

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 310
Week 35
01.09.08
Routine Phase

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1 General

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

It addresses the activities from 23.08.08 until 29.08.08 (both dates inclusive) and covers the revolutions 716 and 717.

2 Summary of Activities

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

The targets of these revolutions consisted of a hexagonal dither of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), a raster dither of X Per (RA 03:55:23.08, DEC +31:02:45.0), a raster dither of the Galactic Plane Region 3 (RA 13:09:32.98, DEC -62:47:56.4), and a raster dither of SGR0501+4516, a ToO (RA 05:01:03.60, DEC +45:16:19.2).

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.

No slews were missed from TL, during the observation period.

The fuel consumption over the period between 23/08/2008 and 29/08/2008 was 0.1398 Kg. The remaining propellant is in the order of 138.8519 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.

Battery 1 Reconditioning terminated on 26/8/2008, the details are:

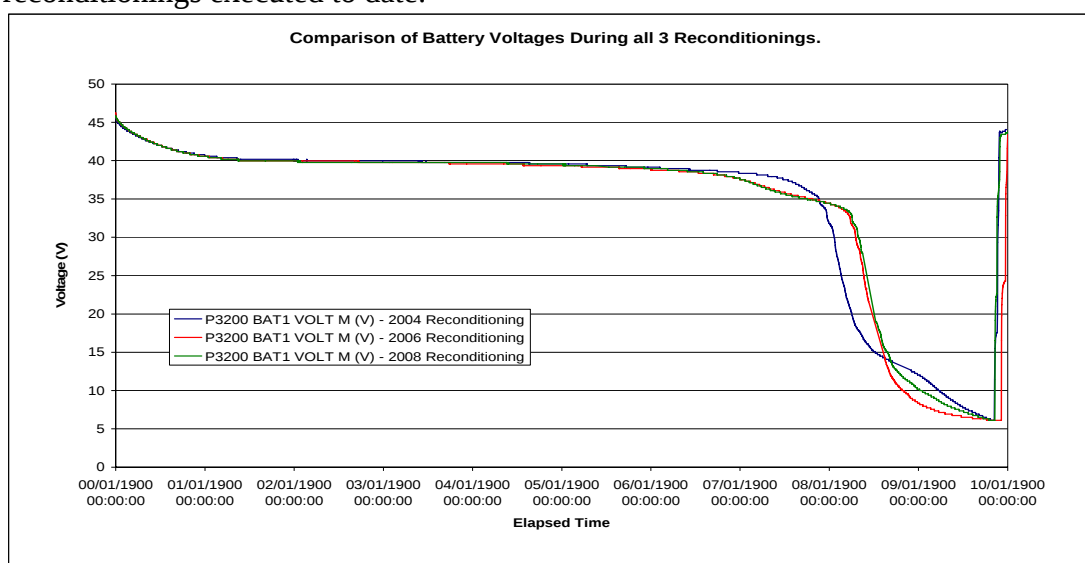
- 15/8/2008 09.15z Start of discharge
- 25/8/2008 05.45z End of discharge - terminated by OBM at battery Voltage = 6V, discharged capacity was 35.71Ah
- 25/8/2008 06.18z start of battery 1 trickle charge
- 25/8/2006 07.02z start of battery 1 full charge at C/26
- 25/8/2006 07.05z start of battery 1 full charge at C/26
- 26/8/2006 04.29z End of charge battery 1, recharged capacity 38.67Ah (ECD)

The table below summarises the batteries capacities during the 3 reconditioning operations executed to date

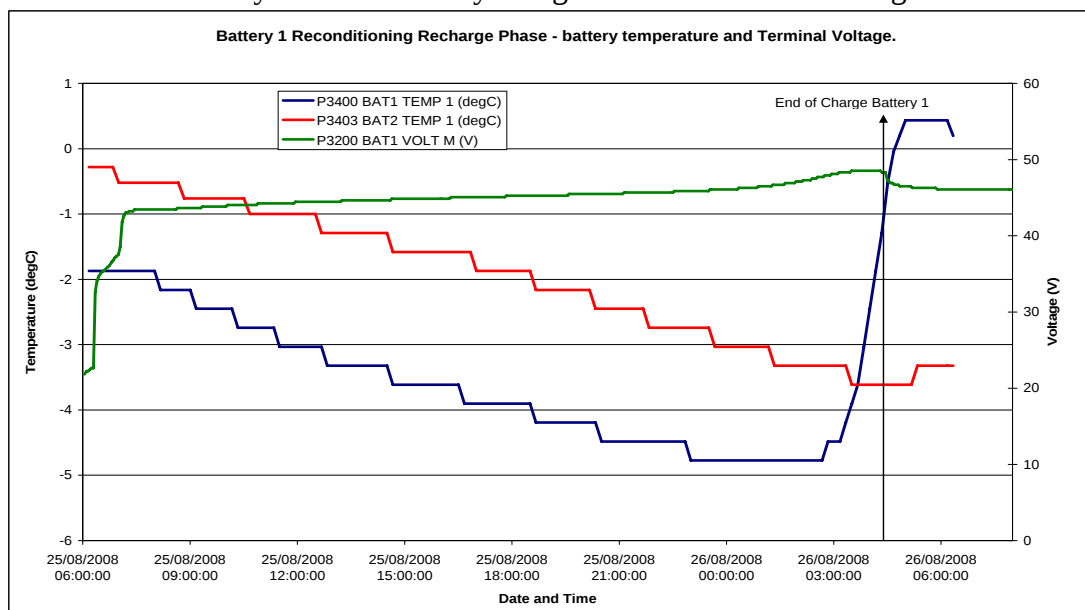
Reconditioning	Battery 1		Battery 2	
	Discharge Capacity	Recharge capacity	Discharge Capacity	Recharge capacity
1	35.71Ah	38.7Ah	35.94Ah	38.7Ah
2	35.97Ah	38.7Ah	36.65Ah	38.7Ah
3	35.86	38.7Ah		

There is no noticeable loss of battery 1 capacity to date.

The plot below illustrates the discharge profile of battery 1 during the 3 reconditionings executed to date:



The plot below shows battery 1 and 2 temperatures and battery 1 voltage during the recharge phase. The sharp increase in battery temperature towards the end of the recharge phase is caused by the (intentional) slight overcharge of battery 1 and indicates that battery was indeed fully charged after the reconditioning



The reconditioning operations were fully nominal, battery 2 reconditioning will start on 2/9/2008. The next battery 1 reconditioning will take place in 2010.

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

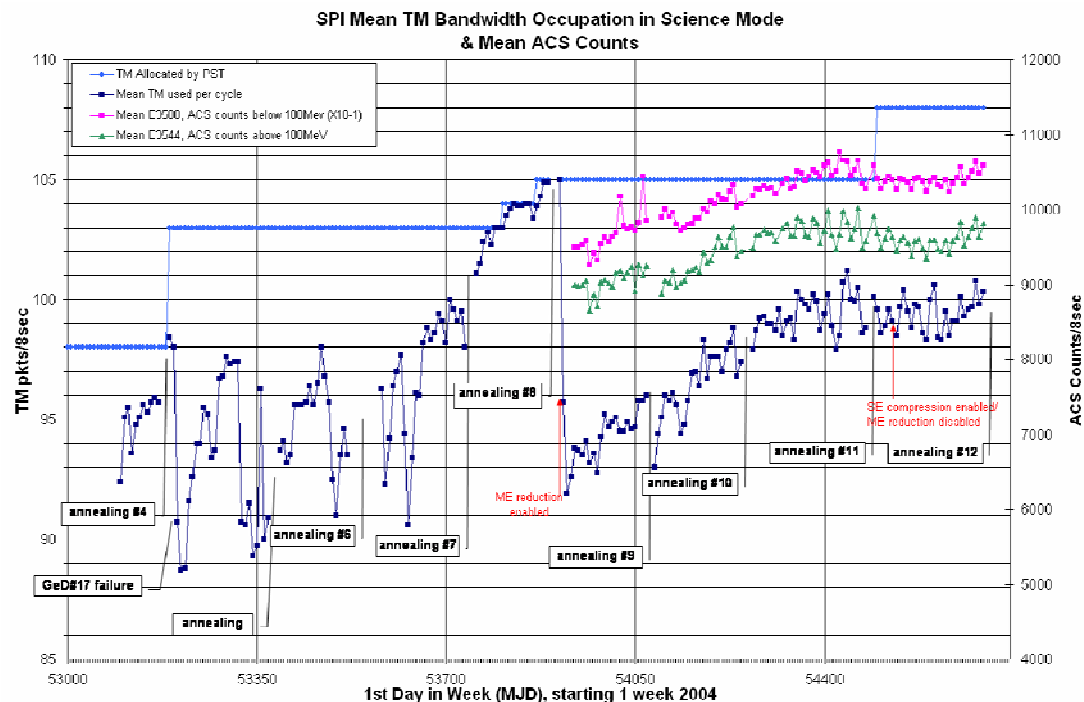
The 12th annealing started on 17/08/2008 at 15:15Z. This annealing is progressing nominally. The summary annealing timeline is included in the future activities section of this report. The following table reports the major events/steps performed so far (i.e. up to 29th August) since the start of the annealing:

Date/Time	Activity
17/08/2008 15:15Z	Configure SPI for start of Annealing and stop SPI active cooling
17/08/2008 16:42Z	Annealing Heater Main ON
17/08/2008 18:42Z	Annealing Heater Redundant ON
19/08/2008 03:54Z	Cold plate temperature reached 373K (100degC)
27/08/2008 10:40Z	Stop SPI Annealing: Annealing Heater Main and Redundant OFF; Heat Pipe Heater Main and Redundant OFF; Antifreeze Heater 1A ON
27/08/2008 11:14Z	ACS switch-on and calibration start (FEE#57 and FEE#81 ON)
29/08/2008 06:45Z	End of ACS Calibration

Throughout the reporting period, SPI was in CONF mode with an assigned TM bandwidth of 30 packets/cycle due to the annealing.

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.



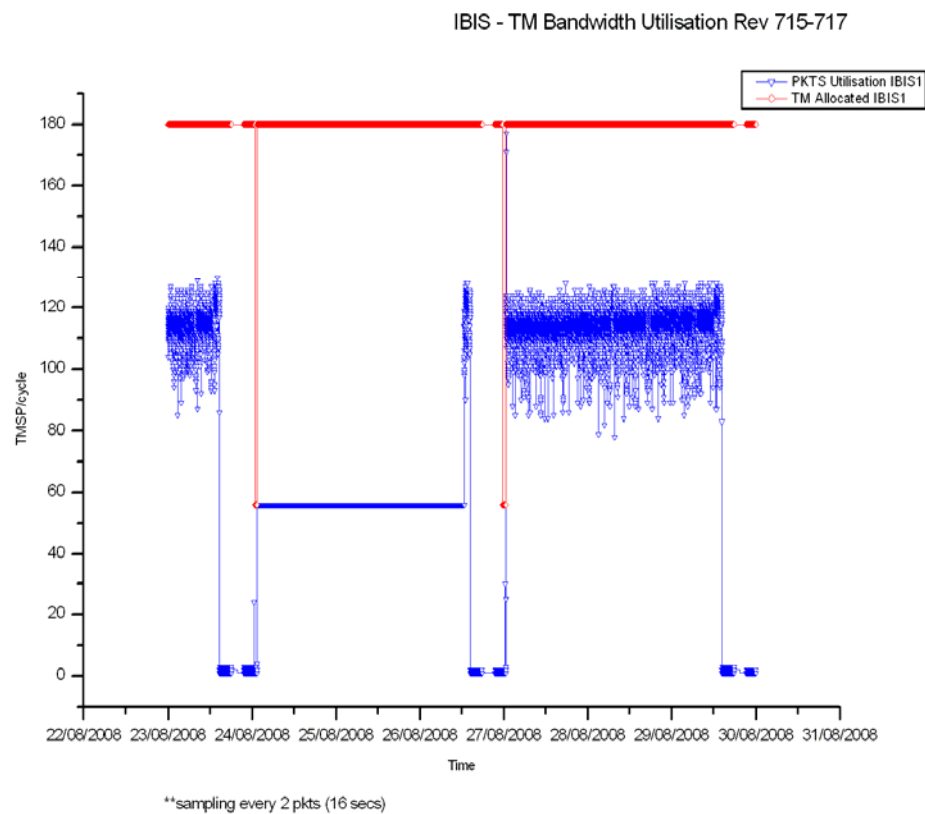
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

