

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 302
Week 27
07.07.08
Routine Phase

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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.....	5
3.2.3	JEM-X.....	6
3.2.4	OMC.....	6
3.2.5	IREM.....	6
4	Ground Facilities.....	6
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.....	7
5	Special Events.....	8
6	Anomalies.....	8
7	Future Milestones.....	8
8	Appendix.....	9
8.1	Overview of Revolutions.....	9
8.2	Consumables.....	9
8.2.1	Detailed Fuel Book-keeping.....	9
8.3	Detailed Satellite Information.....	9
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 28/06/2008 – 04/07/2008.....	10
8.3.2	SPI Operations.....	13
8.3.3	IBIS Operations.....	19
8.3.4	JEM-X Operations.....	25
8.3.5	OMC Operations.....	26
8.3.6	IREM Operations.....	26

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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 28.06.08 until 04.07.08 (both dates inclusive) and covers the revolutions 697, 698 and 699.

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 Loop I-Loop IV Super (RA 13:57:10.00, DEC +07:34:37.0), three raster dithers of XMM-LSS (RA 02:18:00.00, DEC -07:00:00.0), and two raster dithers of the Galactic Plane Region 3 (RA 13:09:32.98, DEC -62:47:56.4).

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.

Two slews were missed from TL, during the observation period, due to problem on FDS.

The fuel consumption over the period between 27/06/2008 and 04/07/2008 was 0.0859 Kg. The remaining propellant is in the order of 139.8576 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.

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.

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

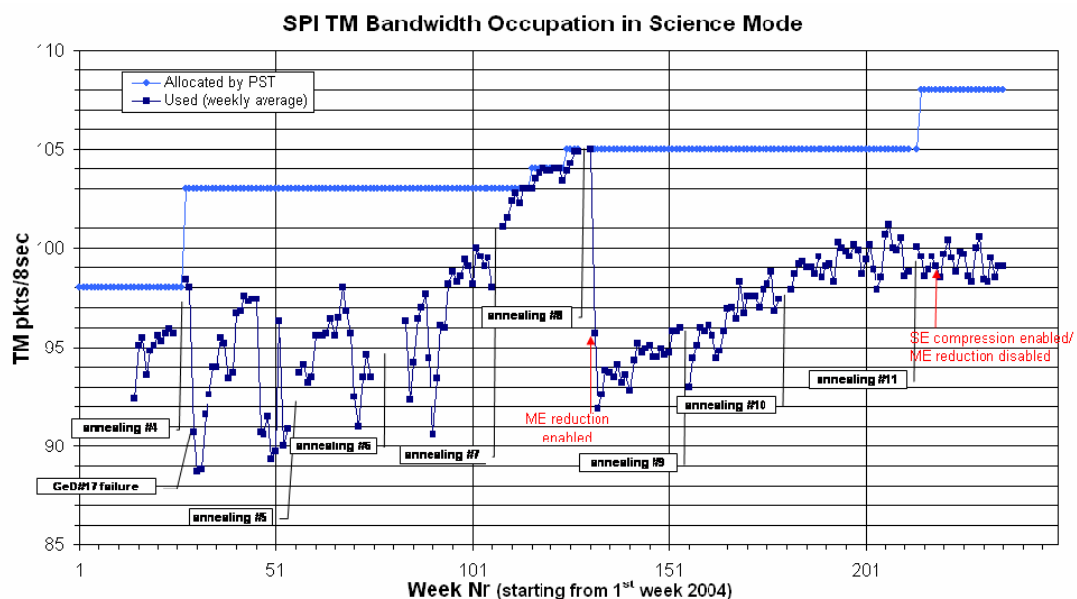
3.2.1 SPI

Following the 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.

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 in the science window was 99.1 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.

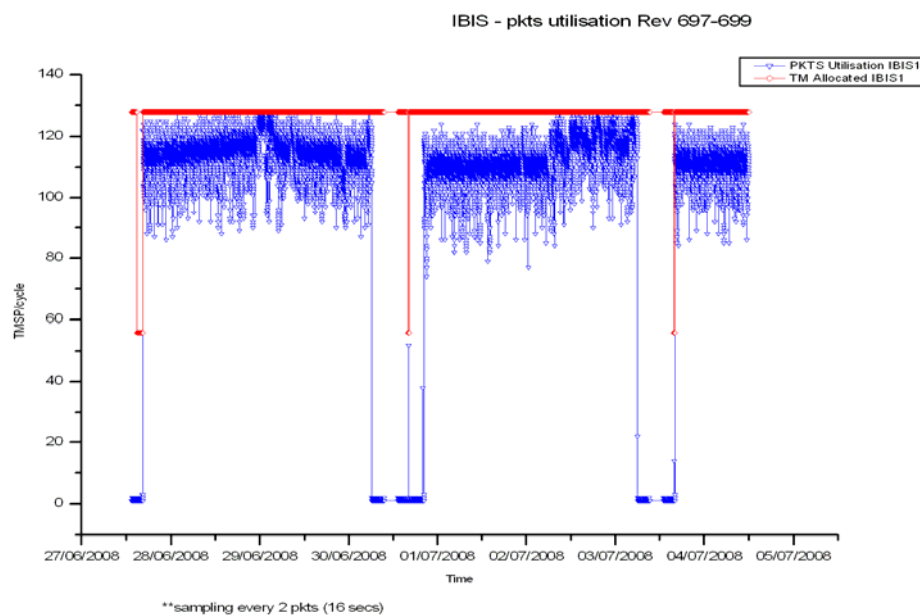
3.2.2 IBIS

The overall status of the unit is nominal.

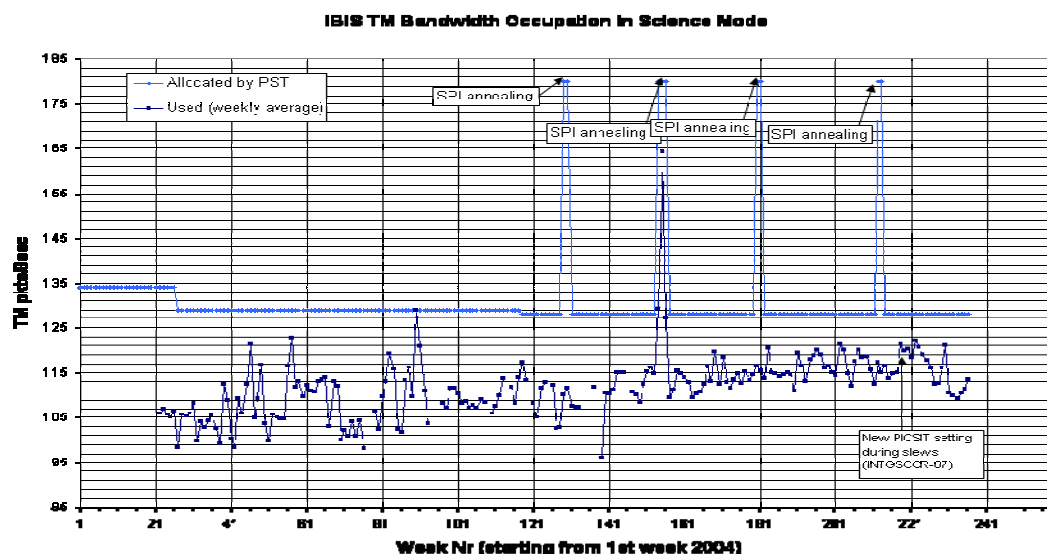
During the reporting period, the TM bandwidth statistics were as follows:

- PST allocation to IBIS above radiation belts: 128 packets/cycle.
- IBIS mean bandwidth utilisation in science mode: 113.38 packets/cycle (up 1.95 on last week)
- Percentage of TM cycles in which full bandwidth was used: 1.47%

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



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, 135 of the 137 planned science pointings were executed nominally, one pointing was performed with a slight attitude offset, and another was cut short.

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. The risk of solar flares was very low.



Reference: www.spaceweather.com

Note: Some more information concerning the IREM operations is provided in the Appendix Section 8.3.6.

4 Ground Facilities

The Operational ground facilities performance was very good this week. Two pointings were affected when the FDS failed to update a slew. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was very good this week. The FDS failed to update 2 slews, one of which was allowed to proceed with a slight offset, the other was manually updated with a small delay.

4.2 Ground Stations & Network

The performance of the ground stations and Network was excellent this week. There were no reported incidents at all.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

We received new PSFs for revs 702 - 707. Those for 702 and 703 were not used to re-plan as the changes were not crucial and the planning for these revolutions was quite long.

The revs 704-707 were planned and sent in the morning of 4th July.

No new TSFs were received.

2. Observation status

No new ECS files were received.

3. ISOC system

ISOC system V19.3 was released and is up for testing.

4. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 07/07/2008:

- Latest Standard Analysis completed: observation 05200260004 (mid-latitude 2, Revolutions 680 & 681) on 26/06/2008.
- Latest products archived: observation 05200260004 (mid-latitude 2, Revolutions 680-681) on 26/06/2008.
- Latest observation products sent to the observer: observation 05200510009 (Mrk 421, Revolutions 679) on 16/06/2008.

5 Special Events

6 Anomalies

The following problems were reported this week that impacted operations.

- On DoY 182 at 17:16, the FDS failed to update slew 06970063. The manoeuvre was left to run, and the subsequent slew updated. The impact was a slight attitude offset in that pointing.
- On DoY 183 at 04:16, the FDS failed to update slew 06980002. A manual recovery was performed to that attitude. The impact was a 774 second delay in the start of that pointing.

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

AR id	Date Created	Subject	Segment	Status
INT-3009	2008-07-17	FDS failed slew update	FDS	Pending
INT-3008	2008-07-17	FDS failed slew update	FDS	Pending
INT_SC-231	2008-07-09	VETO VDM16 High Voltage Breakdown	Payload	Pending
INT_SC-230	2008-07-01	IBIS ISGRI MCE0 Latch-up	Payload	Pending
INT_SC-229	2008-06-30	SPI CDE1 LCL2 SEU (status changed from OPEN to CLOSE)	Payload	Pending

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 697

The observations in revolution 697 began with a raster dither of Loop I-Loop IV Super (RA 13:57:10.00, DEC +07:34:37.0), lasting ~30.0 hours. They continued with a raster dither of XMM-LSS (RA 02:18:00.00, DEC -07:00:00.0), lasting ~24.1 hours, until the end of the revolution.

Revolution 698

The observations in revolution 698 began with a raster dither of XMM-LSS (RA 02:18:00.00, DEC -07:00:00.0), lasting ~36.1 hours. They continued with a raster dither of the Galactic Plane Region 3 (RA 13:09:32.98, DEC -62:47:56.4), lasting ~19.3 hours, until the end of the revolution.

Revolution 699

The observations in revolution 699 began with a raster dither of XMM-LSS (RA 02:18:00.00, DEC -07:00:00.0), lasting ~35.2 hours. They continued with a raster dither of the Galactic Plane Region 3 (RA 13:09:32.98, DEC -62:47:56.4), lasting ~20.2 hours, until the end of the revolution.

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

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2008-06-13T03:03:10.000Z	140.0926	F	Automatic TM processing.
2008-06-14T12:39:22.000Z	140.0722	F	Automatic TM processing.
2008-06-16T02:52:15.000Z	140.0621	F	Automatic TM processing.
2008-06-17T12:26:27.000Z	140.0394	F	Automatic TM processing.
2008-06-19T02:41:35.000Z	140.0320	F	Automatic TM processing.
2008-06-20T12:16:11.000Z	140.0171	F	Automatic TM processing.
2008-06-22T02:30:55.000Z	140.0110	F	Automatic TM processing.
2008-06-23T11:52:02.000Z	139.9857	F	Automatic TM processing.
2008-06-25T02:18:38.000Z	139.9678	F	Automatic TM processing.
2008-06-26T11:59:22.000Z	139.9435	F	Automatic TM processing.
2008-06-28T02:07:42.000Z	139.9309	F	Automatic TM processing.
2008-06-29T11:44:25.000Z	139.9025	F	Automatic TM processing.
2008-07-01T01:54:53.000Z	139.8979	F	Automatic TM processing.
2008-07-02T11:14:18.000Z	139.8716	F	Automatic TM processing.
2008-07-04T01:39:26.000Z	139.8576	F	Automatic TM processing.

This report was generated Fri Jul 4 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, 28/06/2008 – 04/07/2008

The AOCS operations were executed from the Automatic Timeline.

During this period, 92 Open Loop Slews, 63 Closed Loop Slews and 5 Momentum Biases were executed (as reported by ACC).

2 slews (CSL) were missed from TL, during the observation period, due to problem on FDS (failed update generation).

The OTF was not reached during PID 06980054.

