

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 290
Week 15
14.04.08
Routine Phase

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

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1 General

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

It addresses the activities from 05.04.08 until 11.04.08 (both dates inclusive) and covers the revolutions 669, 670 and 671.

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 XTE J1810-189 (RA 18:10:20.48, DEC -19:04:21.4), a raster dither of the Galactic Centre (RA 17:45:40.00, DEC -29:00:29.0), two hexagonal dithers of the object 4U0115+63 (a TOO) (RA 01:18:31.90, DEC +64:14:24.0), two hexagonal dithers of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), two custom pointings of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), and a raster dither, of the mid-latitude 1 region (RA 18:36:17.05, DEC -60:24:50.7) .

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 Eclipse season started on 30/03/2008. The third, fourth and fifth eclipse passages were nominal from an AOCS point of view.

As part of the AOCS preparation for the summer eclipse season, 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 for rev 668-669-670 were verified.

Two slews were missed from TL, during the observation period, due to STR 1750 fault.

The fuel consumption over the period between 04/04/2008 and 10/04/2008 was 0.1605 Kg. The remaining propellant is in the order of 141.1737 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.

The 3rd, 4th and 5th eclipses of the 12th eclipse season took place on 5th, 8th, and 11th April, the relevant details are given below:

Date	Penumbra Entry	Umbra Entry	Umbra Exit	Penumbra Exit	Total Eclipse Duration	Umbra duration Only	Observed DOD 1	Observed DOD 2	Recharge Duration Battery 1	Recharge Duration Battery 2
05/04/2008	03:08:32	03:10:16	04:00:21	04:01:40	0:53:08	0:50:05	5.02	4.97	2:59:14	2:57:30
08/04/2008	02:54:05	02:55:38	03:50:30	03:51:38	0:57:33	0:54:52	5.57	5.52	3:19:08	3:17:24
11/04/2008	02:43:30	02:44:57	03:40:52	03:41:54	0:58:24	0:55:55	5.69	5.63	3:23:32	3:21:40

From the EPS point of view the eclipse passage was entirely nominal.

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. However, one minor software anomaly occurred during the reporting period.

On 11/4/2008 at eclipse entry the OBM entry for parameter P3118 was flagged out of limits by the OBM task as expected.

According to the Integral Users Manual (page 5.1-233):

1. The parameter is acquired, bit-masked if necessary and compared against its lower and upper limit.
2. If the parameter is smaller than the lower limit or greater than the upper limit an OEM 177 (EVE_MO_PARAMETER_OUT_OF_RANGE) is generated.
3. Monitoring of the parameter continues and if a limit is transgressed on **three consecutive checks** the OEM 178 (EVE_MO_PAR_3_TIME_OUT_OF_RANGE) is generated. The value is then stored in the memory with the OBT found in the TM packet. The Recovery Action Command Packets (RACP), if any, are executed.

Note: the number of consecutive checks made on a parameter before Recovery Actions are performed (i.e. 3) is fixed and not re-definable by ground.

On this occasion the parameter was OOL for 5 consecutive checks before the OEM 178 was issued. Following this the Recovery Action commands were issued correctly. All other monitoring entries associated with the eclipse executed nominally.

The OBM entry associated with P3118 at eclipse entry has been in use since launch without change, no such behaviour has been observed in the past.

Following the observed anomaly the on-board monitoring list was reported and the entry for P3118 verified as correct. At the subsequent eclipse entry its behaviour was nominal.

The PST Allocation was over-subscribed by 3 packets to SPI for 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

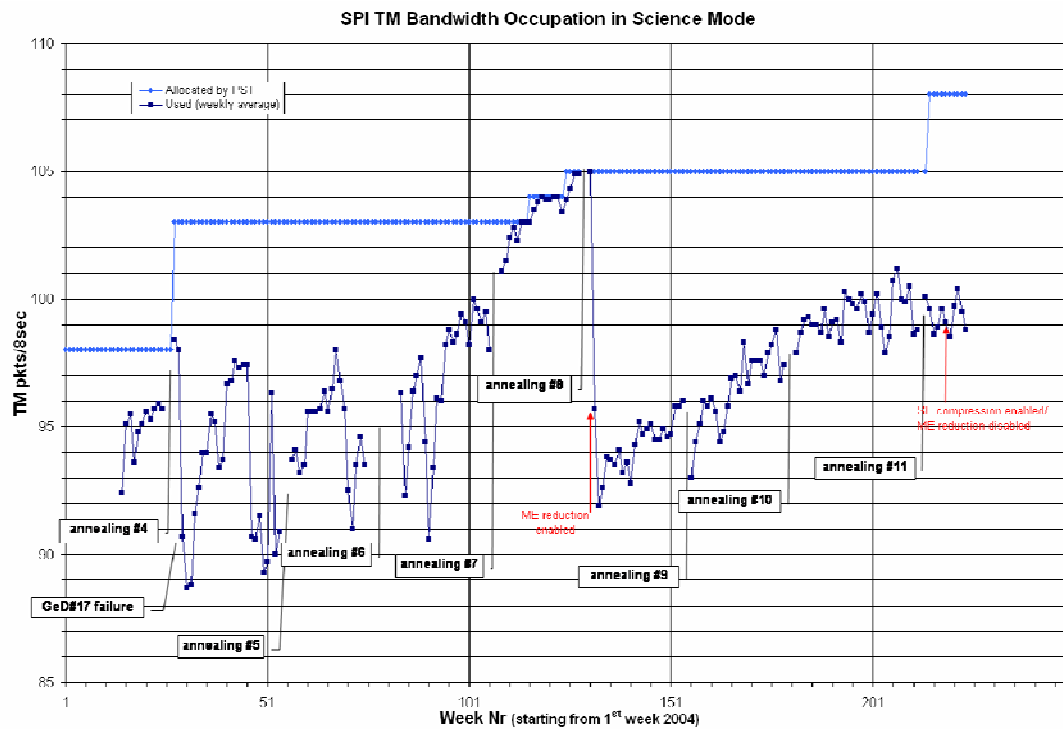
Following the 11th annealing, which ended on 30th January, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #12 which, although its energy resolution improved since the previous annealing, is still showing a slightly degraded energy resolution compared to the other detectors 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.

The first eclipse in the 12th eclipse season occurred on 30/03/2008. Eclipse operations for SPI have been progressing nominally.

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. The over-allocated PST with an additional 3 packets/cycle for SPI was used however the Broadcast Packet TM allocation was not updated. The average telemetry occupation in the science window was 98.8 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.

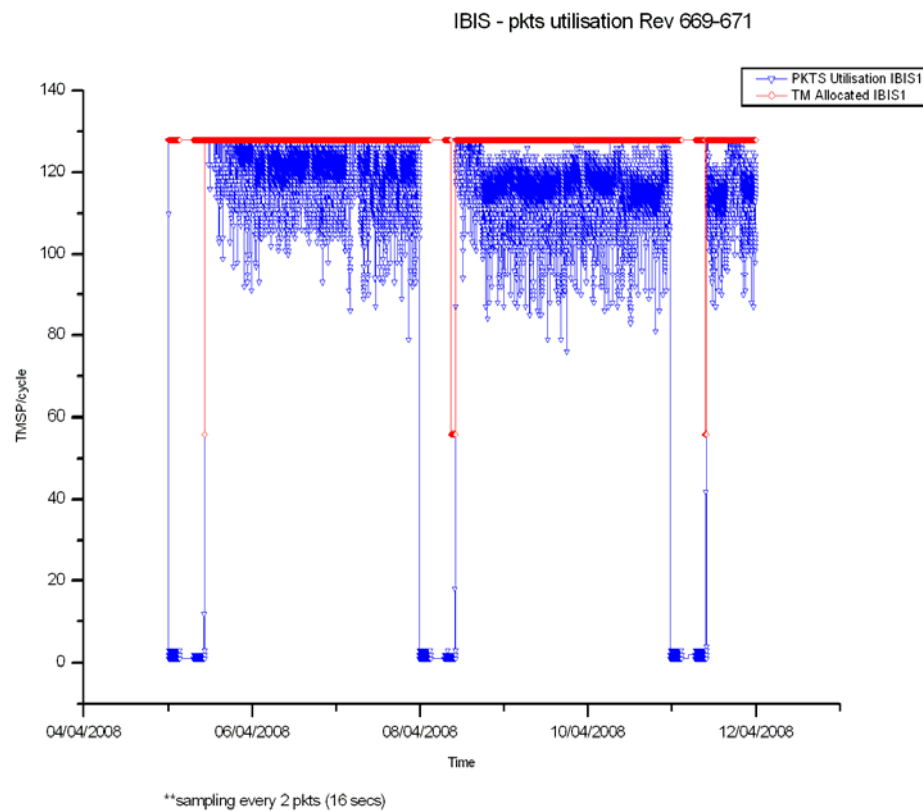
3.2.2 IBIS

The overall status of the unit is nominal.

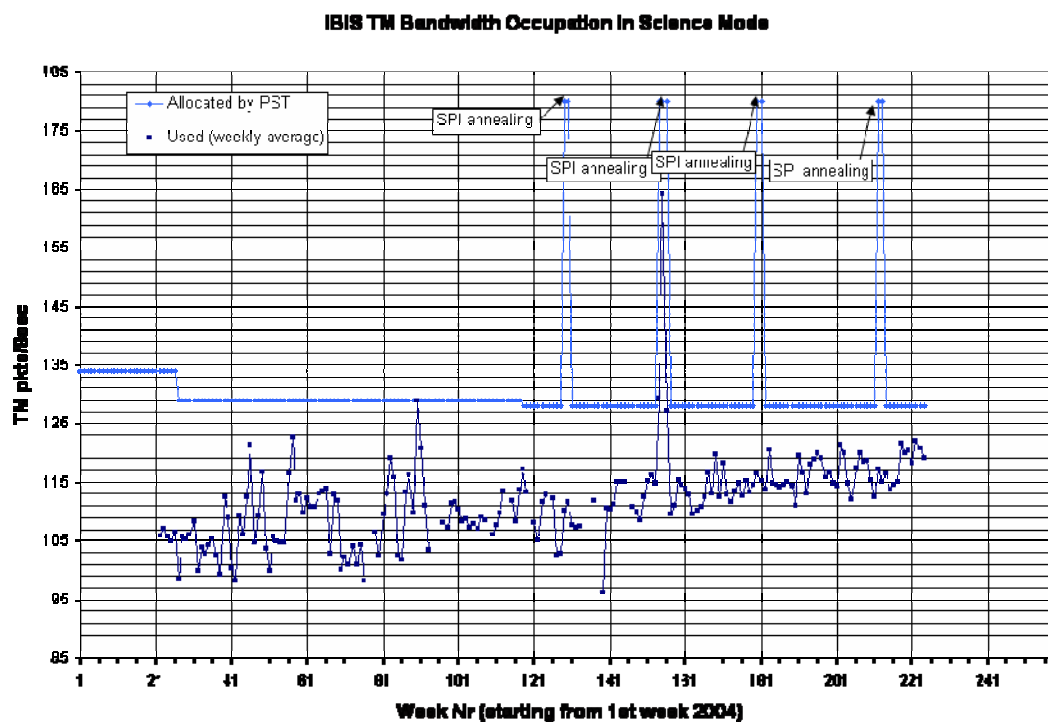
The first eclipse in the 12th eclipse season occurred on 30/03/2008. Eclipse operations for IBIS have been progressing nominally.

During the reporting period, the PST allocation to IBIS above the radiation belts was 128 packets/cycle. The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 119.08 packets/cycle, down 1.63 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, 167 of the 169 planned science pointings were executed nominally, 1 was shortened, and 1 lost.

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

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. The sun was blank all week, with a very low risk of solar 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 good this week. No pointings were lost to ground problems. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was very good this week. No problems were reported that led to the loss of data.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were however 2 occasions where TM was briefly dropped from Redu, one occasion where the nctrs blocked VC7 TM, and a problem with the links to ISDC, all without impact.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSFs have been received for revolutions 676 to 678.

Observations have been planned and sent up to revolution 677. Further planning will wait to see the evolution of the source 4U0115+634 for which a TOO is ongoing.

New TSFs have been received for revolutions 670 to 672.

2. Observation status

A new ECS has been received for revolution 661.

3. ISOC Science Data Archive

Key Programme Data (not yet public) have been downloaded and correctly ingested.

4. ISOC system

V19.0 was tested but waiting for developers to be available (leave & sick-leave) for installation.

5. Problems

A bug was found in the Proposal Generation Tool in case users exited without saving first. Users were warned and the software will be updated.

4.3.2 ISDC

Status of ISDC observation processing on 14/04/2008:

- Latest Standard Analysis completed: observation 05200010020 (Galactic Bulge region, Revolutions 657) on 26/03/2008.

- Latest products archived: observation 05200010021 (Galactic Bulge region, Revolutions 658) on 27/03/2008.

- Latest observation products sent to the observer: observation 04200080003 on 29/03/2008.

5 Special Events

6 Anomalies

There were no problems reported this week that impacted operations.

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

AR id	Date Created	Subject	Segment	Status
INT_SC-222	2008-04-04	IBIS VETO Crash	Payload	Pending
INT-2987	2008-04-10	TM VC 7 Onl-COM from groundst cannot be delivered to MCS	IMCS	Pending
INT-2988	2008-04-10	TM VC 7 Onl-COM from groundst cannot be delivered to MCS	IMCS	Pending
INT-2989	2008-04-10	TM VC 7 Onl-COM from groundst cannot be delivered to MCS	IMCS	Pending
INT-2990	2008-04-10	TM VC 7 Onl-COM from groundst cannot be delivered to MCS	IMCS	Pending
INT-2990	2008-03-24	Command Verifier Crashed.	IMCS	Pending
INT_SC-223	2008-04-11	CDMU S/W OBM Task Malfunction.	Spacecraft	Pending

.

7 Future Milestones

The following activity is foreseen in the next few weeks.

