

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 102
Week 36
06.09.04
Routine Phase

Prepared by: M. Walker (OPS-OFO)

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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 28.08.04 until 03.09.04 (both dates inclusive) and covers the revolutions 229, 230 & 231.

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 were the galactic plane; Sgr A*(RA 17:45:40.04; DEC -29:00:28.1); the Galactic Center field (RA 17:45:40.00; DEC -29:00:28.0); the galactic centre and the Sagittarius Arm tangent (RA 19:00:1.43; DEC +06:55:17.0). The activities consisted of hexagonal dithering, raster dithering, GPS and GCDE observations.

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.

One slew was missed from the Timeline because of the termination of the AD service. The slew was manually executed later.

Due to a high radiation background during the perigee pass on DoY 241, the STR condition was rather unstable for a period of about 30 minutes. The guide star was released/lost 5 times during this period.

Two open loop slews ended with roll errors. The errors were introduced by rather poor attitude determinations that were used for updating the slews. The reason was that the first mapping after the slew was used for attitude determination, during which the SSL was enabled.

The fuel consumption over the period between 27/08/2004 and 03/09/2004 was 0.192 kg. The remaining propellant is in the order of 168.271 Kg on the 3rd of September.

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

3.1.2 Power

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

3.1.3 Thermal

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

3.1.4 OBDH

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

On DoY 244 (31/08/2004) an adjustment of CLCW ratio in VC-0 TM Frames was made.

It is necessary to periodically change the Virtual Channel used for tele-commanding, minimising the degradation of the TM path through the RFDNs by switching the RFDN in use for antenna swapping - the SWT RFDN is moved using VC-0 commands. The SWA using VC-7 commands.

To use VC-7 for commanding, an operation was carried out to alter the CLCW distribution in VC-0 TM frames in favour of VC-7 CLCWs. The ratio during the INSTRUMENT window was about 3.7:1 in favour of VC-0, the operation reversed this ratio.

The procedure consists of switching back and forth between low and high bit rate until a satisfactory CLCW ratio is achieved.

Note that in this configuration VC-0 commanding channel cannot be used for nominal operations via Goldstone. If TC operations are to be moved to VC-0, this operation must be repeated to produce a CLCW ratio heavily in favour of VC-0 TCs. It is currently planned to use VC-7 for commanding for the next year.

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

After the failure of Germanium Detector#17, on 17th July, the overall status of the instrument in this week is nominal, except for the PSD (Pulse Shape Discriminator), which reproduced four times the anomaly of zero counts on all the channel rates, for a few minutes.

The instrument was however maintained in photon-by-photon mode with spectra TM enabled, an assigned TM bandwidth in the science windows of 103 pkts/cycle and an actual average occupation of 94 pkts/cycle.

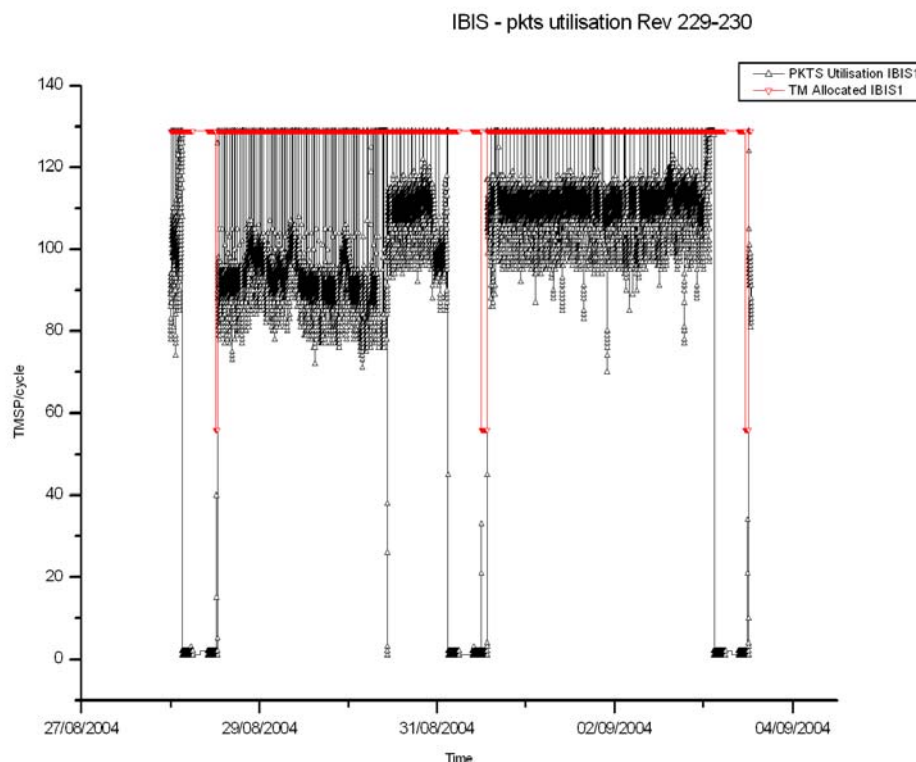
The cryo-cooler is working well, maintaining the temperature within 85+/-1K.

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

3.2.2 IBIS

The overall status of the unit is Nominal.

During the reporting period the PST Allocation to IBIS was 129 TMSP / Cycle. The mean IBIS Bandwidth usage was 105.5 TMSP / Cycle, up 1.3 TMSP from last week. A plot of the TM utilisation during the observation period 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 during science observations; with a TM allocation of 8 packets/cycle. JEM-X2 was dormant with a TM allocation of 1 packet/cycle.

In line with OCR-176 and OCR-177 the JEM-X2 DFEE remained off throughout the reporting period. It is now planned to keep the JEM-X2 DFEE switched off until, at

the latest, the start of the revolution before the one in which the next Crab calibration takes place.

Further information on the JEM-X operations can be found in the Appendix Section 8.3.4.

3.2.4 OMC

The status of OMC is nominal.

During the reporting period OMC operations were performed by the automatic timeline, with the TM allocation to OMC of 5 packets/cycle.

There were 146 OMC pointings executed nominally, 1 was lost.

Note: Some more information concerning the OMC operations is provided in the Appendix Section 8.3.5.

3.2.5 IREM

The overall status of the unit is Nominal.

Solar Activity

The solar activity during the observation period was low. The structure of the Radiation Belts was characterised by the influence of the recent solar activity. The inner part of the Belts passage started to reveal part of the typical footprint of the Integral orbit. (see IREM plot of rev 230).

No major event was reported during the observation period.

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

4 Ground Facilities

The performance of the Operational ground facilities was very good this week, well above the system performance requirements, one pointing was lost, and one delayed

4.1 Mission Operations Centre

There was nothing significant to report.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There was one problem reported this week with the TC link to Redu, that led to the loss of a pointing, and a near-miss with DSS-16. The overall performance though was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSFs: complete up to revolution 235.

POS and POD: no new revolutions planned this week, but see below under "problems".

TSFs: complete up to revolution 231.

2. Observation status

New ECS has been received for revolution 217. Corresponding OCSs have not yet been generated.

3. ISOC science data archive

Nothing to report.

4. ISOC system

The ISOC system version 10.5.0 is still in use.

5. Problems

A puzzling problem affecting the GCDE observations in revolutions 232 to 235 inclusive has surfaced. It involves a wrong value for the IBIS parameter G8602. Due to the urgency, MOC agreed to change the timeline manually for revolution 232, so no re-planning would be done by ISOC. The course of action for the other 3 affected revolutions is still TBD by MOC and ISOC.

4.3.2 ISDC

Status of ISDC observation processing on 06/09/2004:

- Latest Standard Analysis completed: observation 02201450003 (Mkn 590, Revolution 208) on 28/08/2004
- Latest products archived: observation 02201450003 (Mkn 590, Revolution 208) on 31/08/2004
- Latest observation products sent to the observer: amalgamated observations 02200210001, 02201030001, 02297000004 (Carina, Revolution 197-200) on 07/08/2004

5 Special Events

6 Anomalies

There were a number of problems related to the ground segment that impacted the operations:

- On DoY 242, at 01:40, an AOCS tele-command failed uplink with the dynamic PTV still waiting clearance from the previous command. The tele-command AD service with Redu was then terminated. At 01:43 the timeline was stopped. The AD service was then restored by GFCC at 01:48, and the timeline restarted at 02:23. The impact was pointing 02290021 was lost.
- On DoY 243, at 04:55 the IDDA MMI was briefly showing yellow, with the PSRVfastChild task consuming 20% of the cpu..

- Later, at 05:30, sun121 MMI was yellow, some of the displays were closed reducing processor load, clearing the problem.
- At 08:52, the IMCA swap space was down to 42MB. At 09:07, both application launchers were restarted curing the problem, again there was no impact.
- At 23:41, GFCC had problems to bind the TC link to DSS-16, which was only established at the last possible moment, there was no impact.
- On DoY 245 at 11:25, the MADDS – ISDS connection was briefly interrupted. There was no impact.
- On DoY 246, from 04:52 to 04:54 there was a TM interruption from DSS-16. There was no impact.

The following new anomaly reports were entered into the ARTS system for last week.