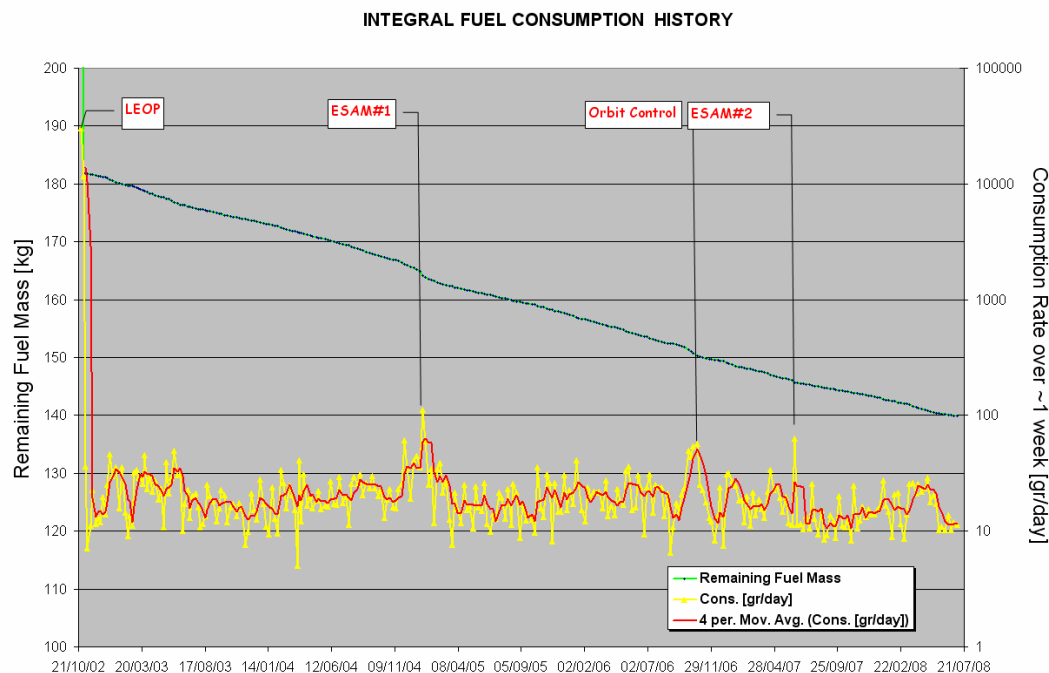
This is equivalent to $\sim 0.6\%$ of the total number of slews planned (154).

Orbit Control

No update

Fuel consumption

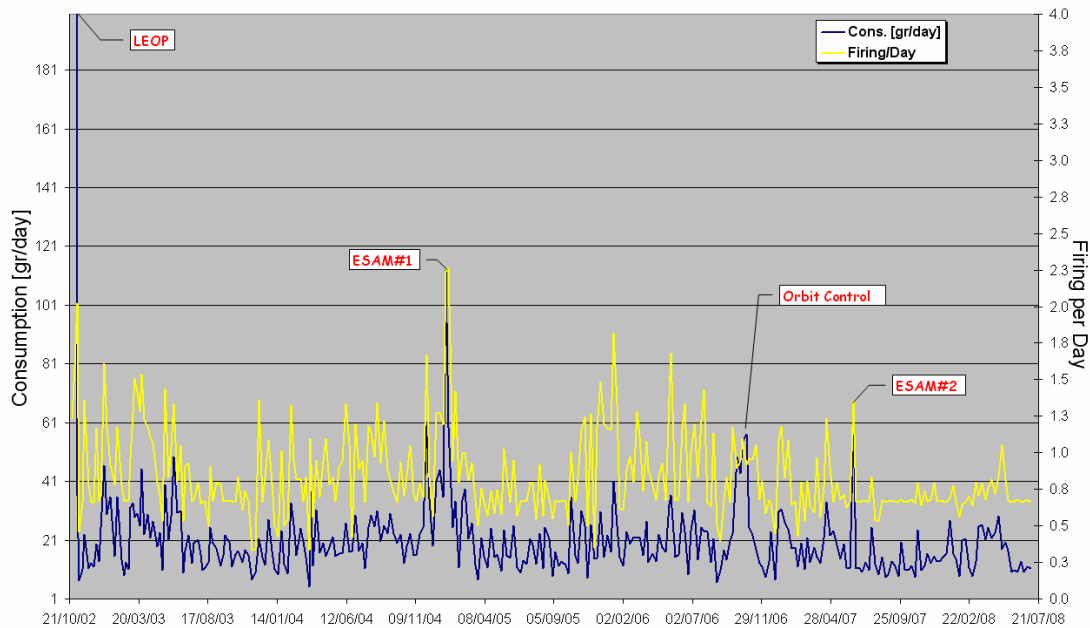
The fuel consumption (total, grams per day) over the period between 01/11/2002 and 04/07/2008 is reported in the plot below.



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 04/07/2008 is reported in the plot below.

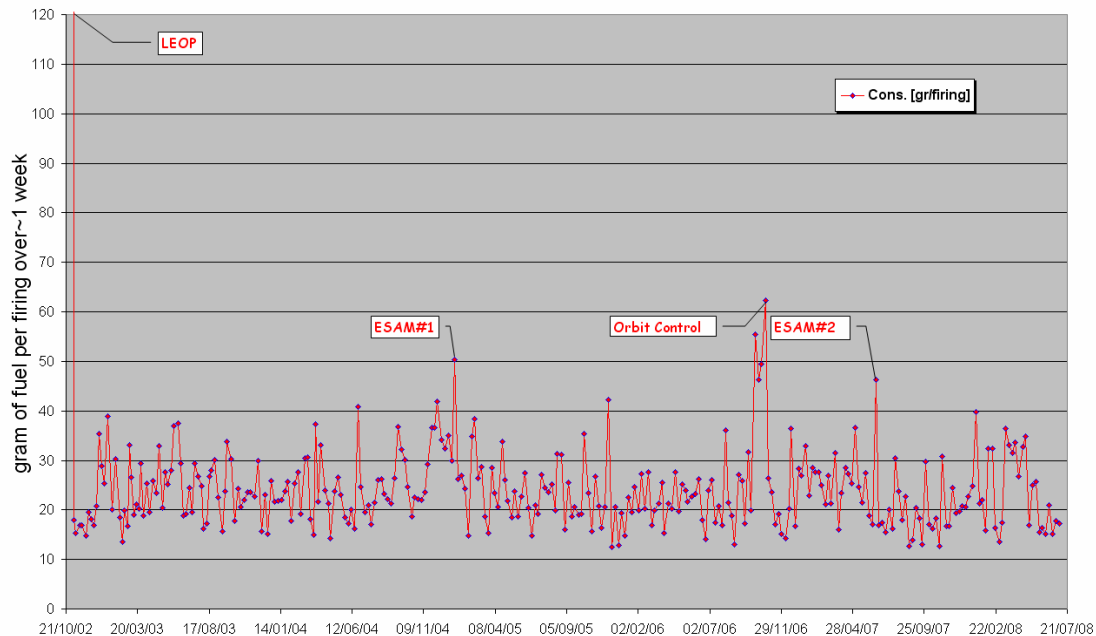
INTEGRAL FIRING PER DAY HISTORY



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 04/07/2008 is shown in the plot below.

INTEGRAL FUEL MASS PER FIRING HISTORY

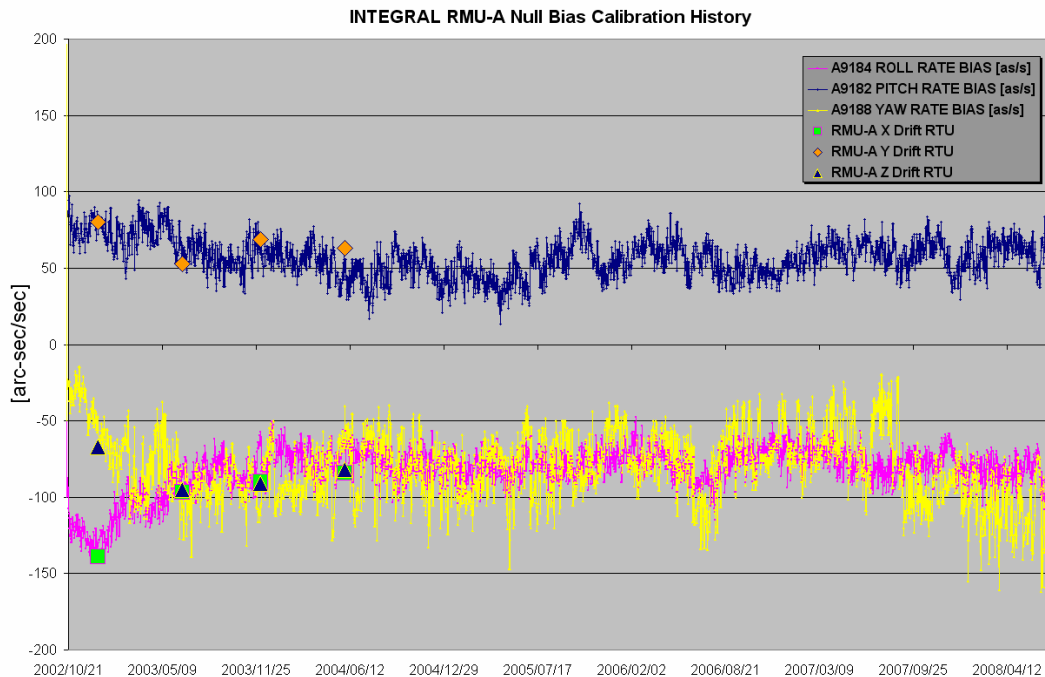


The RMU-A null bias calibration

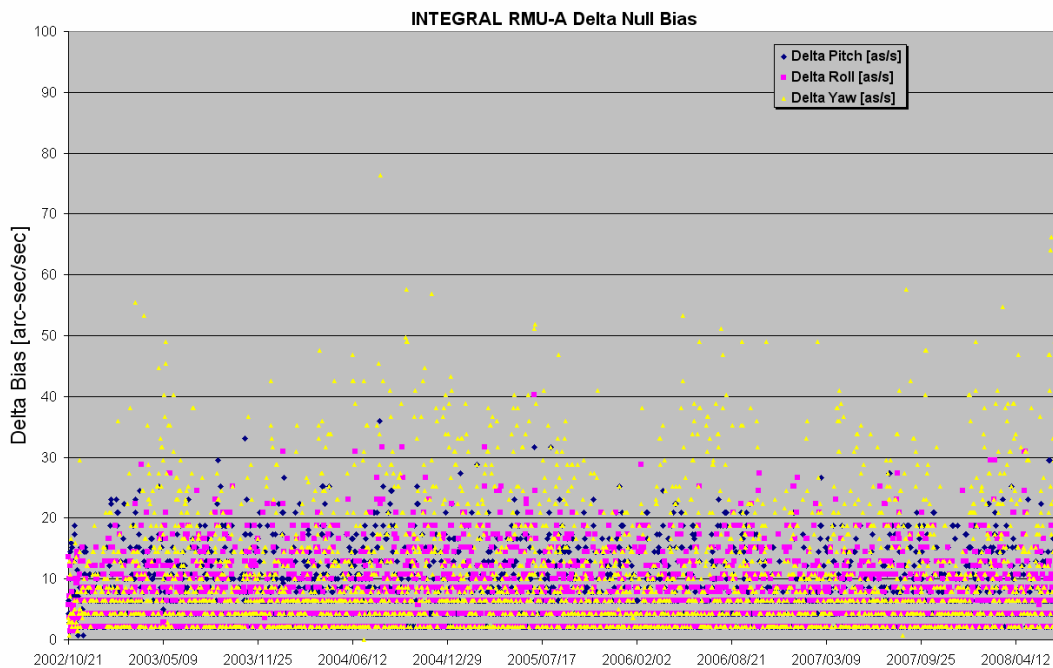
The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 04/07/2008 is reported in the plot below.

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 04/07/2008 is reported in the plot below.



28/06/2008 (Day of Year 180, Revolution 696-697)

Nothing to report.

29/06/2008 (Day of Year 181, Revolution 697)

Nothing to report.

30/06/2008 (Day of Year 182, Revolution 697)

FDS failed slew update: at 17:16z the FDS failed the update of slew ID 06970063. FDS reported an error during the update process and the TPF generation was aborted. Unfortunately the problem was only noticed when the slew was already in execution, this causing the S/C to slew to an attitude different from the one planned in TL. At that time was considered safer for the S/C to leave the slew execution running than abort the slew execution.

A manual recovery was then performed at 21:48z by generating a Close Loop Slew to the attitude of PID 06970063 to correct the off-pointing error. The slew ID 06970064 was manually updated in TL.

The following pointing ID 06970063 was not correctly executed.

01/07/2008 (Day of Year 183, Revolution 697-698)

FDS failed slew update: at 04:16z the FDS failed the update of slew ID 06980002. FDS reported an error during the update process and the TPF generation was aborted.

A manual recovery was then performed at 04:23z by generating a Close Loop Slew from the attitude of PID 06980001 to the attitude of PID 06980002. The slew ID 06980003 was manually updated in TL at 04:47z.

The following slew ID 06980002 was not executed in TL.

02/07/2008 (Day of Year 184, Revolution 698)

Nothing to report.