- The Spring eclipse season starts on the 30th March 2008, at the end of revolution 666, and continues until the last eclipse on 26th April.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 669

The observations in revolution 669 began with a hexagonal dither of XTE J1810-189 (RA 18:10:20.48, DEC -19:04:21.4), lasting ~13.9 hours. They continued with a raster dither of the Galactic Centre (RA 17:45:40.00, DEC -29:00:29.0), lasting ~27.8 hours. Finally, a hexagonal dither, of the object 4U0115+63 (a TOO) (RA 01:18:31.90, DEC +64:14:24.0), lasting ~13.9 hours was performed until the end of the revolution.

Revolution 670

The observations in revolution 670 began with a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~7.0 hours. They continued with a custom pointing of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), lasting ~33.7 hours. Finally, a hexagonal dither, of the object 4U0115+63 (a TOO) (RA 01:18:31.90, DEC +64:14:24.0), lasting ~12.6 hours was performed until the end of the revolution.

Revolution 671

The observations in revolution 671 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. After this, a custom pointing of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), lasting ~33.7 hours was executed. Finally, a raster dither, of the mid-latitude 1 region (RA 18:36:17.05, DEC -60:24:50.7), lasting ~11.9 hours was performed until the end of the revolution.

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

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2008-03-24T08:45:25.000Z	141.5216	F	Automatic TM processing.
2008-03-27T08:44:36.000Z	141.5067	F	Automatic TM processing.
2008-03-28T18:04:16.000Z	141.4688	F	Automatic TM processing.
2008-03-30T09:06:52.000Z	141.4107	F	Automatic TM processing.
2008-03-31T17:54:23.000Z	141.3717	F	Automatic TM processing.
2008-04-02T08:52:19.000Z	141.3565	F	Automatic TM processing.
2008-04-03T01:10:21.000Z	141.3342	F	Automatic TM processing.
2008-04-05T08:41:56.000Z	141.3163	F	Automatic TM processing.
2008-04-06T17:07:11.000Z	141.2840	F	Automatic TM processing.
2008-04-07T08:24:49.000Z	141.2664	F	Automatic TM processing.
2008-04-08T08:28:28.000Z	141.2308	F	Automatic TM processing.
2008-04-10T07:50:41.000Z	141.1975	F	Automatic TM processing.
2008-04-10T09:05:37.000Z	141.1737	F	Automatic TM processing.

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, 05/04/2008 – 11/04/2008

The AOCS operations were executed from the Automatic Timeline.

During this period, 93 Open Loop Slews, 98 Closed Loop Slews and 7 Momentum Biases were executed (as reported by ACC).

2 slews (CSL) were missed from TL, during the observation period due to STR 1750 fault caused by the planet Venus in the STR Field of View.

This is equivalent to ~ 1 % of the total number of slews planned (192).

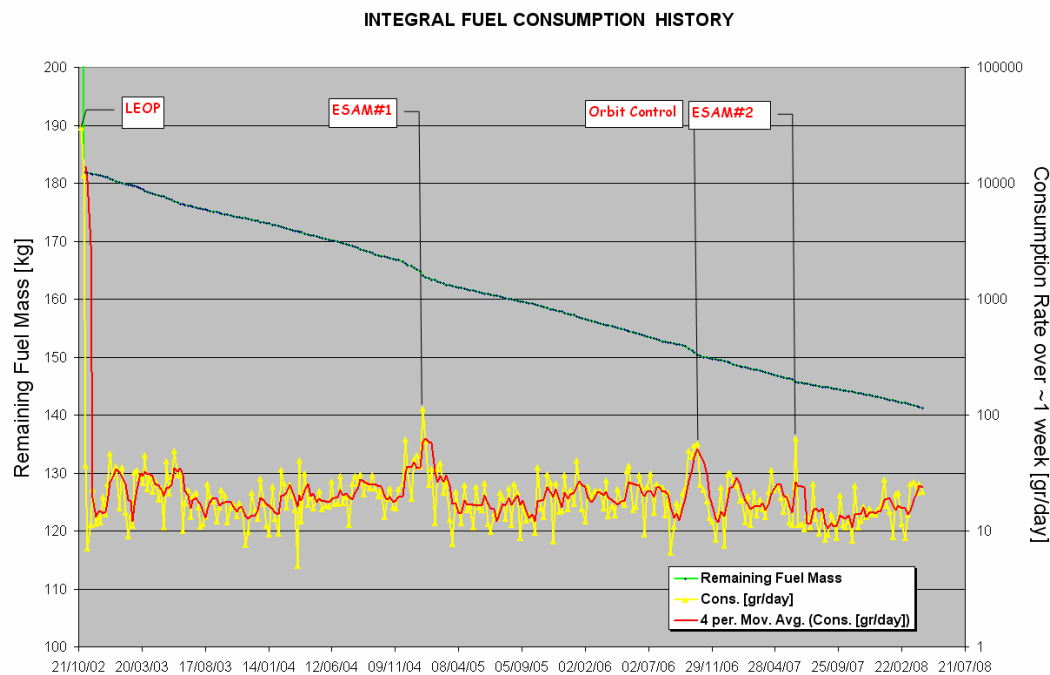
The OTF was not reached during PID 06690050-6690057.

Orbit Control

No update

Fuel consumption

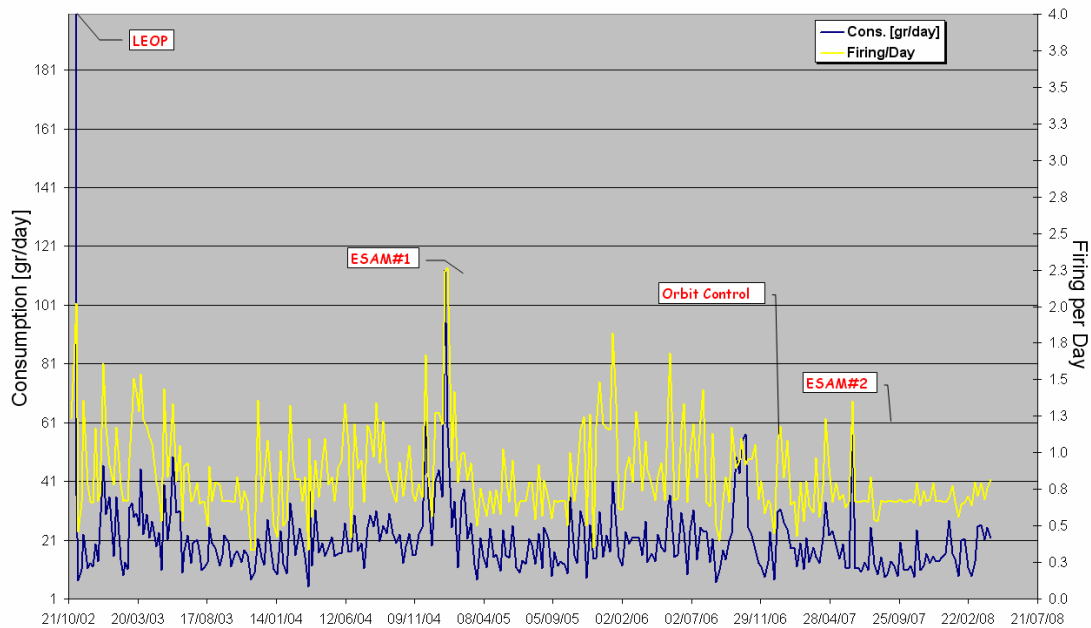
The fuel consumption (total, grams per day) over the period between 01/11/2002 and 10/04/2008 is reported in the plot below.



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 10/04/2008 is reported in the plot below.

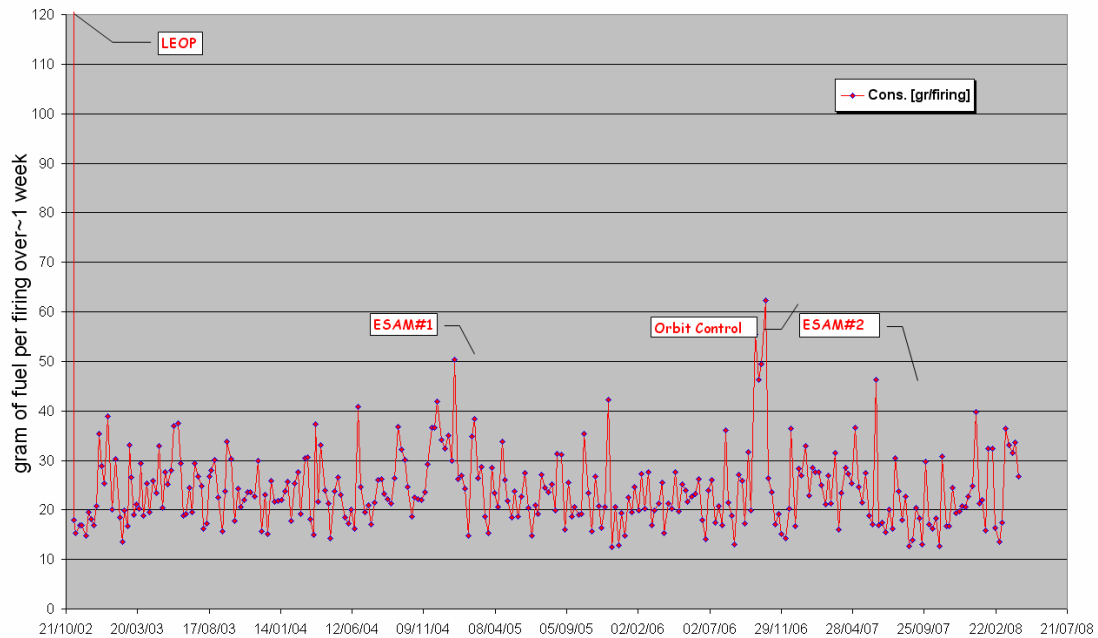
INTEGRAL FIRING PER DAY HISTORY



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

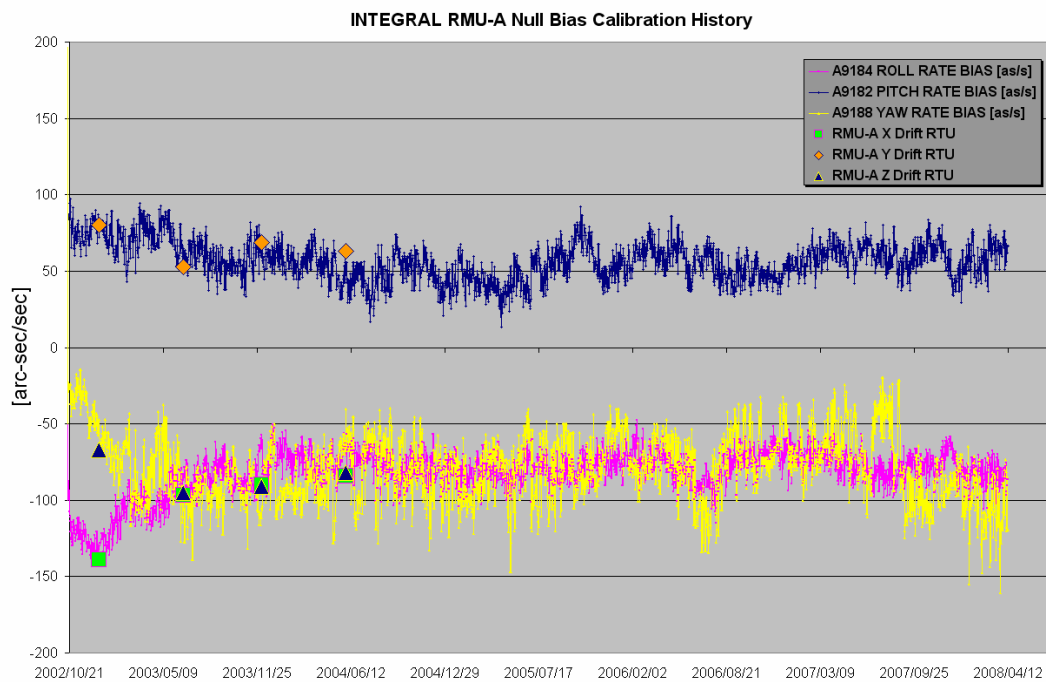
The fuel per firing over the period between 01/11/2002 and 10/04/2008 is shown in the plot below.

INTEGRAL FUEL MASS PER FIRING HISTORY



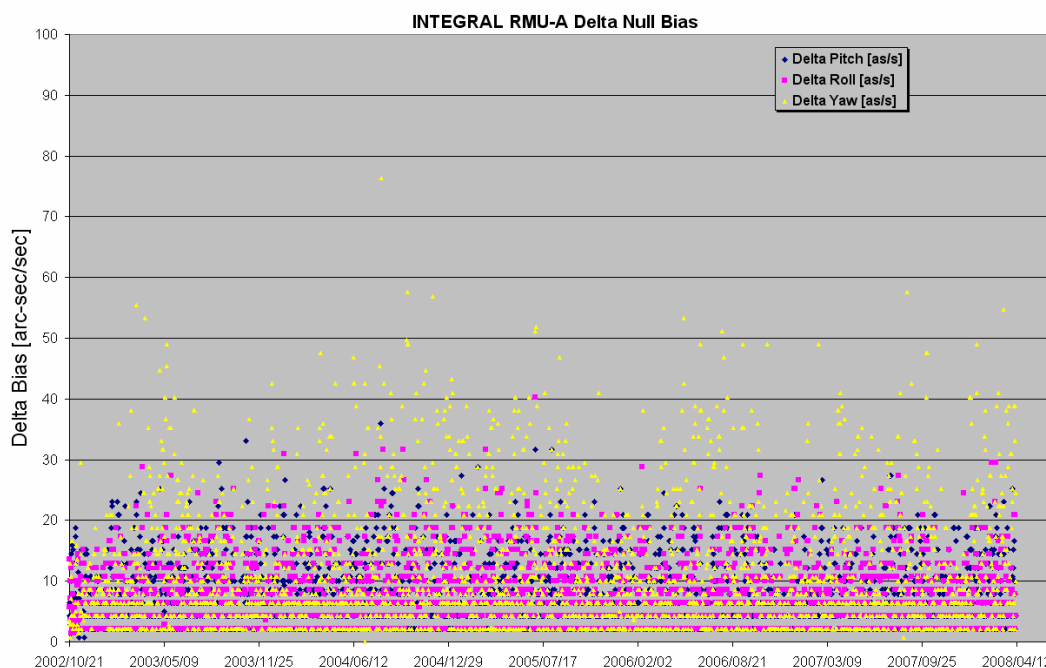
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 11/04/2008 is reported in the plot below.