AR id	Date Occurrence	Subject	Segment	Status
INT_SC-91	01/09/2004	PSD in Stand-by at belts exit halts SPI automatic reconfiguration	Payload	Open
INT-2638	03/09/2004	Incorrect IBIS parameter in ICP for revolution 232	ISOC	Open
INT-2639	03/09/2004	Antenna switch scheduling in EPOS does not consider TM-only coverage	FDS	Pending
INT-2640	06/09/2004	Delayed TC packet Transfer Response (CLCW) Message from Perth.	ESA Stations	Pending
INT-2641	06/09/2004	TM Drop from Goldstone On DoY 246	NASA Station	Pending

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 229

The observations in revolution 229 consisted of a GPS lasting ~43.5 hours followed by a hexagonal dithering observation of Sgr A* (RA 17:45:40.04; DEC -29:00:28.1), performed for the remaining ~14.5 hours of observation time.

Throughout these observations all instruments were in their nominal science modes, except for JEM-X2, for which the DFEE was off, and the TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

Revolution 230

The observations in revolution 230 consisted of a hexagonal dithering observation of Sgr A* (RA 17:45:40.04; DEC -29:00:28.1) lasting ~28.5 hours, followed by a raster dithering observation of the Galactic Center field (RA 17:45:40.00; DEC -29:00:28.0) lasting ~7.5 hours. The hexagonal dithering observation of Sgr A* (RA 17:45:40.04; DEC -29:00:28.1) was then resumed and performed for the remaining ~23.5 hours of observation time.

Throughout these observations all instruments were in their nominal science modes, except for JEM-X2, for which the DFEE was off, and the TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

Revolution 231

The observations in revolution 231 consisted of the following:

- 1 pointing of a GCDE observation (lasting 30 minutes);
- Hexagonal dithering observation of Sgr A* (RA 17:45:40.04; DEC -29:00:28.1) lasting ~20.5 hours;
- GCDE observation lasting ~18.5 hours;
- Raster dithering observation of the Sagittarius Arm tangent (RA 19:00:1.43; DEC +06:55:17.0) lasting ~18 hours.

Due to the loss of the nominal Goldstone pass at the end of the revolution, there was then a TC outage during the last ~3 hours of observation time. During this period of TM-only coverage, the spacecraft continued stable pointing at the target of the last science pointing in the Sagittarius Arm tangent raster, which was (RA 18:56:06.74; DEC +07:59:46.4).

Throughout these observations SPI, JEM-X1 and OMC were in their nominal science modes. IBIS was in Standard mode for all observations, except for the staring observation during the TC-outage, when it was in Safe mode. The JEM-X2 DFEE remained off throughout this revolution. The TM allocation throughout all observations in this revolution was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2004-08-20T21:24:51.000Z	168.5850	F	Automatic TM processing.
2004-08-21T14:05:57.000Z	168.5480	F	Automatic TM processing.
2004-08-22T04:39:10.000Z	168.5230	F	Automatic TM processing.
2004-08-22T11:01:11.000Z	168.5110	F	Automatic TM processing.
2004-08-23T21:19:06.000Z	168.4823	F	Automatic TM processing.
2004-08-25T10:44:14.000Z	168.4635	F	Automatic TM processing.
2004-08-28T05:15:09.000Z	168.4495	F	Automatic TM processing.
2004-08-28T10:30:14.000Z	168.4380	F	Automatic TM processing.
2004-08-28T19:22:47.000Z	168.4165	F	Automatic TM processing.
2004-08-29T09:40:08.000Z	168.3890	F	Automatic TM processing.
2004-08-30T08:19:54.000Z	168.3613	F	Automatic TM processing.
2004-08-30T09:46:51.000Z	168.3421	F	Automatic TM processing.
2004-08-31T04:05:00.000Z	168.3079	F	Automatic TM processing.
2004-08-31T10:13:01.000Z	168.2929	F	Automatic TM processing.
2004-09-01T20:40:41.000Z	168.2713	F	Automatic TM processing.

This report was generated Fri Sep 3 08:00:17 GMT 2004

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 28/08/2004-03/09/2004

AOCS operations were executed from the Automatic Timeline.

During this period, 146 Open Loop Slews, 20 Closed Loop Slews and 10 Momentum Bias were executed. Two slews were missed or executed manually. This is equivalent to a 1.0%.

28/08/04 (Day of Year 241, Revolution 228-229)

Guide star released by the STR SEU Filter during perigee passage: At 09:19:36, the SUE Filter threshold of the ACC exceeded and the guide star was released. At LOS the magnitude 7.8 guide star was located at [3261, 298]. From this time until 09:50:46, the guide star was released/lost 5 times because of the high radiation background.

29/08/04 (Day of Year 242, Revolution 229)

Slew missed from the Timeline due to termination of the AD service: Uplink of the TC sequence for slew 02290021 was interrupted at 01:40 because of the termination of the AD service (AR INT-2637). After establishment of the AD service, a manual open loop slew was performed to the attitude of PID 02290021. PID 02290021 was affected.

30/08/04 (Day of Year 243, Revolution 229)

Nothing to report.

31/08/04 (Day of Year 244, Revolution 229-230)

Guide star released by the STR SEU Filter of the ACC: At 12:06:25, the STR SEU Filter of the ACC released the guide star. In the first cycle, an undetected false event caused a jump in the position of the guide star image, resulting in pitch and yaw errors. In the next cycle, the real guide star image was latched onto as a false event until the STR SEU Filter threshold was exceeded and the star was released. The magnitude 8.5 guide star was picked by the ACC after an open loop slew and was located at [-6954, -4964].

01/09/04 (Day of Year 245, Revolution 230)

Flickering of the Pointing-Bit at the end of open loop slew due to Roll Error: At the end of open loop slew 02300015 the error in roll with respect to the Sun-Steering-Law assumed roll angle was -124 arc-seconds. This is more than the OTF threshold for roll and resulted in the flickering of the Pointing-Bit, which was not seen at BCP level. This error already existed at the start of the slew and was introduced by the attitude reconstruction after open loop slew 02300014. The attitude determination was based on the first mapping after this slew, during which the SSL was enabled. The jitter caused by enabling of the SSL after the slew introduced the error in roll, which was propagated to the next slew by the slew update.

02/09/04 (Day of Year 246, Revolution 230)

Flickering of the Pointing-Bit at the end of open loop slew due to Roll Error: At the end of open loop slew 02300060 the error in roll with respect to the Sun-Steering-Law assumed roll angle was -126 arc-seconds. This is more than the OTF threshold for roll and resulted in the flickering of the Pointing-Bit, which was not seen at BCP level. This error already existed at the start of the slew and was introduced by the attitude reconstruction after open loop slew 02300059. The attitude determination was based on the first mapping after this slew, during which the SSL was enabled. The jitter caused by enabling of the SSL after the slew introduced the error in roll, which was propagated to the next slew by the slew update.

03/09/04 (Day of Year 247, Revolution 230-231)

Nothing to report.

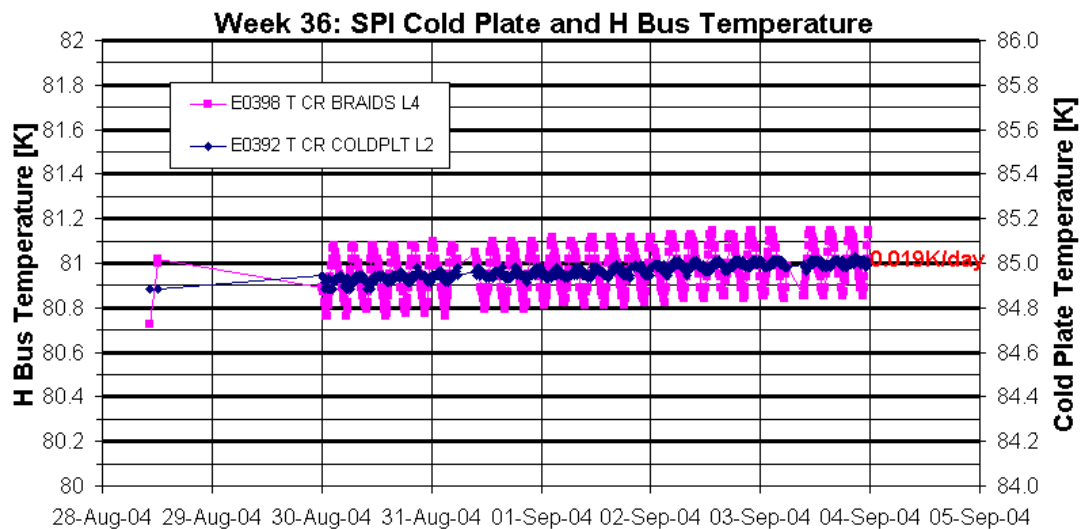
8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The performance of the cryo-cooler is nominal.

The cold plate temperature was maintained at $85\text{K} \pm 1\text{K}$ with the expected small positive drift.