03/07/2008 (Day of Year 185, Revolution 698)

STR loss of guide star: at 07:34z, during the execution of PID 06980054, the current guide star was lost and the IMU switched ON as foreseen by the ACC logic.

The next slew ID 06980055 was manually updated in TL and no impact on TL reported. The OTF was not reached during PID 06980054.

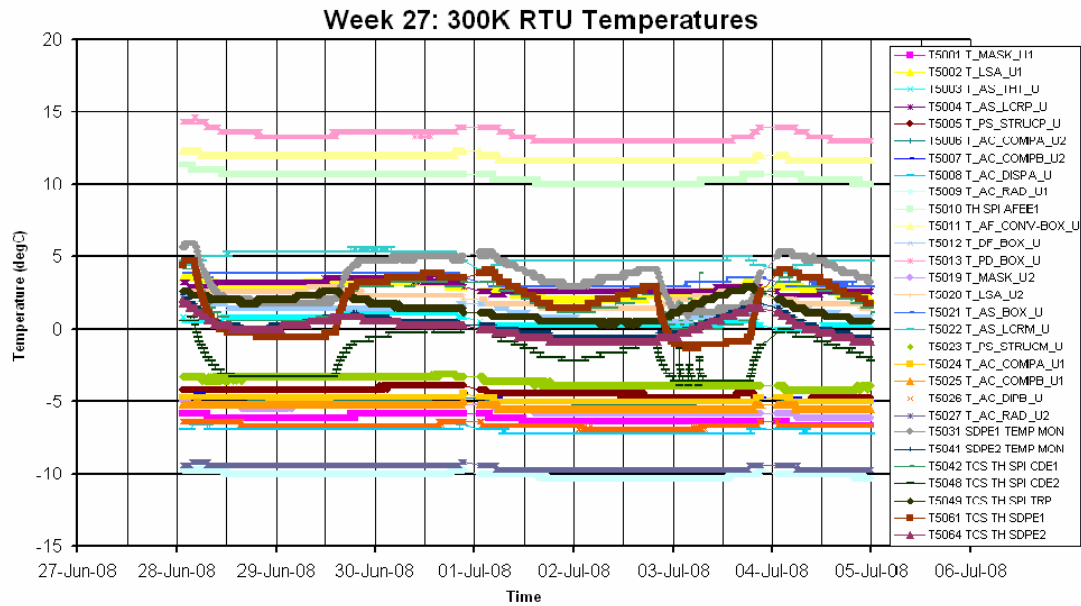
The origin of the guide star lost was likely due to the many variable star present in the FOV for the attitude of PID 06980054

04/07/2008 (Day of Year 186, Revolution 698-699)

Nothing to report.

8.3.2 SPI Operations

Unit Temperatures: All the equipment temperatures are inside the operational limits. The following plot shows their evolution during the reporting period.

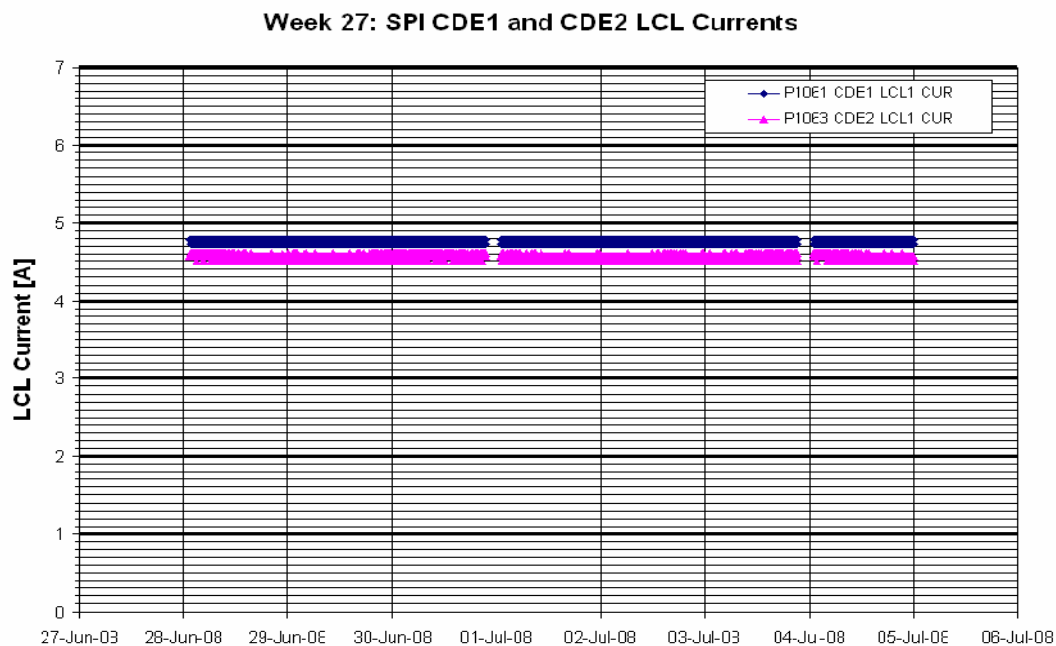


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

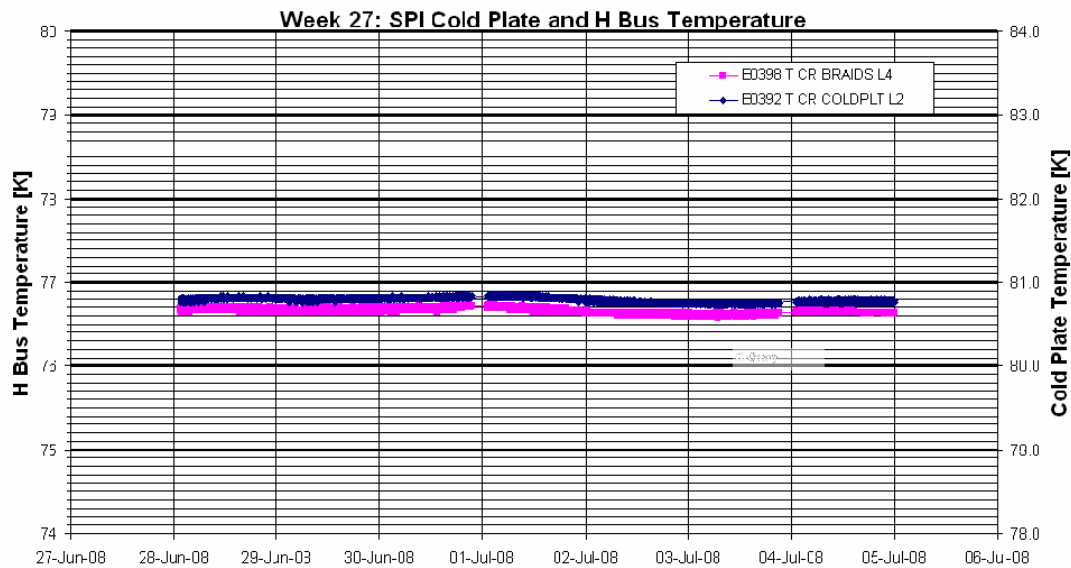
The stroke of all four compressors was set to 40 throughout the week. The average CDE LCL currents were as follows:

- CDE1 LCL Current = 4.75A
- CDE2 LCL Current = 4.56A

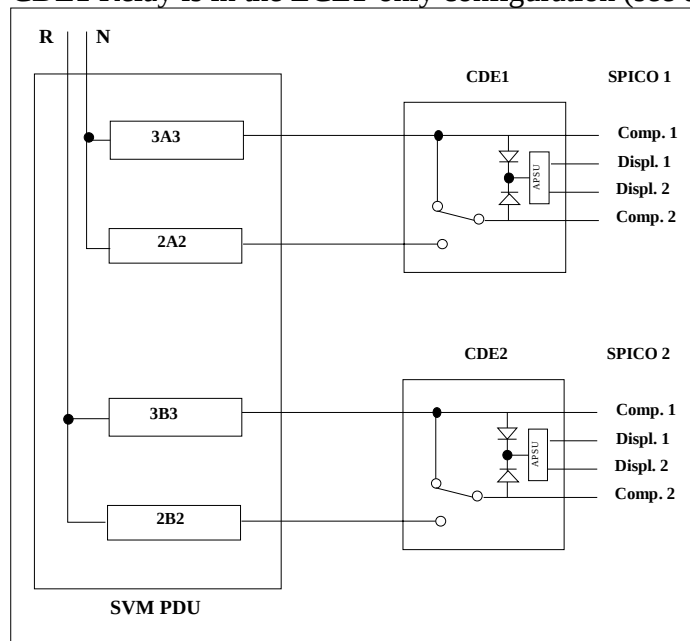
The following plot shows the evolution of the CDE LCL currents during the reporting period.



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



On 2008-06-28 at 14:15:30Z TM parameter P1060 CDE1 LCL2 CUR went OOL Alarm Low (value = 0A). This is the current of LCL2 of the SPI Compressor Drive Electronics unit 1 (CDE1). This is in fact the nominal value for this parameter as the CDE1 LCL2 status (TM parameter P1160) is nominally OPEN. Investigation revealed that the OOL was due the fact that the CDE1 LCL2 status had changed from OPEN to CLOSE at 14:15:22Z. The change in status had no impact (other than the OOL) as the CDE1 Relay is in the LCL1-only configuration (see diagram below).



SPI Cryocooler electronic configuration

No other alarms were received and all other parameters, e.g. the CDE1 LCL1 current TM parameter P1061, were nominal at the time. Therefore the change in the CDE1 LCL2 status was probably due to an SEU. This was recovered at 15:04:10Z by commanding the CDE1 LCL2 back to its nominal status (OPEN) via TC P3060.

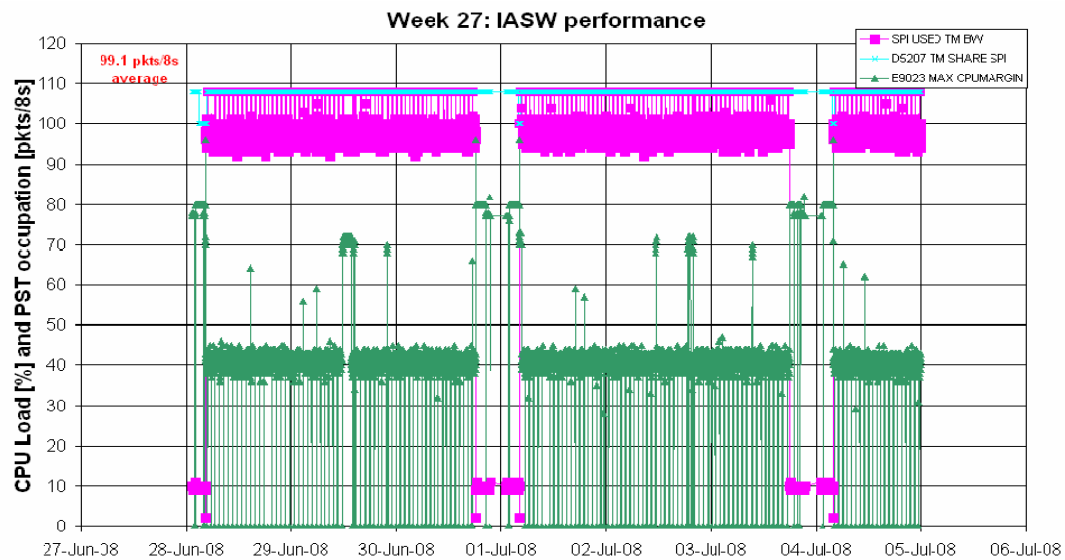
SPI operations continued nominally. This is recorded as AR INT_SC-229.

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.

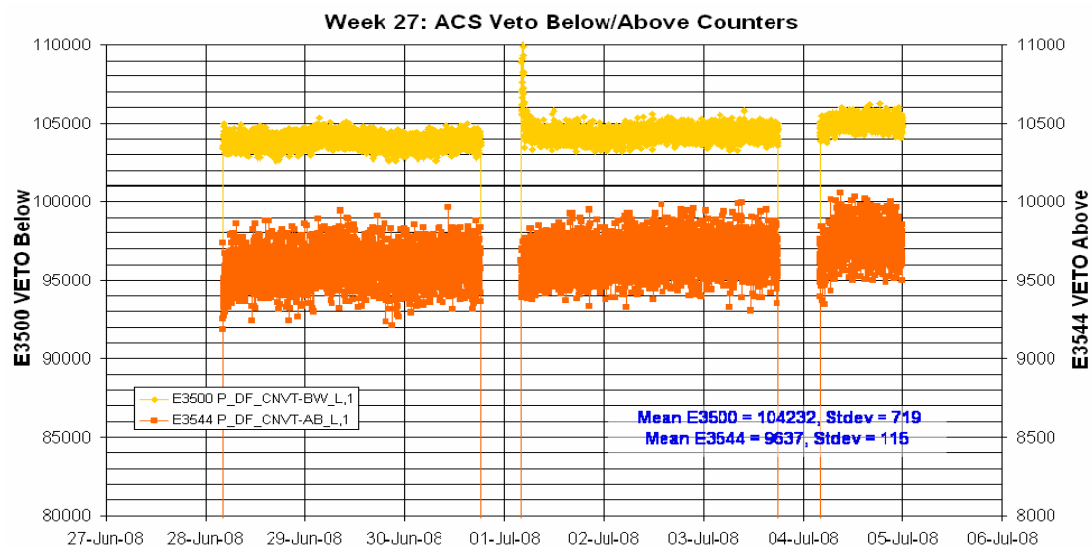
The average TM bandwidth occupation of SPI was 99.1 packets/cycle over the science window. The TM allocation in the science window was 108 packets/cycle.

