

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 105
Week 39
27.09.04
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 18.09.04 until 24.09.04 (both dates inclusive) and covers the revolutions 236, 237 & 238.

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 Sagittarius arm tangent (RA 19:00:1.43; DEC +06:55:17.0); the Galactic Center field (RA 17:45:40.00; DEC -29:00:28.0); the Galactic Plane and X0115+63 (RA 01:18:31.90; DEC +63:44:24.0). The activities consisted of raster and hexagonal dithering and GPS 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.

In revolution 236, with the execution of the first 5x5 dither pattern with the roll angle alternating between +3° and -3° in each 5x5 pattern, a problem with the modelling of the external torques at higher roll angles was revealed. Apparently there is an over-estimate of the external torques at higher, but allowed, roll angles. This causes the deviation of the actual wheel speeds (mostly RW3 in the 234 wheel setting) from the predicted wheel speed profile. The FD is working on a fix to this problem. In the meantime the minimum RW speed margin with respect to the AMD thresholds is increased from 200 rpm to 400 rpm at the mission planning level, to prevent the hitting of the AMD thresholds. More detail on this can be found in the detailed section.

The problem with the wheel speed prediction and the requirement to perform a manual reaction wheel bias before a large open loop slew, affected three slews/pointings. Two more slews were missed from the Timeline due to a communication problem between MOC and the Redu ground station.

The fuel consumption over the period between 17/09/2004 and 24/09/2004 was 0.161 kg. The remaining propellant is in the order of 167.742 Kg on the 24th 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.

3.1.5 RFS

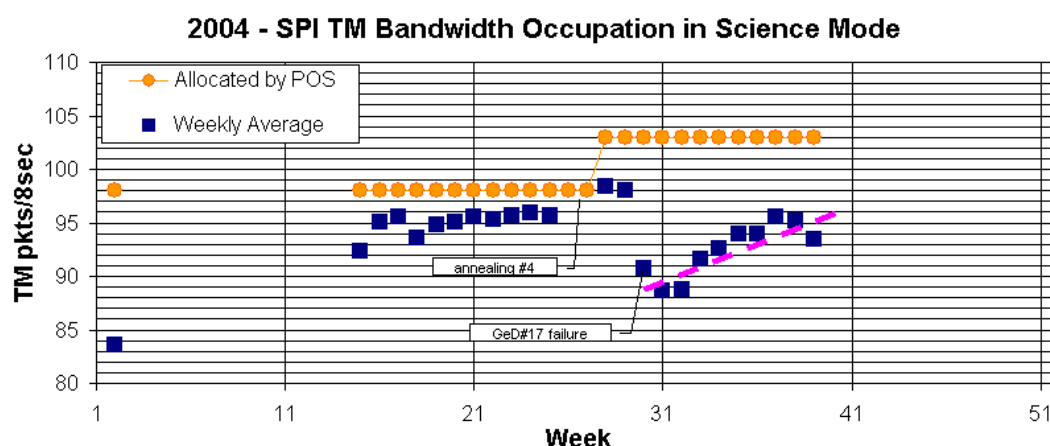
The RF subsystem is working properly. The link margin is sufficient to ensure proper TM reception and execution of commands with the ranging channel enabled.

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, though the PSD (Pulse Shape Discriminator) still continues to randomly reproduce the malfunction of channel rates transitory blanking. The instrument was however, kept in photon-by-photon mode with spectra TM enabled.

The assigned TM bandwidth in the science observation windows was 103 pkts/cycle and an actual average occupation of 93.4 pkts/cycle. The following plot shows the occupied bandwidth, since beginning of 2004.



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.

