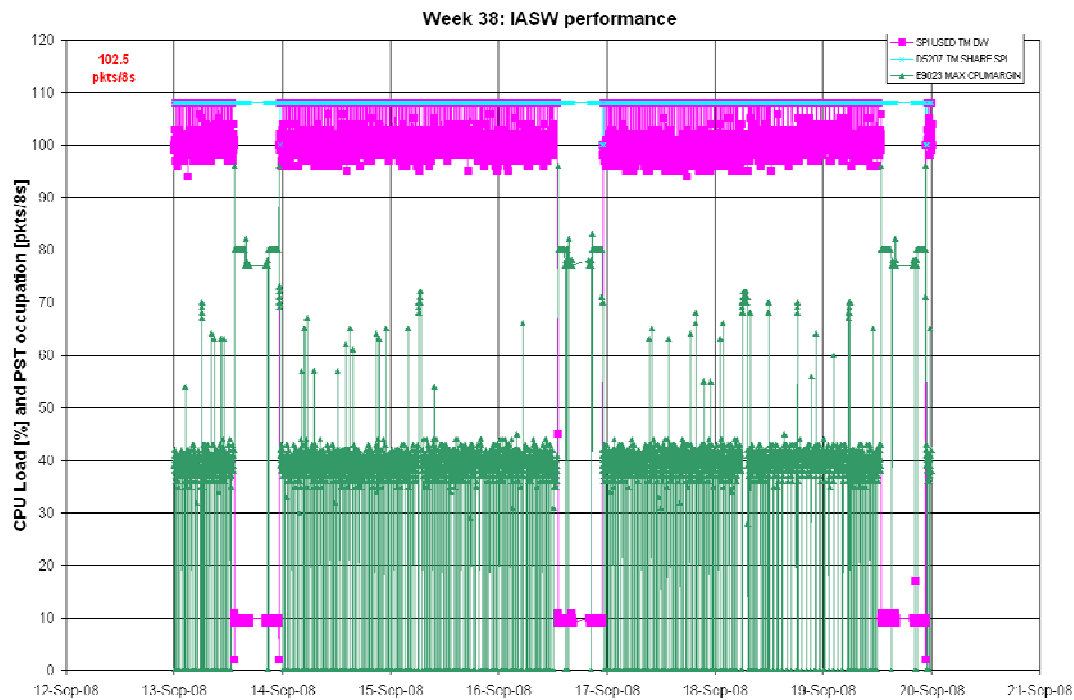


DPE & IASW: The DPE health and IASW performance are nominal.

The IASW version installed is v4.3.4 with SE compression only enabled and the spectra scaling factor set to 8/19 SE.

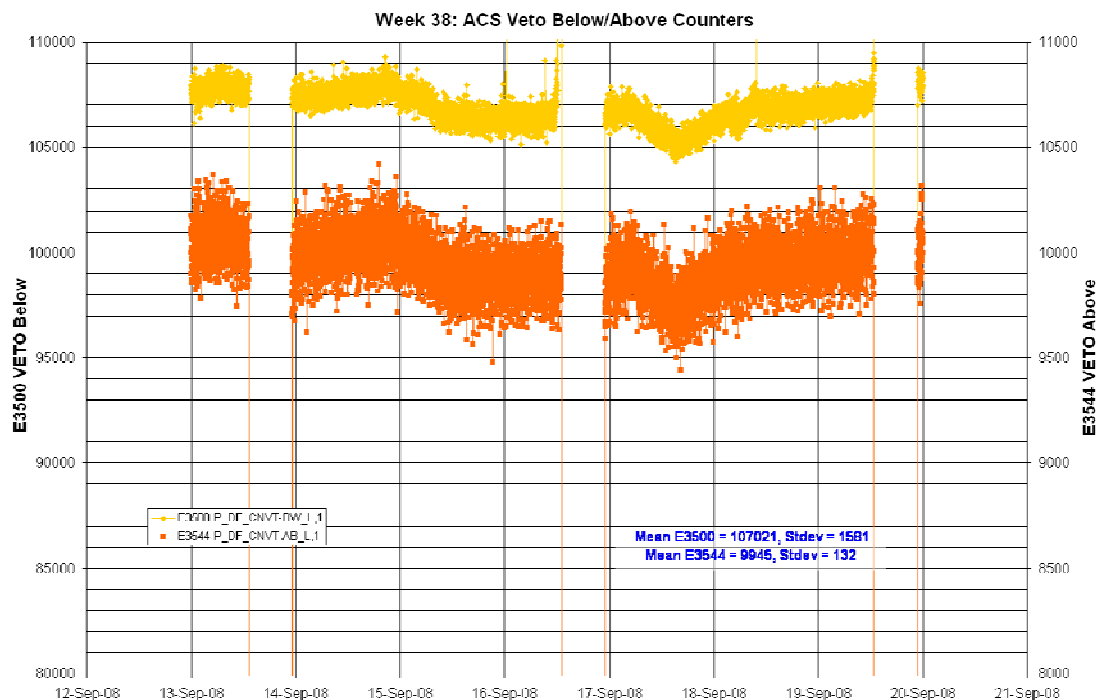
The average TM bandwidth occupation of SPI was 102.5 packets/cycle over the science window when the TM allocation was 108 packets/cycle.