Problems have been reported during the last period on FDS when generating the drift update for the RMU-A Yaw channel: the limits set on FDS have been violated few times. 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 11/04/2008 is reported in the plot below.



05/04/2008 (Day of Year 096, Revolution 668-669)

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AACS ECLIPSE MONITORING						Revolution:	668
Summer 2008						Date:	05/04/2008
						DoY:	96
INPUT							
Penumbra Start	05/04/2008 03:08					L0S:	05/04/2008 03:25:00
Penumbra End	05/04/2008 04:01					AOS:	05/04/2008 07:16:00
Umбра Start	05/04/2008 03:10						
Umбра End	05/04/2008 04:00						
Eclipse Duration	0:53:09						
Eclipse Duration [sec]	3189						
IMU Health Check Start	04/04/2008 23:53:00						
Eclipse Imminent Flag	05/04/2008 02:08:47						
A/C IMU AutoCal Start	05/04/2008 02:23:13						
ACC IMU AutoCal End	05/04/2008 02:43:13						
Sun out of FSS FoV	05/04/2008 03:09:56						
Sun back in FSS FoV	05/04/2008 04:00:30						
Eclipse Timers		From Loaded Timers		Actual From Telemetry		UM [sec]	LSO [sec]
	Absolute	WRT Pen. Start [sec]		Absolute	WRT Pen. Start [sec]		
ACE Eclipse Start	05/04/2008 02:51:01	-10481.00	05/04/2008 02:50:47	-10901.00	-1064		
FDE Eclipse Start	05/04/2008 03:00:18	-489.00	05/04/2008 03:02:29	-358.00	-404	176	
FCE Eclipse Start	05/04/2008 03:01:02	-445.00	05/04/2008 03:02:37	-350.00	-360	176	
		From Loaded Timers		Actual From Telemetry		UM [sec]	LSO [sec]
	Absolute	WRT Pen. End [sec]		Absolute	WRT Pen. End [sec]		
FCE Eclipse End	05/04/2008 04:06:30	254			360	176	
FDE Eclipse End	05/04/2008 04:06:30	254			360	176	
ACC Eclipse End	05/04/2008 04:11:31	595	05/04/2008 04:11:17	581.00	578		
IMU	UpLink	Execution	WRT Penumra End [sec]				
IMU Auto Off Enable	02/04/2008 08:36:04	05/04/2008 04:13:12	696				
IMU On	04/04/2008 23:58:55		[MU H'C Motion Roll [acc]]	0.5958			
IMU Off	05/04/2008 04:13:42		[MU H'C Drift Roll [acc]]	0.2644			
IMU On Time	4:16:51		[MU Auto Cal Drift Roll [acc]]	0.2992			

07/04/2008 (Day of Year 098, Revolution 669)

The following slews were not executed in TL: 06690045(CSL)-46(CSL).

Loss of guide star: at 09:23:10z a loss of the current guide star occurred just after the PID 06690050 reached. As foreseen by the IPS logic, the IMU1 went ON, an automatic mapping commanded by the ACC and a new guide star picked by the STR.

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Rev. : 0
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No impact on TL. The OTF for PID 06690050 was not reached.

The operator performed a manual update of the next planned slew ID 06690058 in the TL.

No impact on TL. The OTF for PID 06690057 was not reached.

The fourth eclipse operations were nominal from the AOCS point of view. A summary of the eclipse passage during rev 669 is given below:

09/04/2008 (Day of Year 100, Revolution 670)

Nothing to report.

Nothing to report.

The fifth eclipse operations were nominal from the AOCS point of view. A summary of the eclipse passage during rev 670 is given below:

INPUT		AOCs ECLIPSE MONITORING Summer 2008		Revolution: 670
				Date: 11/04/2008
				DoY: 102
Penumbra Start	11/04/2008 02:43	Penumbra Start:	11/04/2008 02:43:34	LOS: 11/04/2008 02:57:00
Penumbra End	11/04/2008 03:41	Umbra Start:	11/04/2008 02:45:01	AOS: 11/04/2008 06:50:00
Umbra Start	11/04/2008 02:45	Umbra End:	11/04/2008 03:46:56	
Umbra End	11/04/2008 02:40	Penumbra End:	11/04/2008 03:41:59	
ACC Sample Time	06/04/2008 09:15:15	Eclipse Duration:	0:58:25	
FDE Sample Time	06/04/2008 09:19:15	Eclipse Duration [sec]:	3505	
FCE Sample Time	06/04/2008 09:19:16	IMU Health Check Start	10/04/2008 23:28:00	
ACC Eclipse Counter	0	Eclipse Imminent Flag	11/04/2008 01:43:54	
ACC Eclipse Start	238220	ACC IMU AutoCal Start	11/04/2008 01:58:20	
ACC Eclipse End	243370	ACC IMU AutoCal End	11/04/2008 02:18:20	
FDE Eclipse Start	239598	Sun out of FSS FoV	11/04/2008 02:44:46	
FDE Left to Eclipse Start	239608	Sun back in FSS FoV	11/04/2008 03:41:06	
FDE Eclipse Duration	4736			
FCE Eclipse Start	239642			
FCE Left to Eclipse Start	239642			
FCE Eclipse Duration	4280			

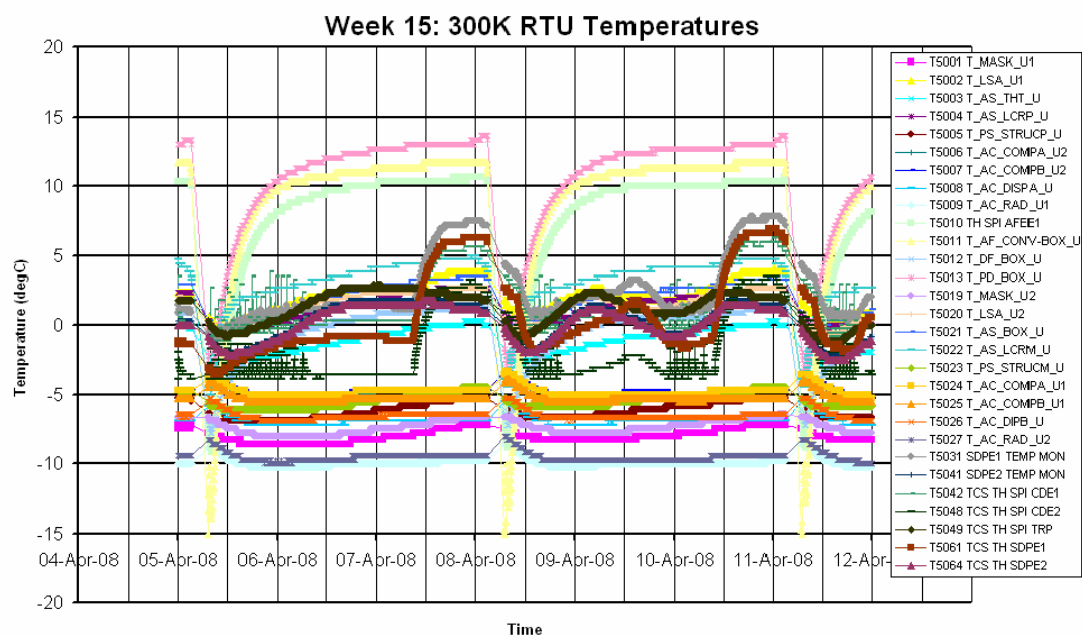
Eclipse Timers		From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]		
ACC Eclipse Start	11/04/2008 02:25:38	-1076.00	11/04/2008 02:25:45	-1069.00		-464	176
FDE Eclipse Start	11/04/2008 02:37:21	-373.00				-360	176
FCE Eclipse Start	11/04/2008 02:36:38	-416.00				-360	176

From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
Absolute	WRT Pen. End [sec]	Absolute	WRT Pen. End [sec]		
FCE Eclipse End	11/04/2008 03:47:58	360		360	176
FDE Eclipse End	11/04/2008 03:47:57	360		360	176
ACC Eclipse End	11/04/2008 03:51:25	564	11/04/2008 03:51:32	573.00	578

IMU	Uplink	Execution	WRT Penumbra End [sec]
IMU Auto Off Enable	06/04/2008 08:08:10	11/04/2008 03:53:46	707
IMU On	10/04/2008 23:30:54	IMU H/C Noise Roll [sec]	0.2001
IMU Off	11/04/2008 03:53:46	IMU H/C Drift Roll [sec]	0.2130
IMU On Time	4:22:52	IMU Auto Cal Drift Roll [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.

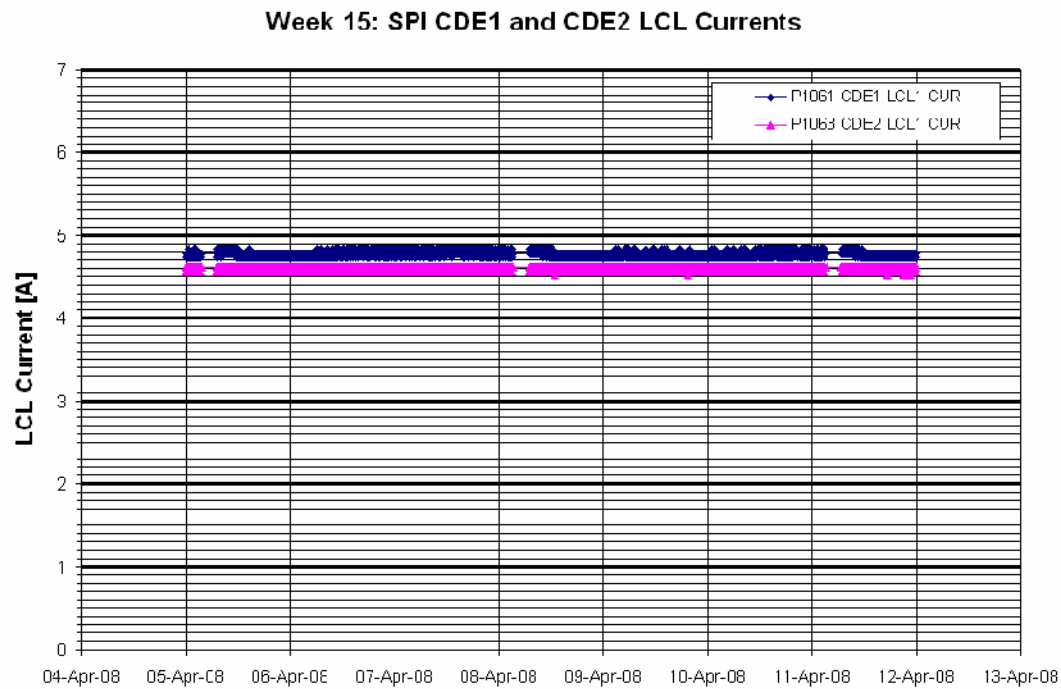


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

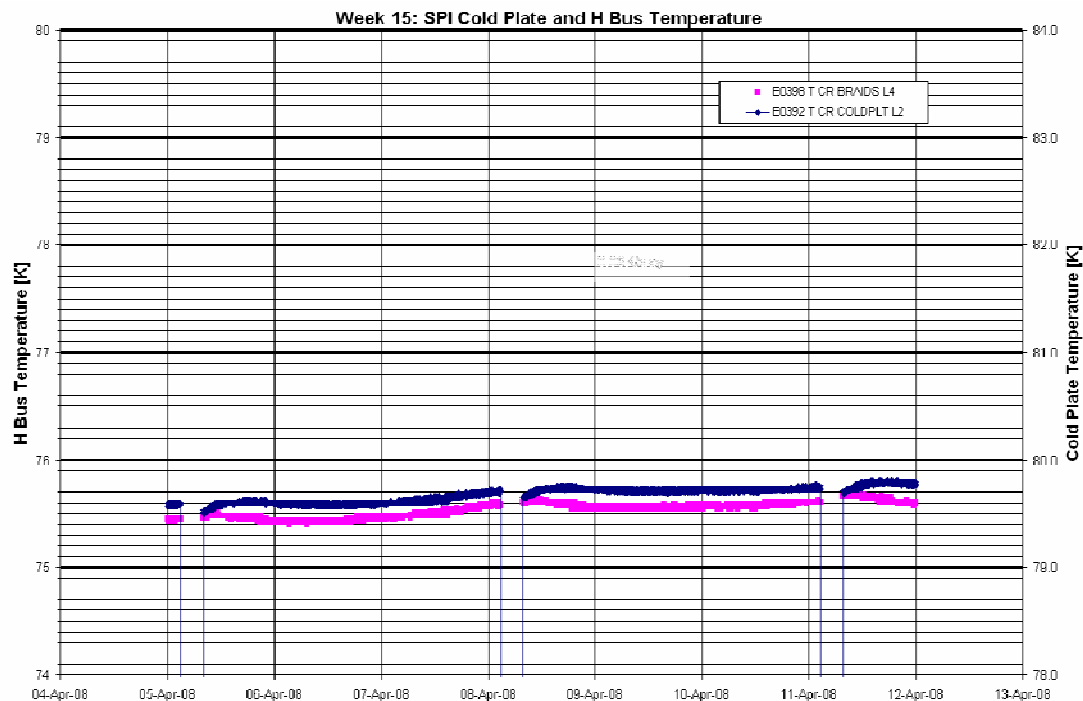
The stroke of all four compressors was set to 40 throughout the week. The average CDE LCL currents were as follows:

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

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.