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

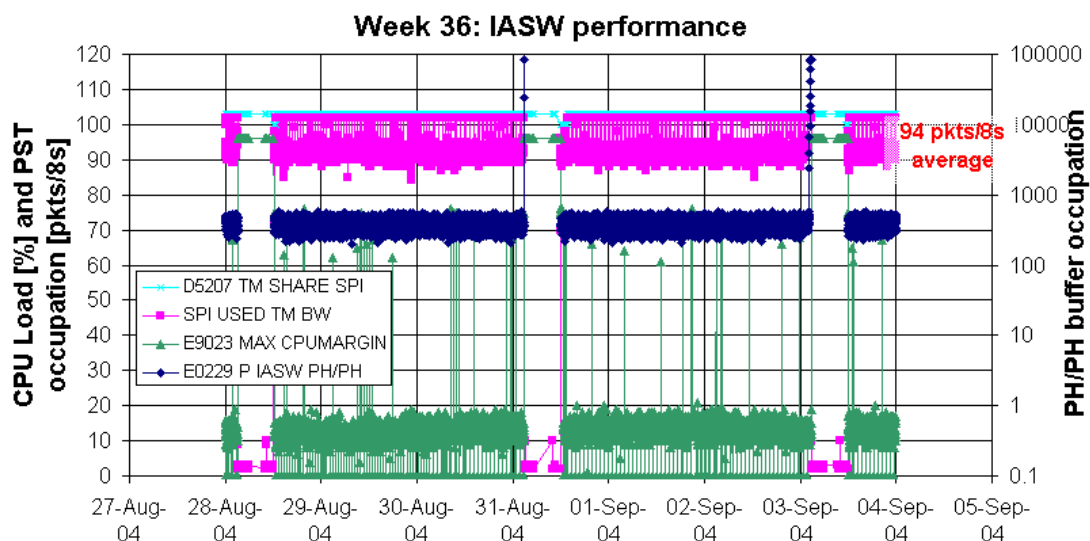


IASW/DPE:

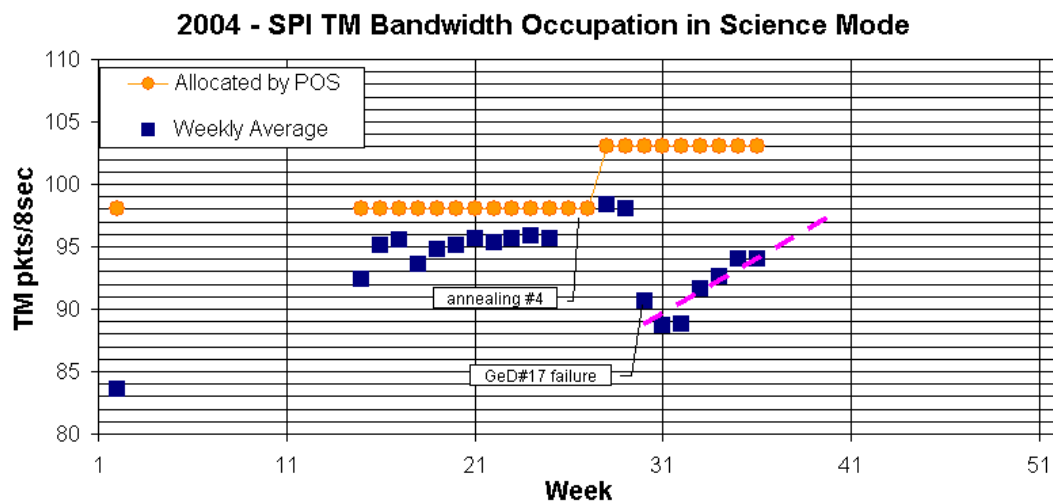
The performance of the IASW/DPE is nominal.

The average TM bandwidth occupation was 94 pkts/cycle in the science windows.

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



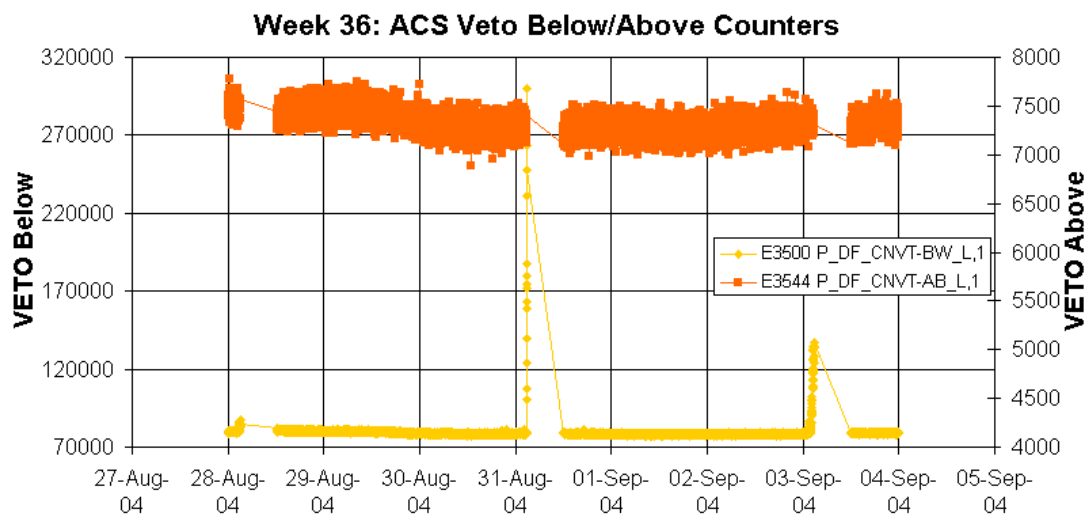
The following plot shows the trend of the occupied bandwidth, since beginning of 2004.



ACS:

The performance of the ACS is nominal.

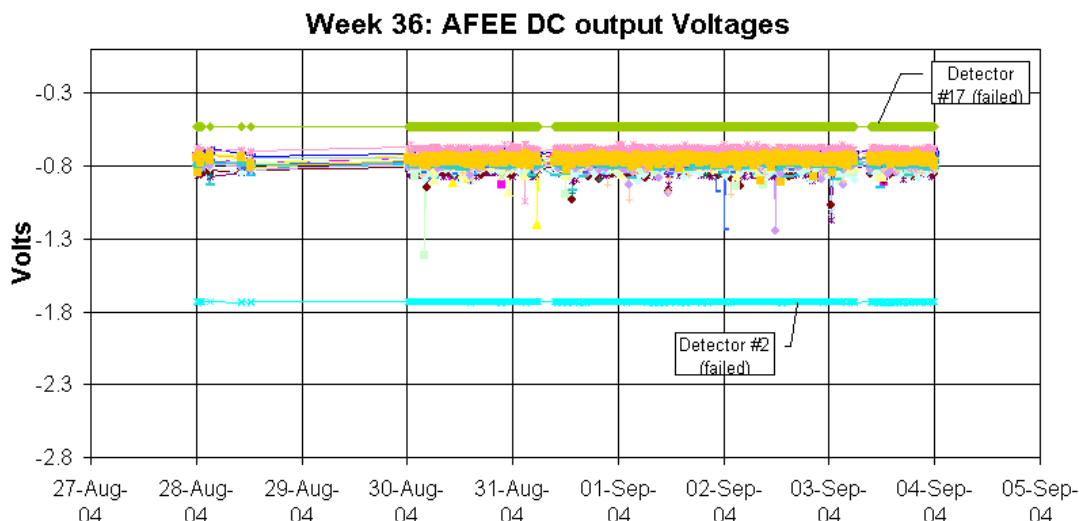
The following plot shows the ACS overall count rate evolution during the reporting period.



AFEE:

The performance of the detectors is nominal except for the detector #2, failed since 06.12.2003, and detector #17, failed since 17.07.2004.

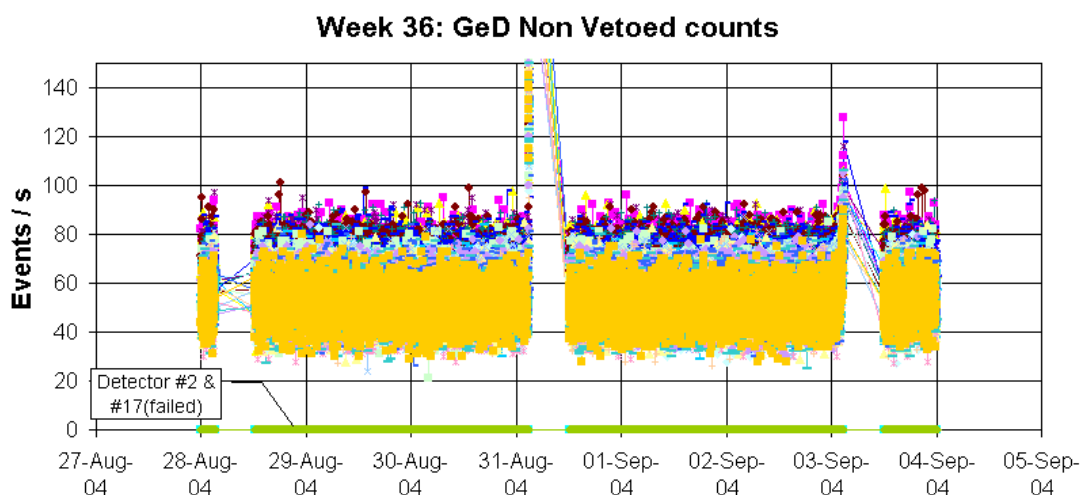
The following plot shows the AFEE dc output signals during the reporting period.