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

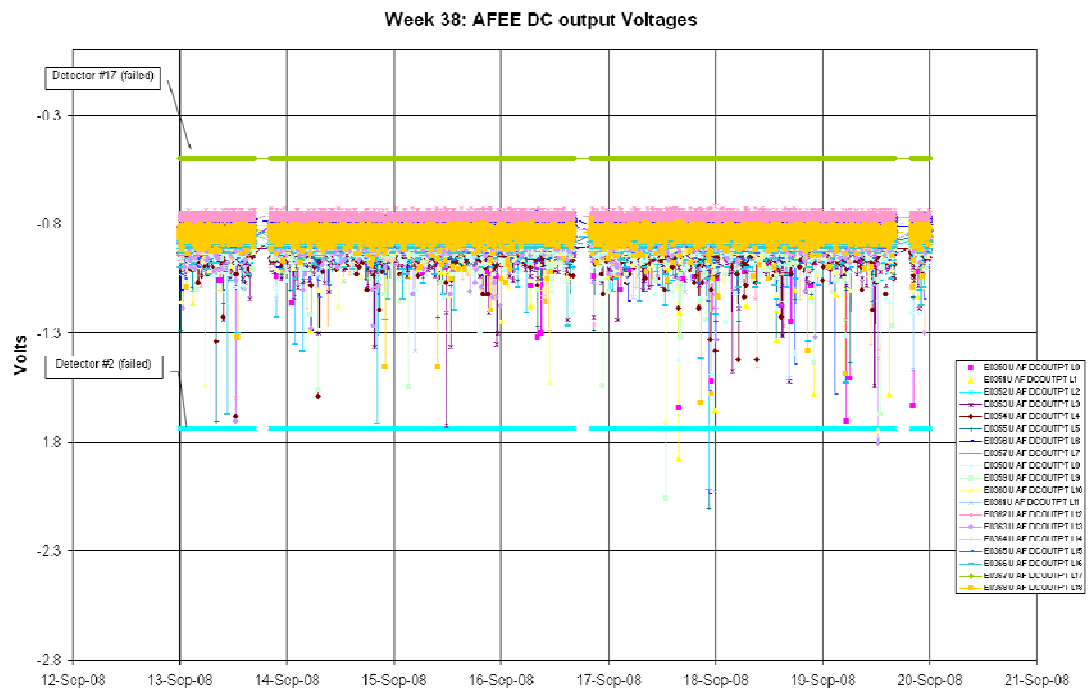


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

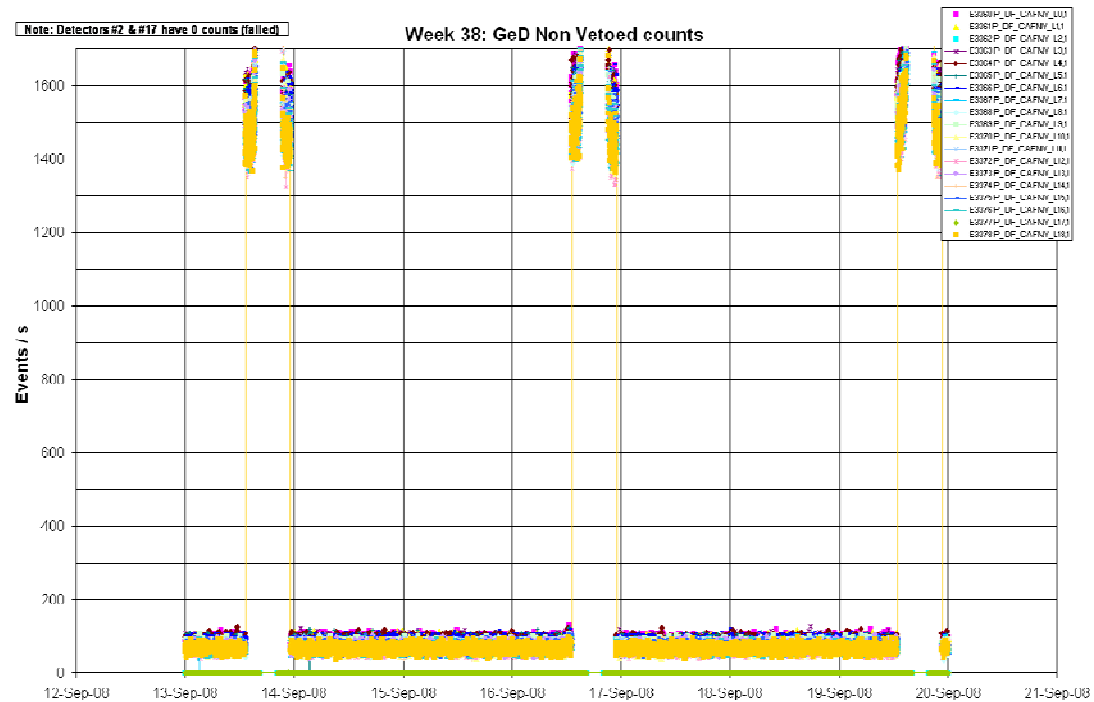
The following plot shows the ACS overall count rate evolution during the reporting period:

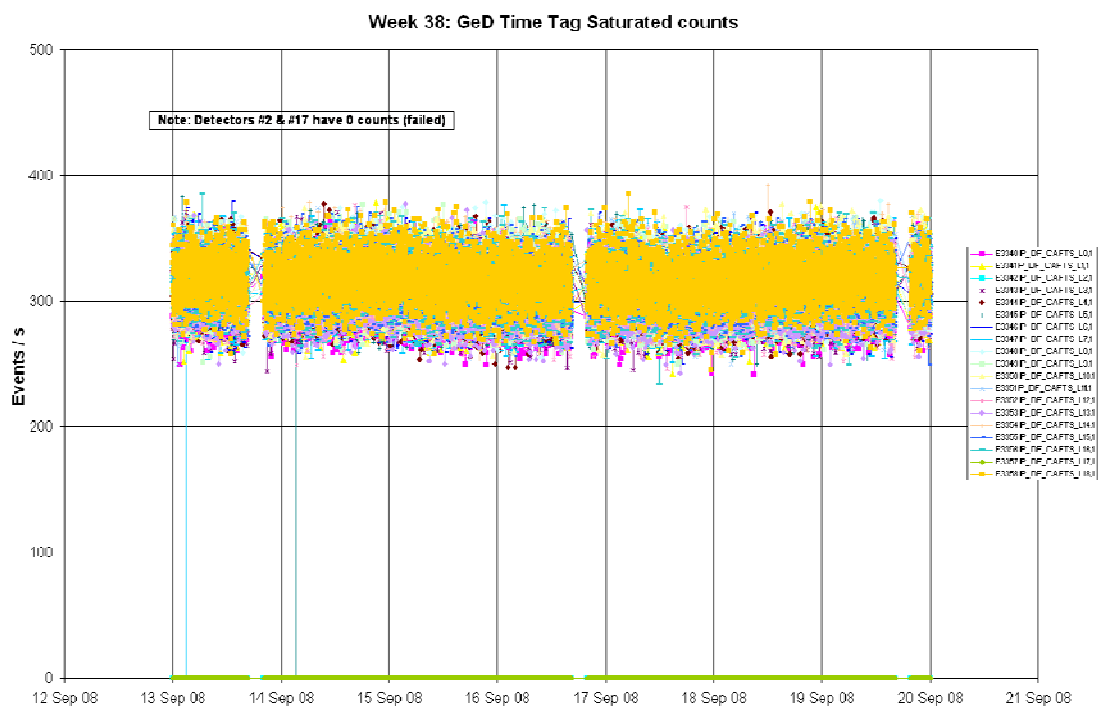
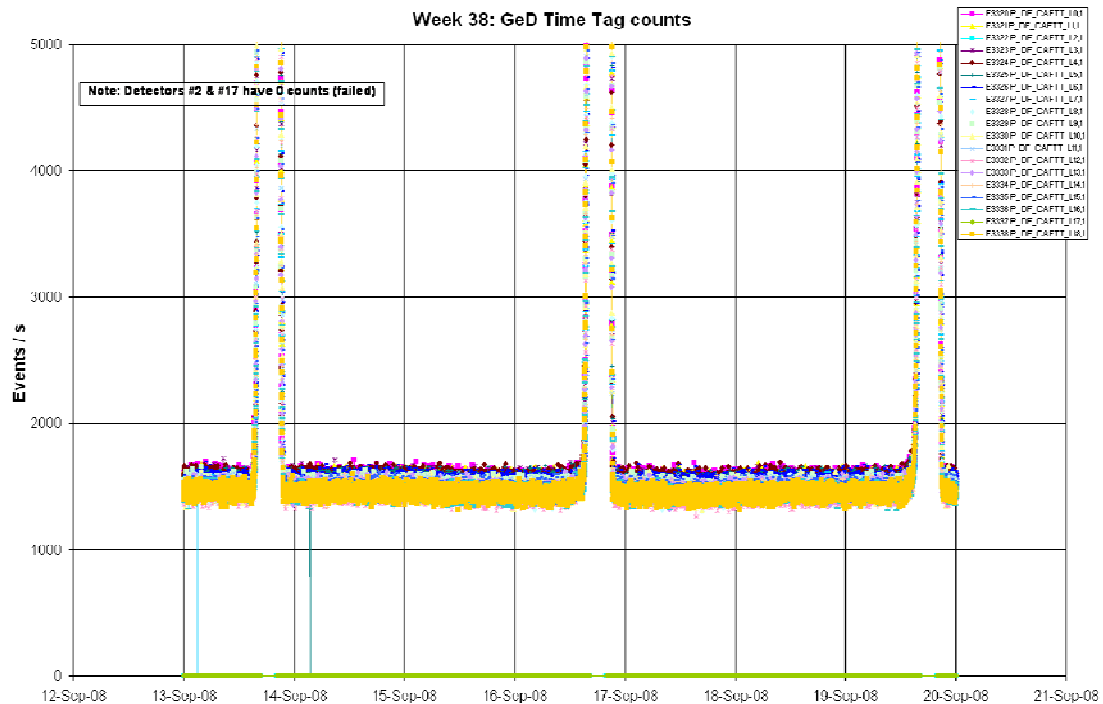


AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.