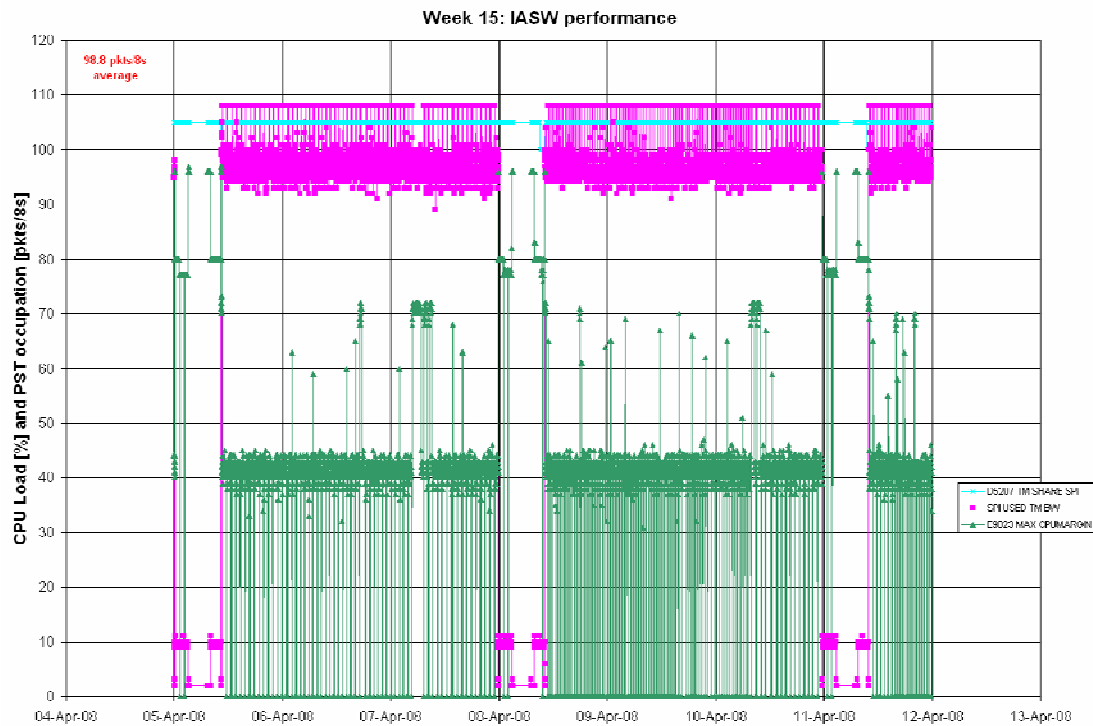


DPE & IASW: The DPE health and IASW performance is nominal.

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

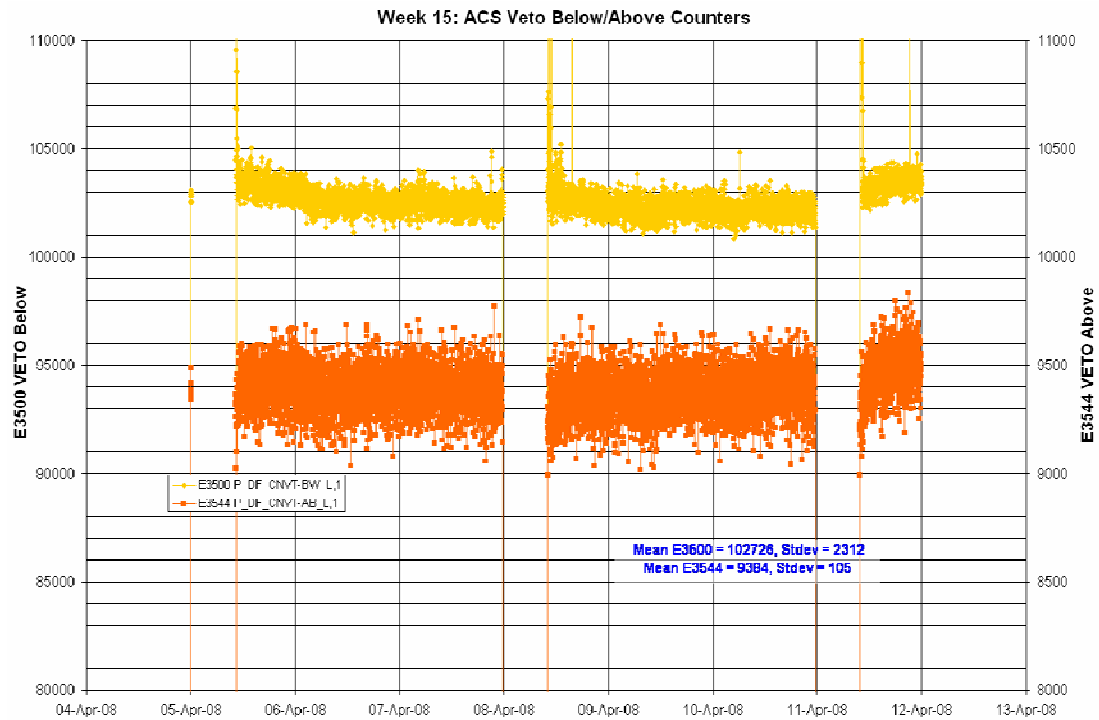
The average TM bandwidth occupation of SPI was 98.8 packets/cycle over the science window. The TM allocation in the science window was 108 packets/cycle. This allocation is considering that the over-allocated PST with the additional 3 packets/cycle for SPI was being used, however the Broadcast Packet TM allocation was not updated (see plot below).

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

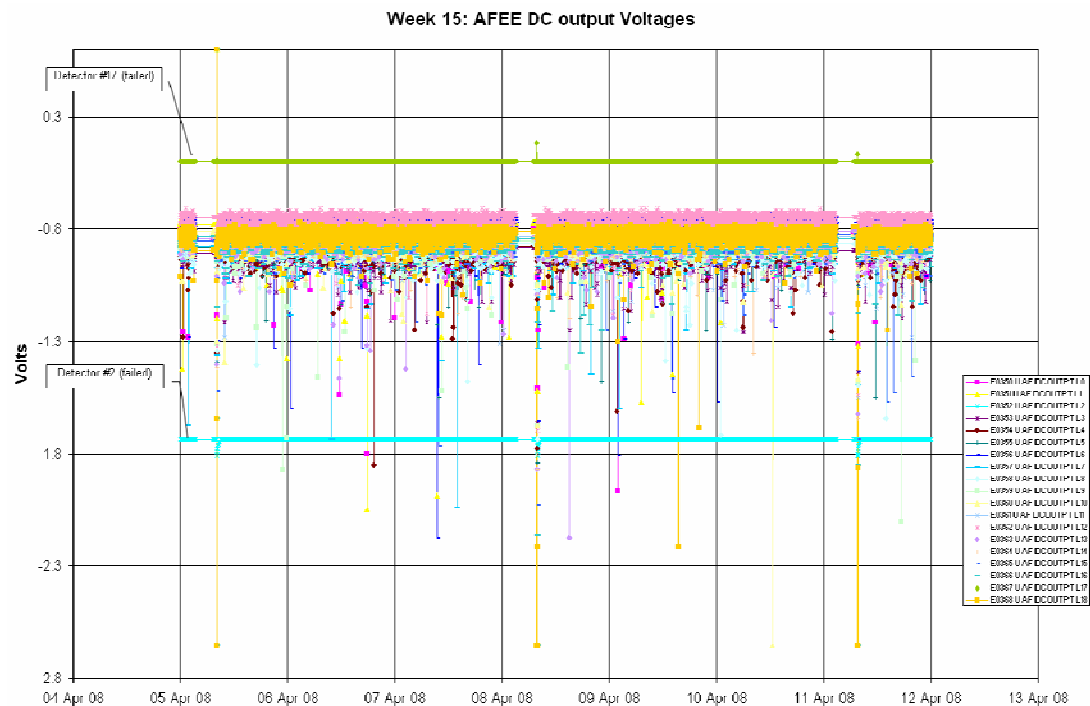


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

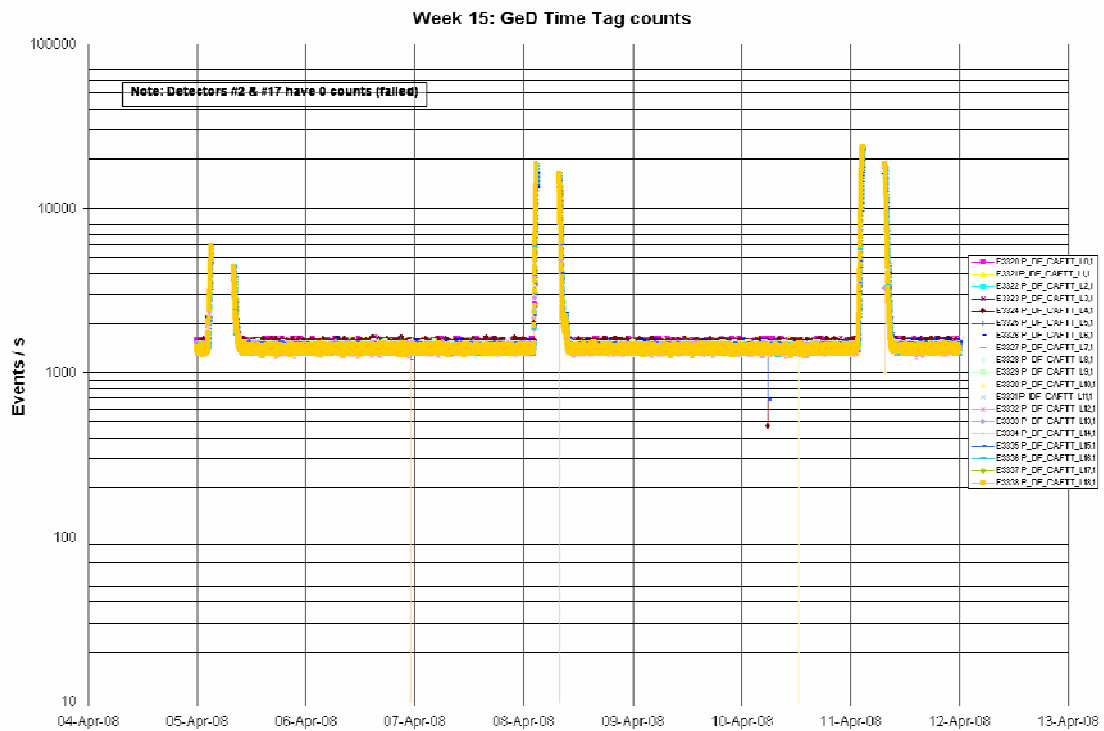
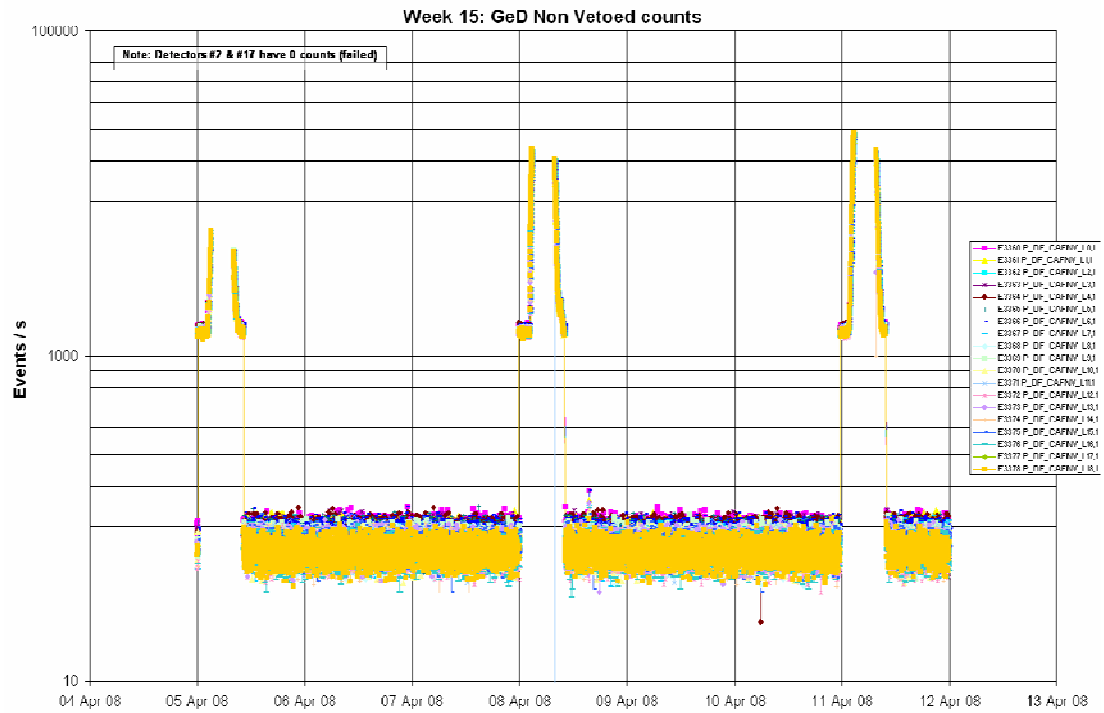
The following plot shows the ACS overall count rate evolution during the reporting period:

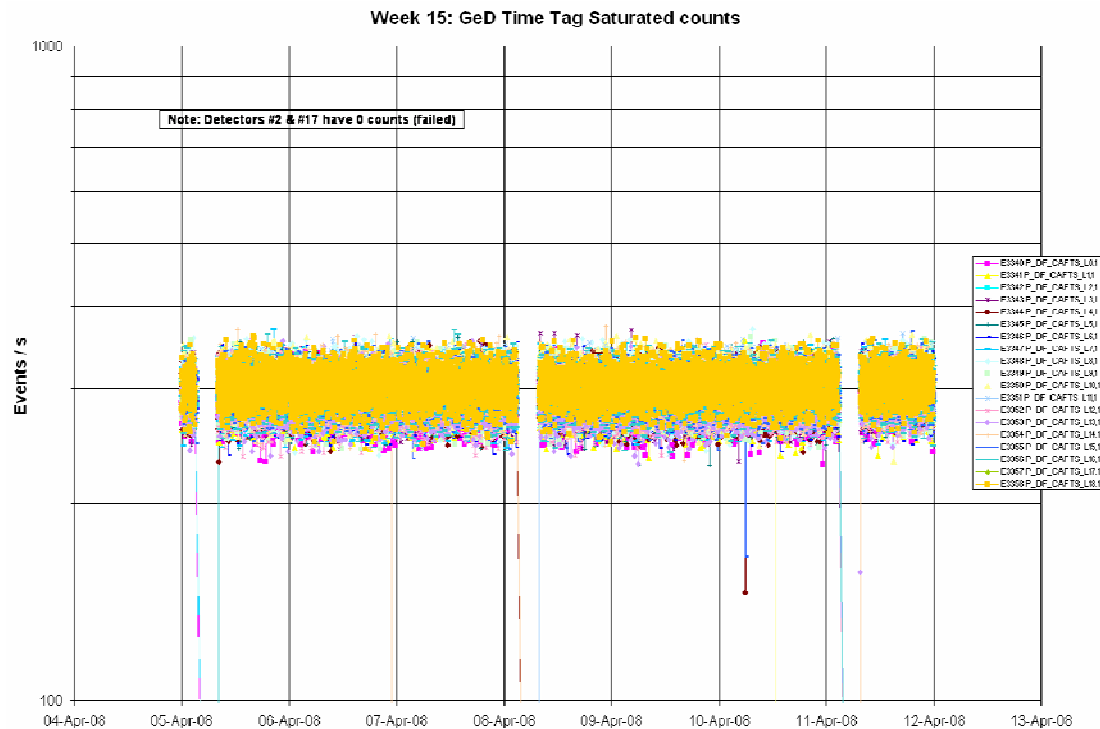


AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.