DFEE:

The performance of the unit is nominal.

The following plot shows the Non Vetoed event rates - i.e. the good photon events, acquired and transmitted through the science telemetry - processed by the DFEE during the reporting period. The count rate of each detector is within the expected range, except for the failed detector #2 and #17.



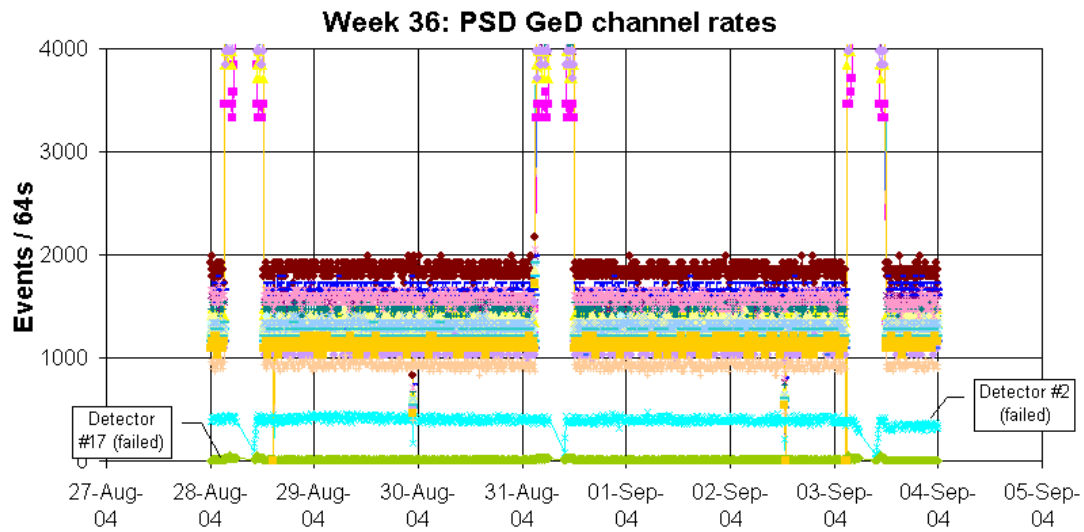
PSD:

The performance of the unit is nominal, though the malfunction of all PSD channel rates dropping to zero counts for a few minutes repeated itself three times (this malfunction is described by AR INT_SC-90).

The anomaly affected only the PSD locally as the GeD count rates measured by the DFEE (see above) were still nominal; also the dc output voltage showed a nominal pattern during the malfunction.

This anomaly was first recorded the day after the GeD#17 failure and present explanations correlate it to this failure. A possible recovery procedure is under discussion with the PI.

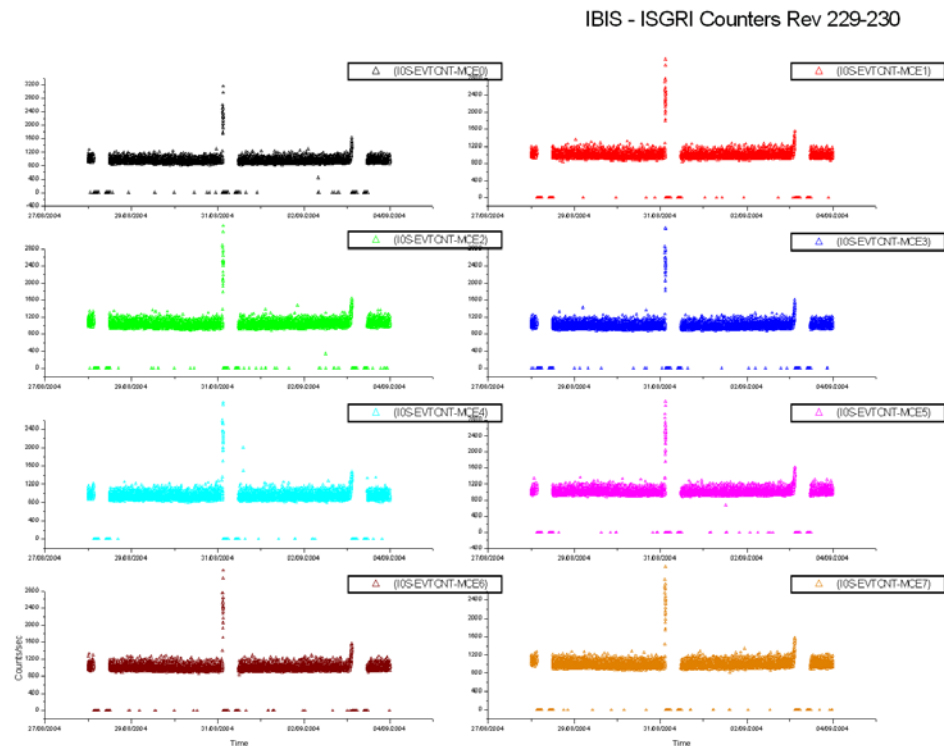
The following plot shows the PSD channel rates during the reporting period.



8.3.3 IBIS Operations

IBIS Event Counters Plots.

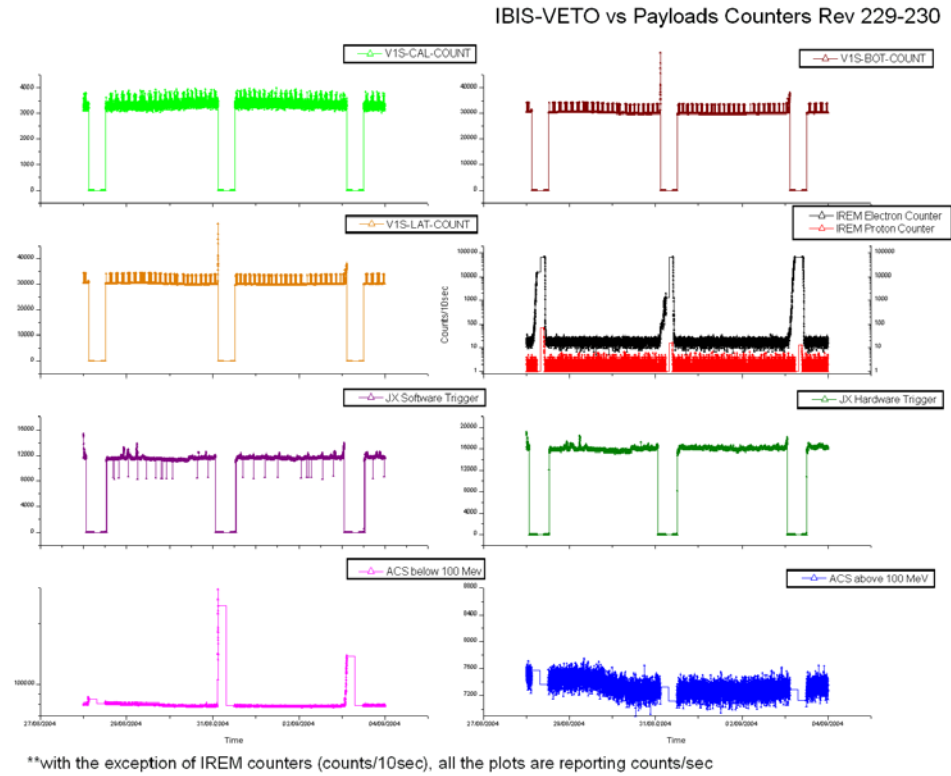
ISGRI Counters:



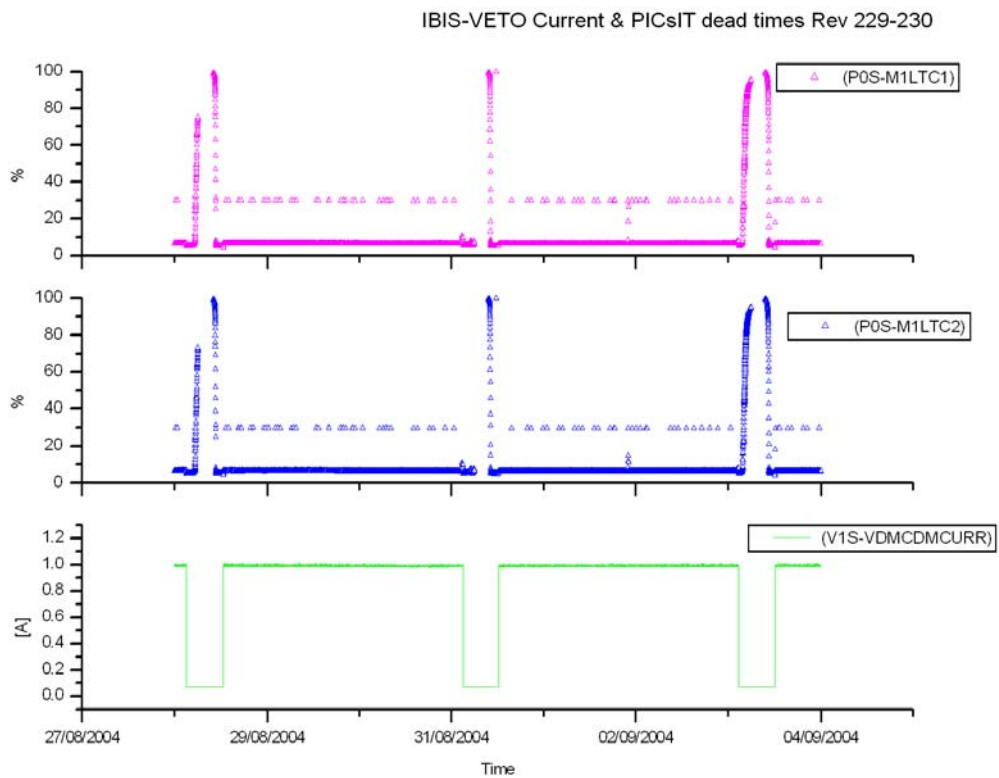
VETO vs Payloads Counters:

A comparison between the count-rates reported by VETO, the SPI-ACS, the IREM counters and JEM-X hardware/software triggers, show a stabilisation of the radiation

background. Some irregularities were again observed in the JEM-X count-rates due probably to specific observation plan.