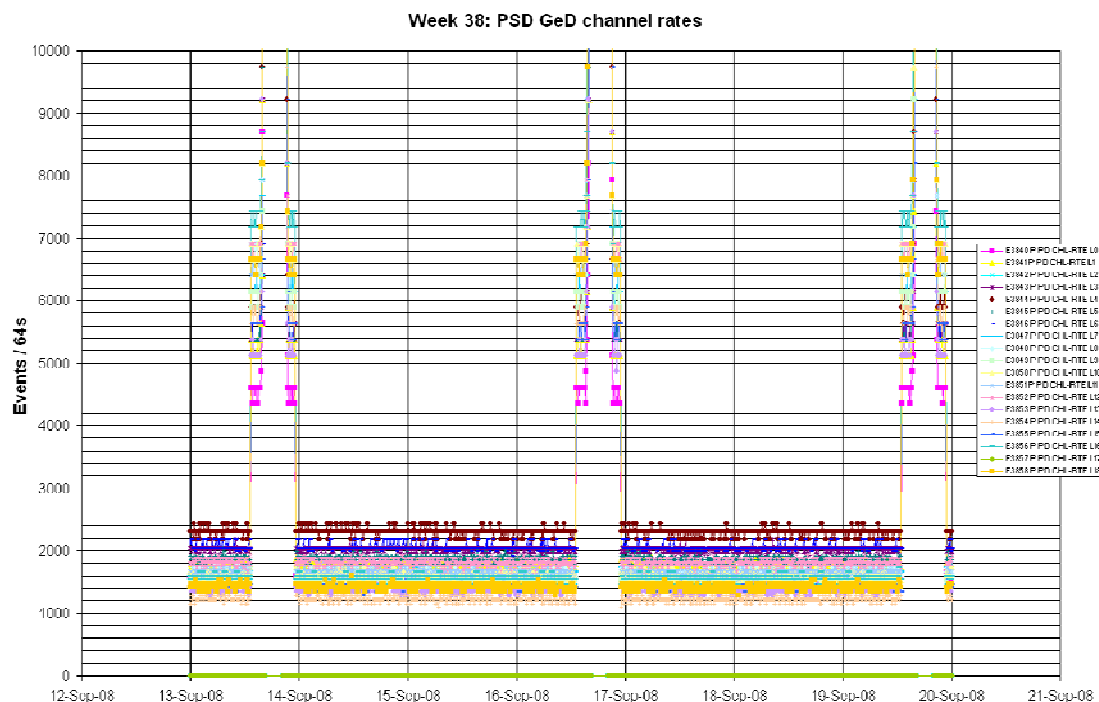


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event count rates during the reporting period.





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



Event Log:

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

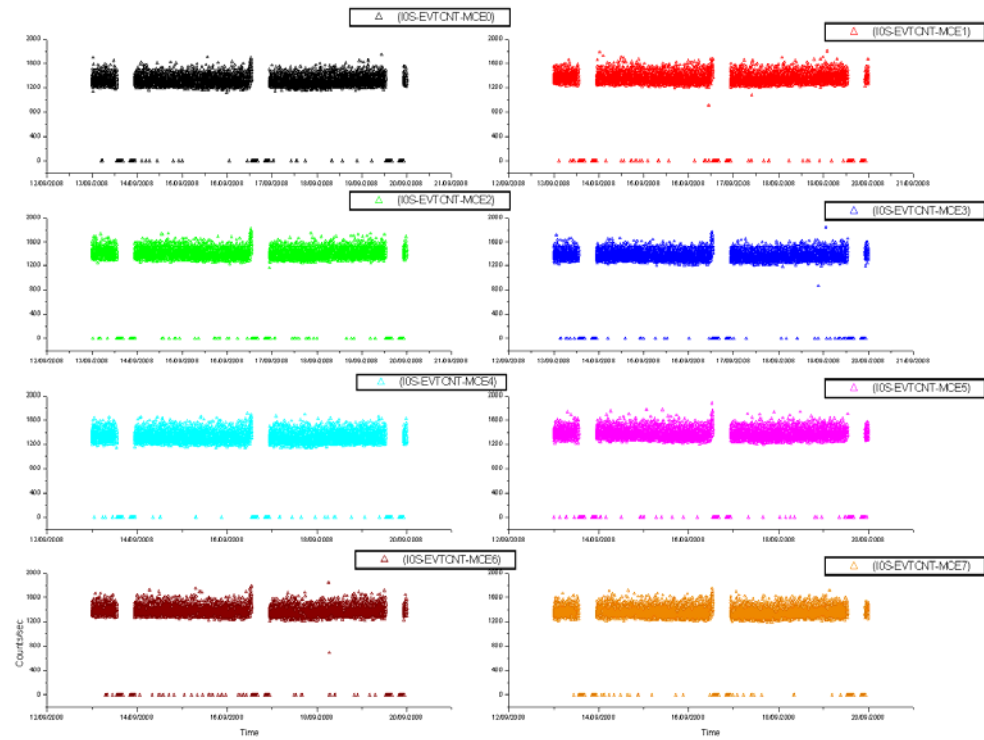
- On 2008-09-13 at 13:15:53Z (packet generation time), at radiation belt entry of revolution 722, TM parameters E0500 to E0592 went OOL STATUS (value = ON). These are the ACS FEE HV On:Off Status. The OOL was due to the fact that the building of this packet started prior to radiation belt entry, however the packet was received after radiation belt entry, when the FEE HV status should be OFF. As they returned within limits of their own accord (value = OFF) when the next packet was received at 13:19:29Z, no action was taken.
- On 2008-09-15 at 01:52:54Z TM parameters E1296 and E1297 went OOL (value = ERROR STATUS), indicating an ISB response parity error and ACS FEE Configuration error respectively. As they returned within limits of their own accord at 01:53:02Z, no action was taken.
- Due to slightly high radiation before the expected radiation belt entry of revolution 723, TM parameter E3500 (ACS CntVetoBelow) toggled OOL High on 2008-09-16 from 12:34:51Z until radiation belt entry at 13:04:25Z.

8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

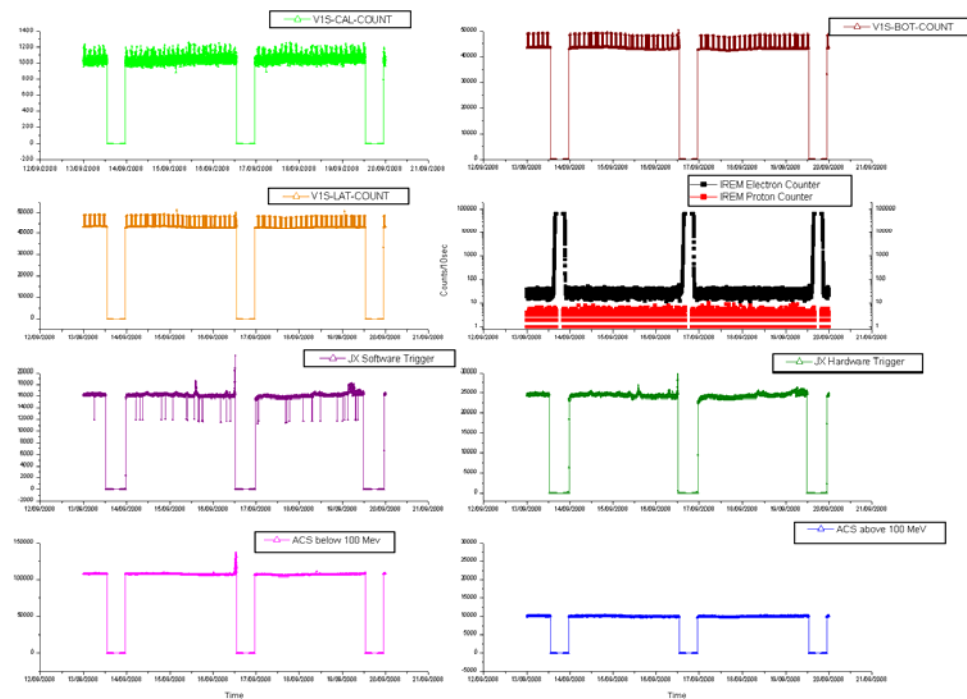
IBIS - ISGRI Counters Rev 722-725



**sampling every 4 pkts (32 secs)

VETO vs Payload Counters:

IBIS-VETO vs Payloads Counters Rev 722-725

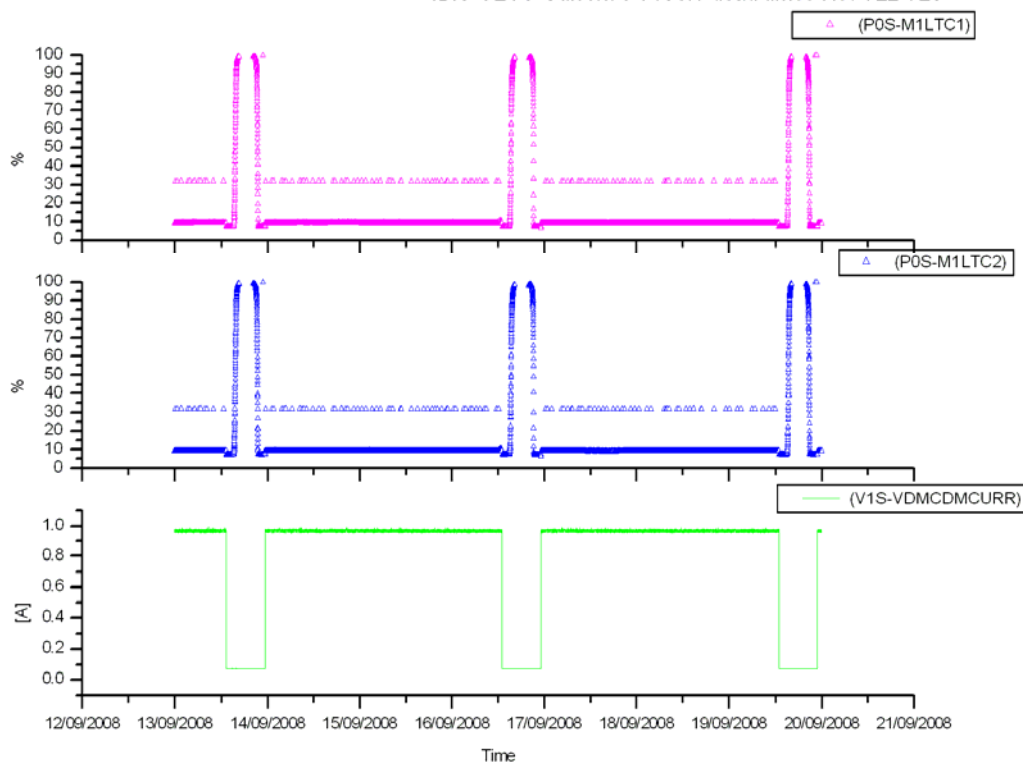


**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

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

VETO Current:

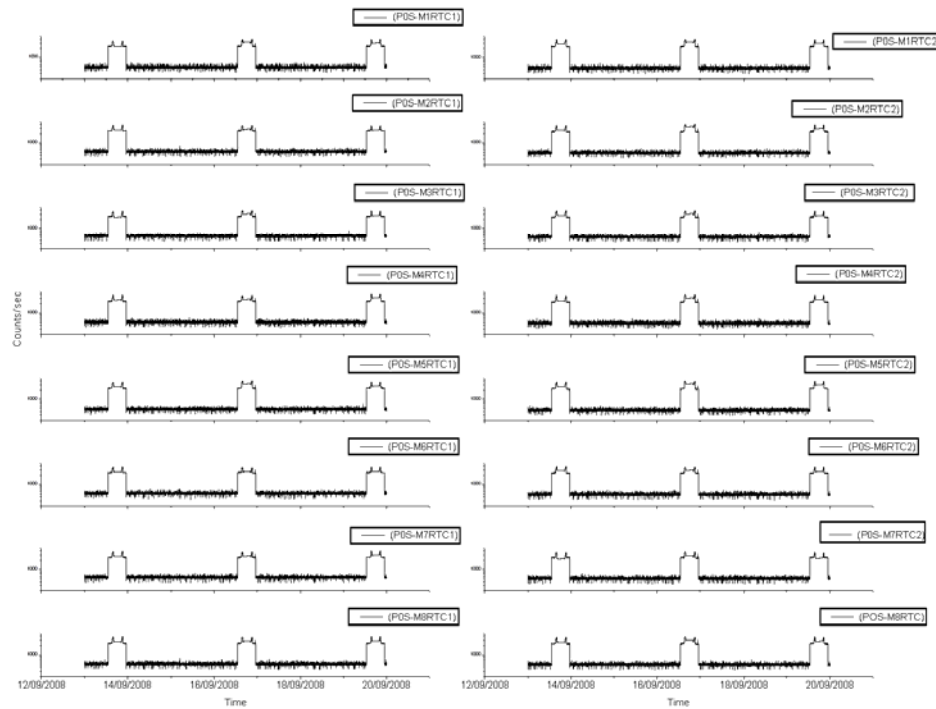
IBIS-VETO Current & PICsIT dead times Rev 722-725



**sampling every 4 pkts (32 secs)

PICsIT Counters:

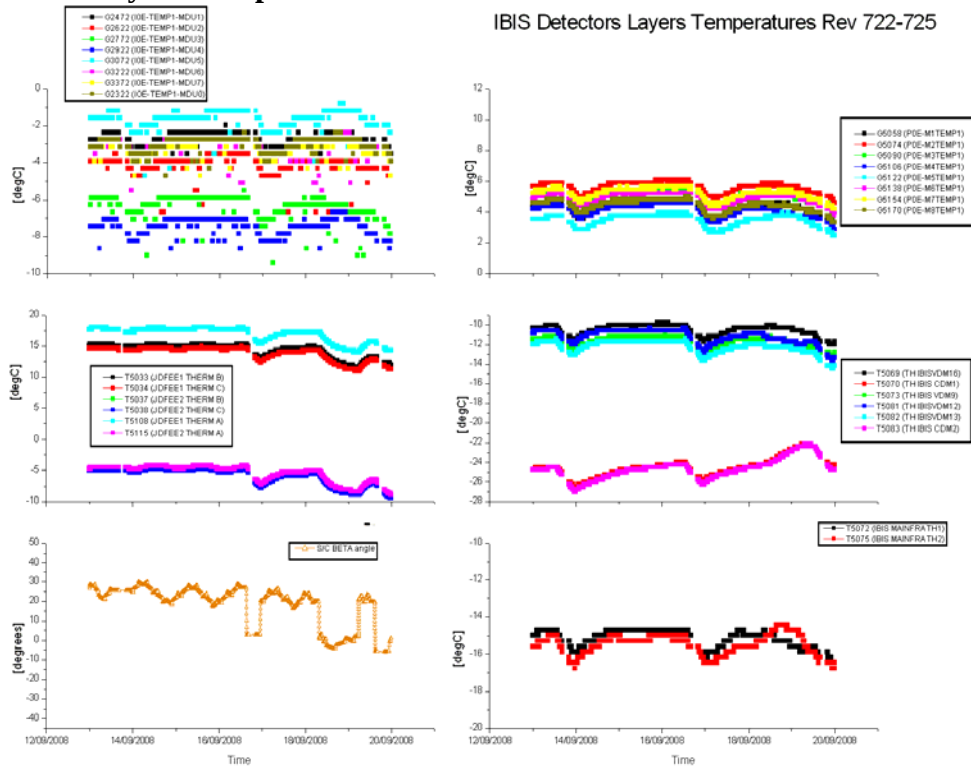
IBIS - PICsIT Counters Rev 722-725



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:

IBIS Detectors Layers Temperatures Rev 722-725



**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.

2008-09-13 (DOY 257, Rev 722-723) to 2008-09-15 (DOY 259, Rev 723)

IBIS operations executed nominally.