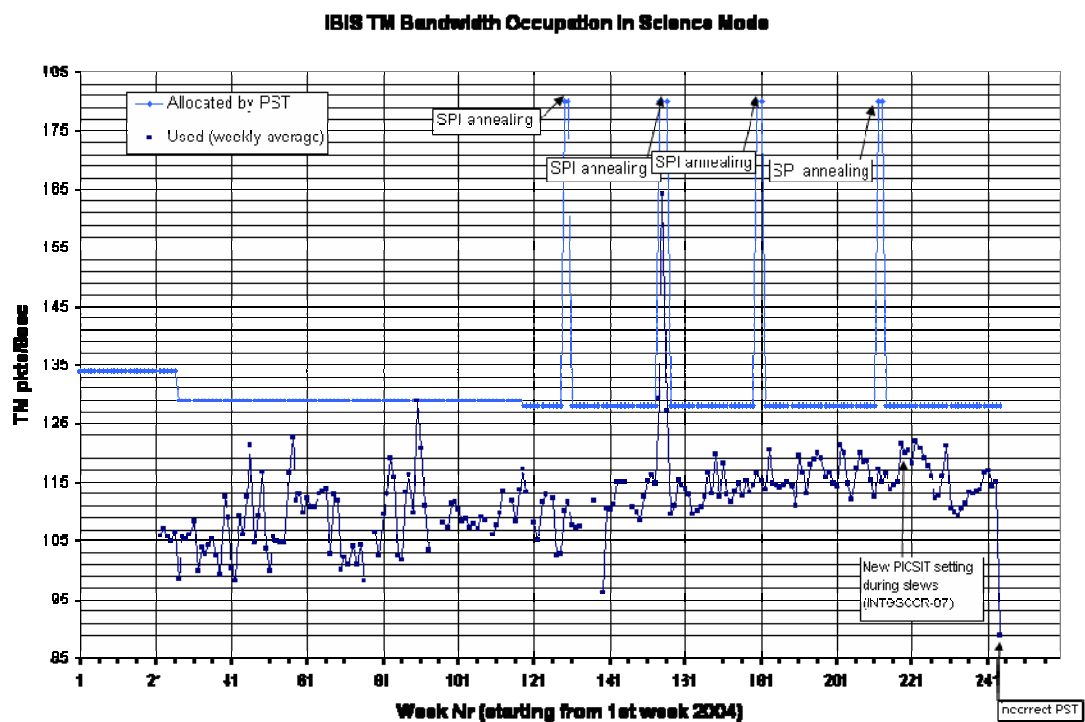
The overall status of the unit is nominal.

During the reporting period, the PST allocation to IBIS above radiation belts was 180 packets/cycle except during revolution 716, from the start until 2008-08-26 at 12:45:52Z, when it was 56 packets/cycle due to the wrong PST (see Anomaly Report INT-3020). Due to this, the average bandwidth utilisation statistics are misleading for this week and are not reported.

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 and JEMX-2 were both operated in Data Taking mode with a TM allocation of 15 packets/cycle. Except during revolution 716, when due to a PST problem the allocation was 9 packets/cycle.

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 9 packets/cycle, except during revolution 716, when there was a problem, see below.

During this reporting period, 167 of the 168 planned science pointings were executed nominally, one was lost. A PST problem during revolution 716 meant reduced TM for 83 pointings.

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 good this week. One pointing was lost. There was also a PST problem that affected almost an entire revolution. The overall performance was above the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. The only problem, was a missed PST command, see anomalies for details.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were four link drops reported with Redu, one of which led to the loss of a pointing, and an incorrect PST for the following 83 pointings..

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSF files have been received for revolutions 723-725.

Revolutions 717 to 719 were re-planned again due to a TOO observation of the new SGR 0501+4516 in revolution 717. Revolutions 722 to 725 have been planned routinely.

New TSFs have been received for revolutions 718 and 719.

2. Observation status

New ECS files were received for revolutions 705, 707 and 708. The ECS for revolution 706 is missing.

3. ISOC Science Data Archive

No news.

4. ISOC system

ISOC system V19.4 was released for testing on Friday 29 August.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 01/09/2008:

- Latest Standard Analysis completed: observation 05200080005 (Loop I-Loop IV Super, Revolution 691, 692 & 693) on 14/08/2008.

- Latest products archived: observation 05200480001 (XMM-LSS, Revolution 695, 696 & 697) on 15/08/2008.

- Latest observation products sent to the observer: observation 05200480001 (XMM-LSS, Revolutions 695-697) on 28/08/2008.

5 Special Events

6 Anomalies

The following problem was reported this week that impacted operations.

- On DoY 237, at 00:53, the TC link with Redu dropped. A recovery was performed, and the Timeline rejoined at 02:31, however, the last command of the PST ED was not sent leaving the allocation SPI 100, IBIS 56, JX1/2 9, OMC 5, instead of the planned SPI 30, IBIS 180, JX1/2 15, OMC 9. This was not corrected until DoY 239 12:46. The impact was a reduced TM for 83 pointings.

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

AR id	Date Created	Subject	Segment	Status
INT-3020	2008-08-24	Incorrect PST used following command failure		Pending
INT-3023	2008-08-25	Database Import on sun129 Missed.	IMCS	Pending

7 Future Milestones

- The 12th annealing operations started on 17th August 2008 at radiation belt entry of revolution 713. Below is the summary timeline of the planned annealing activities

12th SPI ANNEALING - revs 713-720									
ID	Task Name	Duration	Start	Resource Names	11 Aug '08	16 Aug '08	25 Aug '08	01 Sep '08	08 Sep
2	Start SPI Annealing - Warm-up Phase	36.5 hrs	17 Aug 15:10	PST[20 pkts]	17 Aug 15:10				
16	Annealing at 104degC	199 hrs	19 Aug 03:40	PST[20 pkts]	19 Aug 03:40				
28	Stop SPI Annealing - Passive Cooling Phase	64.02 hrs	27 Aug 10:40	PST[20 pkts]			27 Aug 10:40		
32	ACS Calibration	61.83 hrs	27 Aug 10:40	PST[20 pkts]			27 Aug 10:40		
44	Start Cryocoolers - Active Cooling Phase	140.5 hrs	30 Aug 02:41	PST[20 pkts]	WARNING: Active cooling SHALL not start later!				
56	Camera Switch on & Performance Tests	31.2 hrs?	03 Sep 07:11	PST[105 pkts]				03 Sep 07:11	
76	Active Cooling Fine Tuning	67 hrs	04 Sep 23:11	PST[105 pkts]				04 Sep 23:11	
79	Resume SPI POS Observations	62 hrs	05 Sep 00:10	PST[105 pkts]				05 Sep 00:10	

- The next eclipse season will begin on the 22nd September during revolution 725.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 716

The observations in revolution 716 began with a hexagonal dither of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. They continued with a raster dither of X Per (RA 03:55:23.08, DEC +31:02:45.0), lasting ~28.0 hours. Finally a raster dither of the Galactic Plane Region 3 (RA 13:09:32.98, DEC -62:47:56.4), lasting ~21.2 hours, was performed, until the end of the revolution.

Revolution 717

The observations in revolution 717 consisted entirely of a raster dither of SGR0501+4516, a ToO (RA 05:01:03.60, DEC +45:16:19.2), lasting ~57.1 hours.

Throughout these observations, all instruments were in their nominal science modes, except SPI, which is undergoing annealing. The TM allocation was IBIS 180; SPI 30; JEM-X1 15; JEM-X2 15; OMC 9.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2008-08-11T23:06:58.000Z	139.1976	F	Automatic TM processing.
2008-08-12T21:48:20.000Z	139.1539	F	Automatic TM processing.
2008-08-14T22:55:37.000Z	139.1461	F	Automatic TM processing.
2008-08-15T16:35:23.000Z	139.1218	F	Automatic TM processing.
2008-08-17T22:42:01.000Z	139.1102	F	Automatic TM processing.
2008-08-18T05:08:50.000Z	139.0903	F	Automatic TM processing.
2008-08-20T10:37:03.000Z	139.0508	F	Automatic TM processing.
2008-08-20T22:30:49.000Z	139.0378	F	Automatic TM processing.
2008-08-21T04:57:29.000Z	139.0142	F	Automatic TM processing.
2008-08-22T07:48:20.000Z	138.9917	F	Automatic TM processing.
2008-08-23T22:19:04.000Z	138.9761	F	Automatic TM processing.
2008-08-24T04:43:13.000Z	138.9536	F	Automatic TM processing.
2008-08-25T07:36:04.000Z	138.8999	F	Automatic TM processing.
2008-08-26T22:07:44.000Z	138.8864	F	Automatic TM processing.
2008-08-28T07:26:53.000Z	138.8669	F	Automatic TM processing.

This report was generated Fri Aug 29 08:00:30 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, 23/08/2008 – 29/08/2008

The AOCS operations were executed from the Automatic Timeline.

During this period, 99 Open Loop Slews, 82 Closed Loop Slews and 6 Momentum Biases were executed (as reported by ACC).

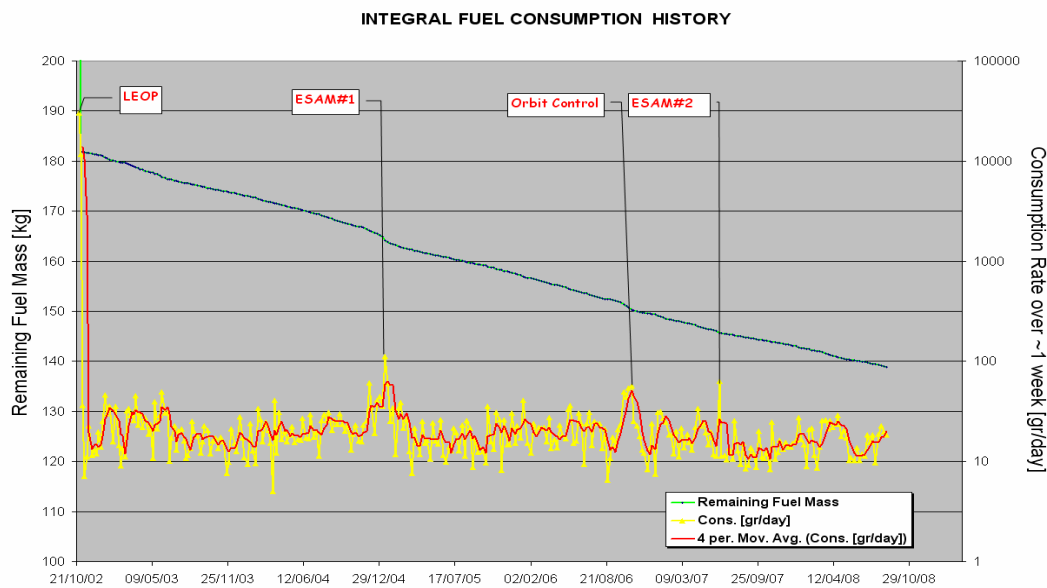
No slews were missed from TL, during the observation period.

Orbit Control

No update

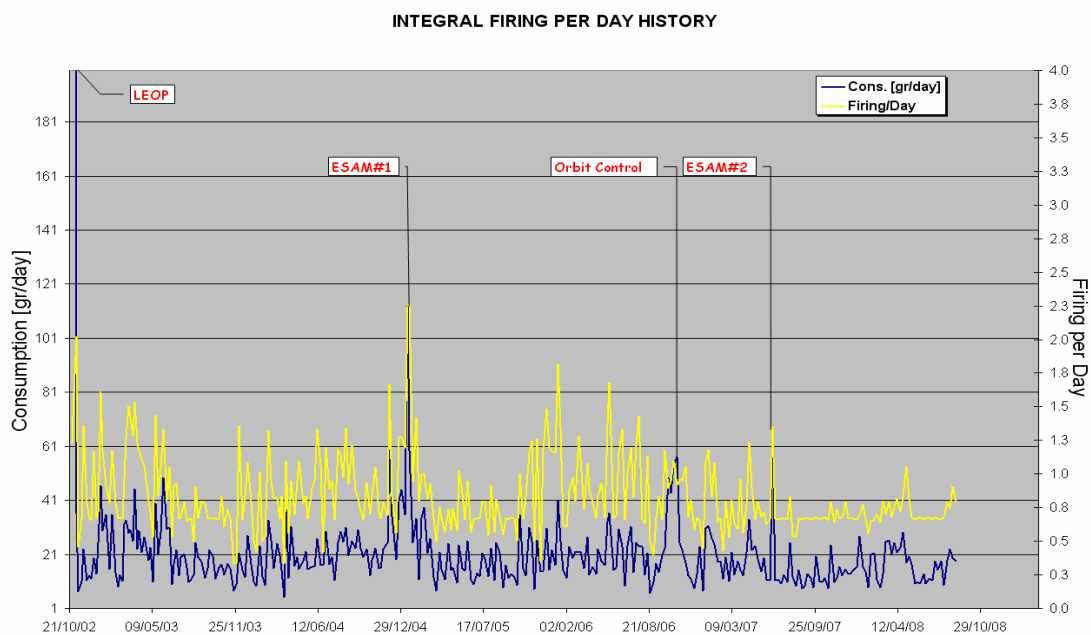
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 29/08/2008 is reported in the plot below.