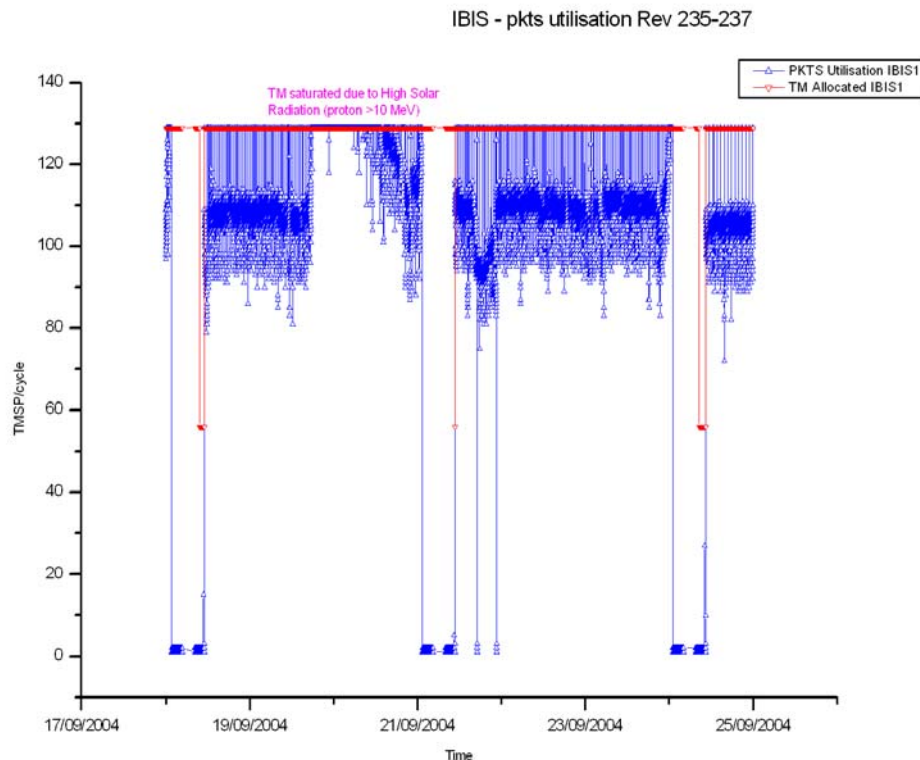
3.2.2 IBIS

The overall status of the unit is Nominal.

On 19/9/2004 a high radiation condition associated to particles (mainly protons >10 MeV) originating from the recent solar activity was observed. The IREM counters reported moderate to high values that did not exceed the radiation thresholds set for the unit, therefore IBIS continued the observation as per timeline. During the same period a wrap around of the VETO count-rates were observed. Investigations are on-going (see daily report for more details)

During the reporting period the PST Allocation to IBIS was 129 TMSP / Cycle. The mean IBIS Bandwidth usage was 112.5 TMSP / Cycle, up 13.2 TMSP from last week. In the night between the 19 and 20/09/2004 the TM utilisation resulted in saturation on some occasions due to the increased background (protons).

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 remained dormant, with a TM allocation of 1 packet/cycle. The JEM-X2 DFEE was off until the start of revolution 238, when it was switched back on at 2004-09-24T08:51Z, in preparation for the use of JEM-X2 for the upcoming Crab calibration in revolution 239 (in line with OCR-177). JEM-X2 then remained in Safe mode throughout revolution 238.

Due to high background radiation conditions, JEM-X1 made an autonomous transition to Safe mode in revolution 236 at 2004-09-19T17:41Z. It was recovered back to Data Taking mode at 2004-09-20T10:59Z, after the background radiation environment had returned stably within the Safe limits for JEM-X1.

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 208 OMC pointings executed nominally, 1 was interrupted and 22 were lost due to Solar activity, 3 were lost due to an unscheduled reaction wheel bias, and a further one due to links problems, with the subsequent pointing starting about 4 minutes late.

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 observation period was characterised by moderate to high solar activity. From 19th to 20th September 2004 a high radiation condition associated with particles (protons) originating from the recent solar activity. The IREM counters (proton & electron) reported moderate to high values that exceeded the radiation thresholds set for JEM-X1 and OMC units, triggering their transition to Safe Mode.

The major event reported was:

SUMMARY: Proton Event 10MeV Integral Flux exceeded 10pfu

Begin Time: 2004 Sep 19 1925 UTC

Maximum Time: 2004 Sep 20 0100 UTC

End Time: 2004 Sep 20 1205 UTC

Maximum 10MeV Flux: 57 pfu

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 good this week, above the system performance requirements.