2008-09-16 (DOY 260, Rev 723-724)

At 12:28:38Z TM parameters G6062 and G6063 (VETO bottom and lateral counters) went OOL Warning High. As they returned within limits at the next TM cycle, no action was taken.

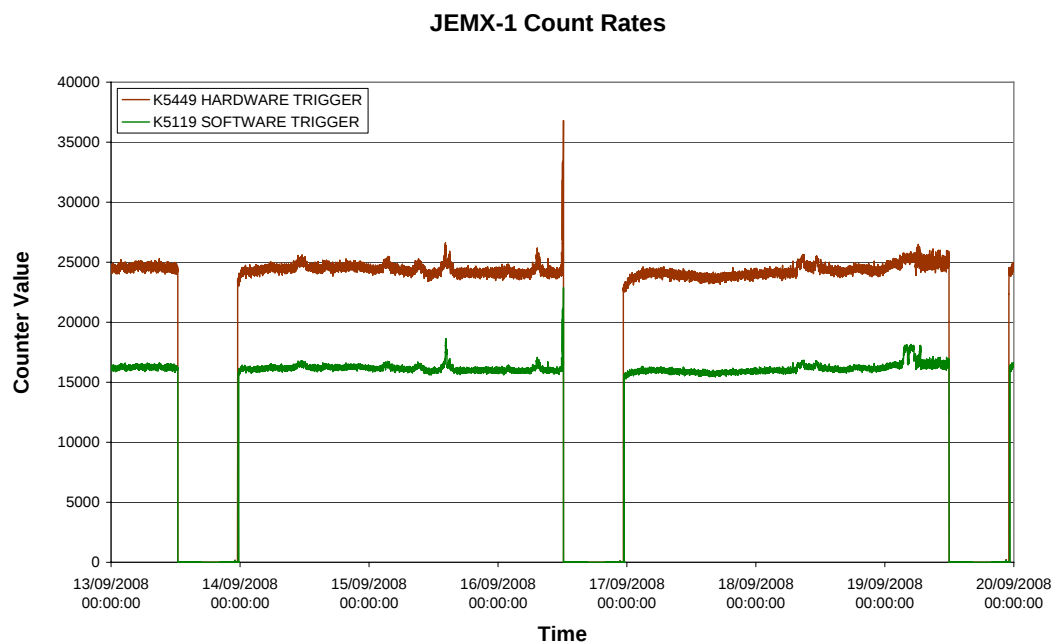
2008-09-17 (DOY 261, Rev 724) to 2008-09-19 (DOY 263, Rev 724-725)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

JEM-X Count Rates

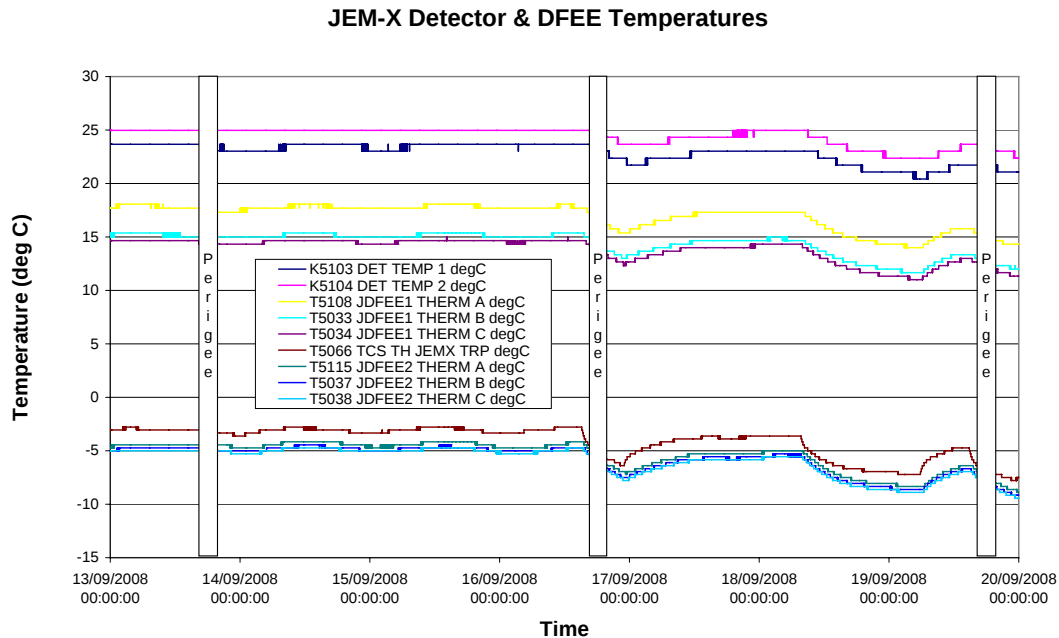
JEM-X count rates over the reporting period are displayed in the following graph¹.



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

JEM-X Temperatures

JEM-X Detector and DFEE temperatures, along with the temperature on the detector bench between the two units, over the reporting period are displayed in the following graph².



JEM-X Daily Report

2008-09-13 (DoY 257, Rev 722) to 2008-09-15 (DoY 259, Rev 723)

JEM-X 1 operations executed nominally.

2008-09-16 (DoY 260, Rev 723)

At 12:00:34, 12:01:37, 12:07:38, 12:08:49 & 12:10:18, TM parameter K5449 exceeded soft limits. This was shortly before the radiation belt entry, see graph above. No action was taken, and there was no impact.

2008-09-17 (DoY 261, Rev 724)

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

2008.261.16.37.01.681	2008.261.16.37.06.600	1536	RealTime	5		EXCEPTION
JEM-X1 EXC IACS INTERF EXID			0	0	65535	PR N
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				
2008.261.16.37.01.681	2008.261.16.37.06.649	1536	RealTime	6		EXCEPTION
JEM-X1 EXC IACS INTERF CULP			0	0	65535	PR N
E						
FIX6		0				
K9079	MESS CLASS	1				

² Data sampled (1 frame in 8)

Doc. Title : INTEGRAL Mission Report #313
 Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
 Date : 22/09/08

Issue : 1
 Rev. : 0
 Page : 28

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.

2008-09-18 (DoY 262, Rev 724)

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

2008.262.21.33.57.754	2008.262.21.34.04.010	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				

2008.262.21.33.57.754	2008.262.21.34.04.084	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.

2008-09-19 (DoY 263, Rev 724-725)

JEM-X 1 operations executed nominally.

8.3.5 OMC Operations

2008-09-13 (DoY 257, Rev 722) to 2008-09-14 (DoY 258, Rev 723)

Nothing to report.

2008-09-15 (DoY 259, Rev 723)

At 06:24:36, an AOCS command failed uplink due to the FDS job scheduler having died. A recovery was performed, and the Timeline rejoined at 06:50:55. The impact was pointing 07230058 was cut short from a planned 1800 to 944 seconds.