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

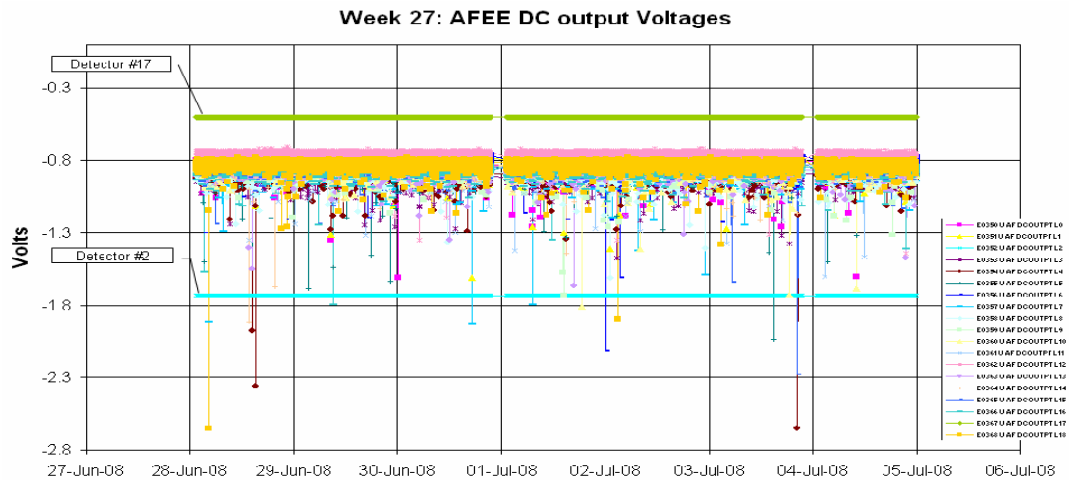


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

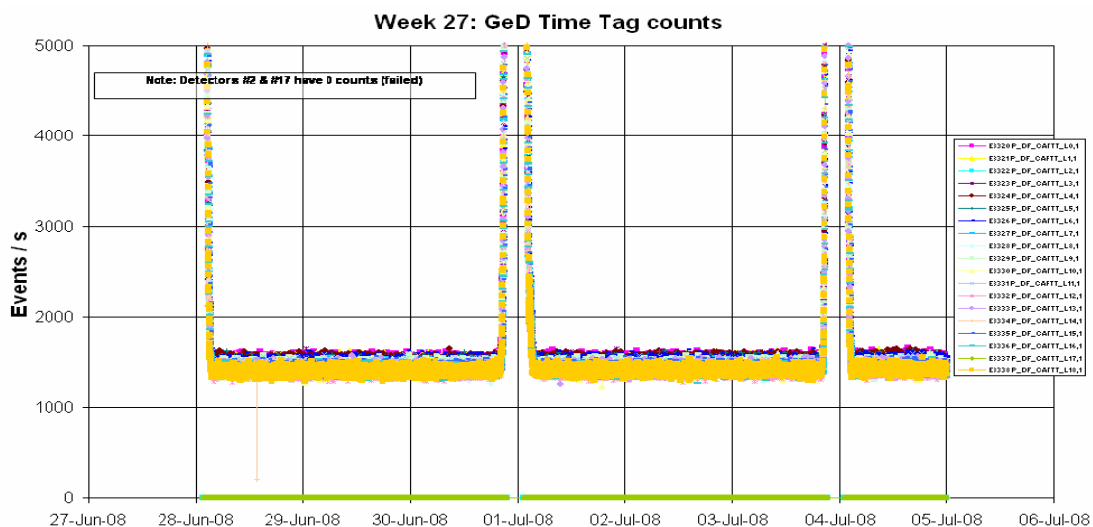
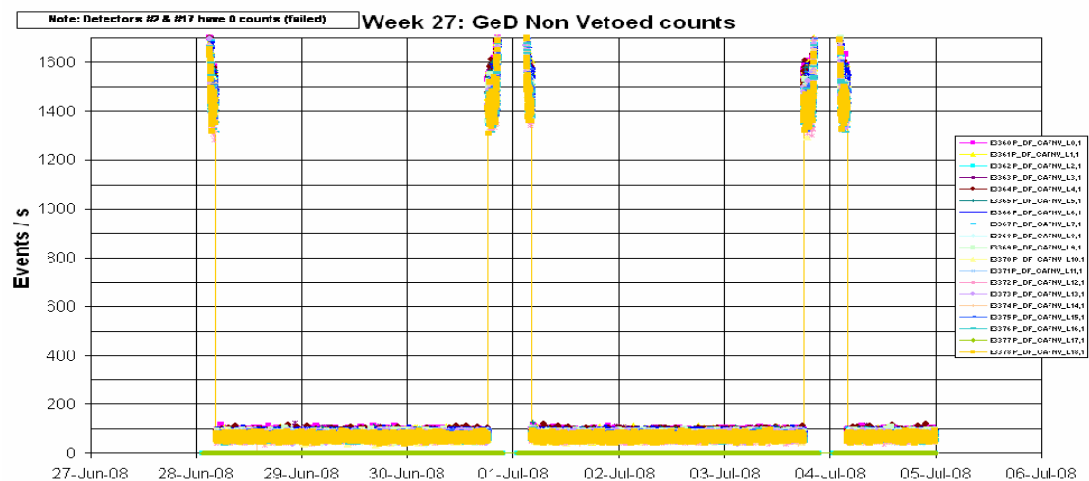
The following plot shows the ACS overall count rate evolution during the reporting period:

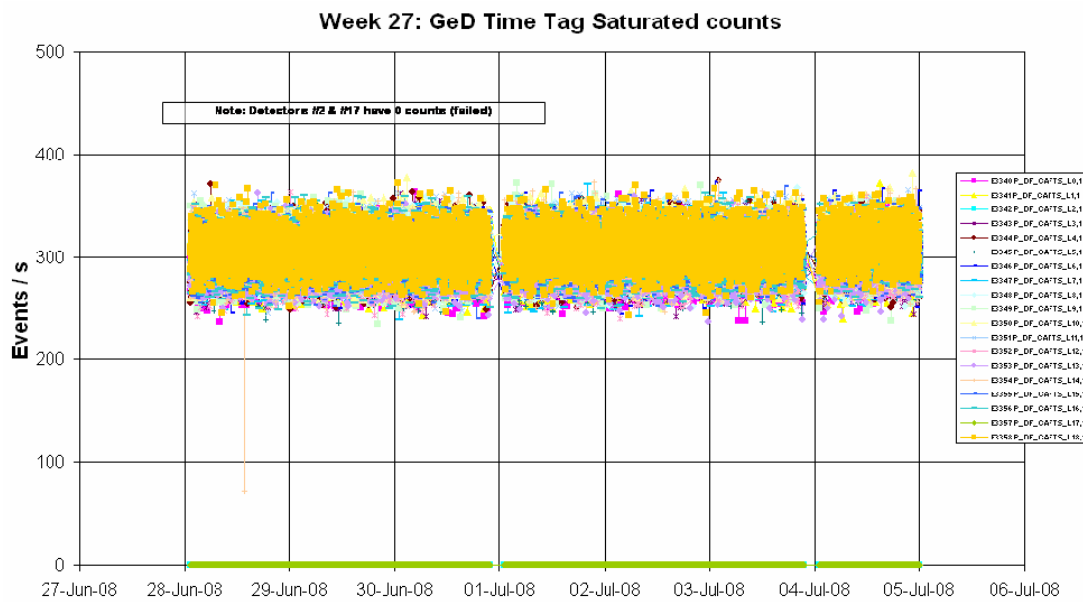


AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.

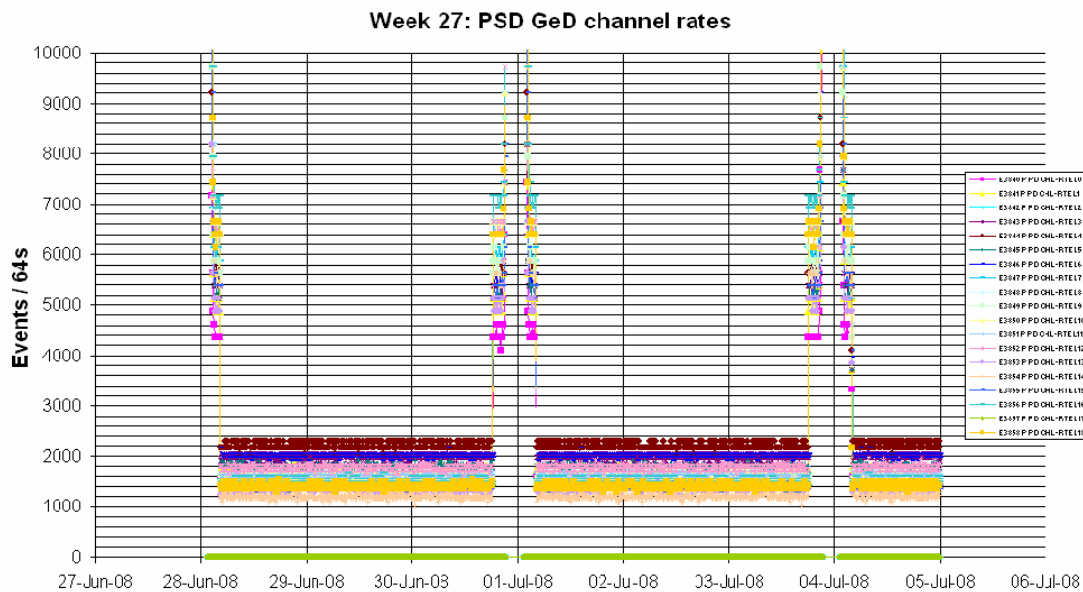


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoeed, Time Tag and Time Tag Saturated Event count rates during the reporting period.





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



Event Log:

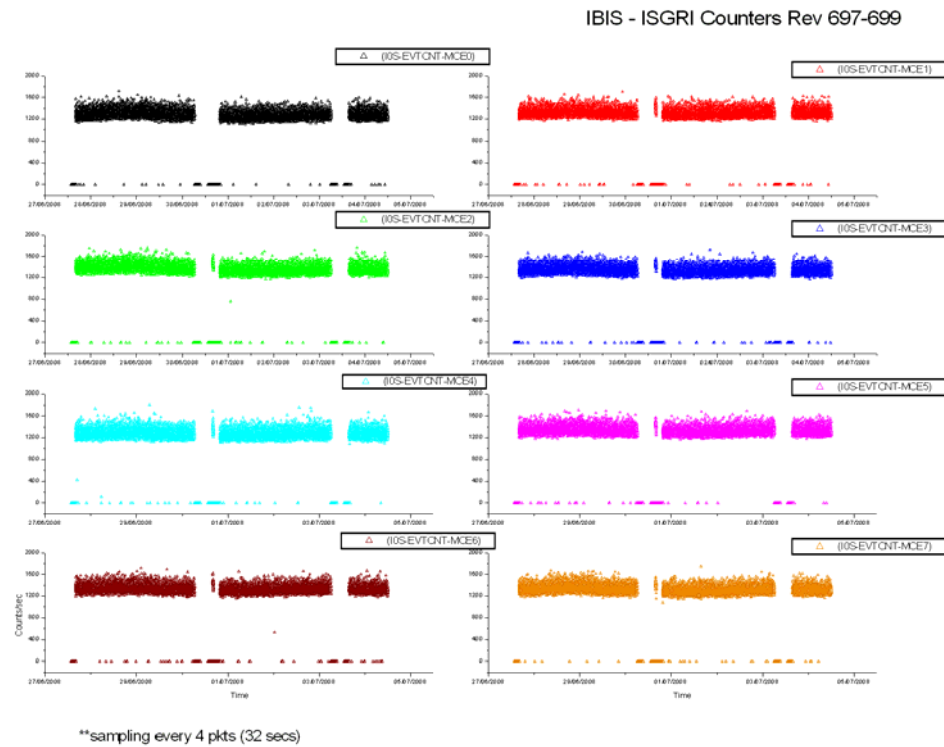
The following non-nominal events occurred on SPI over the reporting period:

- On 2008-06-28 at 14:15:30Z the CDE1 LCL2 tripped spontaneously from OPEN to CLOSE. This is described in the Cryostat section above.
- On 2008-06-28 at 08:17:12Z TM parameter E3238 went OOL (value = NO EXIST VAL). This is the ACS FEE temperature status #74. It returned within limits of its own accord at 08:27:52Z and no action was taken.
- Due to continuing high background radiation after the expected belt exit of revolution 698, on 2008-07-01 at 04:28:55Z TM parameter E3500 ACS CntVetoBelow went OOL High. It returned within limits of its own accord at 04:29:59Z and no action was taken.