4.1 Mission Operations Centre

The most notable problem this week was with the FDS. Due to a new observation strategy, where the satellite roll angle during pointings has been altered, the estimates of the reaction wheel speeds are now inaccurate. This necessitated an unplanned Reaction Wheel Bias manoeuvre during the week, which caused the loss of 3 pointings. FDS are working on a solution.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were several problems with the links with Redu, and some problems with DSS-16, However, the overall performance was still well over 95%.

4.3 Science Ground Segment

4.3.1 ISOC

1. AO-3

No proposals received so far.

2. Mission planning

PSFs: complete up to revolution 244.

POS and POD: revolutions 240 to 241 have been planned.

TSFs: complete up to revolution 238.

Revolution 238 was re-planned for a Target of Opportunity (X0115+63, an accreting pulsar in outburst). Revolution 239 was re-planned to have its perigee exit attitude the same as the re-planned perigee entry attitude in revolution 238. (The change in perigee attitude was made at the request of the Project Scientist)

3. Observation status

ECSs for 223 to 225 inclusive have been processed. ECS for revolution 207 has been re-processed. Twenty-four OCSs have been processed and sent to ISDC.

4. ISOC science data archive

Nothing new to report.

5. ISOC system

Version 10.6.0 (including customised dithers and version 3.7 of the OMC pointing software) was installed on September 17. The first revolution planned with this version was revolution 238

6. Problems

Nothing to report.

4.3.2 ISDC

Status of ISDC observation processing on 27/09/2004:

- Latest Standard Analysis completed: observation 02201400003 (Algol, Revolution 220) on 18/09/2004
- Latest products archived: observation 02201450003 (Mkn 590, Revolution 208) on 31/08/2004
- Latest observation products sent to the observer: observation 02297000010 (Abell 2256, Revolution 205-206) on 11/09/2004

5 Special Events

6 Anomalies

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

- On DoY 262, at 00:07, the timeline was restarted after the lost pointing of 02350113 mentioned in last week's report.
- Later, at 19:18, it was noted that the reaction wheels were deviating from predicted values, see the AOCS section of this report for details.
- On DoY 263, at 05:40, the TM from Redu dropped. Network reported a very noisy signal. The TM returned at 05:43, there was no impact. Later from 06:07 to 06:16 the TM dropped again, again there was no impact. Then at 08:52, 08:55, 09:05, 09:11, 09:14 there were 1 minute TM drops. From 10:48 to 10:53 there was a TM & TC drop, then again at 10:57 there was a TM drop, there was no impact.
- On DoY 264, at 13:47, all links with Redu dropped, Network reported a hit on the line. The TM returned at 13:49, and the TC at 13:51, the impact was that pointing 02360097 was lost.
- On DoY 264, at 23:43, there was a short TM drop with DSS-16, there was no impact.
- On DoY 266, at 11:20, the imca swap space decreased to about 400MB. The imcs MMI was restarted restoring the swap space to 3GB.
- Later, at 20:02, the TM & TC links with Redu dropped. Network reported that the communications node was down. The TM returned at 20:06, and the TC link at 20:09. There was no impact.
- At 20:06, the FDS failed to update the following slew. There was no impact.
- On DoY 267, at 15:50, the MMI application on imcb had to be restarted as the swap space had reduced to about 500MB.
- On DoY 268, from 01:16 to 01:20 the TC from DSS-16 dropped, the impact was command sequence EEORTM01 was interrupted, which did not cause any problems.

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

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AR id	Date Raised	Subject	Segment	Status
INT-2647	23/09/2004	Telemetry Drops from REDU	ESA Stations	Pending
INT-2648	23/09/2004	Communications Problem with REDU	COMMS	Pending
INT-2649	23/09/2004	Extremely late H/O to Goldstone on DoY 257	NASA Stations	Pending
INT-2650	23/09/2004	TM & TC Drop from Redu on DoY 261	ESA Stations	Pending

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 236

The observations in revolution 236 began with 1 pointing of a raster dithering observation of the Sagittarius arm tangent (RA 19:00:1.43; DEC +06:55:17.0), lasting 30 minutes, followed by a raster dithering observation of the Galactic Centre field (RA 17:45:40.00; DEC -29:00:28.0) lasting ~55 hours. The raster dithering observation of the Sagittarius arm tangent (RA 19:00:1.43; DEC +06:55:17.0) was then resumed and performed for the remaining ~5 hours of observation time.