2008-09-16 (DoY 260, Rev 723) to 2008-09-19 (DoY 263, Rev 725)

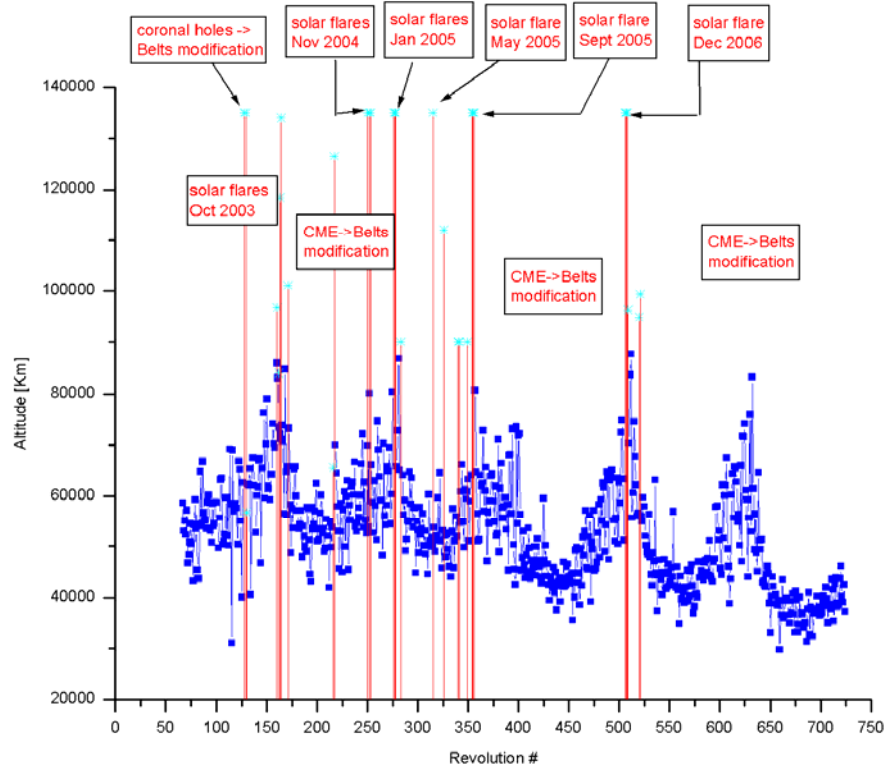
Nothing to report.

On DoY 257 at 13:18:09, DoY 260 at 13:04:25 and DoY 263 at 12:50:25 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 2003-2008



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]
722	RAD_ENTR R 2008-09-13T13:18:00Z	13/09/2008 15:09:27	39029.9	13-Sep-2008 15:23:23	38280.55
723	RAD_EXIT R 2008-09-13T23:11:30Z	13/09/2008 21:35:19	>>33546.6	13-Sep-2008 22:33:23	46509.37
723	RAD_ENTR R 2008-09-16T13:04:21Z	16/09/2008 14:38:56	42431.1	16-Sep-2008 15:15:57	37673.49
724	RAD_EXIT R 2008-09-16T22:58:27Z	16/09/2008 21:25:44	>>33524.2	16-Sep-2008 22:25:57	46979.53
724	RAD_ENTR R 2008-09-19T12:50:18Z	19/09/2008 14:55:28	37235.5	19-Sep-2008 15:05:57	37620.54
725	RAD_EXIT R 2008-09-19T22:44:01Z	19/09/2008 21:03:44	>>36872.5	19-Sep-2008 22:05:57	45560.24

Reference

High radiation

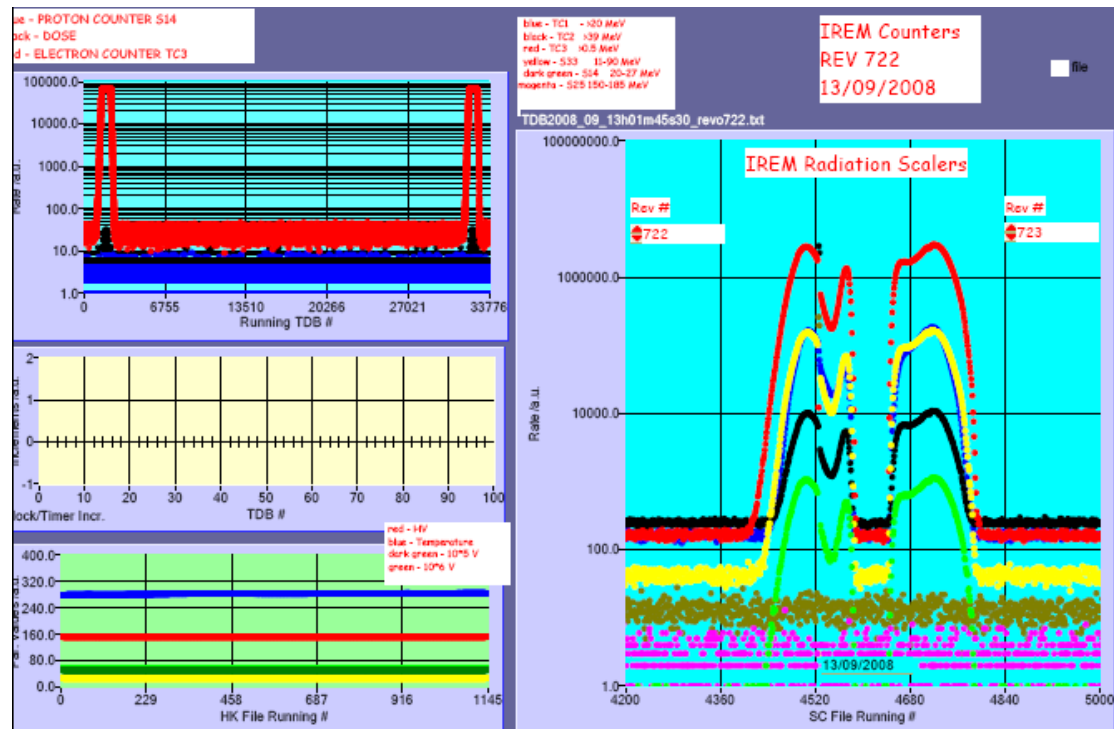
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

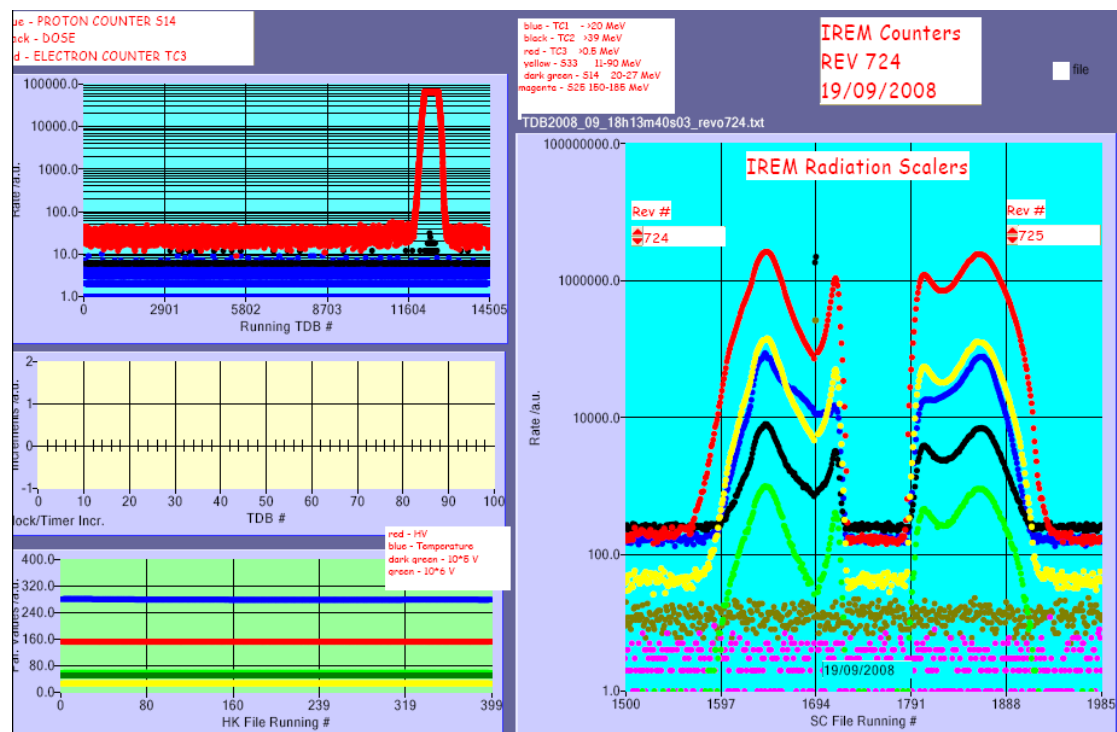
Large error vs reference (more than 30 minutes)

* Rad belt entry time ignoring previous threshold crossings where a gap of more than 30 minutes is present.