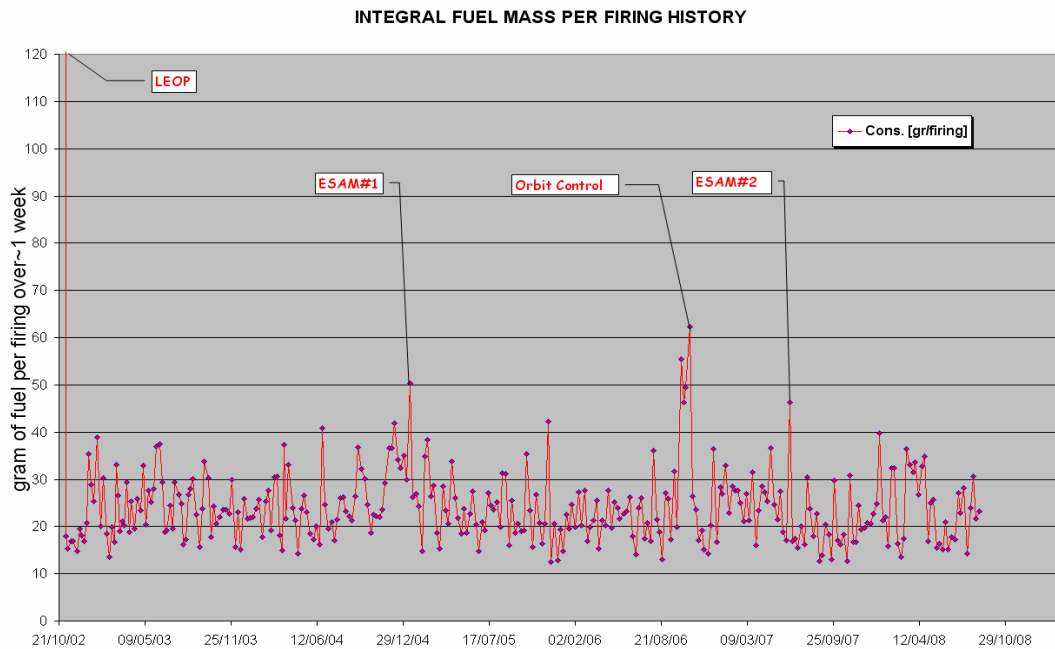
The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 29/08/2008 is reported in the plot below.



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

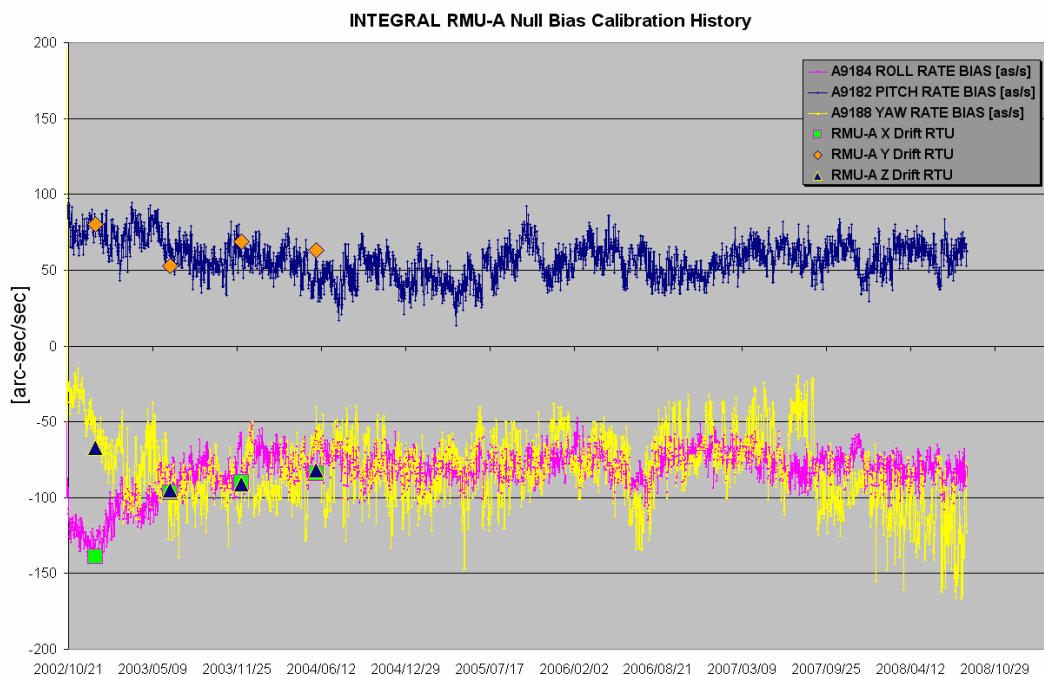
The fuel per firing over the period between 01/11/2002 and 29/08/2008 is shown in the plot below.



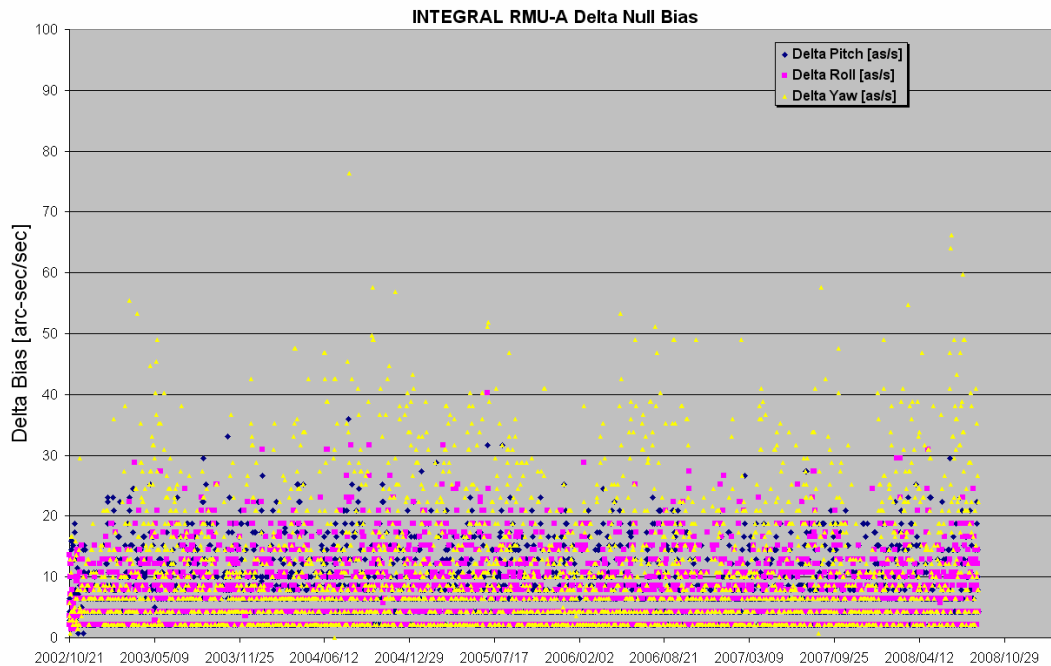
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 29/08/2008 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 29/08/2008 is reported in the plot below.



23/08/2008 (Day of Year 236, Revolution 715)

Nothing to report.

24/08/2008 (Day of Year 237, Revolution 715-716)

Nothing to report.

25/08/2008 (Day of Year 238, Revolution 716)

Nothing to report.

26/08/2008 (Day of Year 239, Revolution 716)

Nothing to report.

27/08/2008 (Day of Year 240, Revolution 716-717)

Nothing to report.

28/08/2008 (Day of Year 241, Revolution 717)

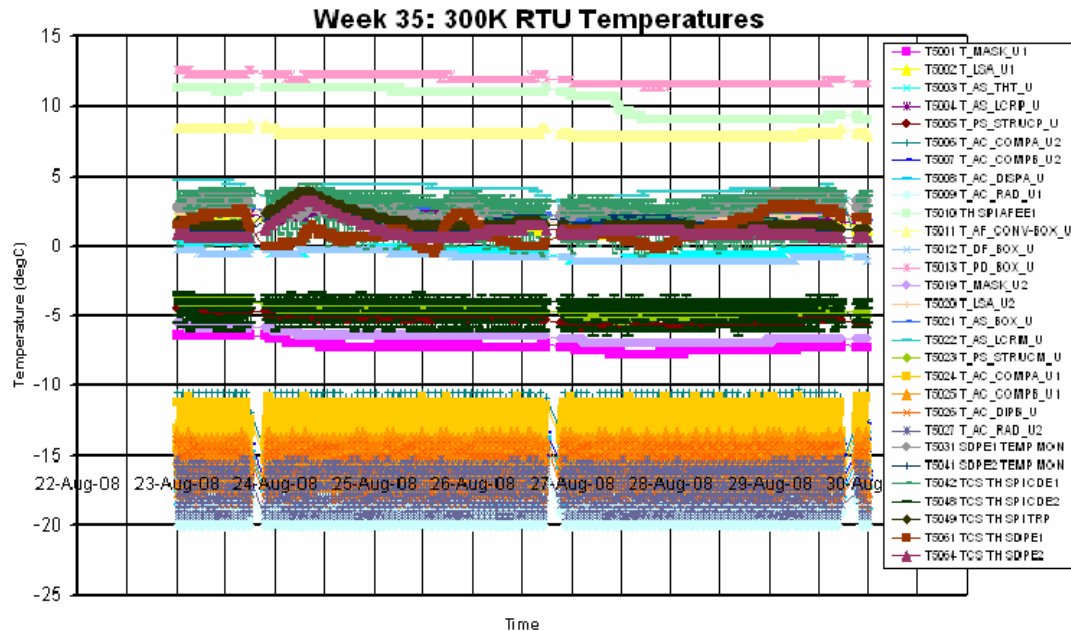
Nothing to report.

29/08/2008 (Day of Year 242, Revolution 717)

Nothing to report.