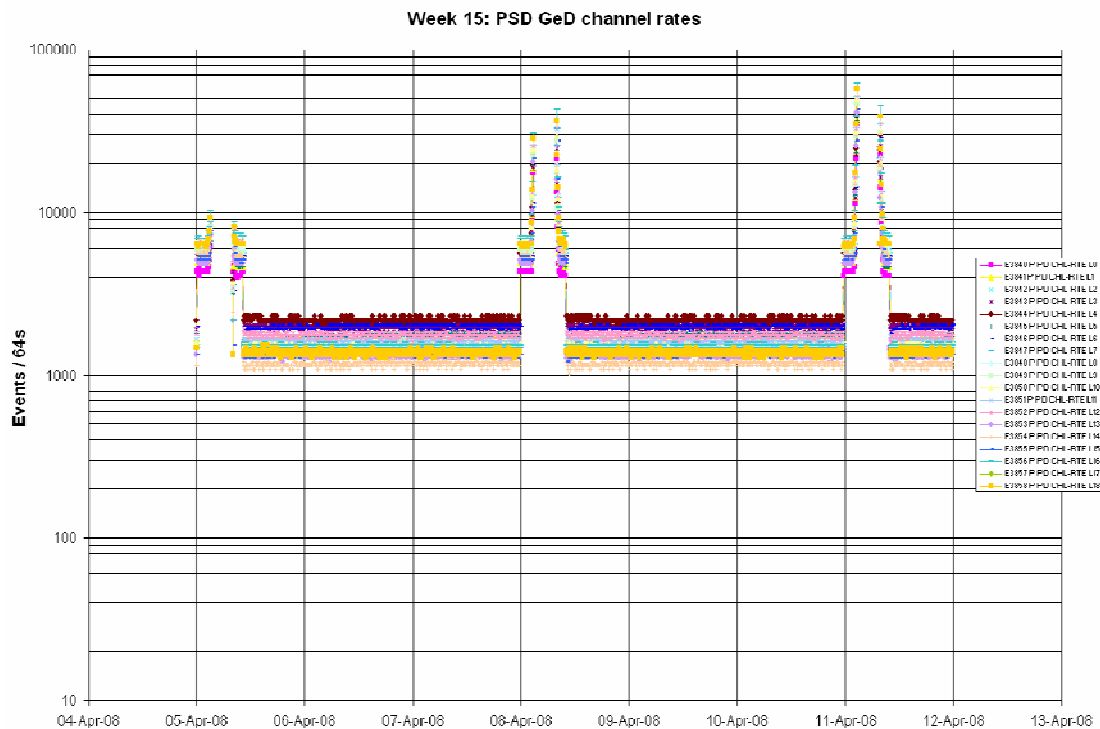


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event count rates during the reporting period.





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:

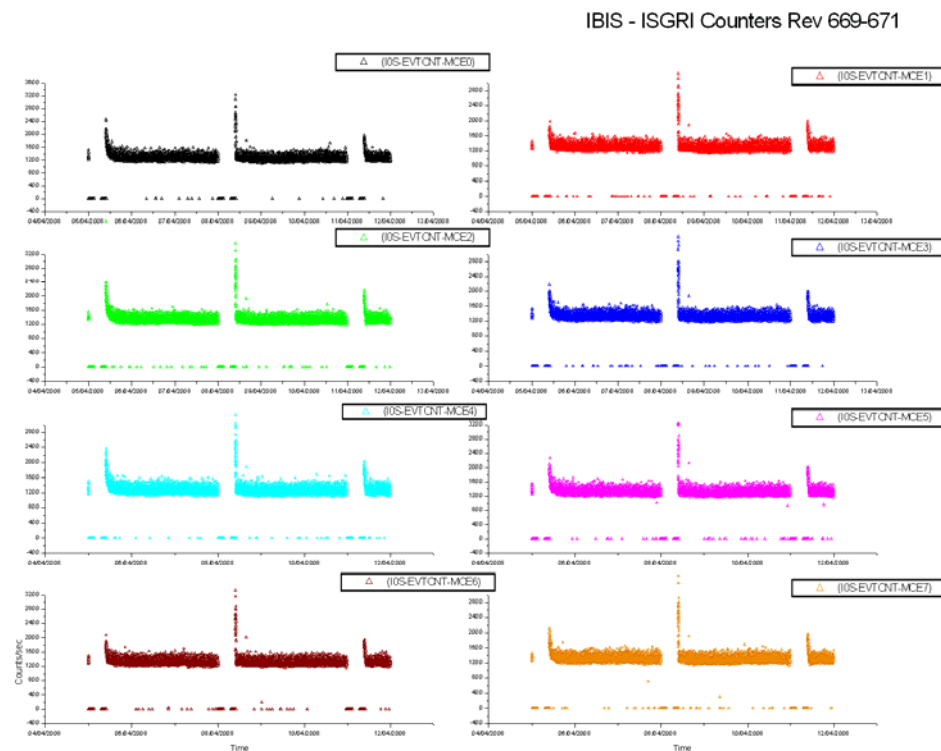
- On 2008-04-11 at 08:16:24Z OEM APID 1024 ID 145 EXCEPTION SPI1 LSL ERROR, with parameters indicating a NACK from the PSD, was received. As it was a single occurrence, no action was taken.

- Due to continuing high radiation after the expected radiation belt exit of revolution 671, the TM parameter E3500 went OOL High on 2008-04-11 at 09:57:43Z. It returned within limits at 10:12:31Z and no action was taken.
- TM parameter E2115 went OOL warning low on several occasions during the week. As in each case it returned within limits of its own accord, no action was taken.

8.3.3 IBIS Operations

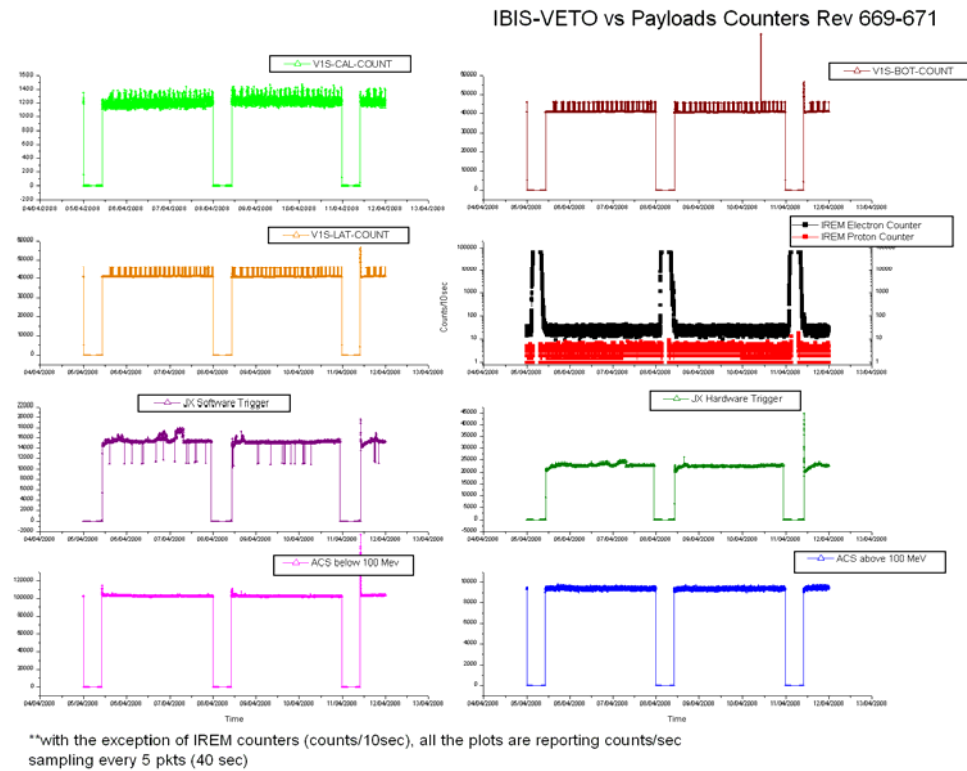
IBIS Event Counters Plots

ISGRI Counters:



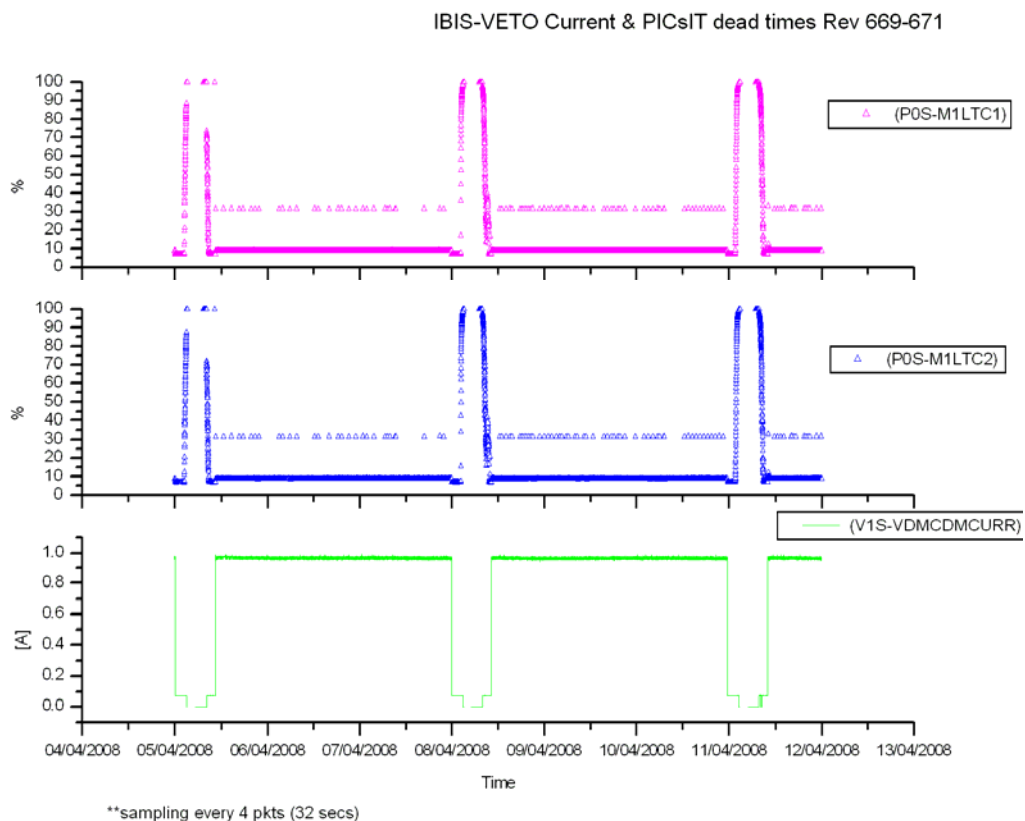
**sampling every 4 pkts (32 secs)

VETO vs Payload Counters:



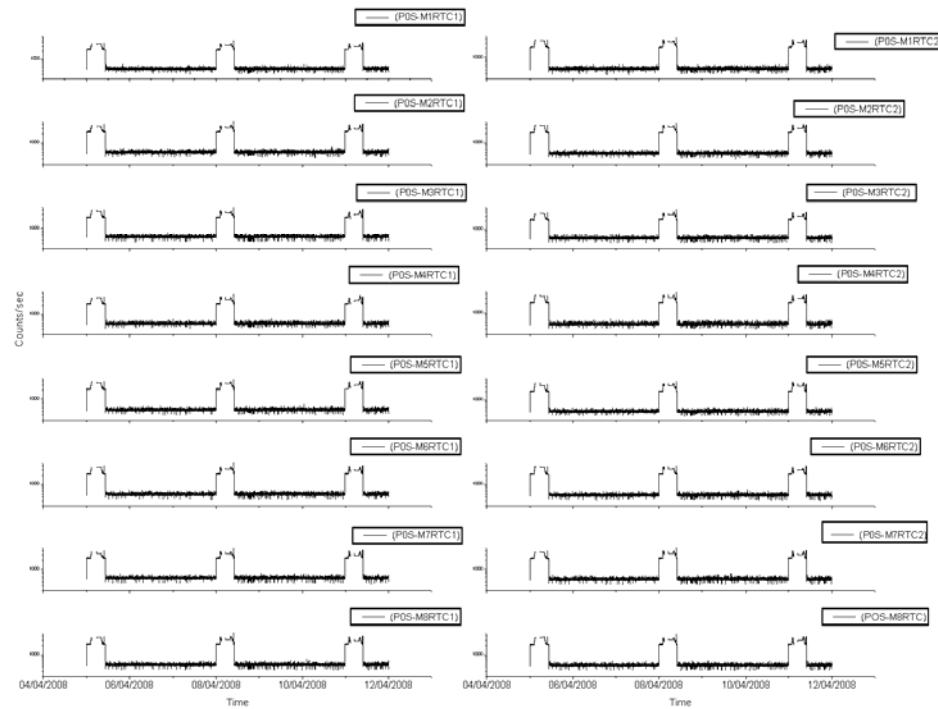
The week was characterised by slightly high radiation after the expected radiation belt exit of revolution 671 as reported by the payload.