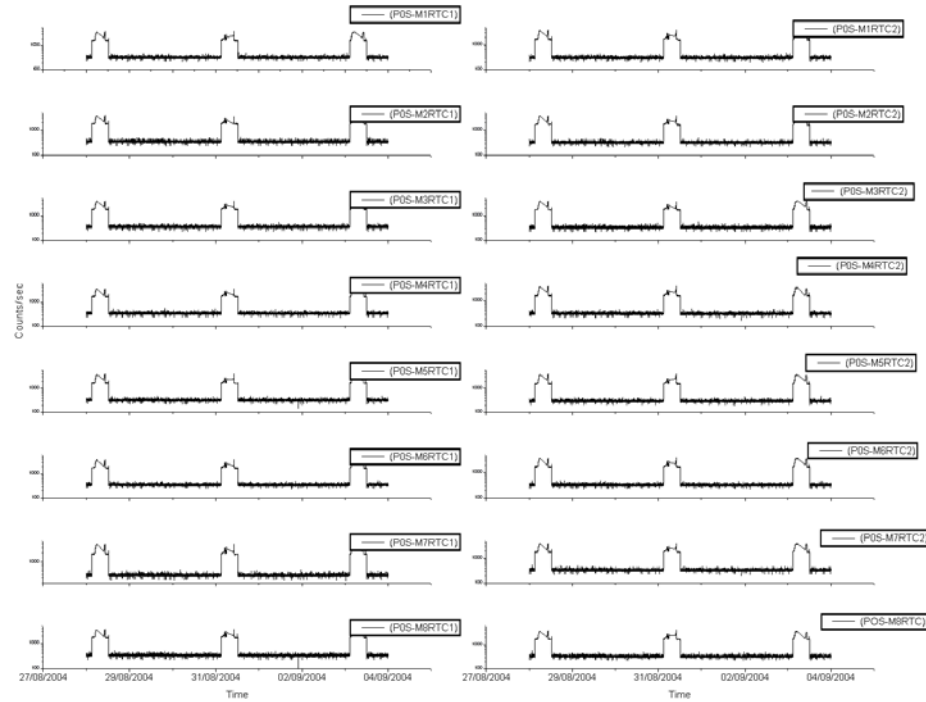


Veto Current:



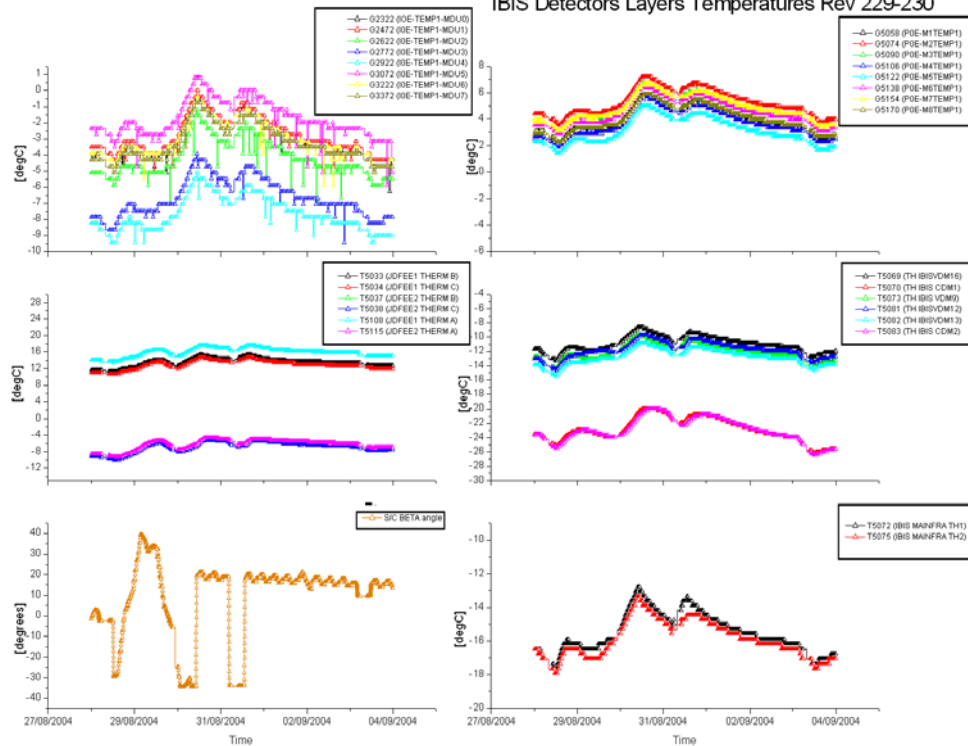
Picsit Counters

IBIS - PICsIT Counters Rev 229-230



IBIS Detectors Layers Temperatures

IBIS Detectors Layers Temperatures Rev 229-230



IBIS daily report

DoY 2004.241 (28/08/04)

At 11:57z and 12:20z the OEM APID 1280 Class 0 ID 169 << HK OUT OF SYNCH>> was reported. According to the Payload Recovery doc no further action was taken (the rate of the OEM generation was <1 OEM/30 sec).

DOY 2004.242 (29/07/04)

Nothing to report.

DoY 2004.243 (30/08/04)

At 03:56Z an overflow of the noisy pixell address buffer in MCE4 (parameter G2056) was reported. The value returned within limits after few TM cycles. No further action was taken

DOY 2004.244 (31/08/04)

At 02:44z the valid event rate on the HBRA interface (parameter G8080) and the VETO lateral and bottom counters (G6062-6063) went in and out of limits (warning High) for few TM cycles due to the proximity to the Radiation Belts. No action was taken as at 02:58Z the unit autonomously went to Stand-By triggered by the BCPKT.

At 02:54Z the number of events triggering the MCEs per second (parameter family G2013) went in and out of limits for few TM cycles due to the proximity to the Radiation Belts. No action was taken as at 02:58Z the unit autonomously went to Stand-By triggered by the BCPKT.

At 10:01Z the PDMs counter semimodule #1 (parameter family G5002) went in and out of limits (warning High) ,during the Belt passage, due to the PICsIT detectors being ON without the VETO anticoincidence system, as it required by PIs.

At 11:38z the OEM APID 1280 Class 0 ID 169 << HK OUT OF SYNCH>> was reported. According to the Payload Recovery doc no further action was taken (the rate of the OEM generation was <1 OEM/30 sec).

DoY 2004.245 (01/09/04)

At 22:03Z the PDMs Semimodules 1 FIFO Error Flag (parameter family G5068) failed the SCC. After one minute the SCC was cleared and no further action was taken.

DoY 2004.246 (02/09/04)

Nothing to report.

DoY 2004.247 (03/09/04)

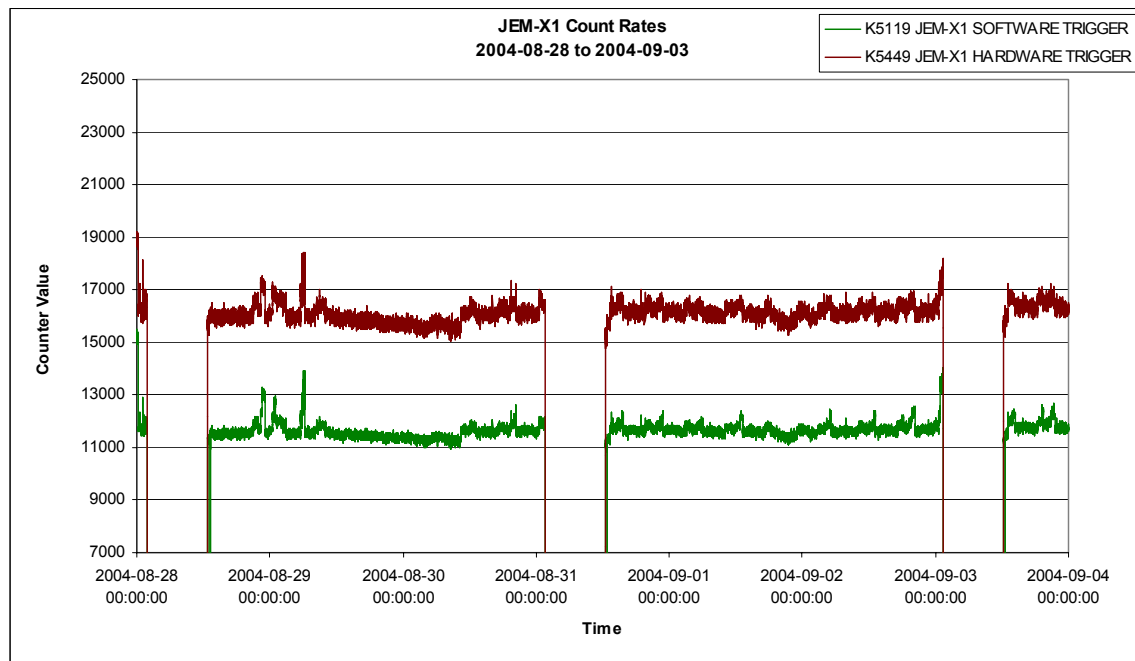
At 11:26z and 11:50z, the OEM APID 1280 Class 0 ID 169 << HK OUT OF SYNCH>>. According to the Payload Recovery doc no further action was taken (the rate of the OEM generation was <1 OEM/30 sec).