Revolution 237

The observations in revolution 237 consisted of a raster dithering observation of the Sagittarius arm tangent (RA 19:00:1.43; DEC +06:55:17.0) lasting ~6 hours, followed by a GPS lasting ~5 hours. A raster dithering observation of the Galactic Centre field (RA 17:45:40.00; DEC -29:00:28.0) was then performed for the remaining ~50 hours of observation time.

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

Revolution 238

In revolution 238 a hexagonal dithering observation of the Target of Opportunity X0115+63 (RA 01:18:31.90; DEC +63:44:24.0) was performed throughout the available observation time (~62 hours).

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

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2004-09-06T09:47:49.000Z	168.2265	F	Automatic TM processing.
2004-09-07T20:04:57.000Z	168.1787	F	Automatic TM processing.
2004-09-09T04:43:00.000Z	168.1143	F	Automatic TM processing.
2004-09-09T09:33:08.000Z	168.1131	F	Automatic TM processing.
2004-09-09T18:47:17.000Z	168.0861	F	Automatic TM processing.
2004-09-10T19:47:44.000Z	168.0146	F	Automatic TM processing.
2004-09-12T09:19:24.000Z	168.0073	F	Automatic TM processing.
2004-09-12T18:16:45.000Z	167.9609	F	Automatic TM processing.
2004-09-15T09:06:43.000Z	167.9450	F	Automatic TM processing.
2004-09-15T21:27:48.000Z	167.9025	F	Automatic TM processing.
2004-09-18T08:52:42.000Z	167.8896	F	Automatic TM processing.

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2004-09-19T19:08:30.000Z	167.8696	F	Automatic TM processing.
2004-09-20T19:32:24.000Z	167.8305	F	Automatic TM processing.
2004-09-21T08:41:46.000Z	167.7697	F	Automatic TM processing.
2004-09-22T19:08:05.000Z	167.7416	F	Automatic TM processing.

This report was generated Fri Sep 24 08:00:18 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 18/09/2004-24/09/2004

AOCS operations were executed from the Automatic Timeline.

During this period, 107 Open Loop Slews, 144 Closed Loop Slews and 6 Momentum Bias were executed. 4 slews were missed or executed manually. This is equivalent to a 1.6%.

18/09/04 (Day of Year 262, Revolution 235-236)

Nothing to report.

19/09/04 (Day of Year 263, Revolution 236)

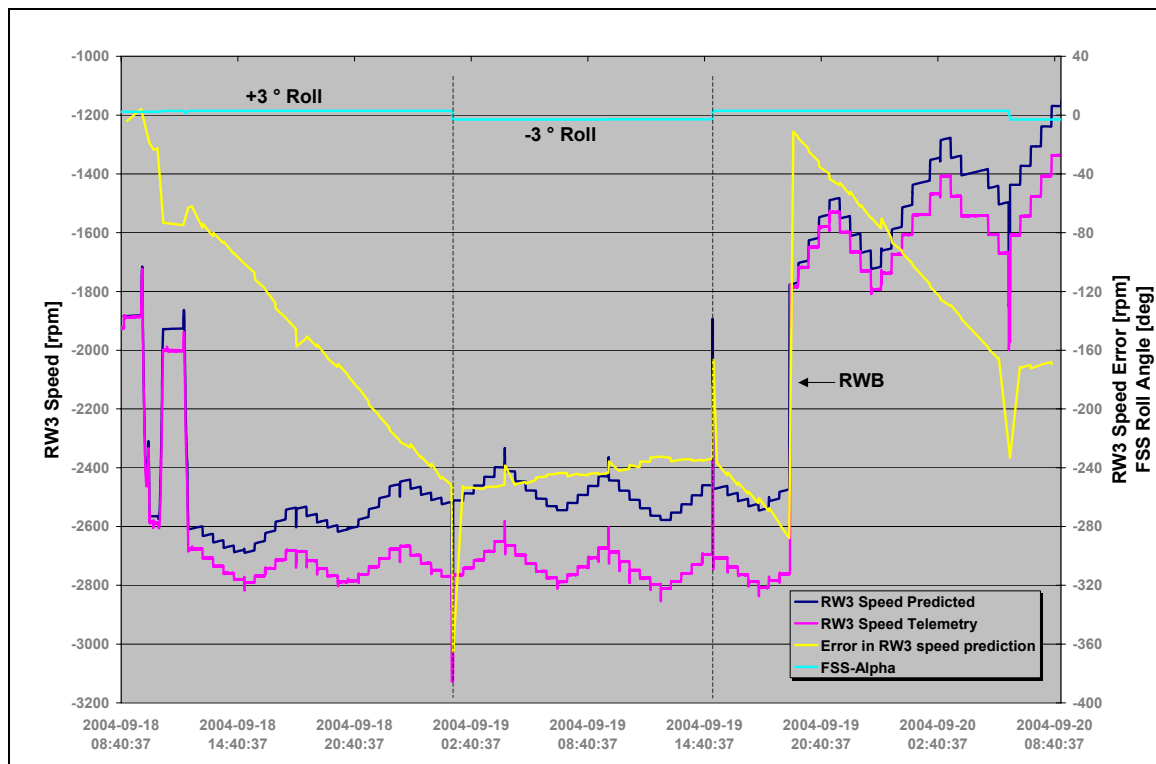
Nothing to report.