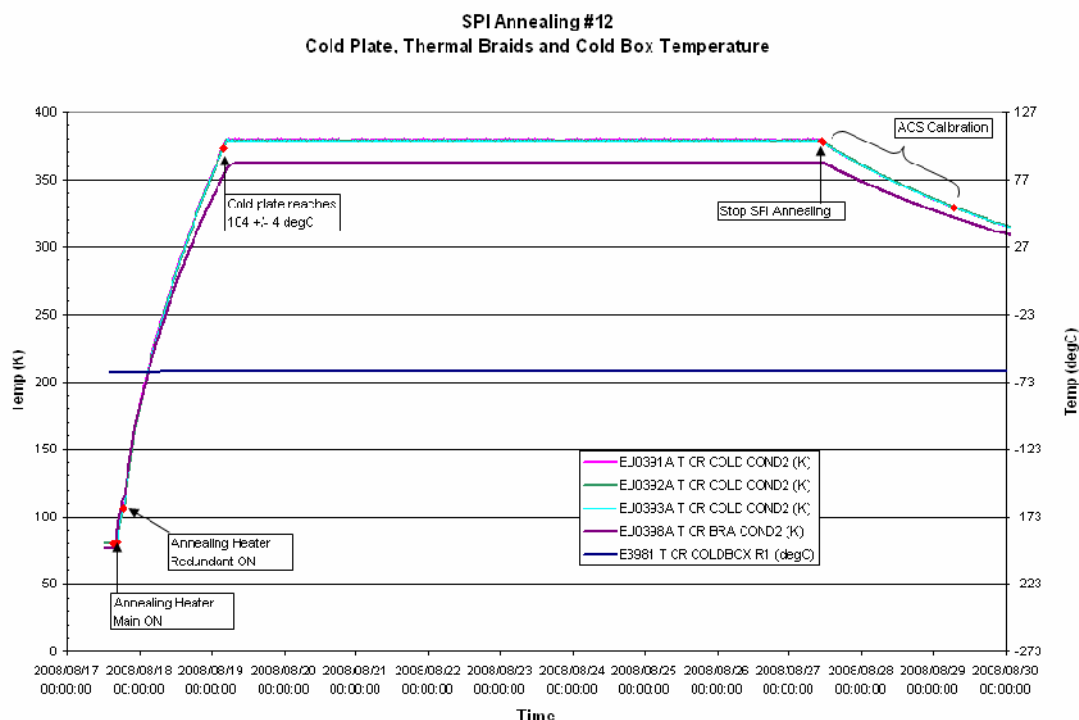
8.3.2 SPI Operations

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

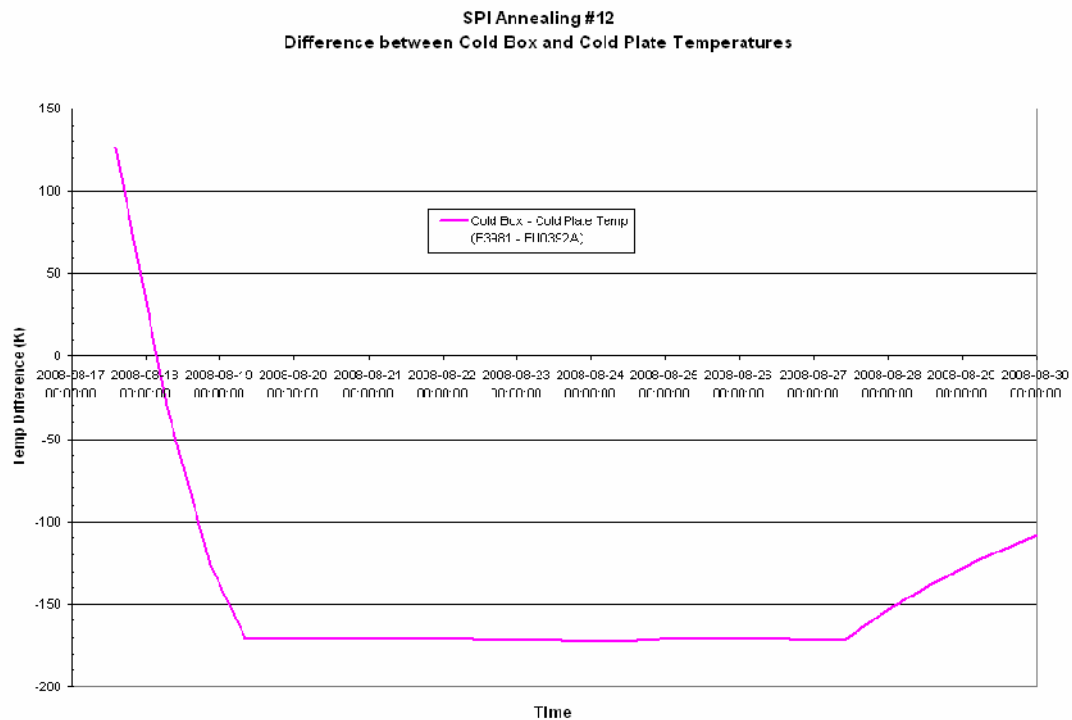


Stirling Compressors and Cryostat: The cryocooler was off throughout the reporting period due to the annealing.

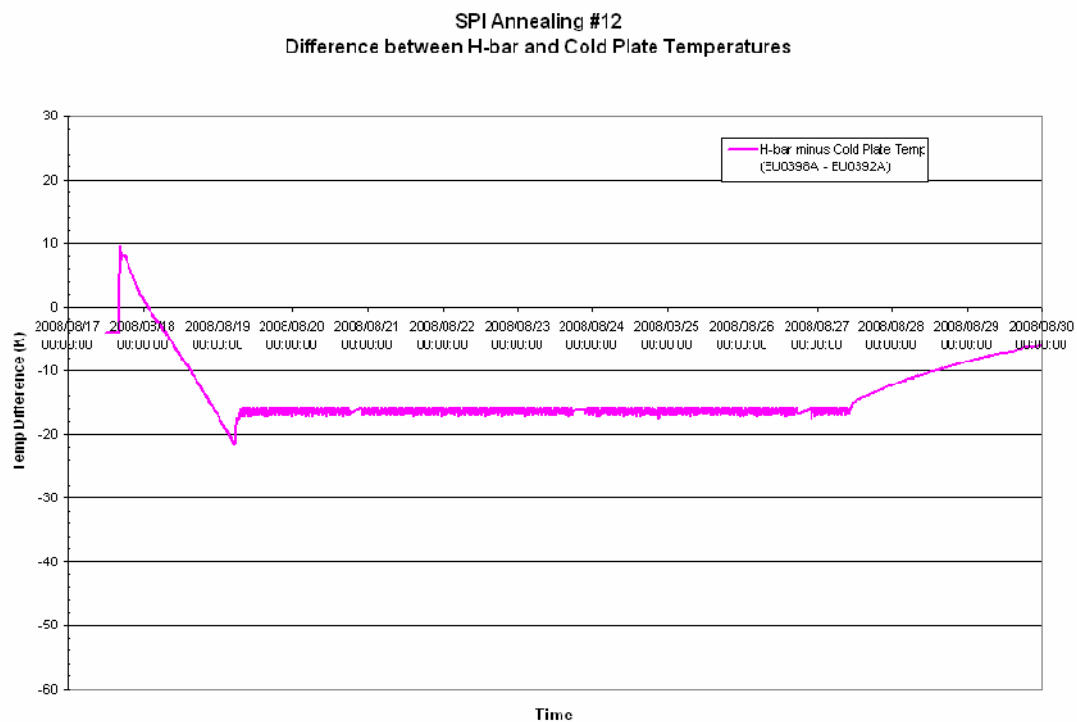
The following plot shows the evolution of the Cold Plate, Thermal Braids and Cold Box temperatures since the start of annealing.



The following plot shows the difference between the Cold Box and Cold Plate temperatures since the start of annealing.



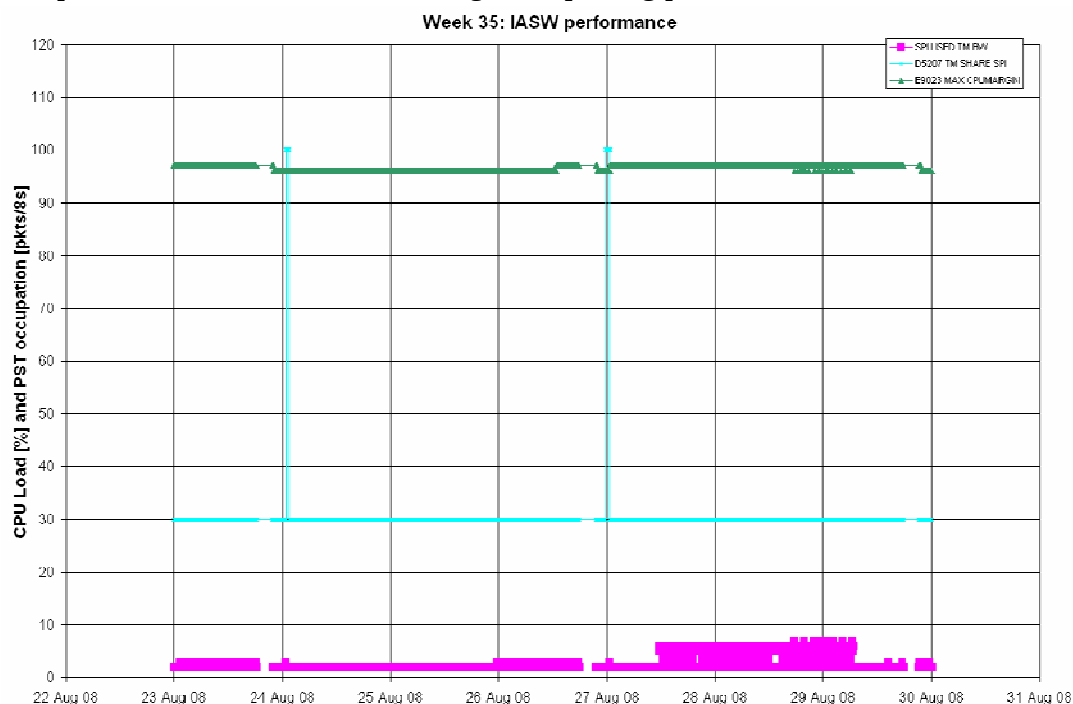
The following plot shows the difference between the H-bar and Cold Plate temperatures since the start of annealing.



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. Throughout the reporting period, the IASW was in CONF mode due to the ongoing annealing.

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

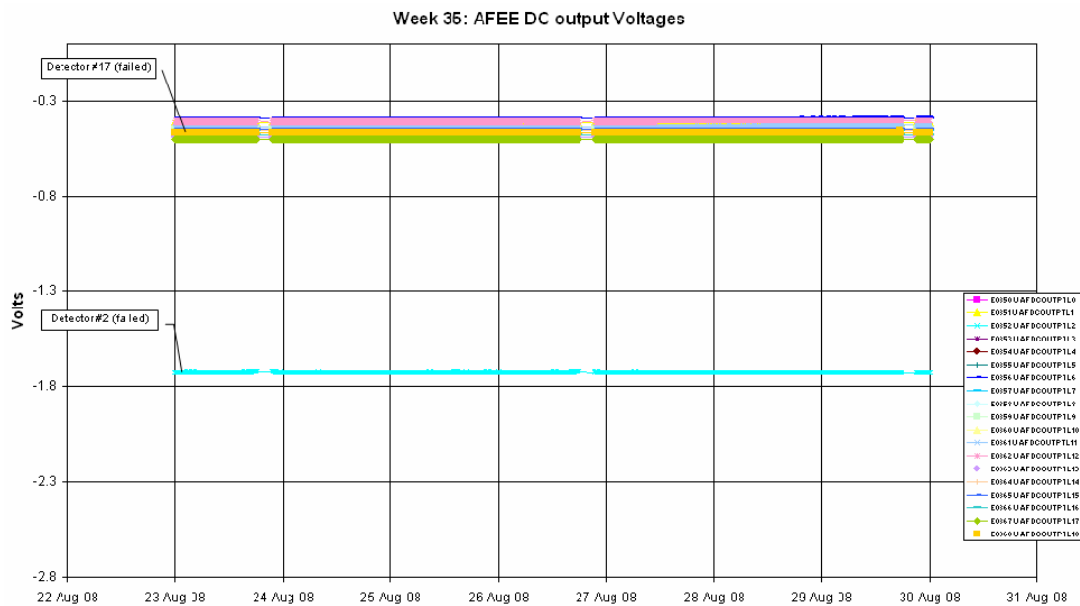


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

For the 12th annealing operations, started on 17/08/2008, the ACS High Voltages were set to the minimum voltage (~980V) and the ACS was in CONF mode until 27/08/2008 at 11:14Z when the nominal HV was restored and FEE#57 and FEE#81 were switched on for the purpose of the ACS Calibration. The ACS Calibration was completed on 29/08/2008 at 06:45Z, after which the ACS HV was left at the nominal settings and with all FEEs ON.