There were a few reports during the Belt passage of the OEM APID 1280 ID 167 Class 2 <<IBIS1 PICsIT NOISY SEMIMODULE SIGNALLING>> due to the PICsIT detectors being ON without the VETO anticoincidence system, as required by the PIs.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

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



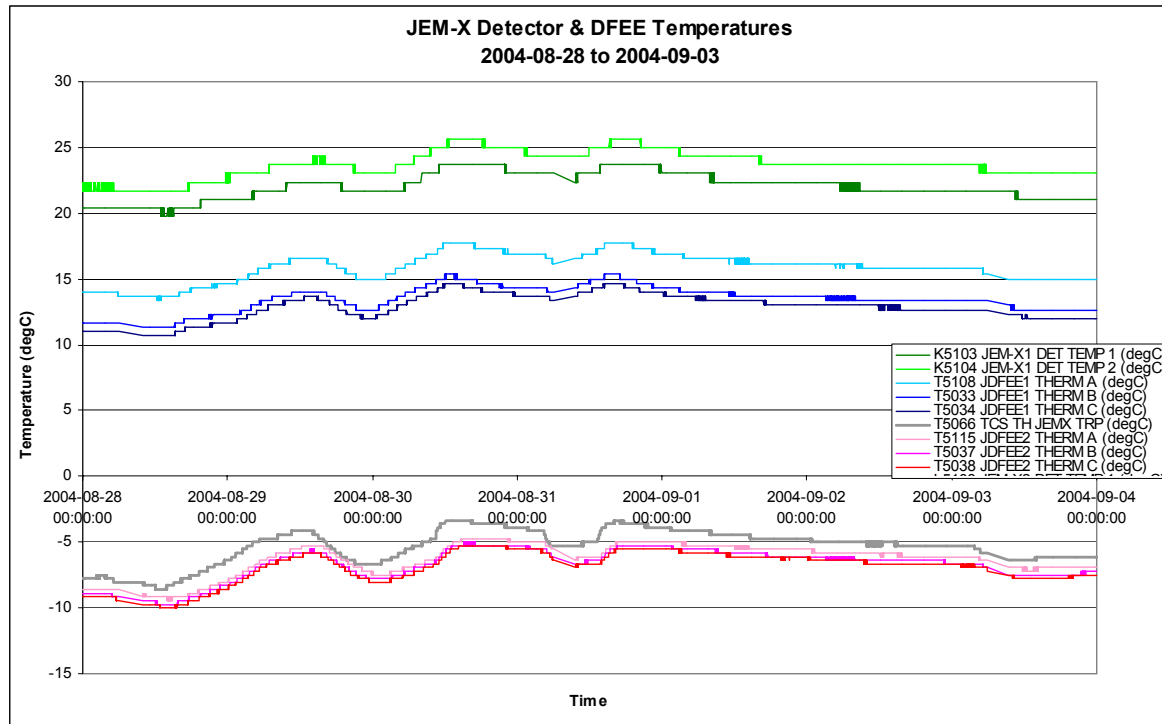
8.3.4.2 JEM-X Temperatures

JEM-X detector and DFEE temperatures over the reporting period are displayed in the following graph, along with the temperature on the detector bench between the two units².

Apart from variations due to changes in the solar aspect angle, the temperatures of both JEM-X units remained stable throughout the week.

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)



8.3.4.3 JEM-X Daily Report

2004-08-28 (DOY 241, Rev 228-229)

Since there had been no adverse impact on IBIS or JEM-X1 of the JEM-X2 DFEE switch off (performed on 2004-08-25), it was decided to extend the period of JEM-X2 DFEE switch off by 1 revolution. Thus, in line with OCR-167, the switch-on of the JEM-X2 DFEE, originally planned to be performed after radiation belt entry of revolution 228, was postponed until the end of revolution 229 (see INT_OR_0167). The temperatures of JEM-X1 and IBIS continued to be closely monitored.

2004-08-29 (DOY 242, Rev 229) to 2004-08-30 (DOY 243, Rev 229)

Nothing to report.

2004-08-31 (DOY 244, Rev 229-230)

Analysis by IBIS and JEM-X teams of the thermal impact of the JEM-X2 DFEE switch off concluded that:

- There were no adverse thermal impacts on IBIS (see IBIS section of this report).
- The JEM-X1 temperatures had decreased by ~5degC. No adverse effects on JEM-X1 were apparent, and the gain of JEM-X1 had decreased as hoped.

Therefore, OCR-177 was raised to extend the period of the JEM-X2 DFEE switch-off until the revolution before the next Crab calibration, and the switch-on of the JEM-X2 DFEE planned for the end of revolution 229 was not executed.

2004-09-01 (DOY 245, Rev 230) to 2004-09-03 (DOY 247, Rev 230-231)

Nothing to report.

8.3.5 OMC Operations

On DoY 242, at 01:40, due to a tele-commanding problem, pointing 02290021 was lost.

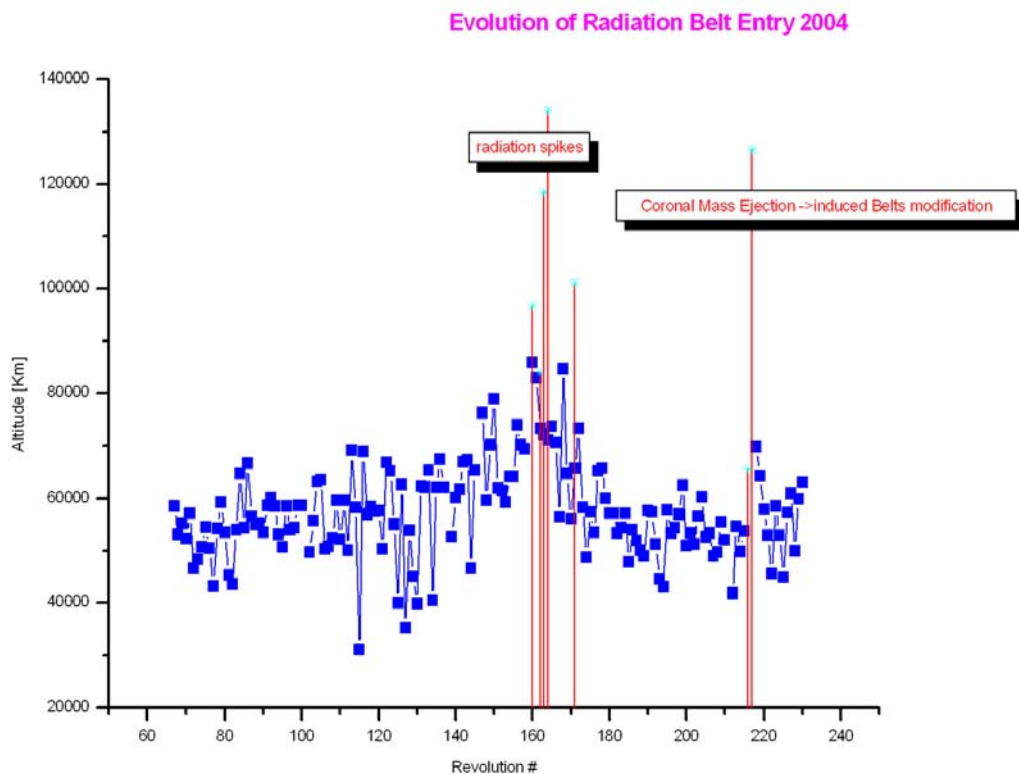
On DoY 242, at 11:38, during Rev 229, there was a non-critical SECL OEM, when temperature detected in the middle of the lens barrel (parameter T5016, OMC LENS TEMP1) went below the limit of -10°C . The autonomous on-board monitoring routine SECL turned on heater 39 using the command T1231 (OMC Lens Barrel Heater A TSW 5 On) to control the situation.

No commands were rejected this week.