IREM radiation counters:

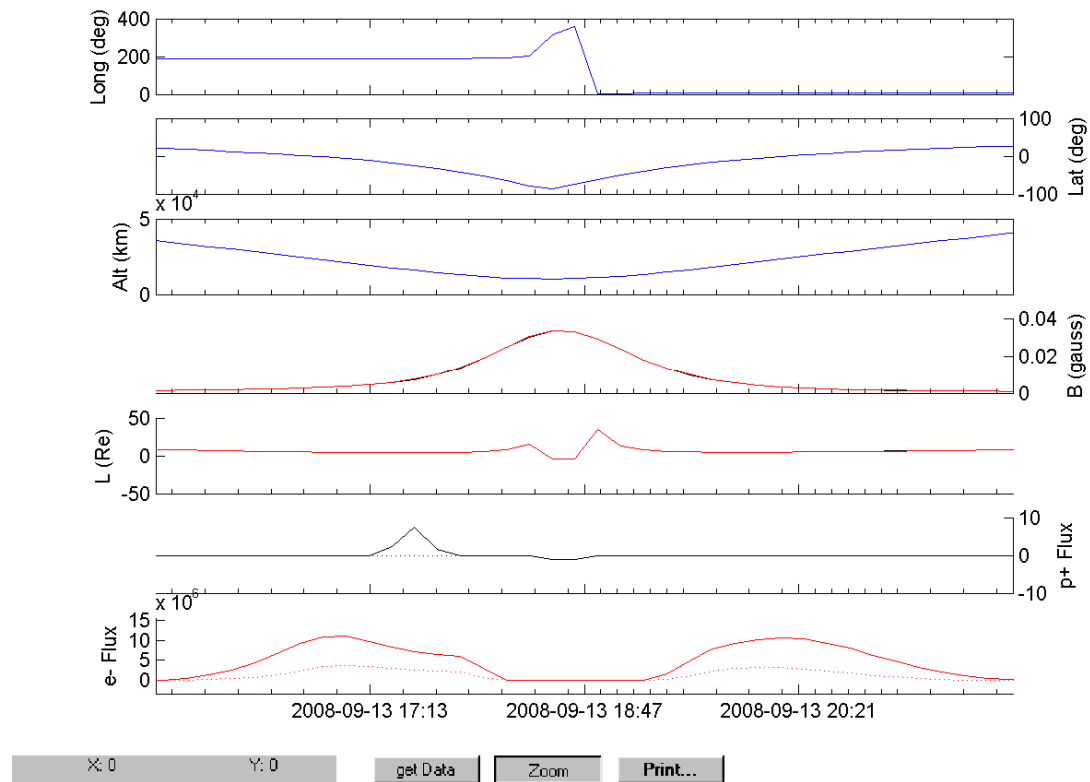


IREM radiation counter plot for revolution 723 is not available.