VETO Current:



PICsIT Counters:

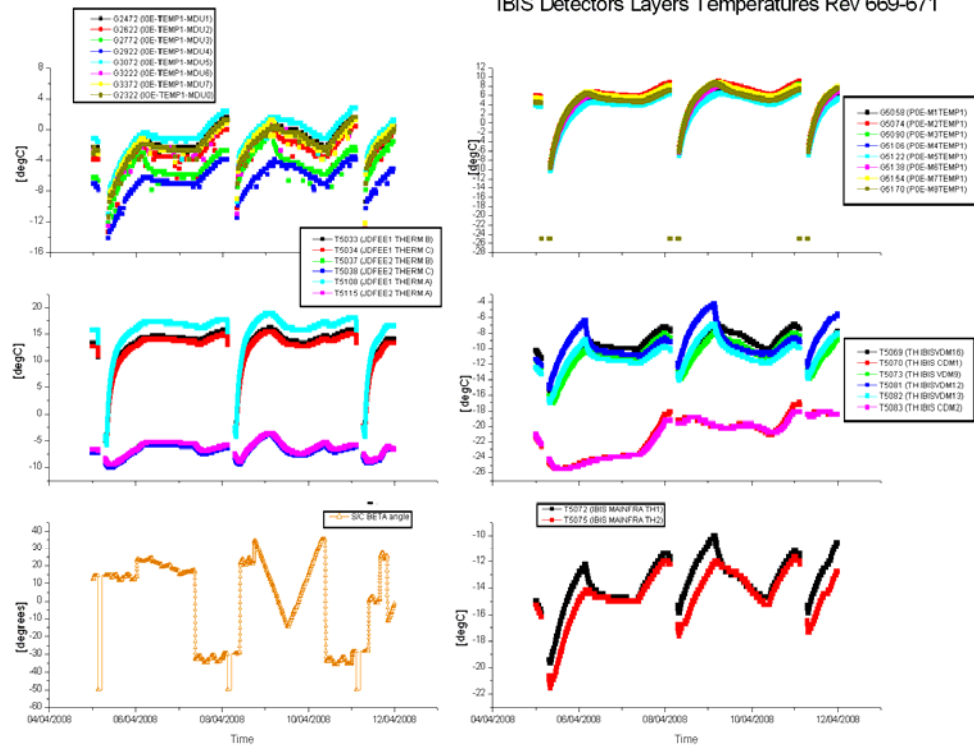
IBIS - PICsIT Counters Rev 669-671



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:

IBIS Detectors Layers Temperatures Rev 669-671



**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 (I0E-OVFWPXADD-Mi) were received during the radiation belt passages.

2008-04-05 (DOY 096, Rev 668-669)

Following a request from the IBIS PI, the Module Counter Maximum of the Noisy Pixel Handling System was changed from 10000 to 20000 at the start of revolution 669. This was done by disabling the Timeline such that the ED GEISCL03 for the ISGRI calibration scheduled at 09:50:23Z was not released and a manually edited GEISCL03 sequence with the new parameter value was uplinked instead.

At 13:19:09Z and again at 14:07:49Z TM parameter G2056 failed status consistency check, indicating an overflow of the noisy pixel address buffer in MCE4. As in each case it returned within limits at the next TM cycle, no action was taken.

2008-04-06 (DOY 097, Rev 669) to 2008-04-07 (DOY 098, Rev 669)

IBIS operations executed nominally.

2008-04-08 (DOY 099, Rev 669-670)

Following a request from the IBIS PI, the Module Counter Maximum of the Noisy Pixel Handling System was changed from 10000 to 20000 at the start of revolution 670. This was done by disabling the Timeline such that the ED GEISCL03 for the ISGRI calibration scheduled at 09:35:05Z was not released and a manually edited GEISCL03 sequence with the new parameter value was uplinked instead.

During the execution of the ED GEISCL03, the TM parameter family G2013 toggled OOL Warning High from 09:41:41Z to 09:53:49Z. These are the number of events triggering the MCEi per second. As they returned within limits of their own accord, no action was taken.

2008-04-09 (DOY 100, Rev 670) to 2008-04-10 (DOY 101, Rev 670)

IBIS operations executed nominally.

2008-04-11 (DOY 102, Rev 670-671)

At 07:47:11Z, during the execution of the ED GEVESP01 from the Timeline, OEM APID 1280 ID 129 ANOMALY IBIS1 IASW TIME-OUT TRANSMITTING LSL DATA (NO ANSWER FROM CSSW) was received.

In addition, at 07:47:17Z TM parameter G8012 failed SCC with value = ON (indicating a VEB reset generated by Watchdog) and G6030 failed SCC with value = ON, indicating the CDM02 was ON, which is the default configuration of VETO after a reset. This is a known problem (see AR INT_SC-130), that occasionally VETO resets during the execution of the VETO patch (ED GEVESP01) after eclipse.

Therefore the following recovery procedure was executed:

- 08:17Z FCP_IBIS1_0332 IBIS VEB-A Deactivation
- 08:20Z FCP_IBIS1_0111 VETO VEB Activation. In executing this procedure, the commands to switch the VEB heater A OFF during the procedure were omitted as the VEB Heater A was already disabled following post-eclipse reconfiguration and was due to be enabled by the Timeline at later stage.
- 08:25Z FCP_IBIS1_0199 IBIS: VETO Restore CTX
- 08:27:44Z ED GEVESP01 re-uplinked.

IBIS operations continued nominally.

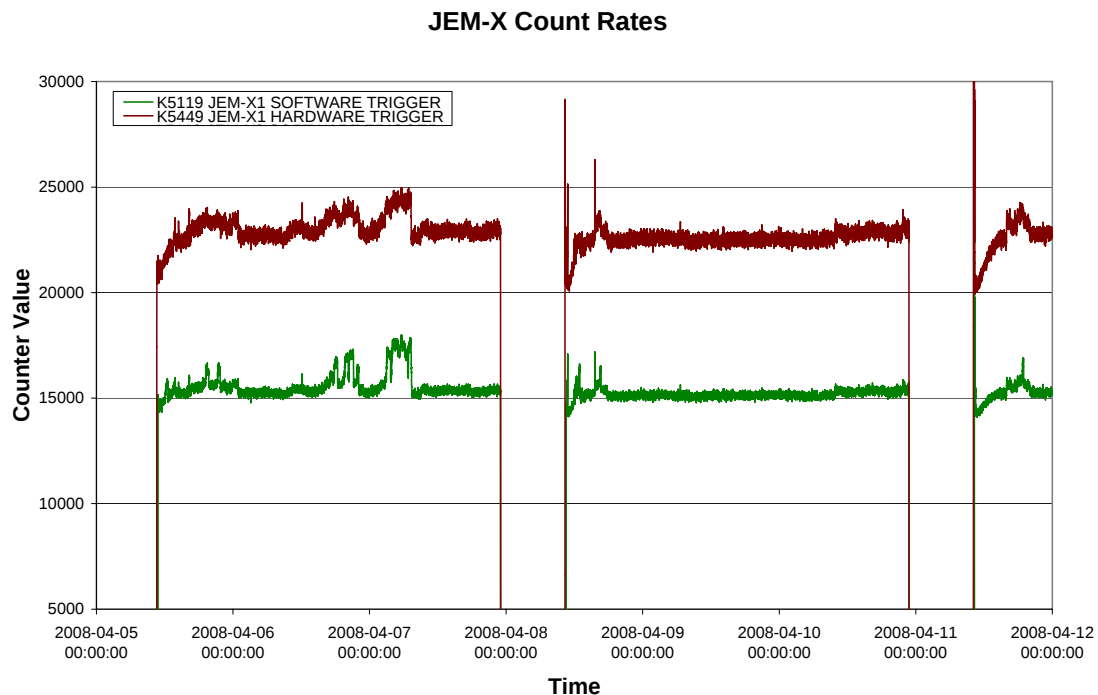
Following a request from the IBIS PI, the Module Counter Maximum of the Noisy Pixel Handling System was changed from 10000 to 20000 at the start of revolution 671. This was done by disabling the Timeline such that the ED GEISCL03 for the ISGRI calibration scheduled at 09:20:41Z was not released and a manually edited GEISCL03 sequence with the new parameter value was uplinked instead.

Due to slightly high radiation after the expected radiation belt exit of revolution 671, from 10:00:05Z to 10:11:57Z the VETO counters, TM parameters G6062 and G6063, toggled OOL High. As they returned within limits of their own accord, no action was taken.

8.3.4 JEM-X Operations

JEM-X Count Rates

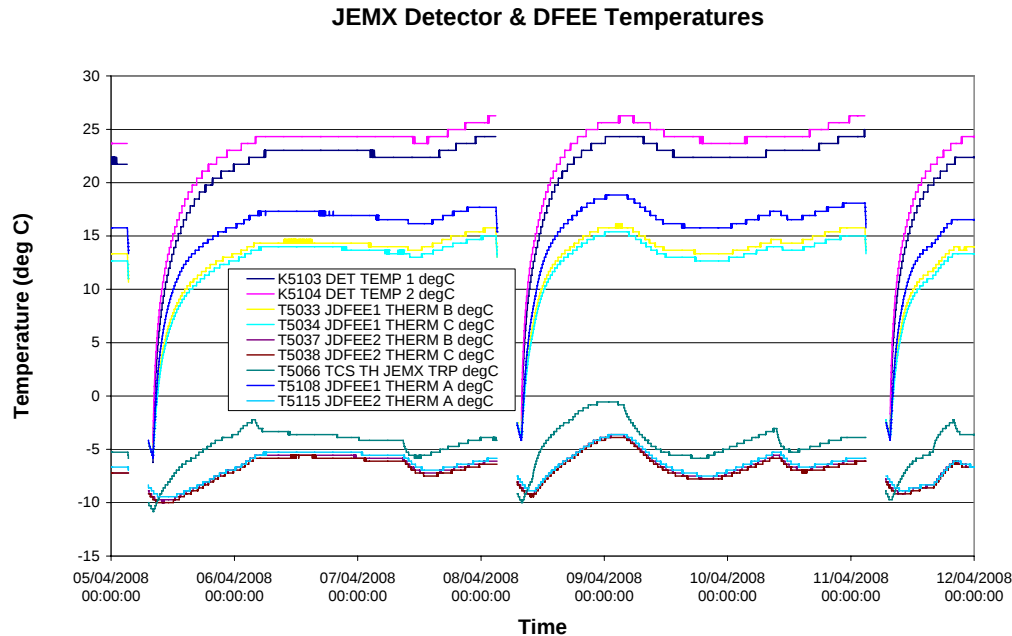
JEM-X count rates over the reporting period are displayed in the following graph¹.



JEM-X Temperatures

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 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

2008-03-08 (DoY 068, Rev 659)

JEM-X1 operations executed nominally.

2008-03-09 (DoY 069, Rev 659-660)

At 01:16:46, TC KU0014 terminated with status 'AFFECTED', and at 01:16:54, the same command terminated with status 'UNVERIFIED'. On both occasions, no action was taken and there was no impact.

2008-03-10 (DoY 070, Rev 660) to 2008-03-11 (DoY 971, Rev 660)

JEM-X1 operations executed nominally.

2008-03-12 (DoY 072, Rev 660-661)

At 11:45:36, and 11:52:39, TM parameter K5317 exceeded hard limits. At 12:22:14, TM parameter K5449 exceeded its soft limits. On each occasion, no action was taken and there was no impact.

2008-03-13 (DoY 073, Rev 661) to 2008-03-14 (DoY 074, Rev 661)

JEM-X1 operations executed nominally.

² Data sampled (1 frame in 8)

2008-04-05 (DoY 096, Rev 669)

From 08:08:19 to 08:08:40, parameter KD5380D was briefly out of hard limits. From 08:33:52 to 08:37:04, parameter K5102 exceeded soft limits 5 times. From 08:55:48 to 09:44:32, parameter K5102 exceeded soft limits 46 times. From 10:54:32 to 11:22:41, parameter K5101 again, exceeded soft limits 12 times. No action was taken on any of the above events, and there was no impact.

2008-04-06 (DoY 097, Rev 669)

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

2008.097.07.08.36.634	2008.097.07.08.39.744	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		
2008.097.07.08.36.634	2008.097.07.08.39.772	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 the messages did not reappear. There was no impact.

2008-04-07 (DoY 098, Rev 669)

JEM-X1 operations executed nominally.

2008-04-08 (DoY 099, Rev 670)

From 07:52:32 to 07:52:56, parameter KD5380D was briefly out of hard limits. From 09:46:24 to 10:00:56, parameter K5317 exceeded hard limits. From 15:34:58 to 15:37:55, parameter K5136 exceeded soft limits. No action was taken on any of the above events, and there was no impact.