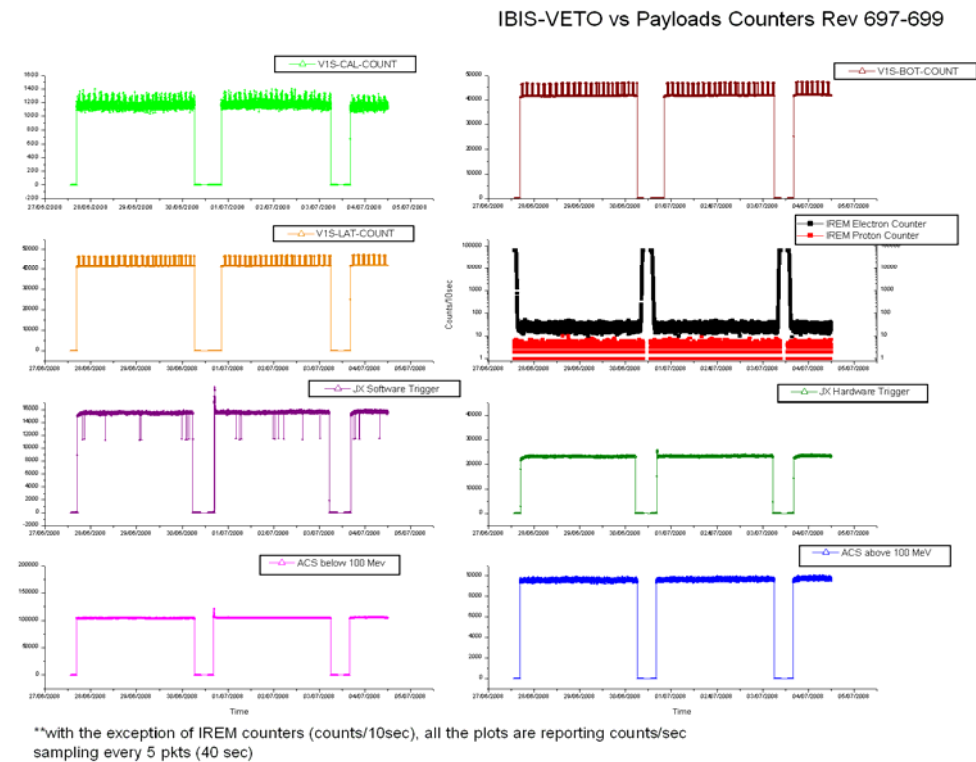
8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

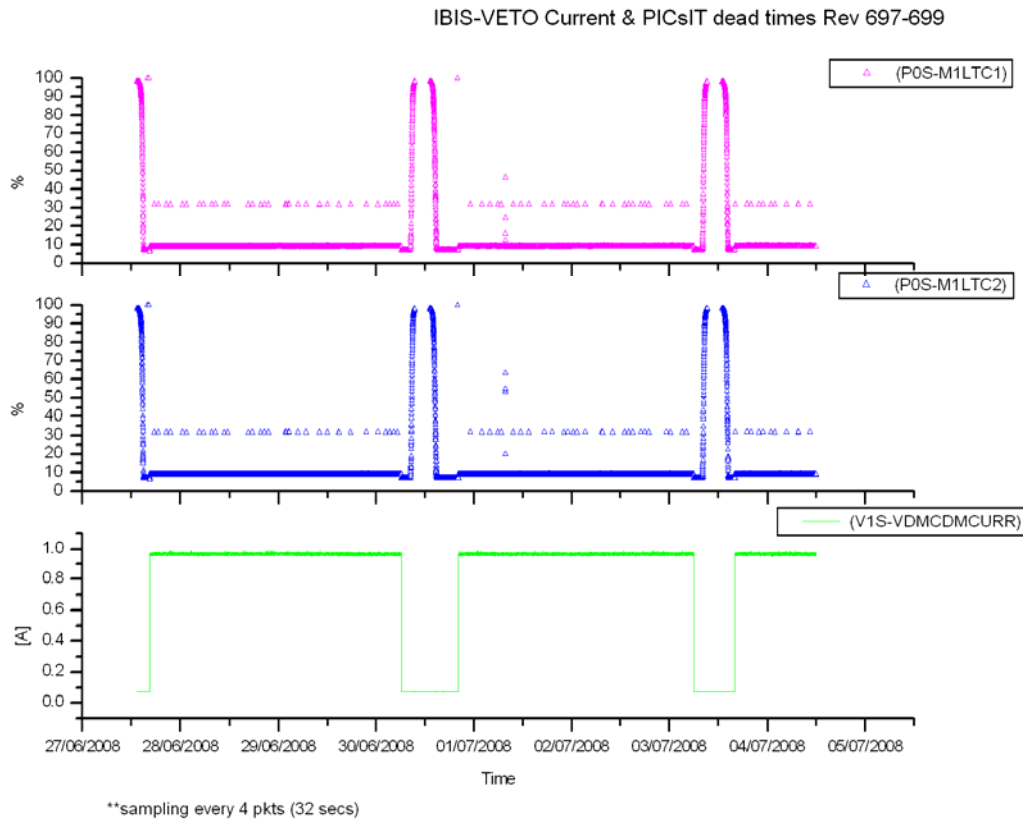


VETO vs Payload Counters:

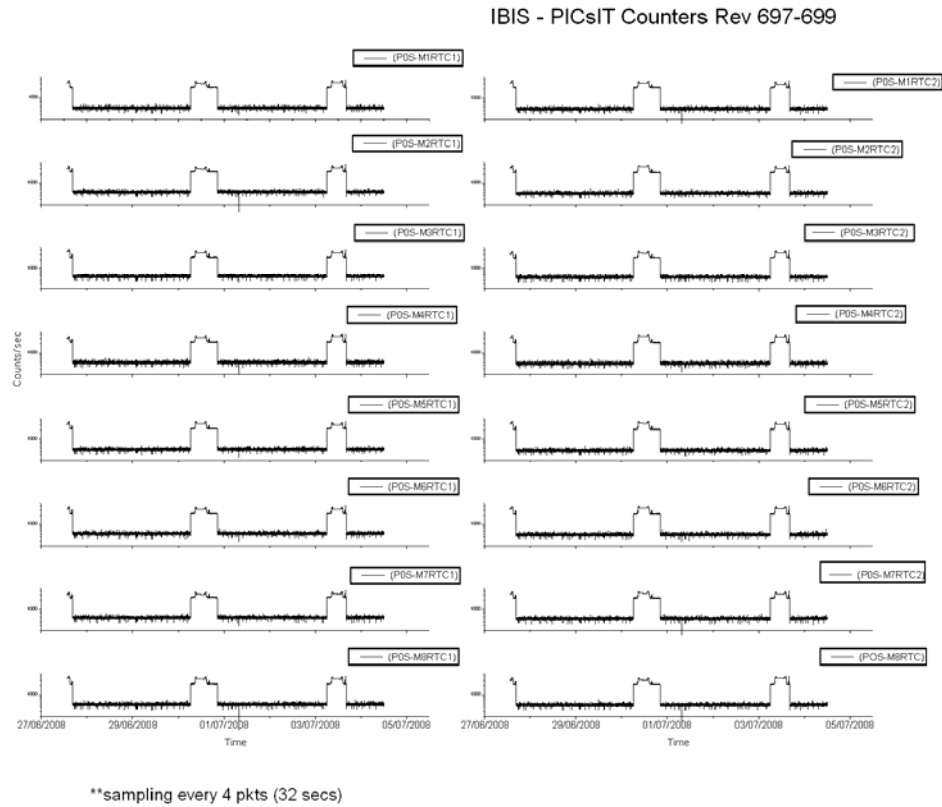


The week was characterised by low radiation as reported by the payload.

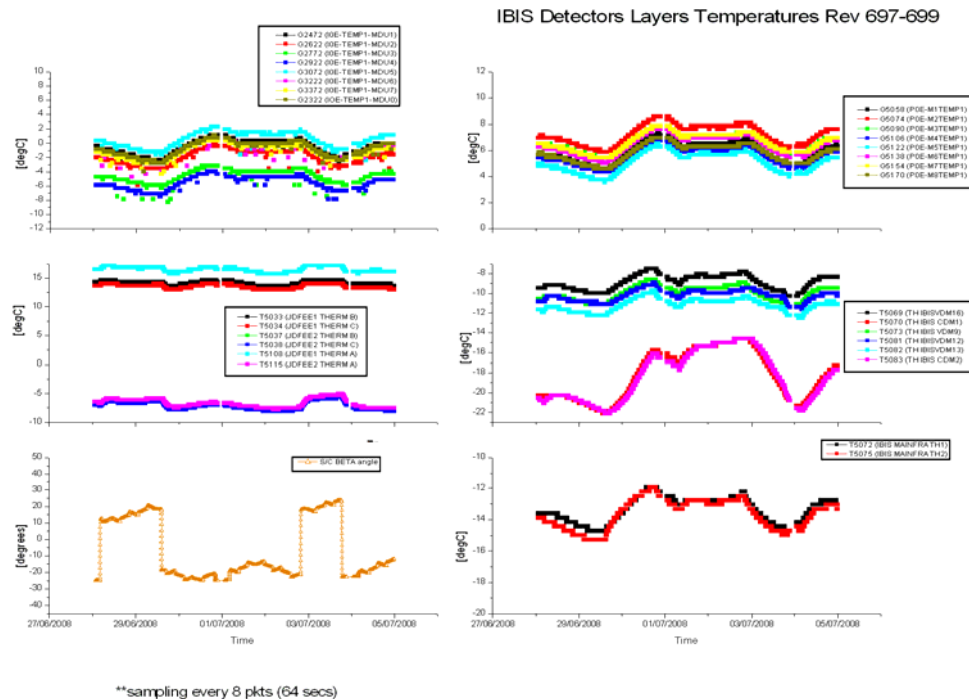
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



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.

2008-06-28 (DOY 180, Rev 697) to 2008-06-30 (DOY 182, Rev 697-698)

IBIS operations executed nominally.

2008-07-01 (DOY 183, Rev 698)

At 02:28:07Z TM parameter G5079 went OOL High (value = 2.605V). This is the PDM2: +2.5 V. It returned within limits of its own accord at 02:28:39Z and no action was taken.

Starting at 03:25:18Z, during the radiation belt passage at the start of revolution 698, the following OEMs were received:

2008.183.03.25.19.677	2008.183.03.25.26.098	1280	RealTime	192	TC	REJECT
IBIS1 MCE0 ILLEGAL CMD NUMBER			0	0	65535	PR N
FIX3		7				
G1562	I MCE NUMBER	MCE0				
G9079	MESS CLASS	3				
G9080	MESS ID	192				
G1563	I CID	255				
G1564	I APID	255				
G1565	I PSC	16383				
2008.183.03.25.19.677	2008.183.03.25.26.097	1280	RealTime	192	TC	REJECT
IBIS1 MCE0 ILLEGAL CMD NUMBER			0	0	65535	PR N
FIX3		7				
G1562	I MCE NUMBER	MCE0				
G9079	MESS CLASS	3				
G9080	MESS ID	192				
G1563	I CID	251				

Doc. Title : INTEGRAL Mission Report #302
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 07/07/08