On DoY 241 at 03:10:07, DoY 244 at 02:59:08 and DoY 247 at 02:47:40, OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



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]
228	RAD_ENTR R 2004-08-28T03:09:51Z	2004-08-28 04:24:51	49957.5	28-Aug-2004 03:57	54019
229	RAD_EXIT R 2004-08-28T12:15:11Z	2004-08-28 10:48:27	>24844.0	28-Aug-2004 10:57	26864
229	RAD_ENTR R 2004-08-31T02:58:50Z	2004-08-31 02:58:59	59958.1	31-Aug-2004 03:53	53018
230	RAD_EXIT R 2004-08-31T12:03:39Z	2004-08-31 10:23:07	23142.0	31-Aug-2004 10:53	28177
230	RAD_ENTR R 2004-09-03T02:47:18Z	2004-09-03 02:21:23	63057.7	03-Sep-2004 03:33	54075
231	RAD_EXIT R 2004-09-03T11:52:23Z	2004-09-03 10:34:43	>23144.1	03-Sep-2004 10:33	16842

Reference

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)

Radiation Spike

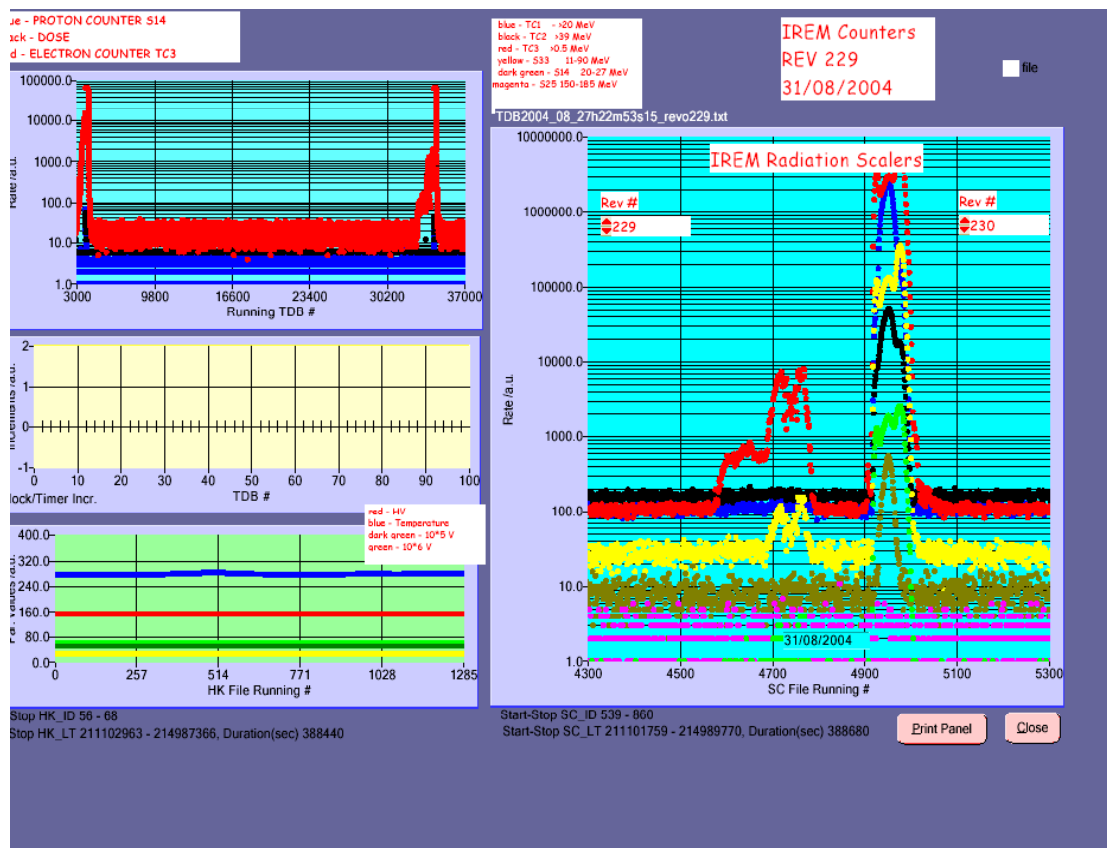
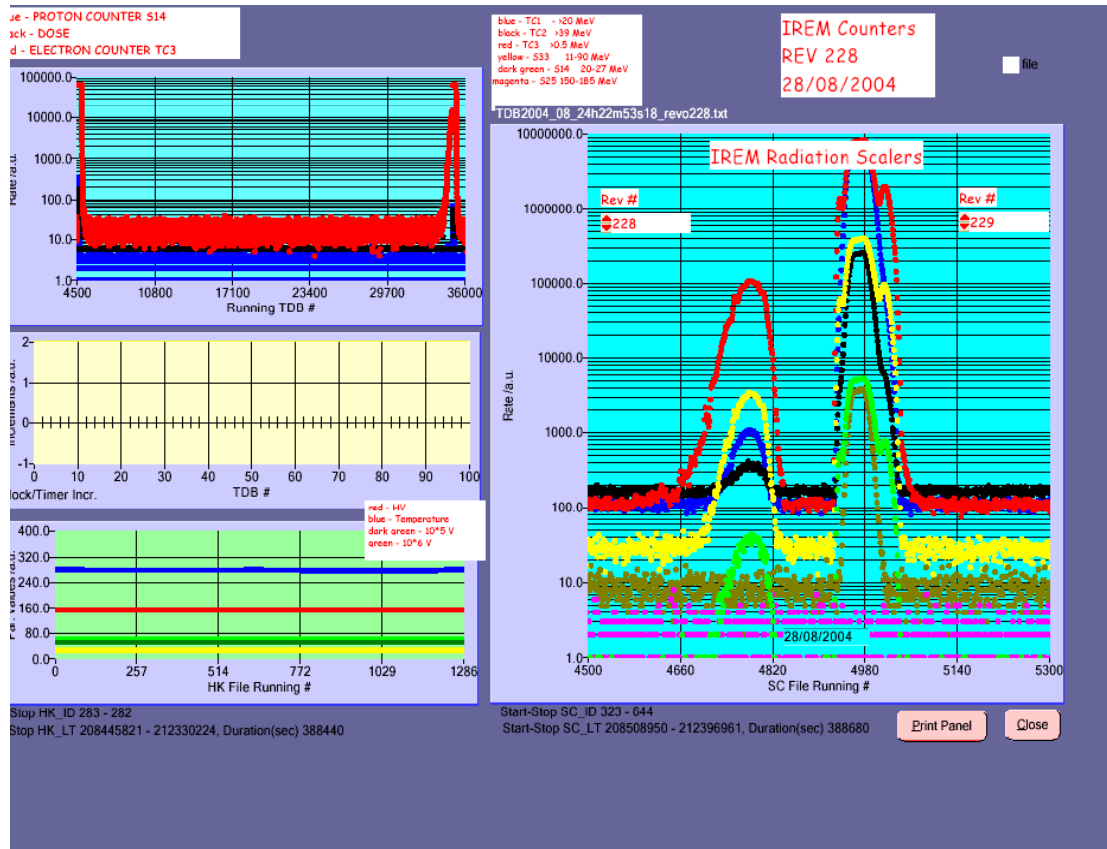
Proton Belts

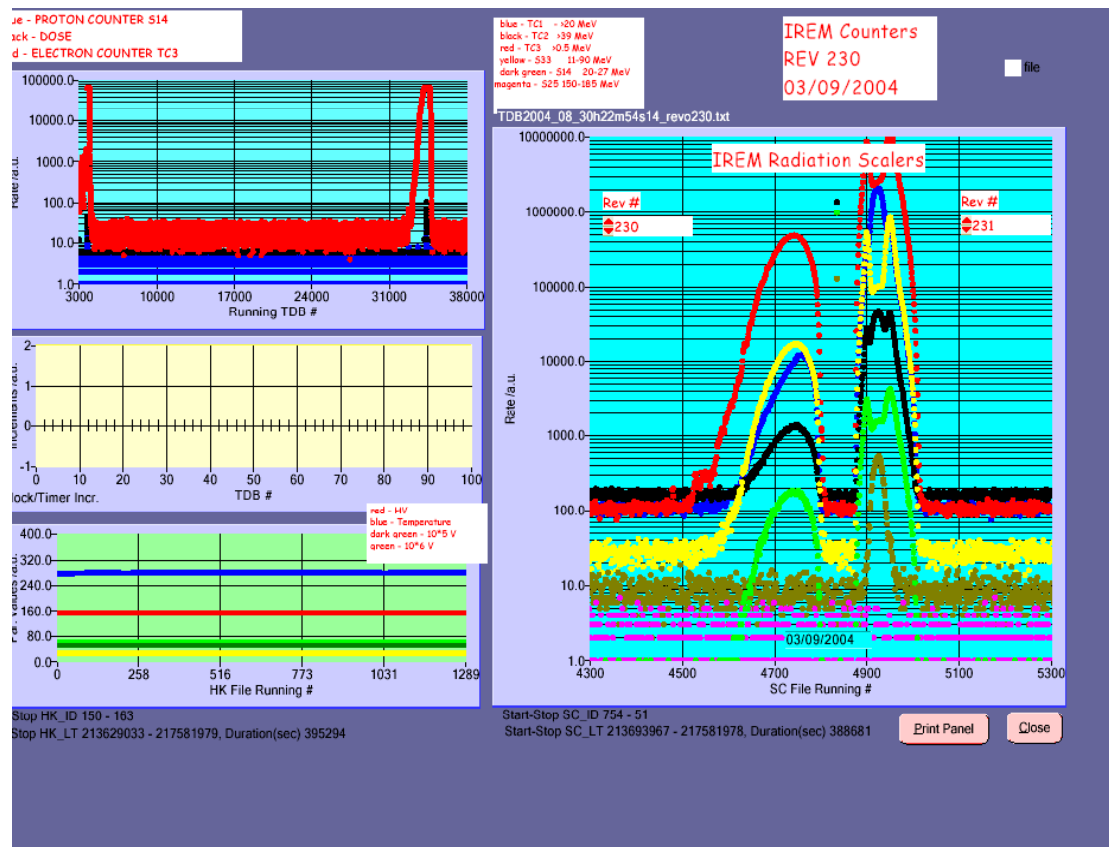
REV		Proton CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
228	PROTON_RAD_ENTR	28-Aug-2004 09:27	13021
229	PROTON_RAD_EXT	28-Aug-2004 09:47	15479
229	PROTON_RAD_ENTR	31-Aug-2004 09:13	12708
230	PROTON_RAD_EXT	31-Aug-2004 09:33	15099
230	PROTON_RAD_ENTR	03-Sep-2004 09:03	12954
231	PROTON_RAD_EXT	03-Sep-2004 09:23	15421