2008-04-09 (DoY 100, Rev 670) to 2008-04-10 (DoY 101, Rev 670)

JEM-X1 operations executed nominally.

2008-04-11 (DoY 102, Rev 671)

From 07:39:57 to 07:40:17, parameter KD5380D was briefly out of hard limits. From 09:49:45 to 10:11:44, parameter K5317 was intermittently outside hard limits. From 10:08:00 to 10:20:56, parameter K5449 was intermittently outside soft limits. At 10:10:16, parameter K9104 exceeded soft limits. At 10:12:00, parameter KD5020D exceeded hard limits. From 10:15:52 to 10:20:02, parameter K5136 was intermittently

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

8.3.5 OMC Operations

2008-04-05 (DoY 096, Rev 669) to 2008-04-06 (DoY 097, Rev 669)

Nothing to Report.

2008-04-07 (DoY 98, Rev 669)

At 03:58:56, an AOCS problem forced the suspension of the Timeline. A recovery was performed, with the OMC commands for pointing 06690046 manually sent at 06:53:13. The impact was the loss of pointing 06690045, and the shortening of pointing 06690046 from a planned 3230 to 1264 seconds

2008-04-08 (DoY 099, Rev 670) to 2008-04-11 (DoY 102, Rev 671)

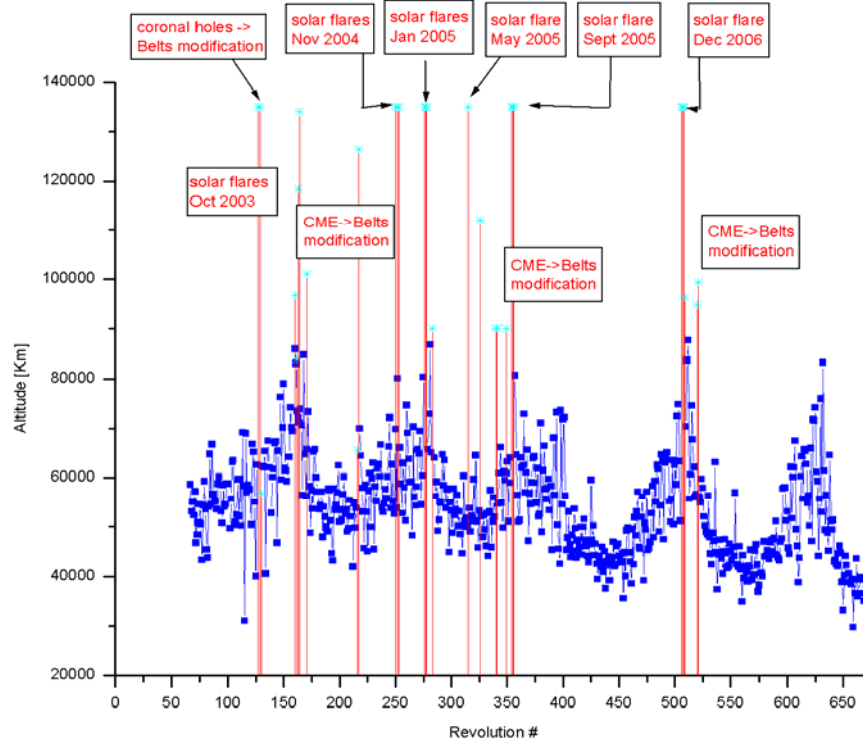
Nothing to Report.

On DoY 096 at 00:11:20, DoY 098 at 23:56:24 and DoY 101 at 23:42:56 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]
668	RAD_ENTR R 2008-04-05T00:11:13Z	05/04/2008 02:29:51	36528.0	05-Apr-2008 01:46:49	42074.82
669	RAD_EXIT R 2008-04-05T10:15:03Z	05/04/2008 09:47:43	>>41196.8	05-Apr-2008 09:26:49	46348.11
669	RAD_ENTR R 2008-04-07T23:56:23Z	08/04/2008 02:15:11	34990.0	08-Apr-2008 01:31:09	42321.97
670	RAD_EXIT R 2008-04-08T10:00:13Z	08/04/2008 10:00:39	53021.1	08-Apr-2008 09:11:09	46084.32
670	RAD_ENTR R 2008-04-10T23:42:49Z	11/04/2008 01:38:31	39336.9	11-Apr-2008 01:21:09	42010.7
671	RAD_EXIT R 2008-04-11T09:45:48Z	11/04/2008 10:17:27	56573.6	11-Apr-2008 08:51:09	44981.51

Reference

High radiation

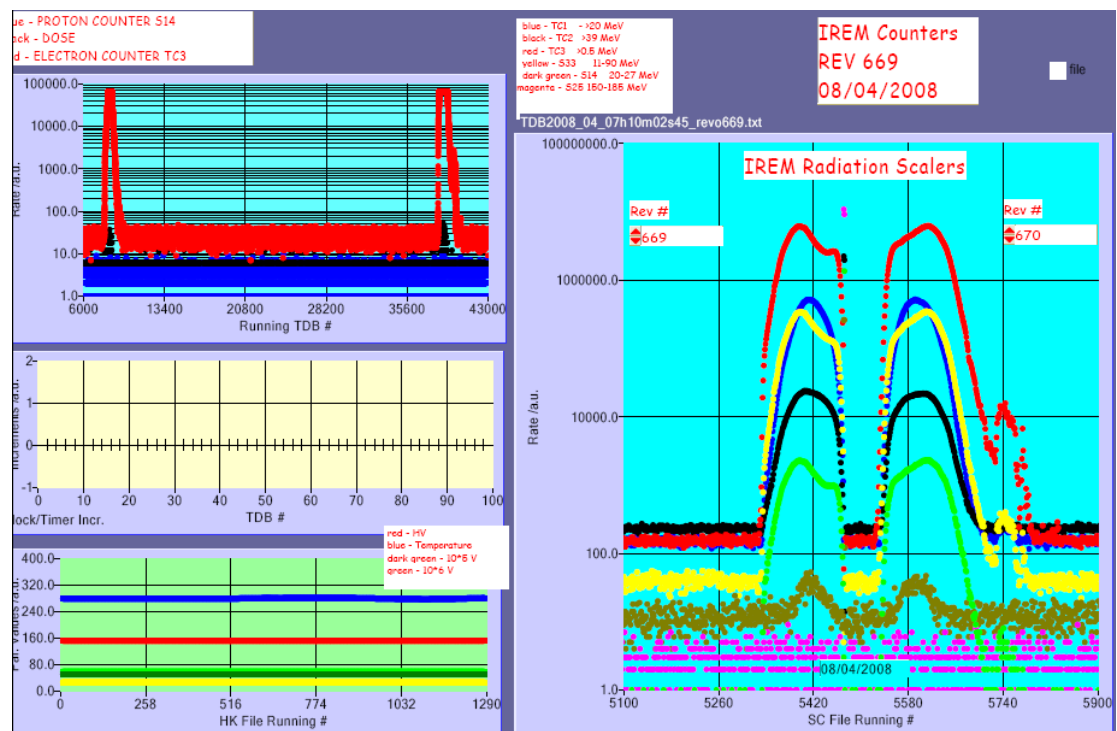
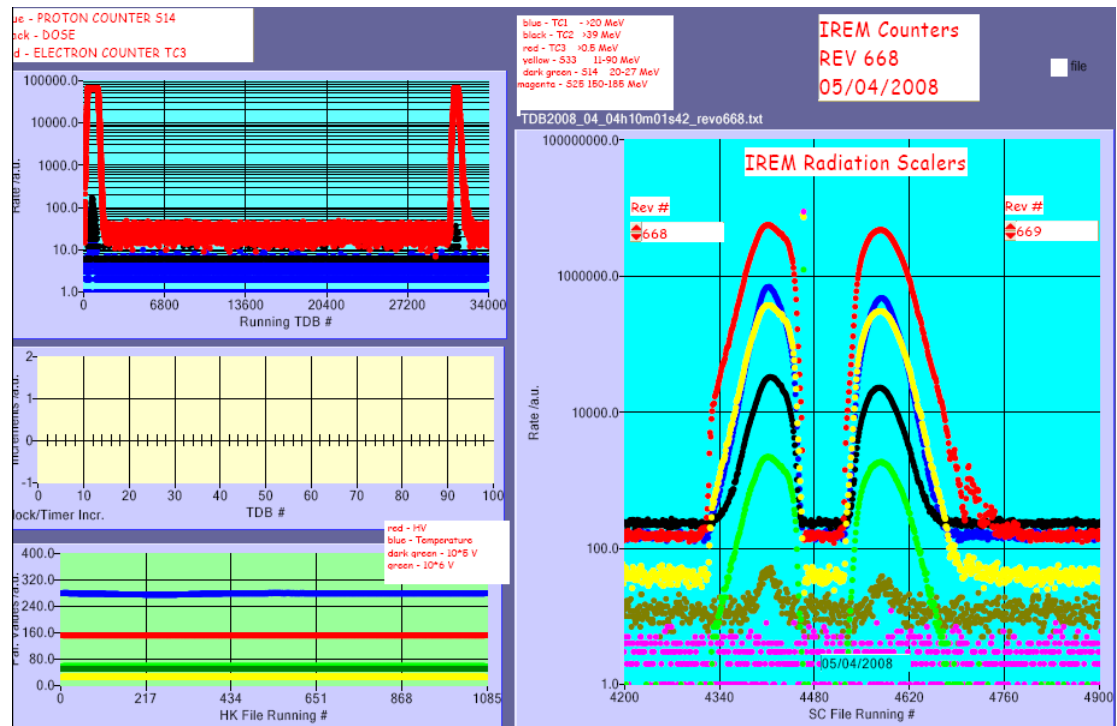
Very small error vs reference (less than 10 minutes)

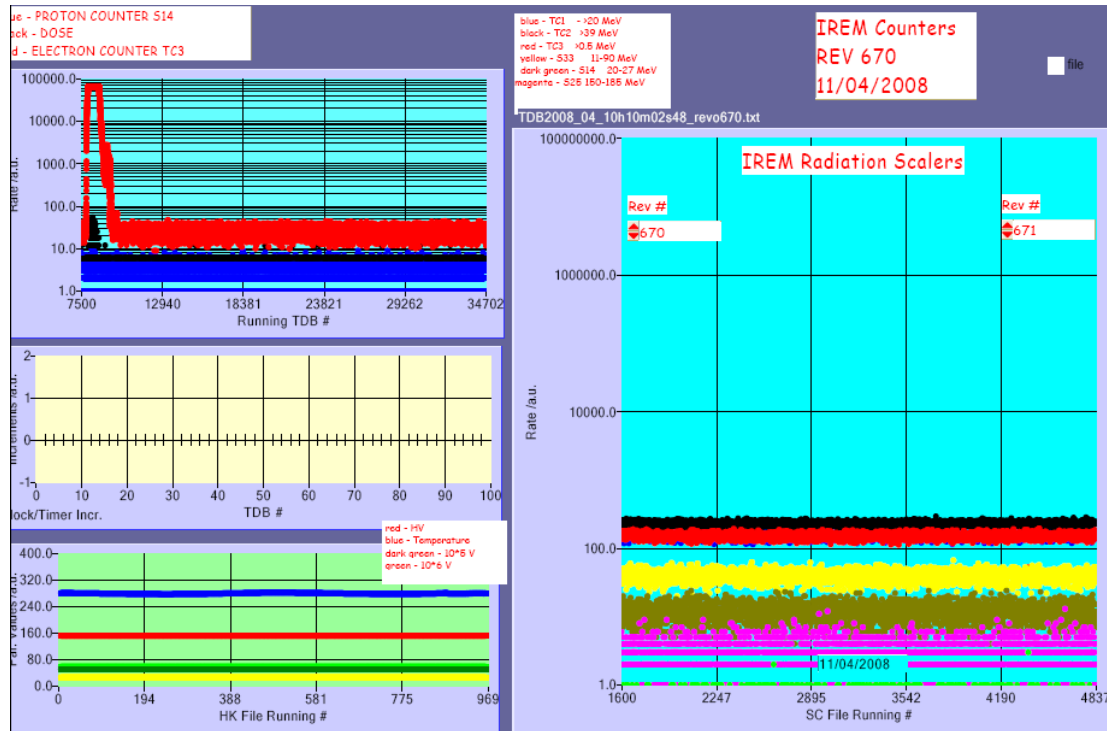
Small error vs reference (between 10 and 30 minutes)

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.