Issue : 1
Rev. : 0
Page : 22

G1564	I APID	255							
G1565	I PSC	16383							
2008.183.03.25.19.677	2008.183.03.25.26.096	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	255							
G1564	I APID	255							
G1565	I PSC	15108							
2008.183.03.25.19.677	2008.183.03.25.26.095	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	0							
G1564	I APID	149							
G1565	I PSC	255							
2008.183.03.25.19.677	2008.183.03.25.26.093	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	254							
G1564	I APID	1							
G1565	I PSC	14304							
2008.183.03.25.11.677	2008.183.03.25.18.188	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	254							
G1564	I APID	1							
G1565	I PSC	14296							
2008.183.03.25.11.677	2008.183.03.25.18.230	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	255							
G1564	I APID	255							
G1565	I PSC	15108							
2008.183.03.25.11.677	2008.183.03.25.18.229	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	0							
G1564	I APID	149							
G1565	I PSC	255							
2008.183.03.25.11.677	2008.183.03.25.18.228	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	254							
G1564	I APID	1							
G1565	I PSC	14296							
2008.183.03.25.11.677	2008.183.03.25.18.227	1280	RealTime	192	TC	REJECT			
IBIS1 MCE0 ILLEGAL CMD NUMBER		0	0	65535	PR	N			
FIX3		7							
G1562	I MCE NUMBER	MCE0							
G9079	MESS CLASS	3							
G9080	MESS ID	192							
G1563	I CID	255							
G1564	I APID	255							
G1565	I PSC	16383							

```

2008.183.03.25.11.677 2008.183.03.25.18.226 1280 RealTime 192 TC REJECT
IBIS1 MCE0 ILLEGAL CMD NUMBER 0 0 65535 PR N
FIX3 7
G1562 I MCE NUMBER MCE0
G9079 MESS CLASS 3
G9080 MESS ID 192
G1563 I CID 251
G1564 I APID 255
G1565 I PSC 16383
2008.183.03.25.11.677 2008.183.03.25.18.225 1280 RealTime 192 TC REJECT
IBIS1 MCE0 ILLEGAL CMD NUMBER 0 0 65535 PR N
FIX3 7
G1562 I MCE NUMBER MCE0
G9079 MESS CLASS 3
G9080 MESS ID 192
G1563 I CID 255
G1564 I APID 255
G1565 I PSC 15108
2008.183.03.25.11.677 2008.183.03.25.18.224 1280 RealTime 192 TC REJECT
IBIS1 MCE0 ILLEGAL CMD NUMBER 0 0 65535 PR N
FIX3 7
G1562 I MCE NUMBER MCE0
G9079 MESS CLASS 3
G9080 MESS ID 192
G1563 I CID 0
G1564 I APID 149
G1565 I PSC 255

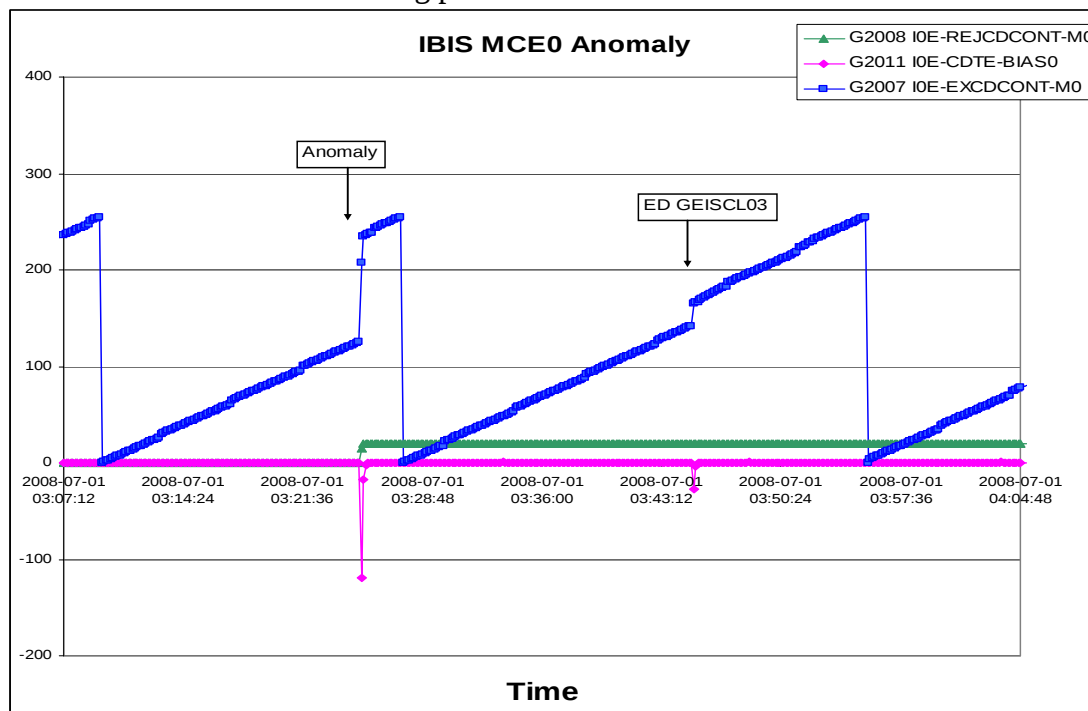
```

These OEMs would indicate the failure of TCs to MCE0 of ISGRI, however no commands were being sent from ground or were loaded as time-tags at this time. The Command Ids (CID) in the OEMs also do not correspond to those of any defined command except for CID 254, which corresponds to a HK1 request.

Later investigations revealed that around the time of these OEMs, at 03:25:06Z, the following symptoms also occurred:

- The MCE0 bias, TM parameter G2011 spontaneously went from the nominal value of -0.56V (inside belts) to -118.90V.
- The counter of executed TCs, TM parameter G2007, increased suddenly.
- The counter of rejected TCs, TM parameter G2008, jumped from 0 to 20.

These are shown in the following plot:



In addition the TM parameter G2001 (OEM buffer overflow) indicated OVERFLOW. As the other TM parameters from MCE0 were showing nominal values it seems that these values were genuine, however a TM corruption is not excluded.

By 03:25:30Z, the MCE0 bias had returned to the nominal value of -0.56V (inside belts), the OEM buffer flag (TM parameter G2001) had returned to NO OVERFLOW and the OEMs had stopped of their own accord. Operations continued nominally until the ED GEISCL03 was uplinked from the Timeline at 03:45:03Z. The first command of this sequence, TC G0103 to restore the context from the DPE to MCE0 failed completion (Command Execution Verification), with the TM parameter G8043 (ISGRI MCE0 context restoring) going to FAILED. Likewise all further TCs to MCE0 in the ED GEISCL03 failed completion. That is to say the commands were accepted onboard but not executed and therefore MCE0 remained in STANDBY mode with the bias set to -0.56V throughout, while all other MCEs were activated nominally.

In order to recover, the following actions were performed:

- 04:10Z Commanding to IBIS from the Timeline was disabled.
- 04:15Z CRP_IBIS1_0010 IBIS Safe Config (Fast) executed to return the IASW; VETO and ISGRI to Standby and set the MCE biases to zero.
- 04:18Z ISGRI context tables re-uplinked
- 05:52:19Z Attempt to resend ED GEISCL03. Again the first TC, G0103, to restore the context from the DPE to MCE0 failed completion and the TM parameter G8043 (ISGRI MCE0 context restoring) remained FAILED. At this point the rest of the ED GEISCL03 was not sent and IBIS remained in Safe configuration. Following consultation with the PI it was decided to attempt a power cycle of the MCE0.
- 07:03:02Z FCP_IBIS1_0333 IBIS ISGRI MCE0 OFF performed.
- 07:09:32Z FCP_IBIS1_0085 ISGRI MCE0 Activation performed. In this procedure, the TC to disable the CDTE heater 1A was omitted as this was not required in this case (in this instance the procedure was not being performed as part of the high level procedure for the full switch-on of ISGRI).
- 07:17Z ISGRI context tables re-uplinked.
- 07:37:04Z ED GEISCL03 uplinked successfully, with all MCE biases being switched on nominally and MCEs transitioned to Nominal mode.
- 08:13:53Z ED GEBENT02 (missed from Timeline) re-uplinked.
- 08:15:40Z ED GEBEXT01 (missed from Timeline) re-uplinked.
- 08:23:11Z ED GESTAN02 (missed from Timeline) re-uplinked. IBIS transitioned to Science Standard mode and commanding to IBIS from the Timeline was re-enabled.

IBIS operations continued nominally. This is recorded as AR INT_SC-230.

At 19:47:03Z the TM parameters families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semi-module FIFO error flags. As they had all returned within limits by 19:48:07Z, no action was taken.

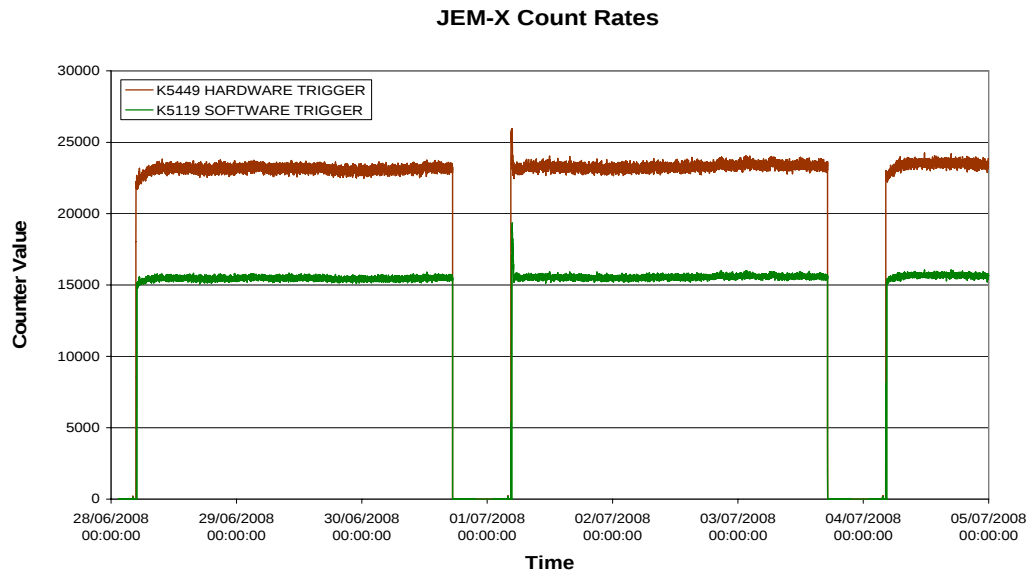
2008-07-02 (DOY 184, Rev 698) to 2008-07-04 (DOY 186, Rev 699)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

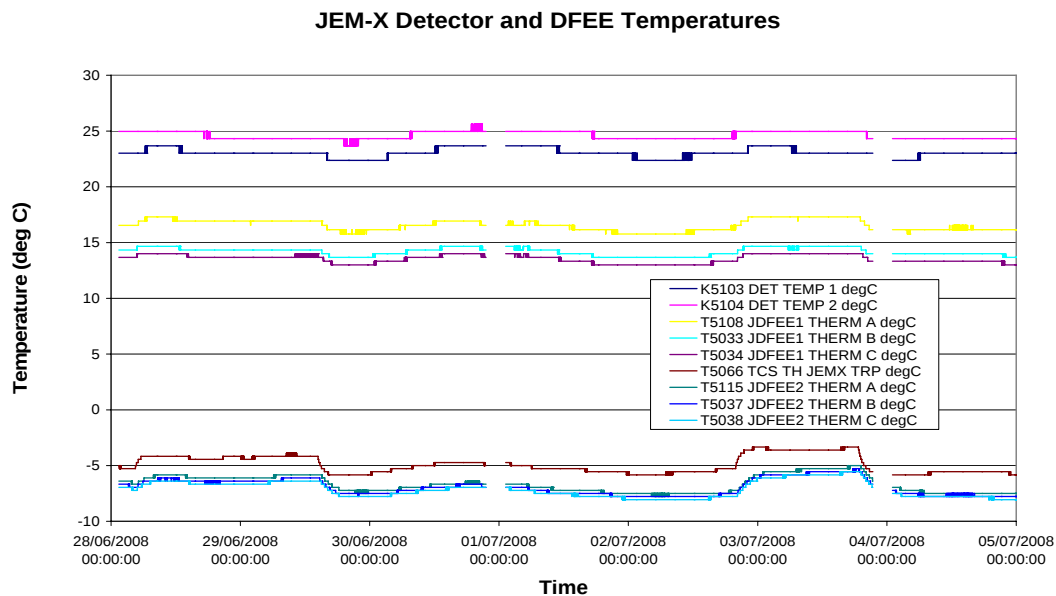
JEM-X Count Rates

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



JEM-X Temperatures

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



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

² Data sampled (1 frame in 8)

JEM-X Daily Report

2008-06-28 (DoY 180, Rev 697) to 2008-07-04 (DoY 186, Rev 699)

JEM-X1 operations executed nominally.

8.3.5 OMC Operations

2008-06-28 (DoY 180, Rev 697) to 2008-06-29 (DoY 181, Rev 697)

Nothing to report.

2008-06-30 (DoY 182, Rev 697)

At 17:16, the FDS failed to update slew 06970063. The manoeuvre left to execute, and the following slew updated. The impact was a slight attitude offset in pointing 06970063.

2008-07-01 (DoY 183, Rev 698)

At 04:16, the FDS failed to update slew 06980002. The Timeline was stopped, and a recovery was performed. OMC was commanded manually into science mode at 04:39:40. The impact was that pointing was cut short from a planned 3334 to 2560 seconds.