IREM daily report

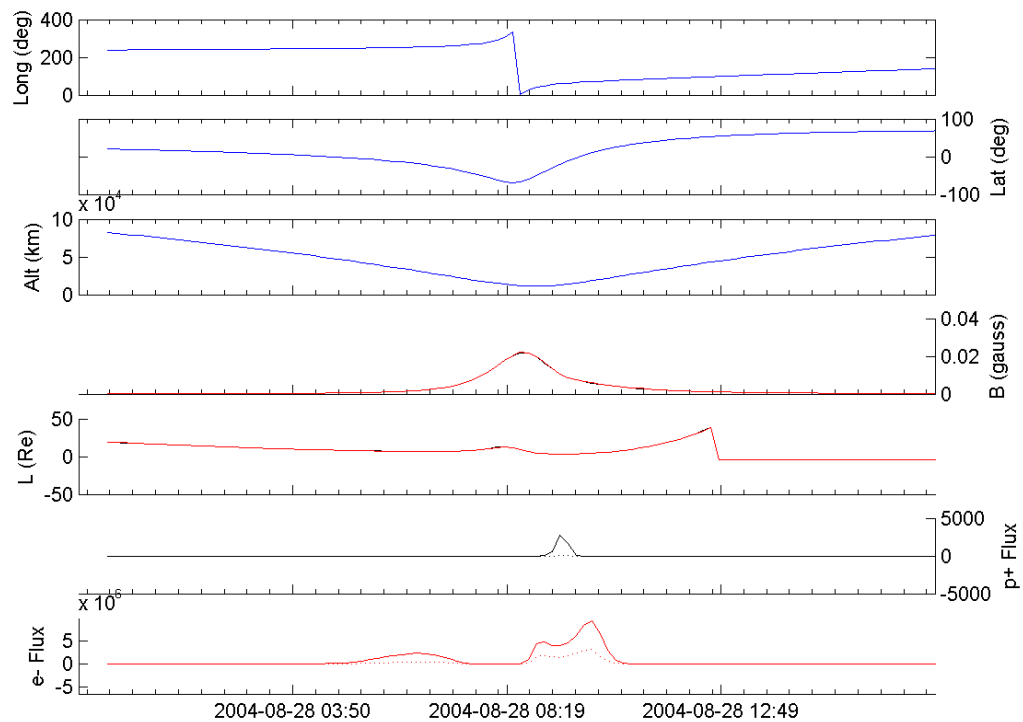
Nothing to report.

IREM radiation counters



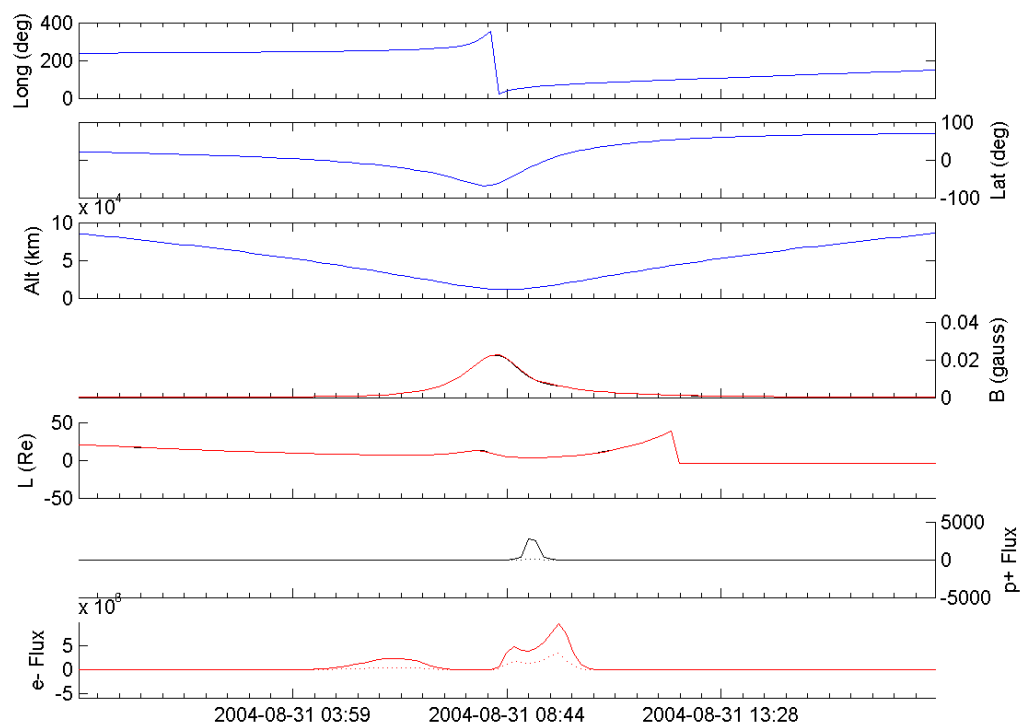


IREM Predicted Radiation Belt Passages.Rev 228



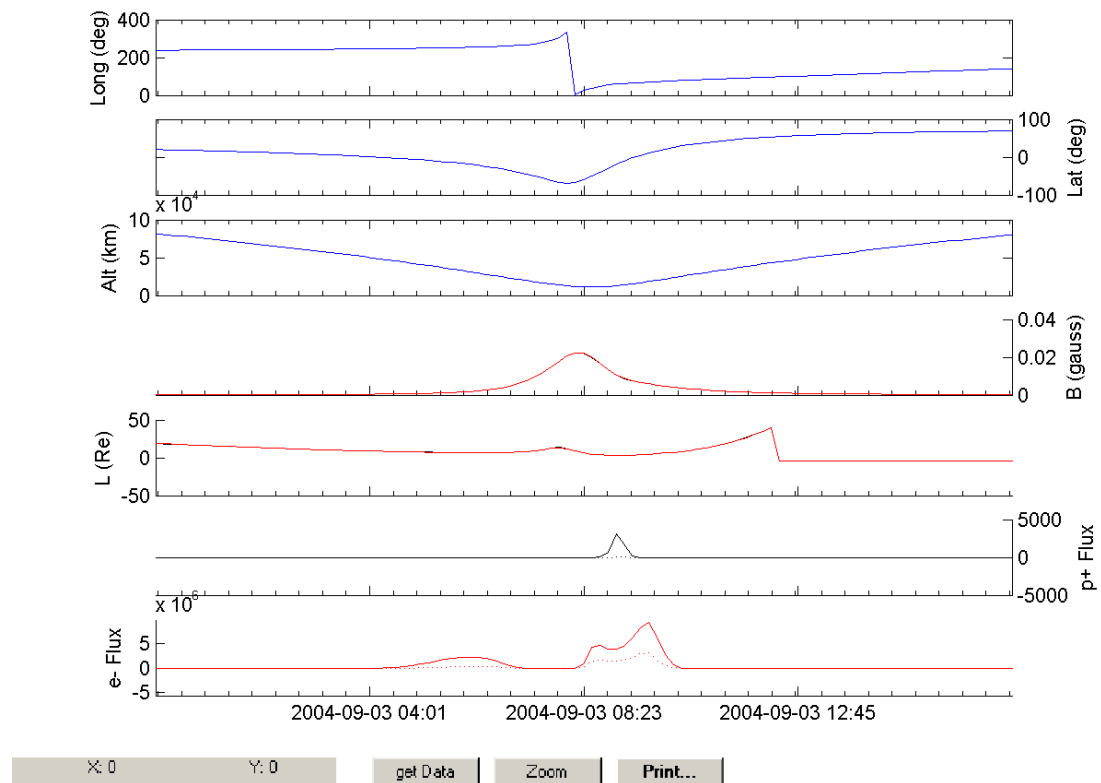
X: 0 Y: 0 [get Data](#) [Zoom](#) [Print...](#)

Rev 229



X: 0 Y: 0 [get Data](#) [Zoom](#) [Print...](#)

Rev 230



SEC-GOES Observed Particles Fluxes.