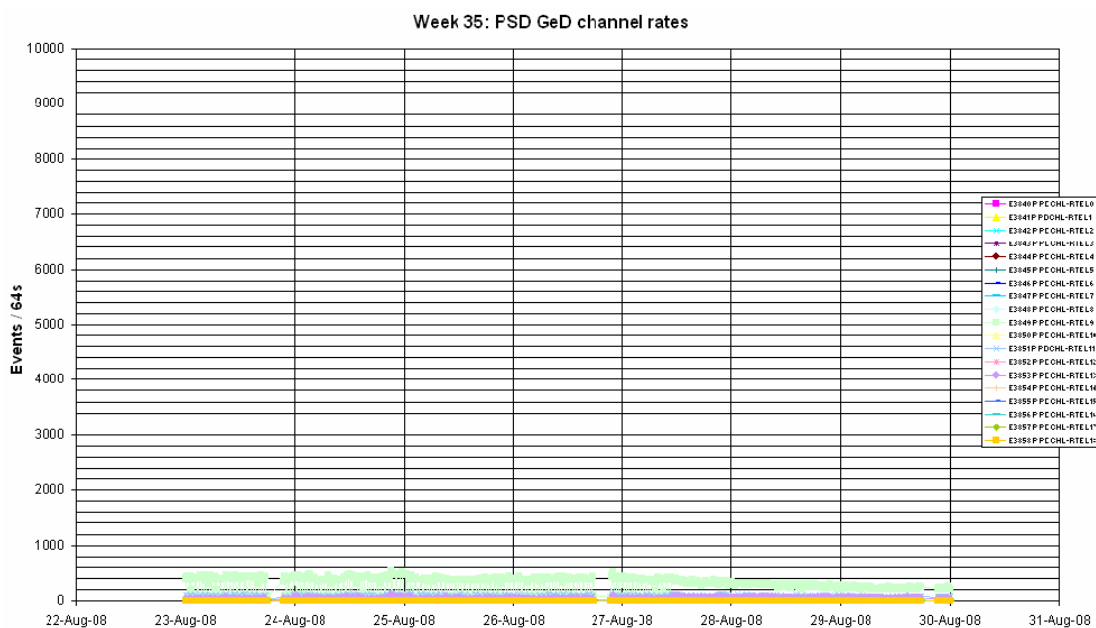
AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.

For the 12th annealing operations, started on 17/08/2008, all detector HVPSs were switched off and only the LVPSs are left on and the AFEE was in CONF mode.



DFEE: The performance of the unit is nominal. For the 12th annealing operations, started on 17/08/2008, the DFEE was in CONF mode throughout the reporting period.

PSD: The health of the unit is nominal. The following plot shows the PSD channel rates during the reporting period. For the 12th annealing operations, started on 17/08/2008, the PSD was in CONF mode.



Event Log:

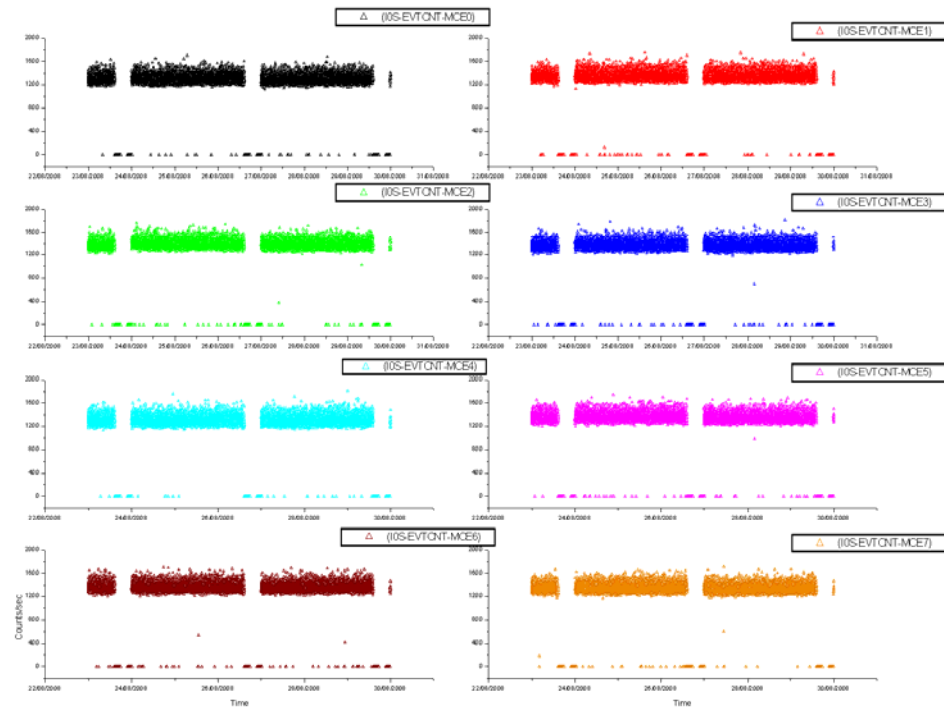
No non-nominal events occurred on SPI over the reporting period.

8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

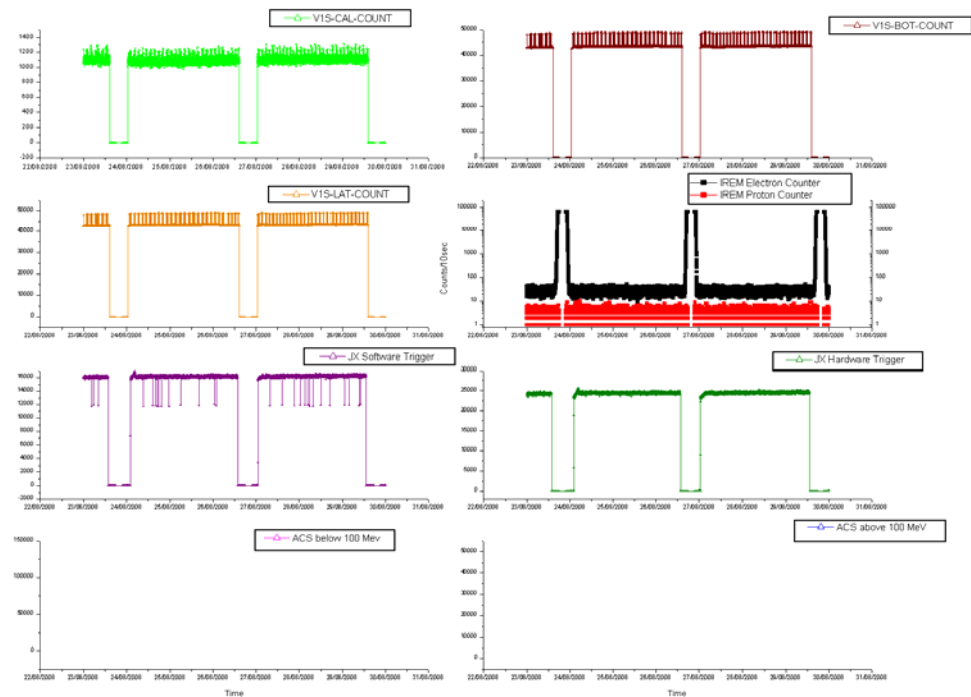
IBIS - ISGRI Counters Rev 715-717



**sampling every 4 pkts (32 secs)

VETO vs Payload Counters:

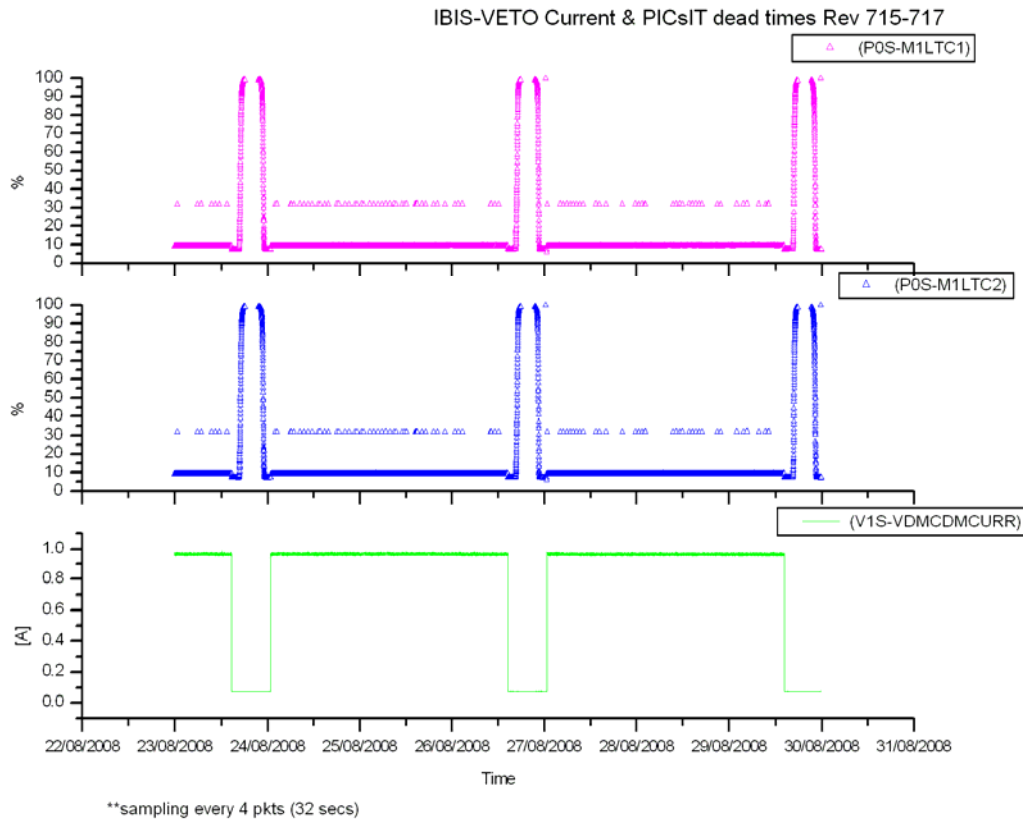
IBIS-VETO vs Payloads Counters Rev 715-717



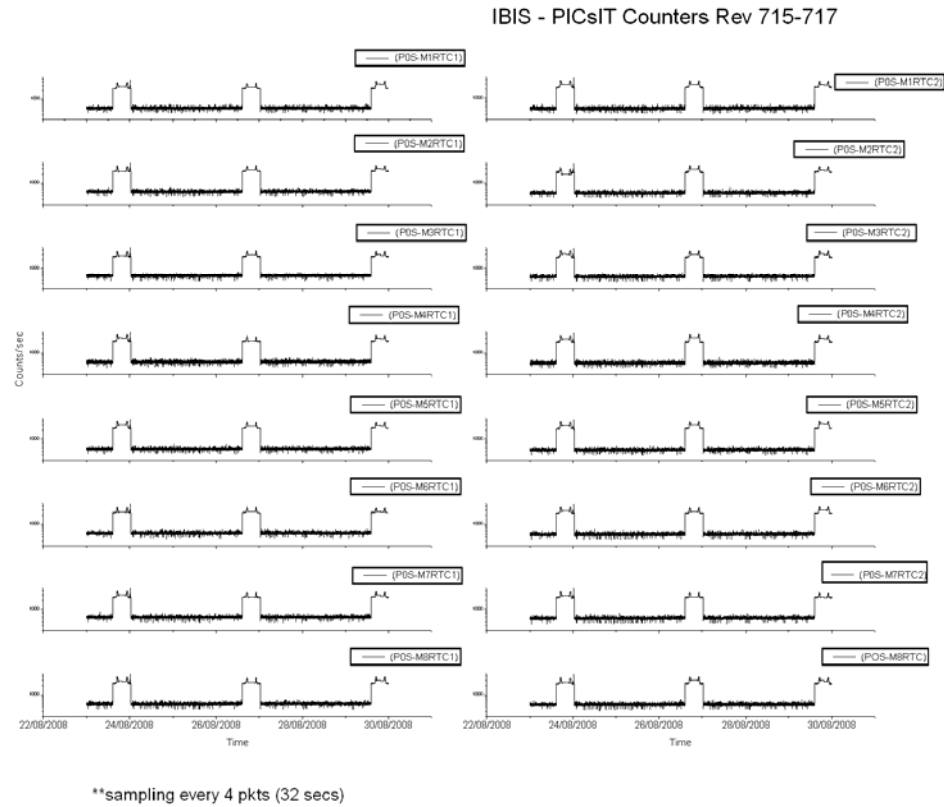
**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec
 sampling every 5 pkts (40 sec)