2008-07-02 (DoY 184, Rev 698) to 2008-07-04 (DoY 186, Rev 699)

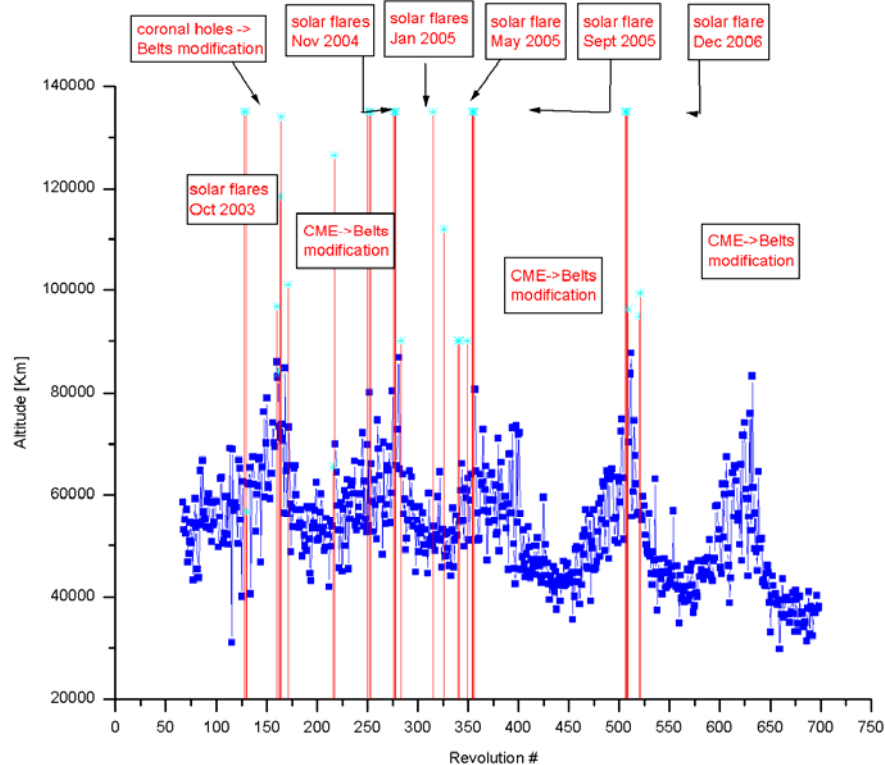
Nothing to report.

On DoY 182 at 18:15:33 and DoY 185 at 18:03:41 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 2003-2008



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]
697	RAD_EXIT R 2008-06- 28T04:23:02Z	28/06/2008 03:14:03	42812.7	28-Jun-2008 03:32:25	45446.98
697	RAD_ENTR R 2008-06- 30T18:15:32Z	30/06/2008 20:17:47	37742.6	30-Jun-2008 20:11:50	39030.62
698	RAD_EXIT R 2008-07- 01T04:09:30Z	01/07/2008 03:09:47	>>33530.4	01-Jul-2008 03:21:50	45806.93
698	RAD_ENTR R 2008-07- 03T18:03:37Z	03/07/2008 20:03:56	38086.6	03-Jul-2008 20:01:50	39111.26
699	RAD_EXIT R 2008-07- 04T03:57:09Z	04/07/2008 02:44:20	>>33545.3	04-Jul-2008 03:11:50	45762.95

Reference

High radiation

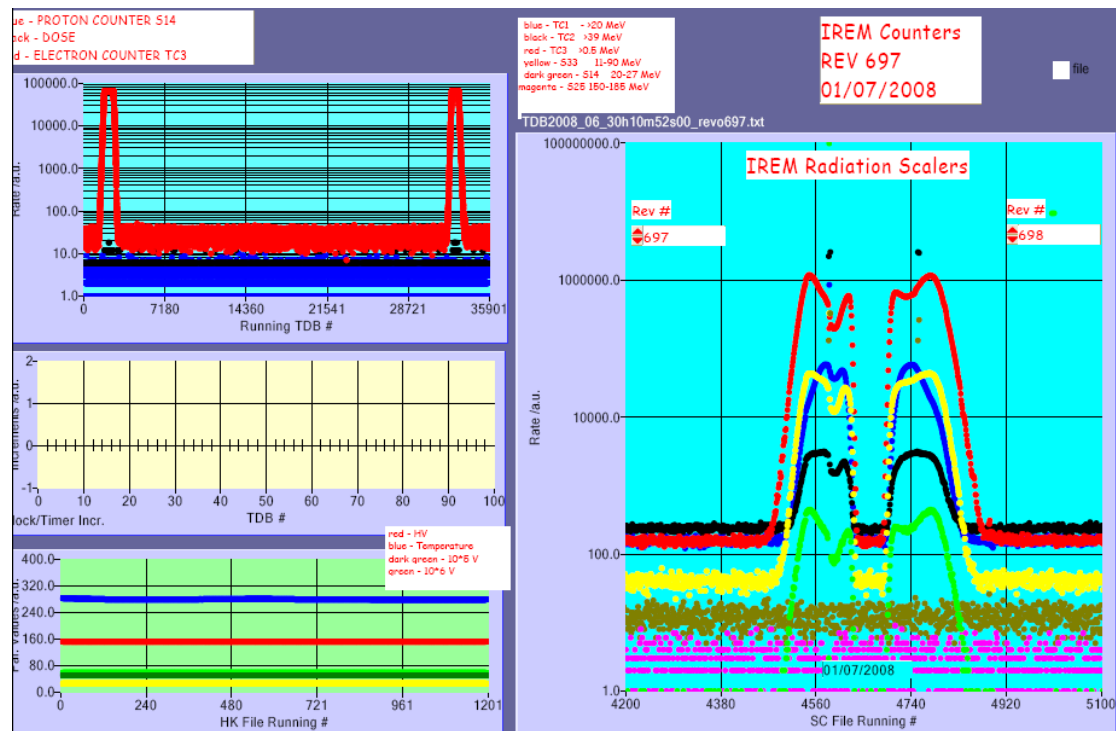
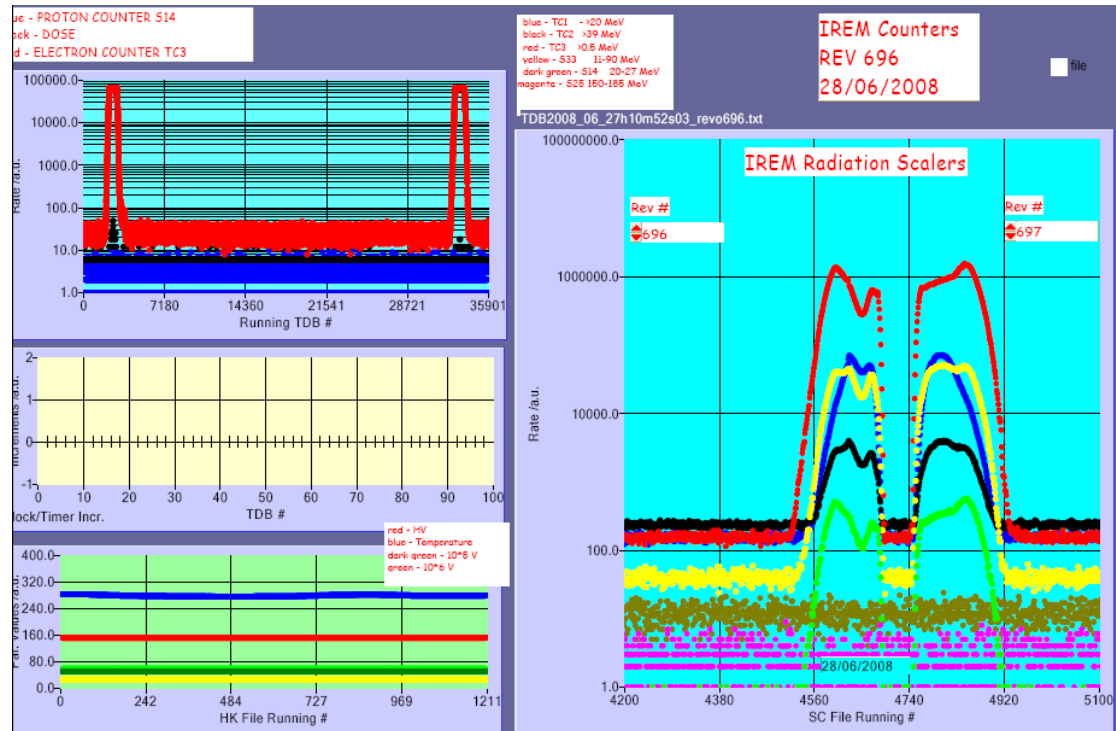
Very small error vs reference (less than 10 minutes)

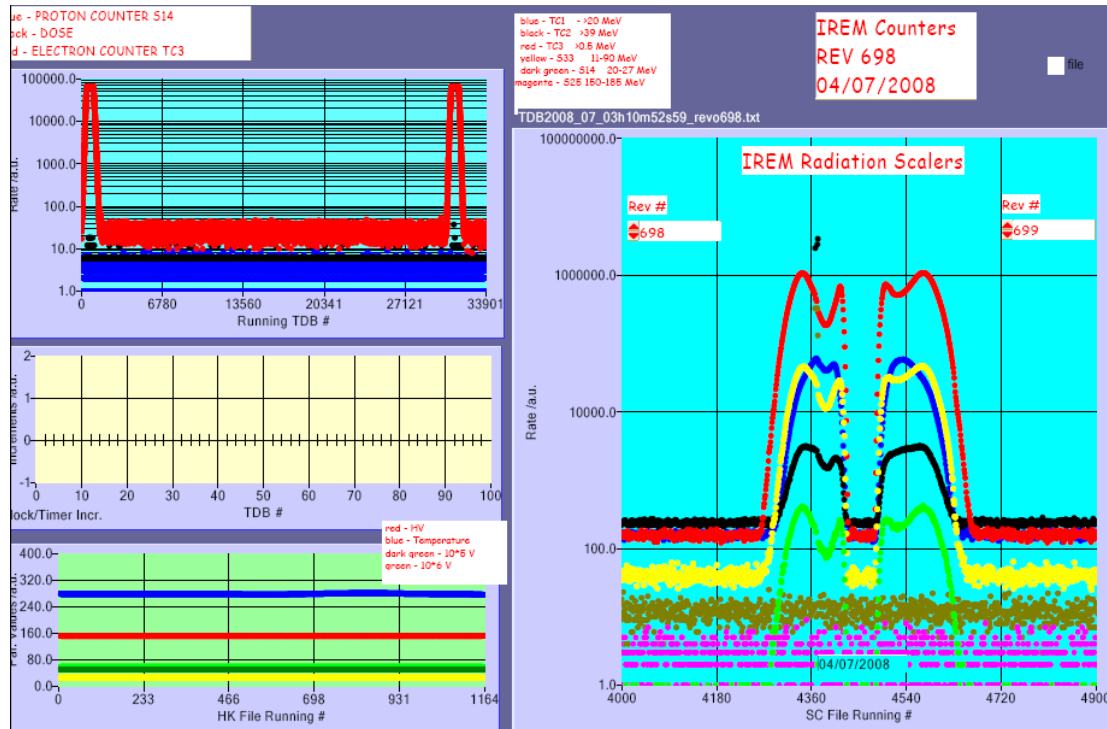
Small error vs reference (between 10 and 30 minutes)

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.

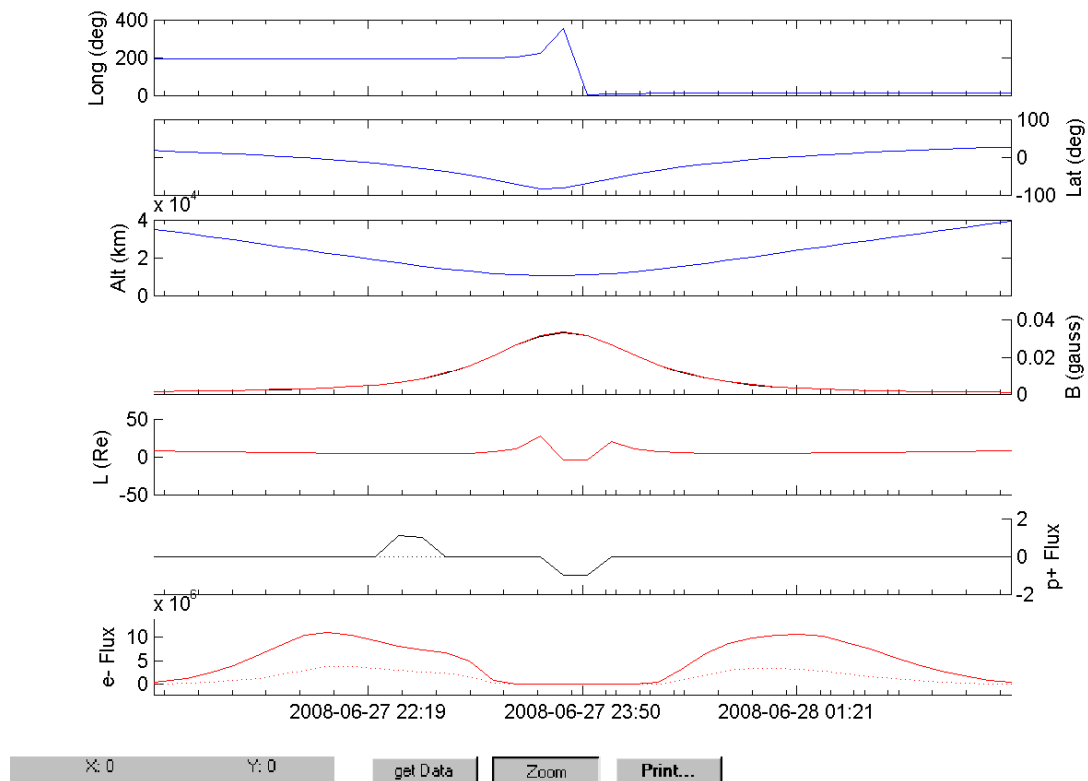
IREM radiation counters:



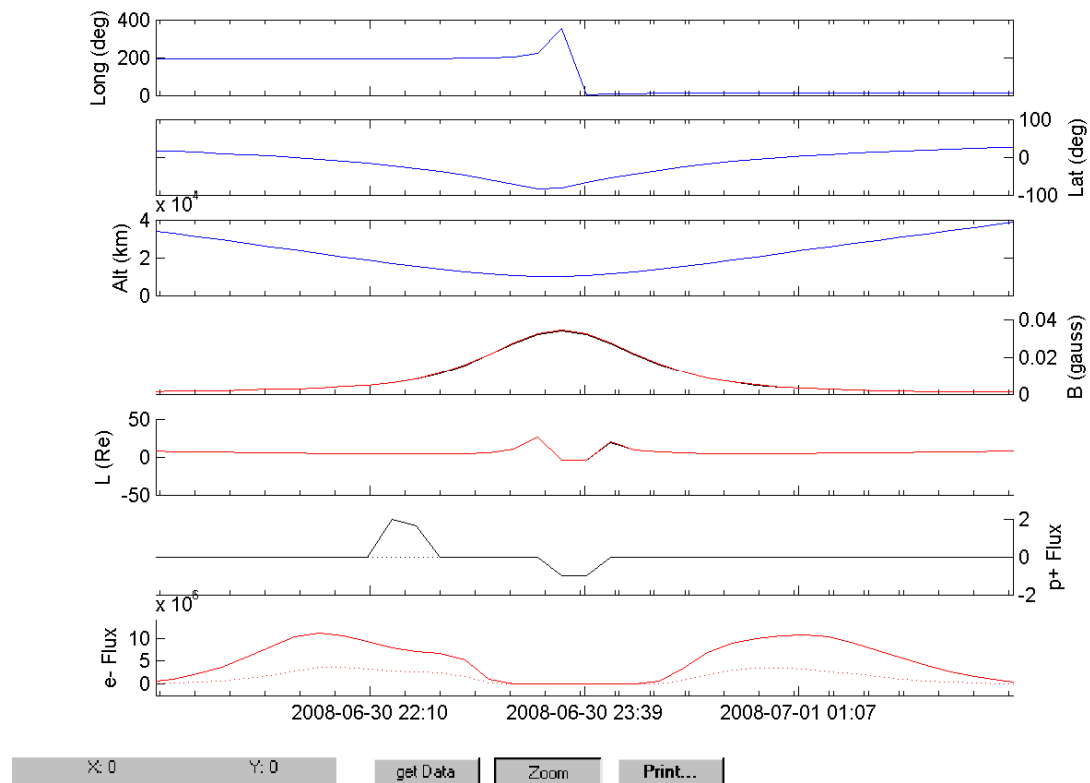


IREM Predicted Radiation Belt Passages

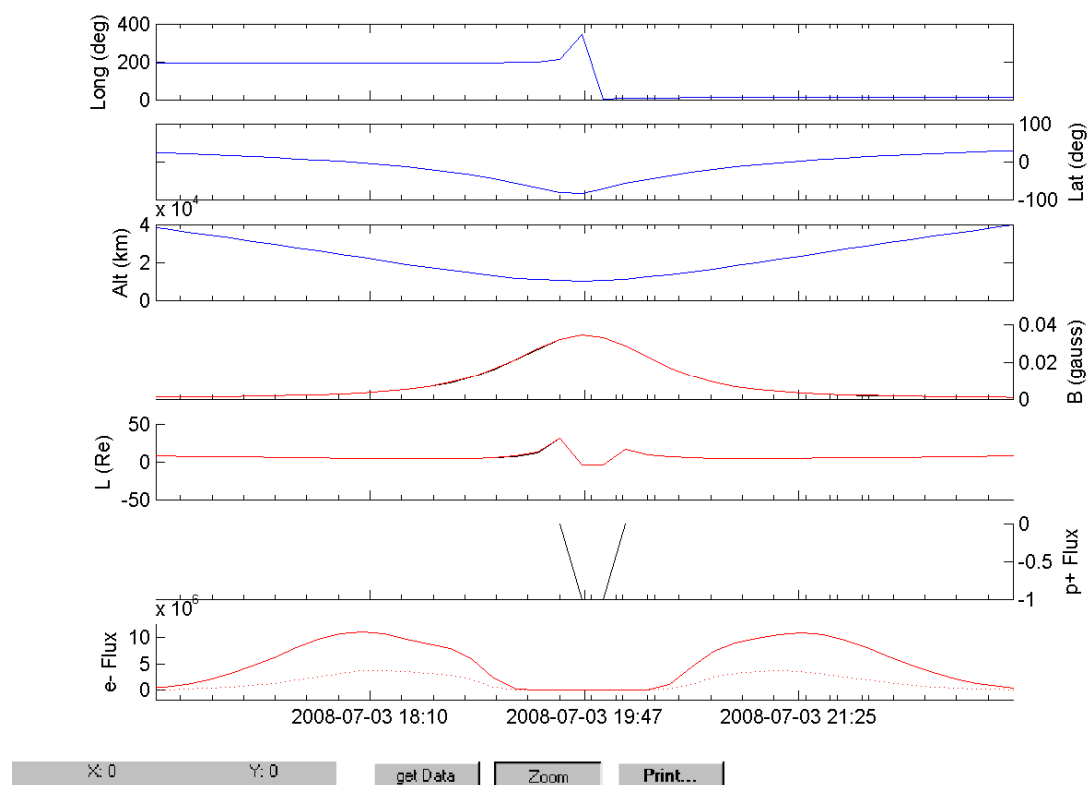
Rev 696



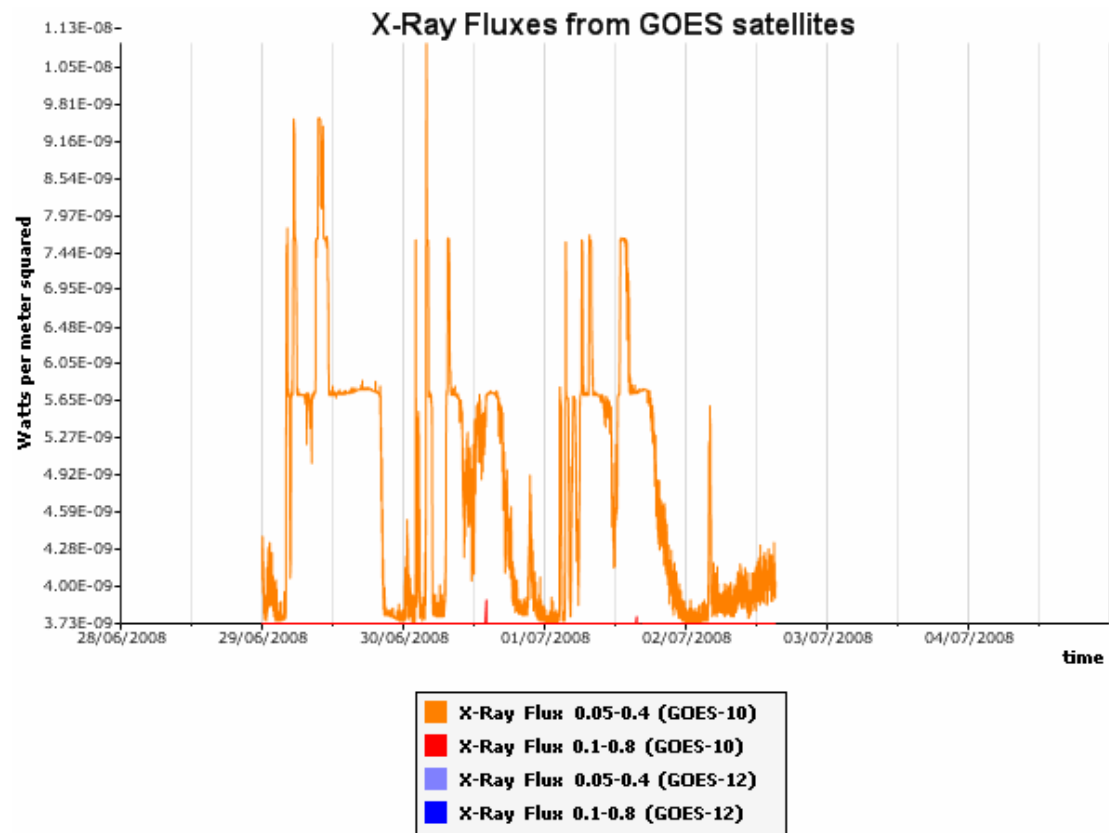
Rev 697



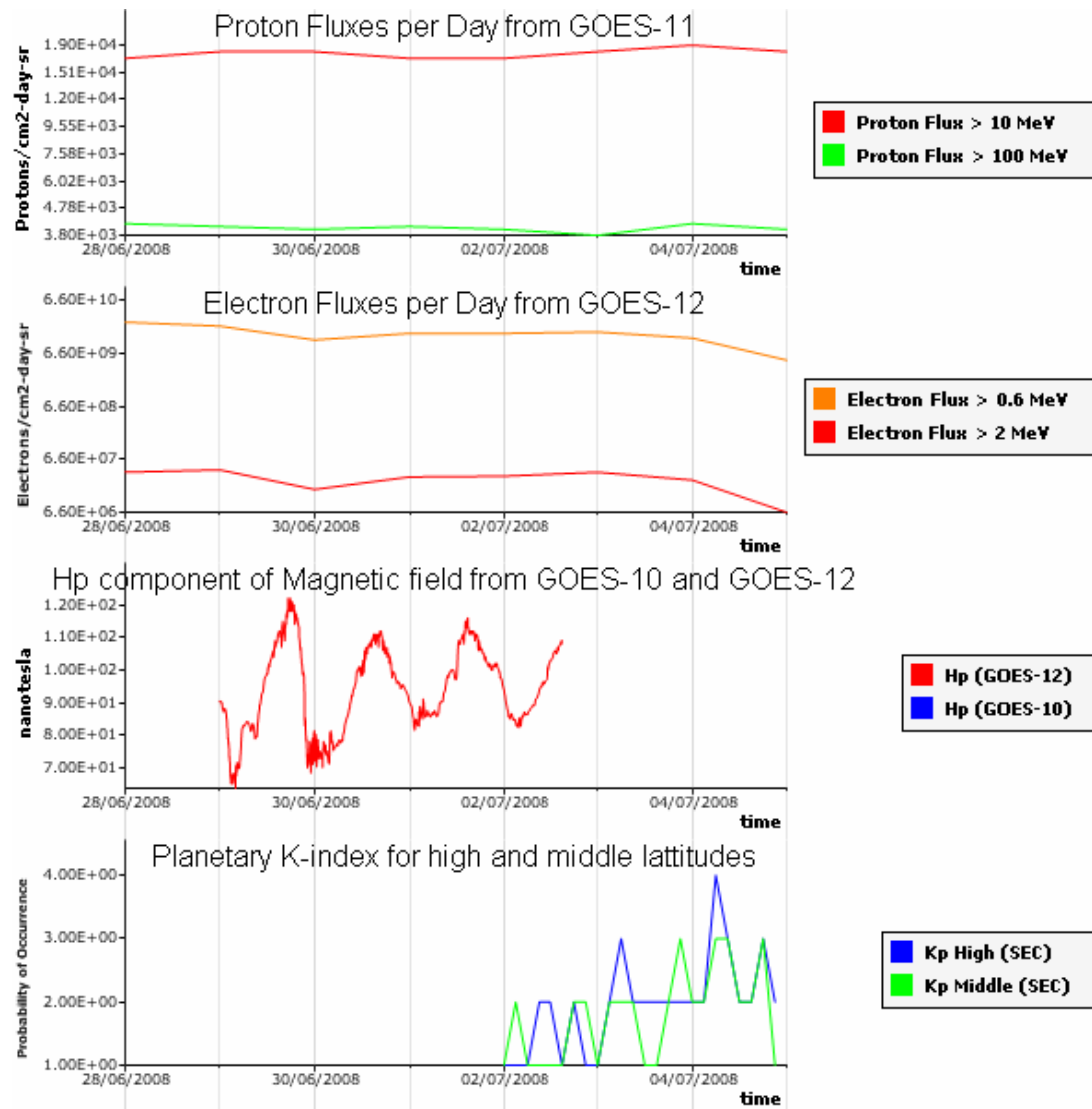
Rev 698



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



X-Ray fluxes start to be significant over 10^{-5} W/m² (corresponding to M-class flares). Above 10^{-4} W /m², 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.