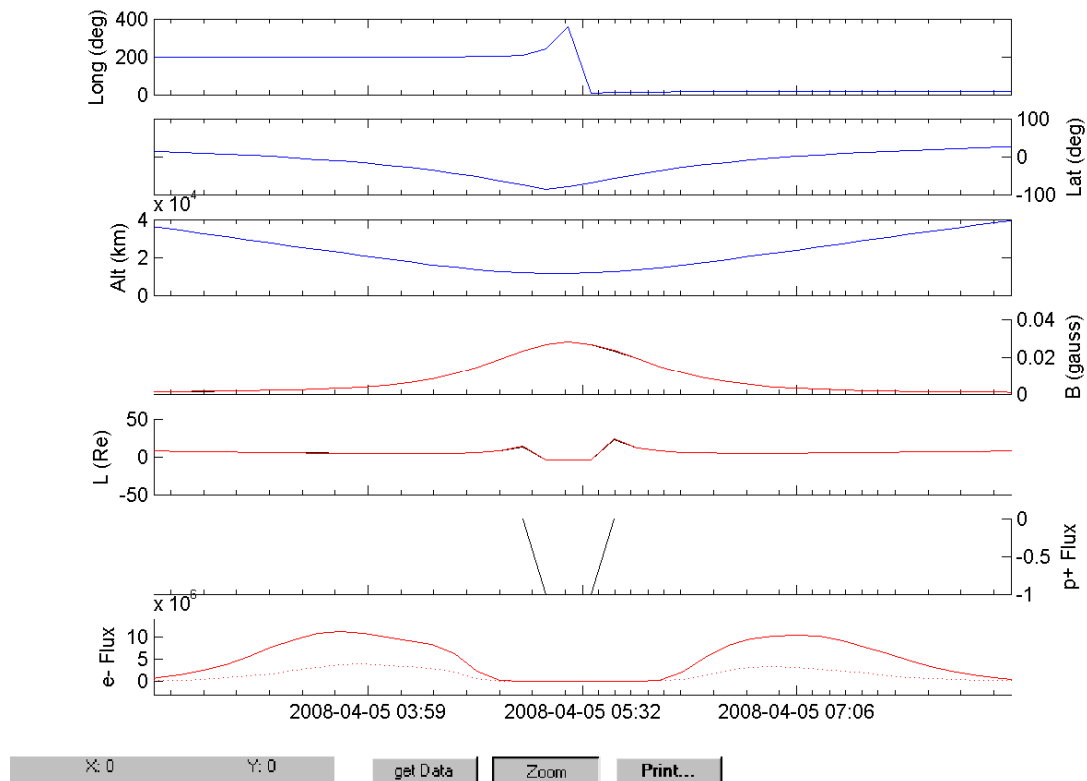
IREM radiation counters:



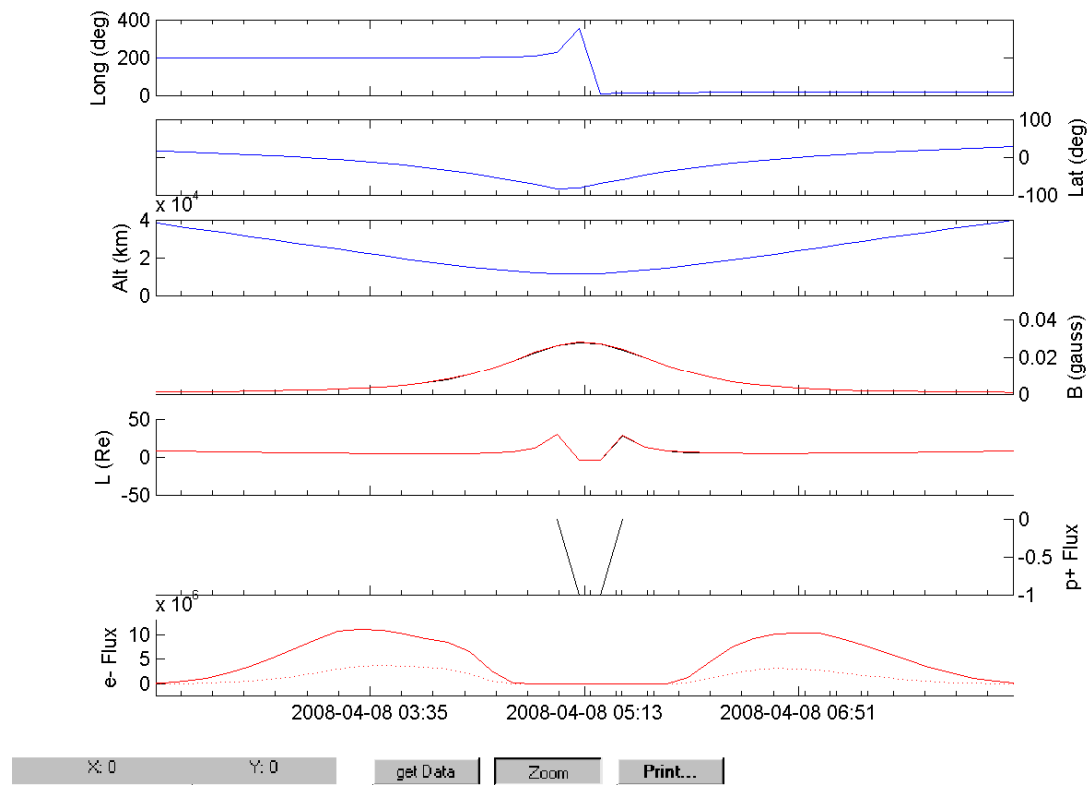


IREM Predicted Radiation Belt Passages

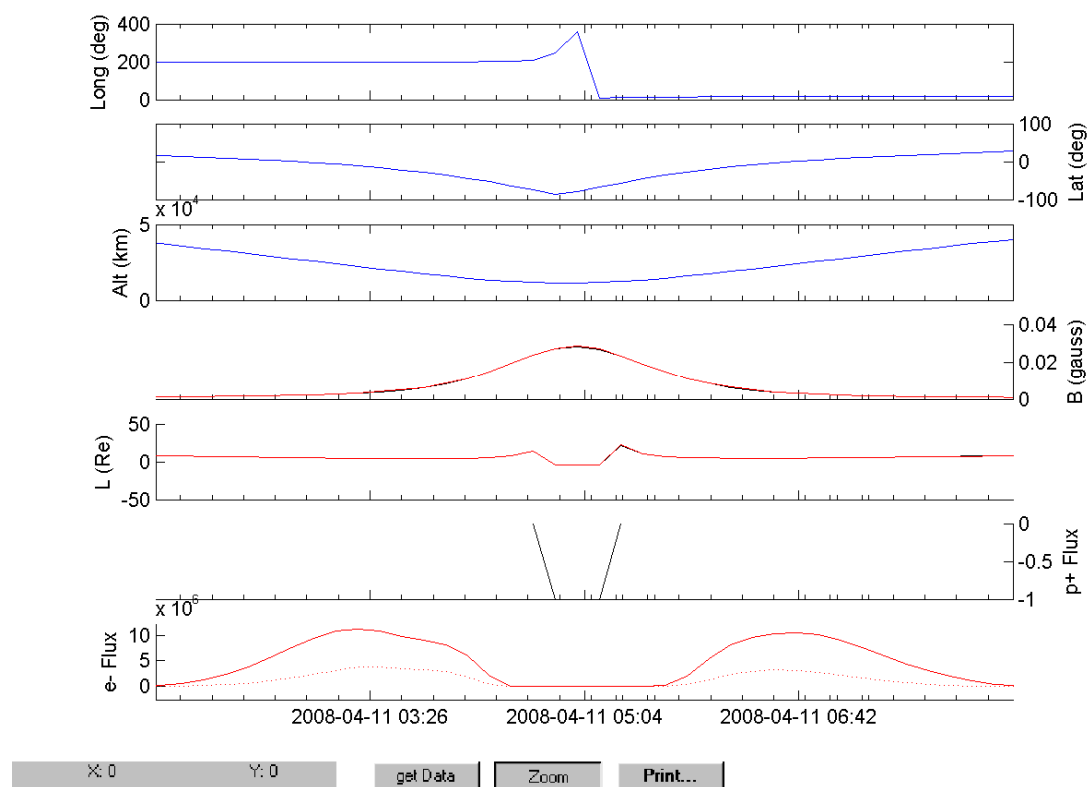
Rev 668



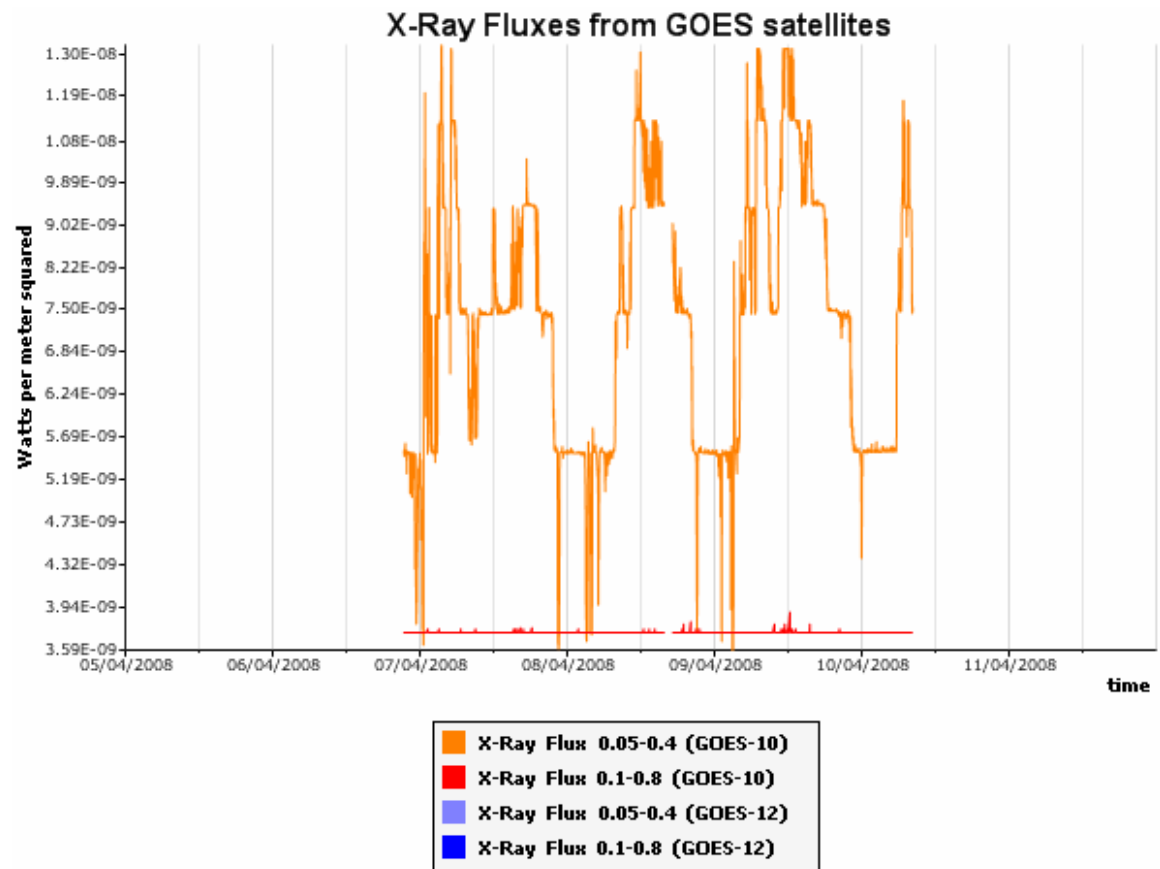
Rev 669



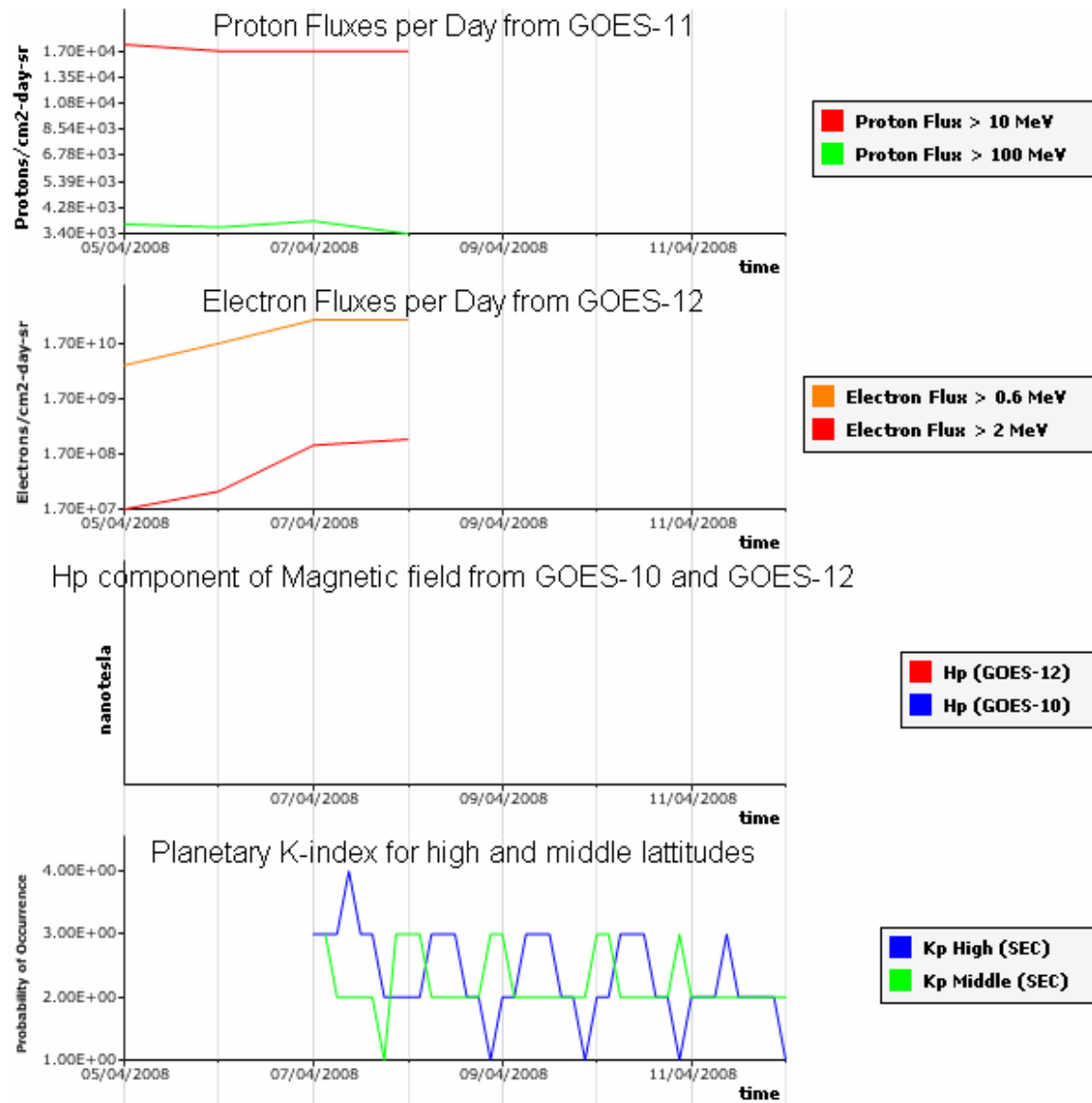
Rev 670



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.