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

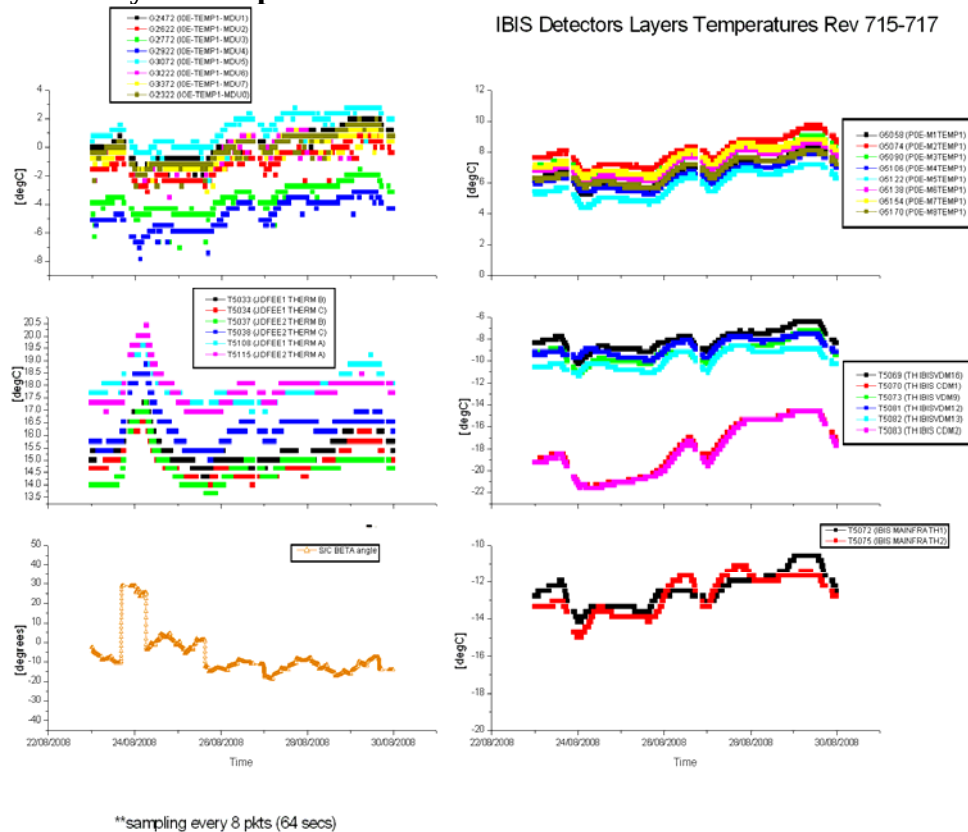
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report:

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), G5002 (P0S-Mi_RTC1) and G5003 (P0S-Mi_RTC2) families and G2000 family (I0E-OVFWPXADD-Mi) were received during the radiation belt passages.

2008-08-23 (DOY 236, Rev 715-716)

At 10:39:09Z TM parameter G2000 failed status consistency check, indicating an overflow of the noisy pixel address buffer in MCE0. As it returned within limits of its own accord at 10:39:17Z, no action was taken.

2008-08-24 (DOY 237, Rev 716)

Due to a loss of the TC link, the ED GESTAN02 scheduled in the Timeline at 00:53:45Z failed. Once TC capability was regained, the ED GESTAN02 was re-linked at 01:27:56Z with the planned observation parameters. A further consequence of the loss of TC was that the last command of the PST ED also failed. However, this was overlooked during the recovery and consequently the TM allocation to IBIS remained at 56 packets/cycle (as set during radiation belts) instead of the planned 180 packets/cycle. This is recorded as Anomaly Report INT-3020.

2008-08-25 (DOY 238, Rev 716)

IBIS operations executed nominally, except for the fact that, as reported for the previous day, the TM allocation to IBIS remained at 56 packets/cycle instead of the planned 180 packets/cycle. However, no alarms or OEMs were raised.

2008-08-26 (DOY 239, Rev 716-717)

IBIS operations executed nominally, except for the fact that, as reported for the previous day, the TM allocation to IBIS remained at 56 packets/cycle instead of the planned 180 packets/cycle. Once this problem was noticed (following a query from the OMC PI) the TC to start the correct PST, which had been missed on DOY 237, was uplinked at 12:45:52Z. IBIS operations continued nominally.

2008-08-27 (DOY 240, Rev 717) to 2008-08-28 (DOY 241, Rev 717)

IBIS operations executed nominally.

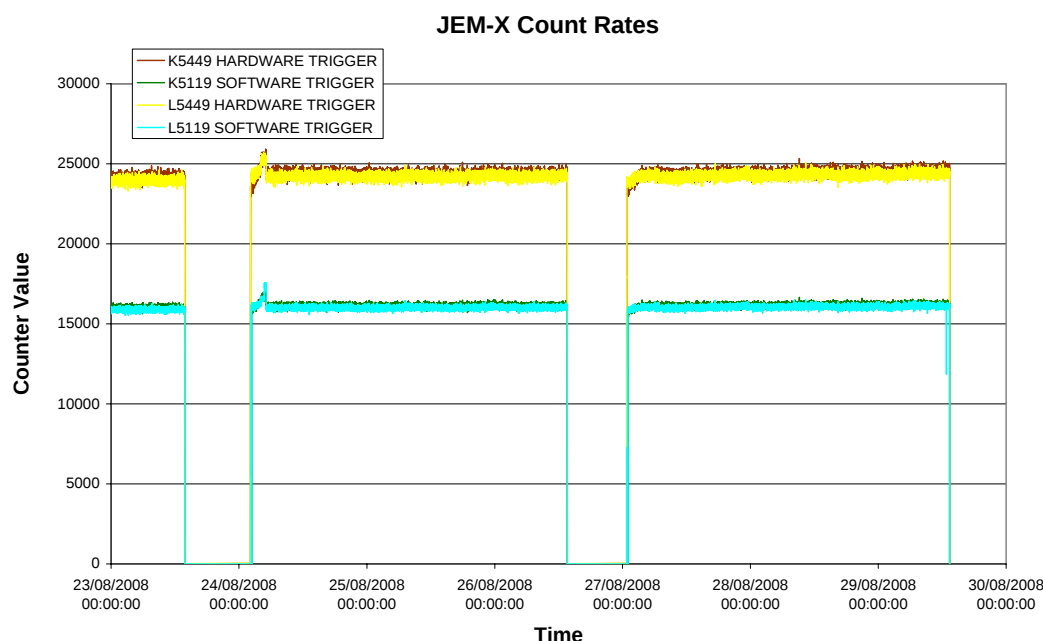
2008-08-29 (DOY 242, Rev 717-718)

At 08:34:53Z TM parameter G2098 failed status consistency check, indicating an overflow of the noisy pixel address buffer in MCE7. As it returned within limits of its own accord at 08:35:01Z, no action was taken.

8.3.4 JEM-X Operations

JEM-X Count Rates

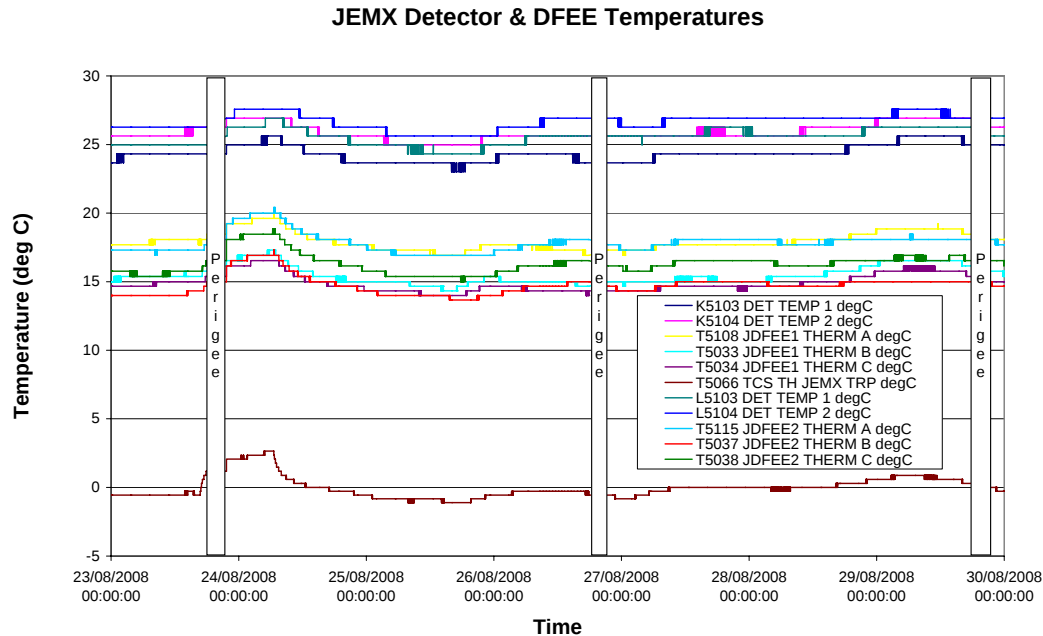
JEM-X count rates over the reporting period are displayed in the following graph¹.



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

2008-08-23 (DoY 236, Rev 715)

JEM-X 1&2 operations executed nominally.

2008-08-24 (DoY 237, Rev 716)

At 00:53, a TC link drop forced a suspension of the Timeline, which prevented the release of the K/LEHVAC01 and K/LEDDATA01 EDs. As part of the recovery, at 01:52, the instruments were both put to SAFE mode using procedures FCP_JEM1_0040 & FCP_JEM2_0040. At 01:53, they were put to SETUP using procedures FCP_JEM1_0041 & FCP_JEM2_0041. At 02:03, the EDs KEHVAC01 & LEHVAC01 were then uplinked, and at 02:20, the KEDATA01 & LEDATA01 EDs were sent putting both the instruments to DATA TAKING. JEMX 1 & 2 were both re-enabled in the Timeline at 02:22. However, the last command of the PST ED was missed, leaving 9 packets per cycle instead of the planned 15 packets per cycle. This was not noticed until the morning of DoY 239, it was then corrected at 12:46. This impacted almost the entire revolution.

2008-08-25 (DoY 238, Rev 716) to 2008-08-29 (DoY 242, Rev 717)

JEM-X 1&2 operations executed nominally.

² Data sampled (1 frame in 8)

8.3.5 OMC Operations

2008-08-23 (DoY 236, Rev 715)

Nothing to report.

2008-08-24 (DoY 237, Rev 716)

At 00:53, a TM drop from Redu forced the suspension of the Timeline. During the recovery, a PST command was missed, and the allocation left at 5 packets per cycle instead of the planned 9. This was not corrected until 26th at 12:46. The impact was the loss of pointing 07160001 and a reduction in TM from a planned 9 to 5 packets per cycle affecting pointings 07160002 to 07160090 (83 pointings).

2008-08-25 (DoY 238, Rev 716) to 2008-08-29 (DoY 242, Rev 717)

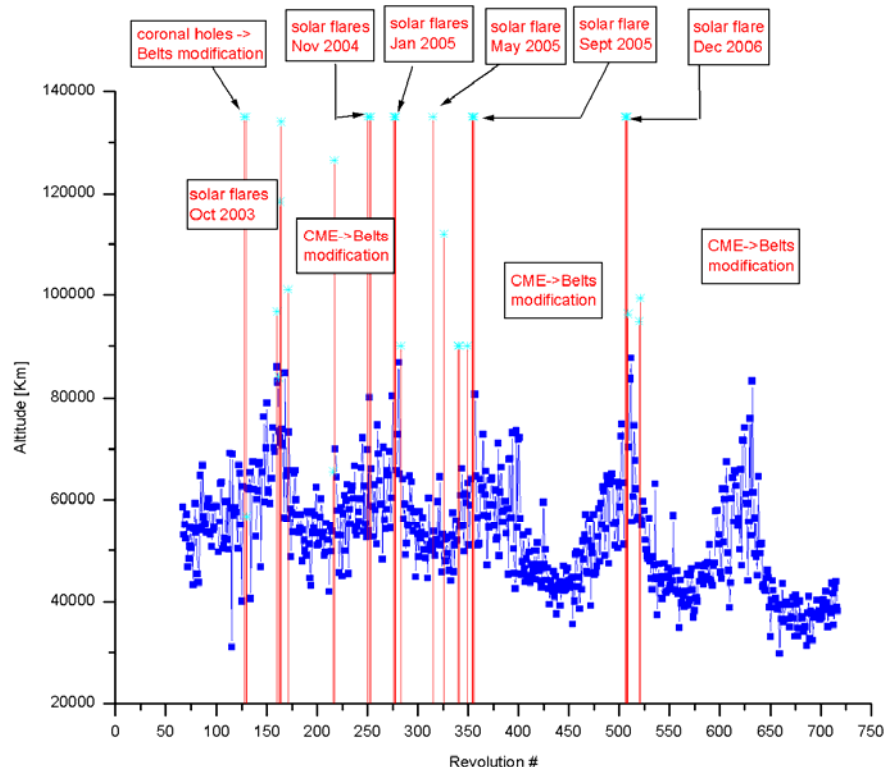
Nothing to report.