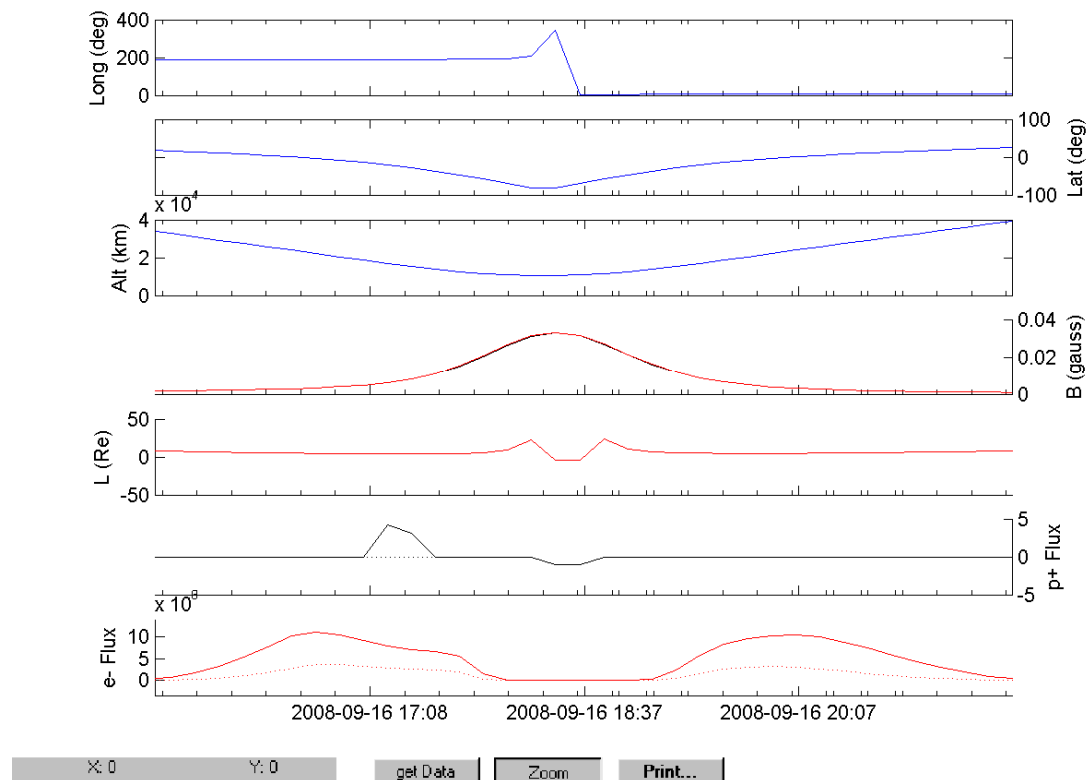


IREM Predicted Radiation Belt Passages

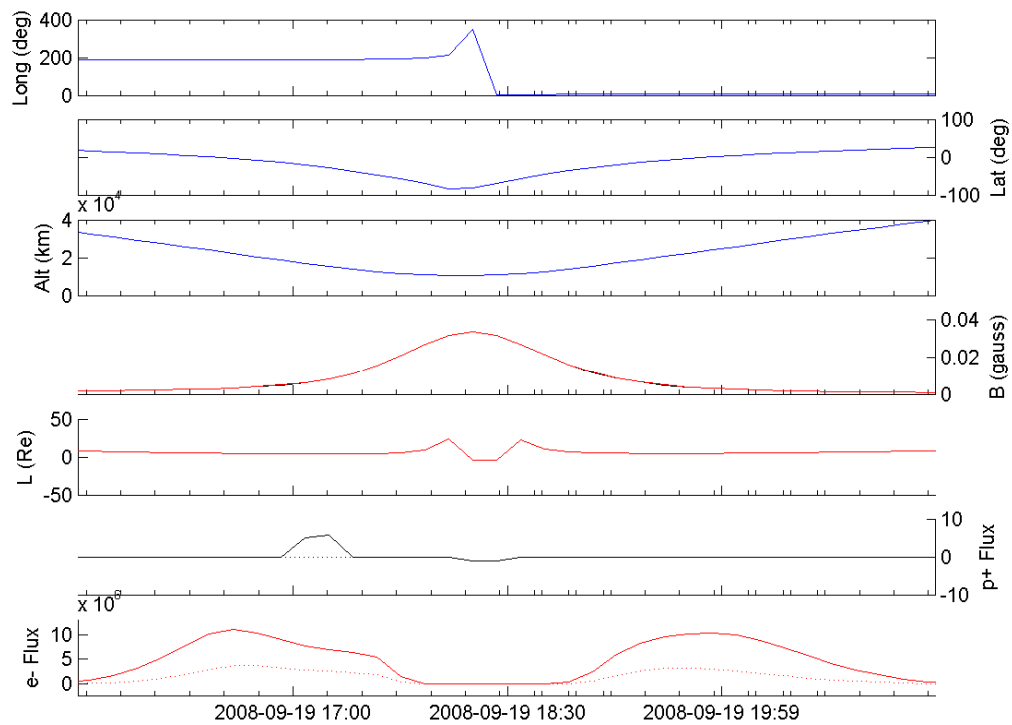
Rev 722



Rev 723

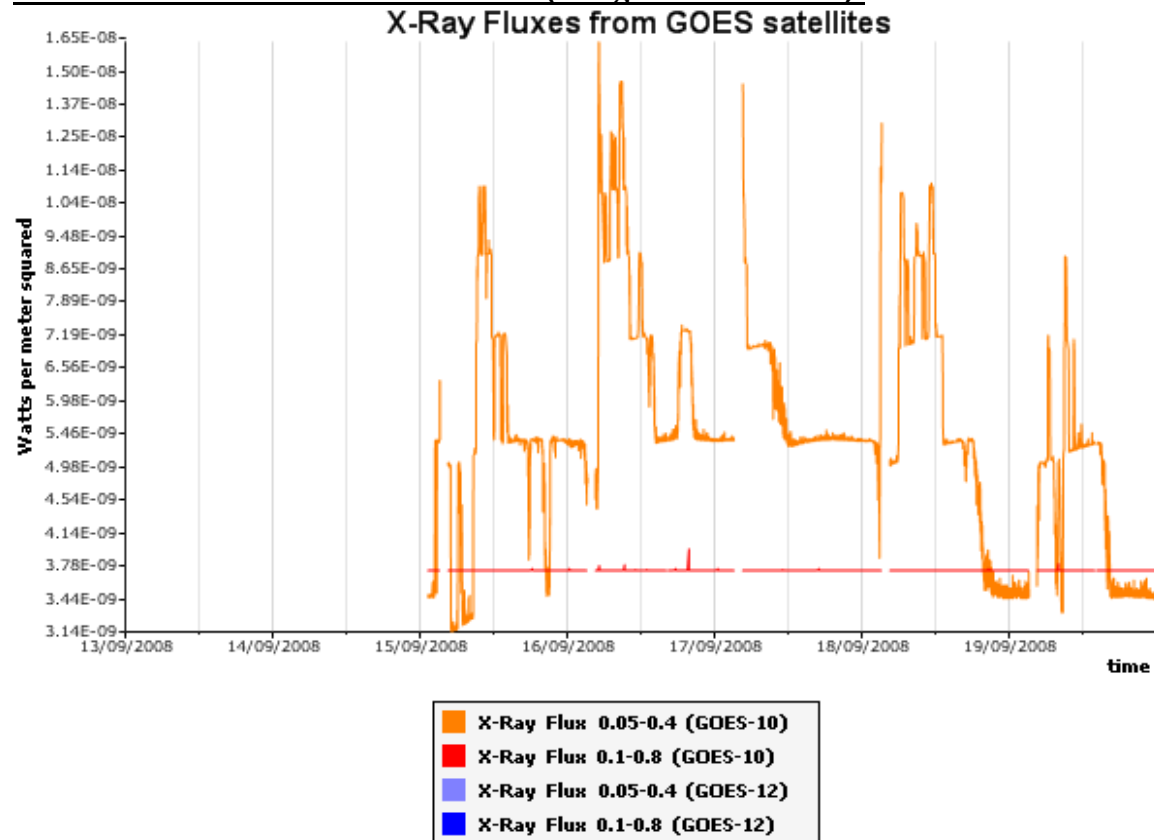


Rev 724

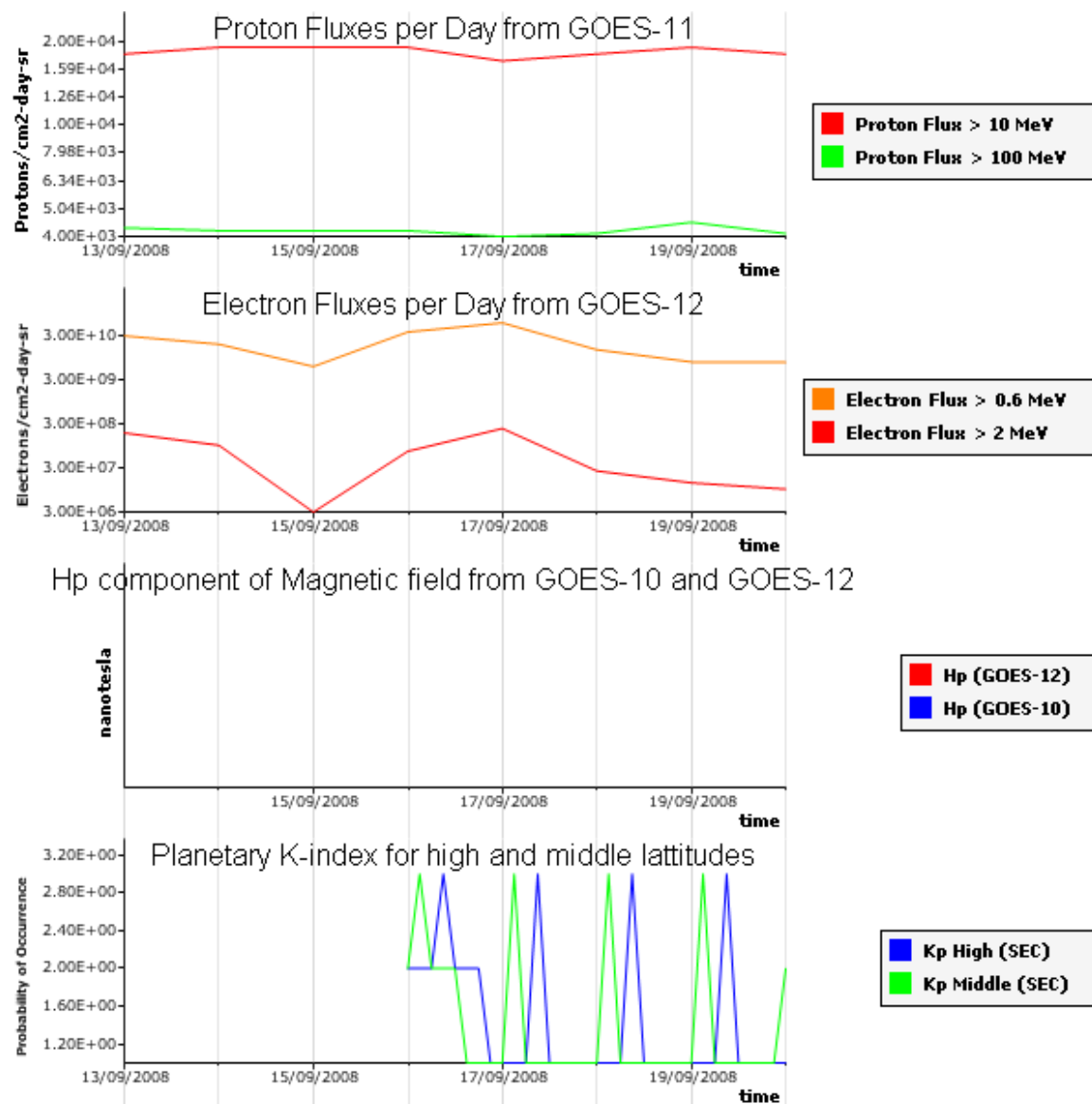


X: 0 Y: 0 get Data Zoom Print...

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



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



Proton and electron flux report low radiation background.

Hp component of the Geomagnetic Field is essentially parallel to the Earth's rotation axis. A drop near 0 nT is associated with a significant variation in the magnetic field.

Kp index is based on ground magnetometers. Kp ≥ 5 features storm-level geomagnetic activity.