On DoY 236 at 14:42:55, DoY 239 at 14:30:32 and DoY 242 at 14:16:48 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]
715	RAD_ENTR R 2008-08-23T14:42:49Z	23/08/2008 16:08:46	43947.9	23-Aug-2008 16:36:26	39292.01
716	RAD_EXIT R 2008-08-24T00:36:33Z	23/08/2008 23:29:26	>>33538.4	23-Aug-2008 23:46:26	45556.44
716	RAD_ENTR R 2008-08-26T14:30:31Z	26/08/2008 16:23:10	38942.4	26-Aug-2008 16:30:25	38173.54
717	RAD_EXIT R 2008-08-27T00:23:54Z	26/08/2008 22:46:14	>>33550.3	26-Aug-2008 23:40:25	46643.81
717	RAD_ENTR R 2008-08-29T14:16:40Z	29/08/2008 16:17:11	38106.8	29-Aug-2008 16:10:25	39160.79
718	RAD_EXIT R 2008-08-30T00:10:33Z	29/08/2008 22:45:03	>>33533.7	29-Aug-2008 23:20:25	45672.19

Reference

High radiation

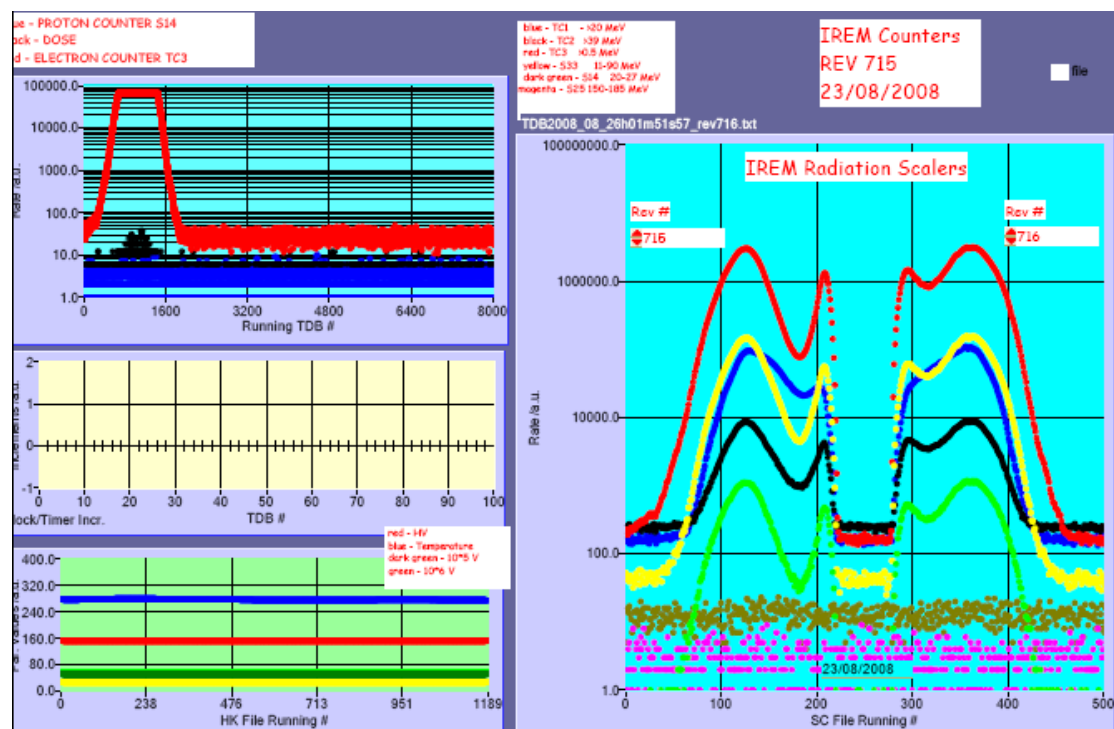
Very small error vs reference (less than 10 minutes)

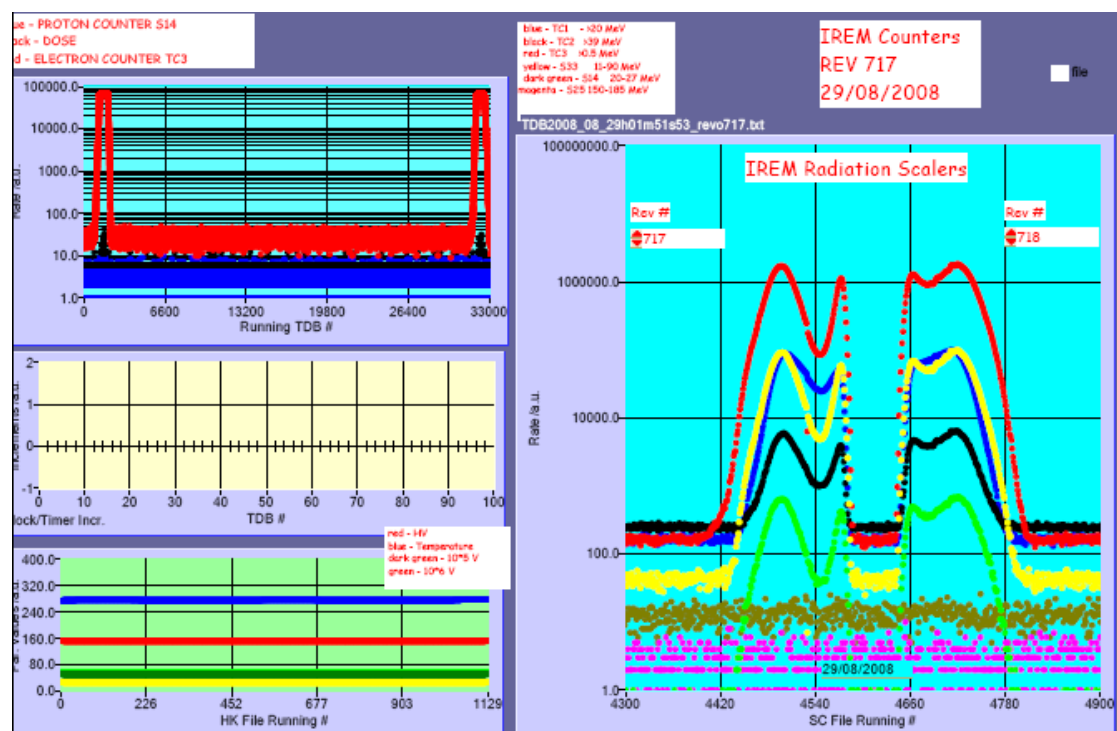
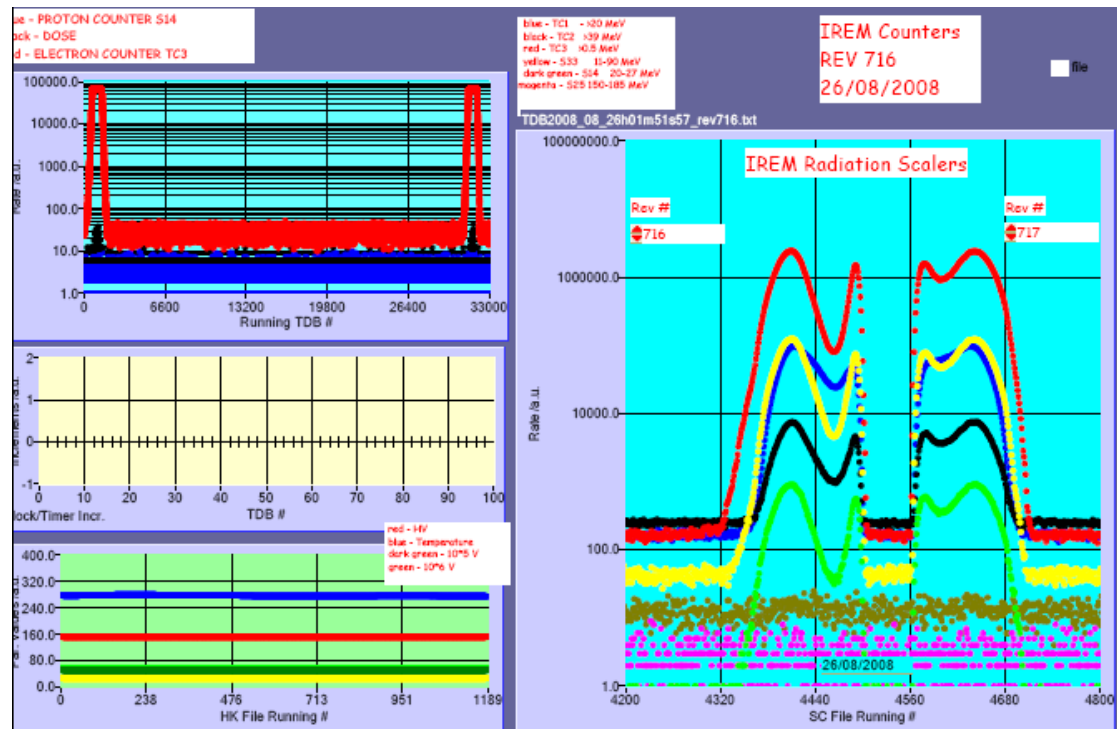
Small error vs reference (between 10 and 30 minutes)

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.

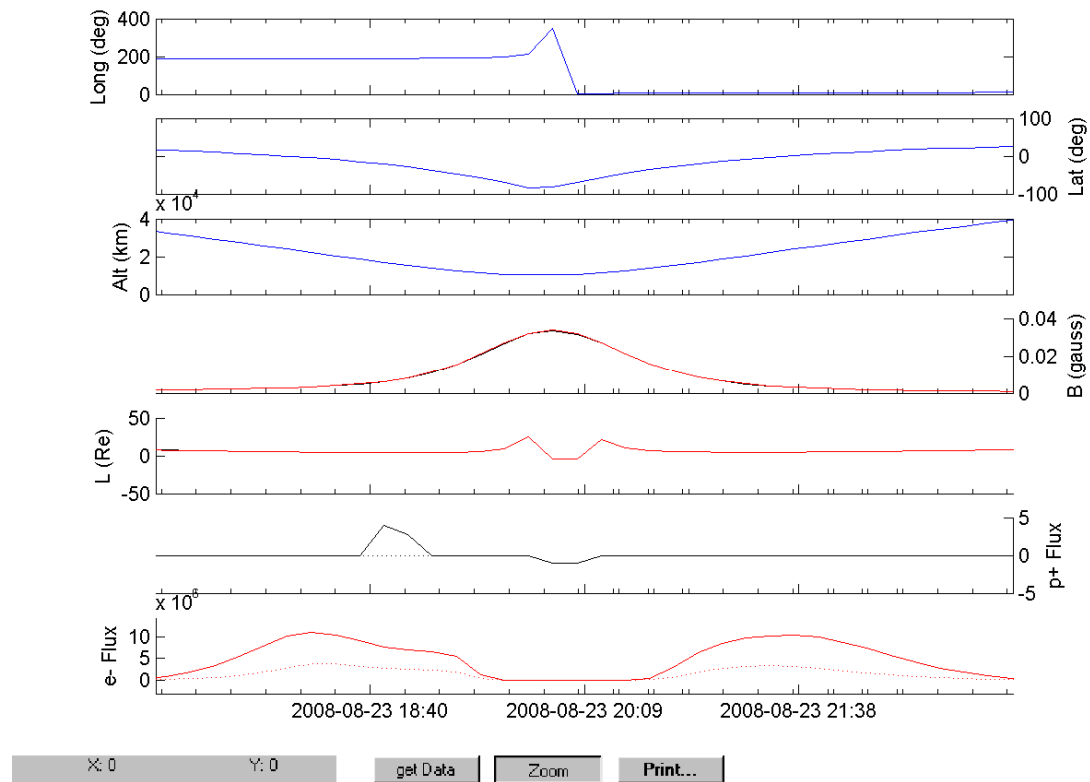
IREM radiation counters:



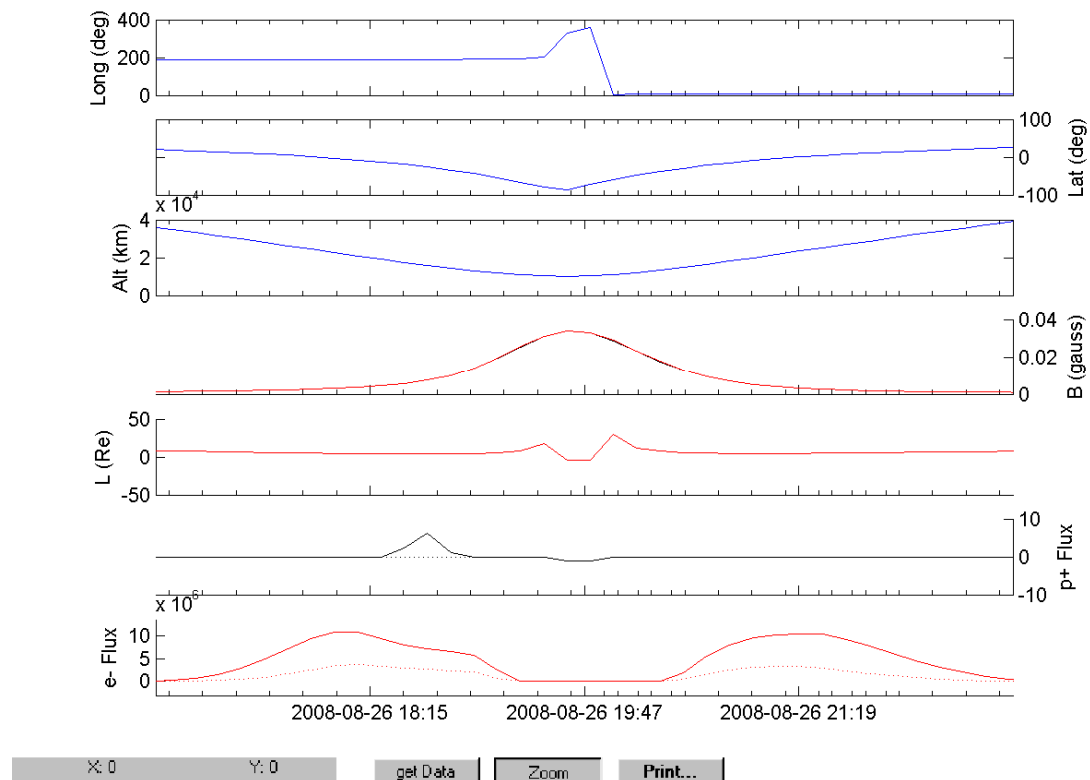


IREM Predicted Radiation Belt Passages

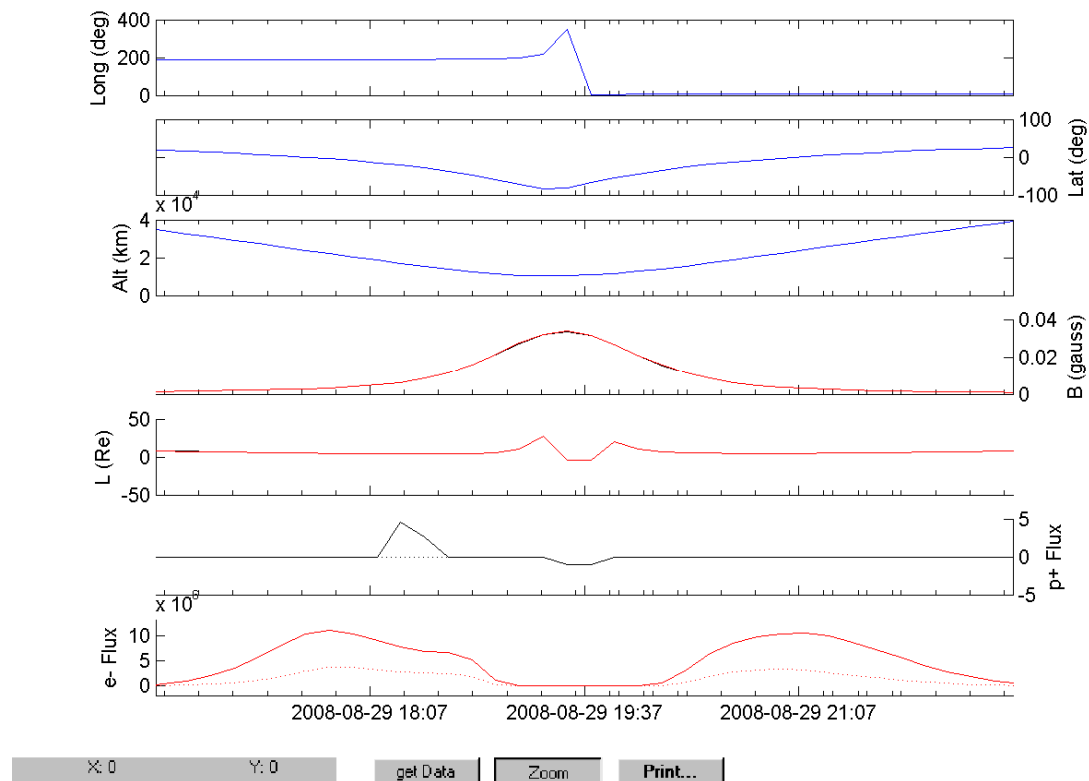
Rev 715



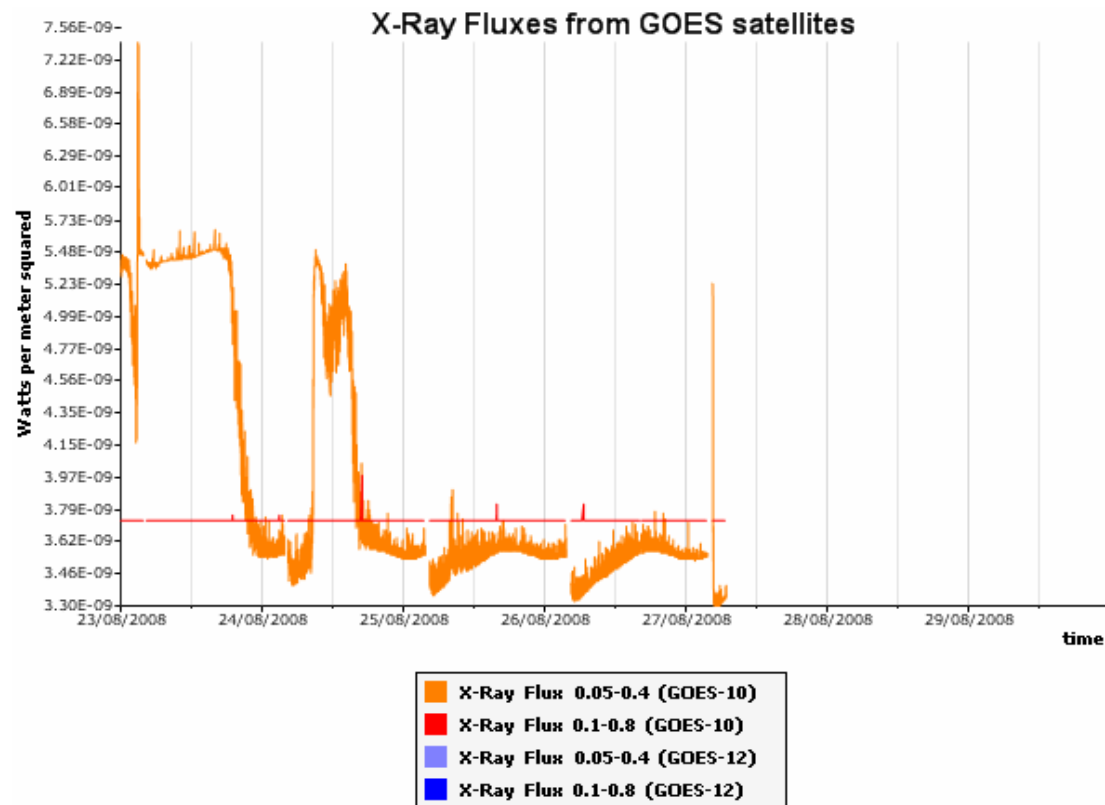
Rev 716



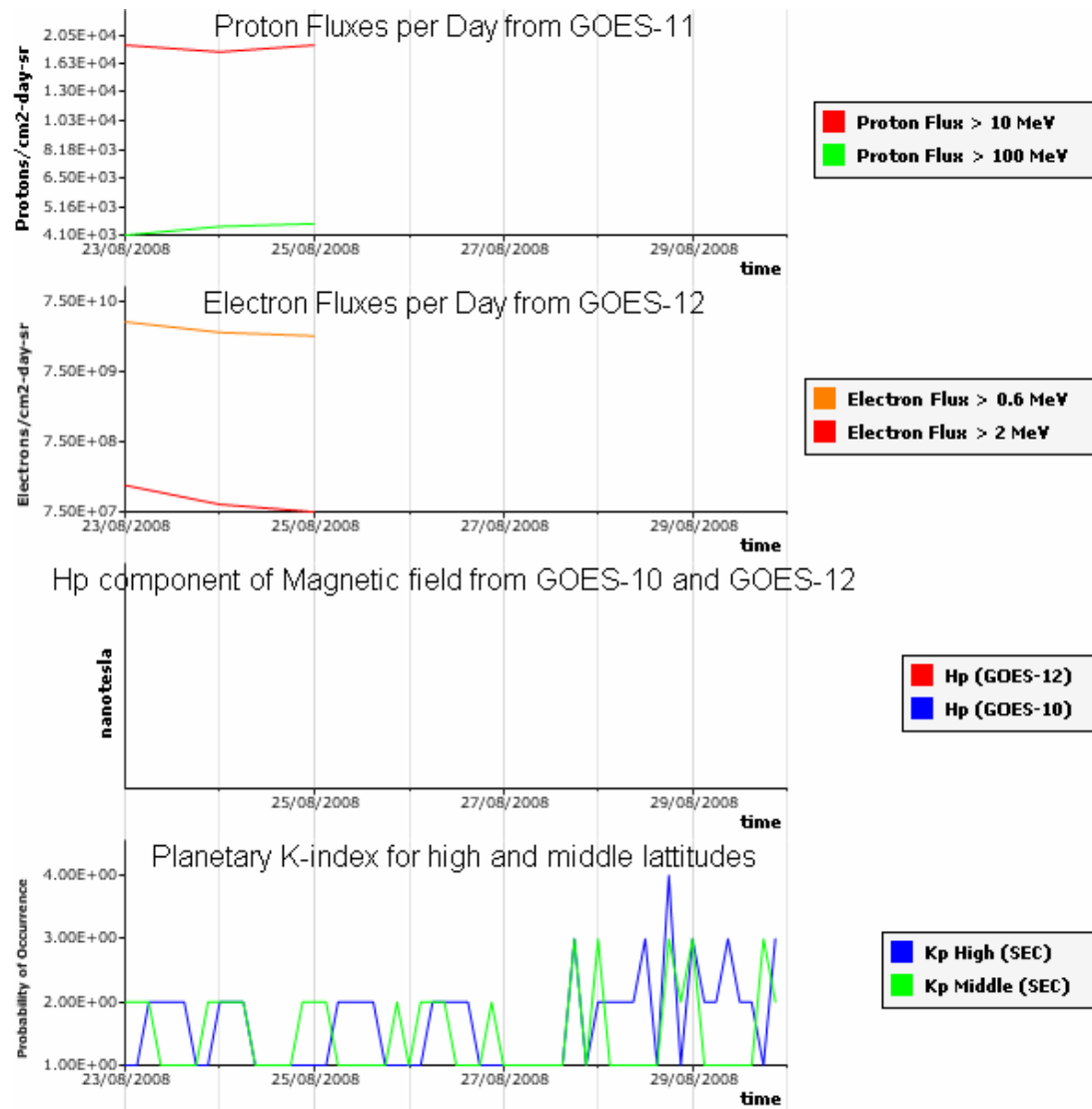
Rev 717



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.