20/09/04 (Day of Year 264, Revolution 236)

Slews missed due to communication problem with the station: At 13:47 the TM and TC links to the Redu ground station dropped due to a communication problem (hit on the line). The Timeline restarted at 13:54 after re-establishment of the links. Slews/Pointings 02360096 and 02360097 were missed from the Timeline. To rejoin the schedule, a manual open loop slew was performed to the attitude of PID 02360097. Slew 98 was executed from the Timeline.

Deviation of the actual RW speeds from the predicted profile: Revolution 236 was the first revolution in which the modified 5x5 dither pattern was planned throughout the complete revolution. In the modified dither pattern of this revolution the roll angle was switched from $+3^\circ$ to -3° for each 5x5 dither pattern, i.e. one dither pattern was executed at $+3^\circ$ roll angle and the next one at -3° , and so on. From the beginning of the first pointings the RW speeds started deviating from the predicted reaction wheel speed profile. The deviation was especially high on RW3, which is the only wheel assembly in the 234-wheel set with a component on the S/C roll axis. Furthermore, the error increased only at $+3^\circ$ roll angles with a gradient of about -13 rpm/hr, for a pitch angle in the range between -5° and $+5^\circ$.

The following graph shows the actual evolution of the RW3 speed during a part of revolution 236, compared with the predicted speed. The error in prediction is plotted with a different scale.



According to Flight Dynamics the problem is caused by inaccurate modelling of the solar radiation torques at higher roll angles. From the predicted RW speed plot, the problem looks like an over-estimation of the external torques, on the roll axis, at larger positive roll angles. FD is working on this problem and has promised a fix by 1st of October.

For the time being, the minimum RW speed margin with respect to the AMD thresholds is increased from 200 rpm to 400 rpm at the mission planning level. This temporary precaution could increase the number of the required RWBs in the revolution, depending on the observation plan.

Due to the offset in the predicted wheel speed profile, a manual Reaction Wheel bias was required before the execution of open loop slew 02360107, to avoid the possibility of AMD triggering after the slew. The manual bias was commanded at 19:24, during PID 02360106. The open loop slew to the attitude of PID 02360107 was then commanded manually and then another manual slew to the attitude of PID 02360109 to rejoin the Timeline. PIDs 02360106 to an including 02360108 were affected.

Revolution 237 was re-planned with the new RWB margin settings.

21/09/04 (Day of Year 265, Revolution 236-237)

Nothing to report

22/09/04 (Day of Year 266, Revolution 237)

Nothing to report

23/09/04 (Day of Year 267, Revolution 237)

Nothing to report.

24/09/04 (Day of Year 268, Revolution 237-238)

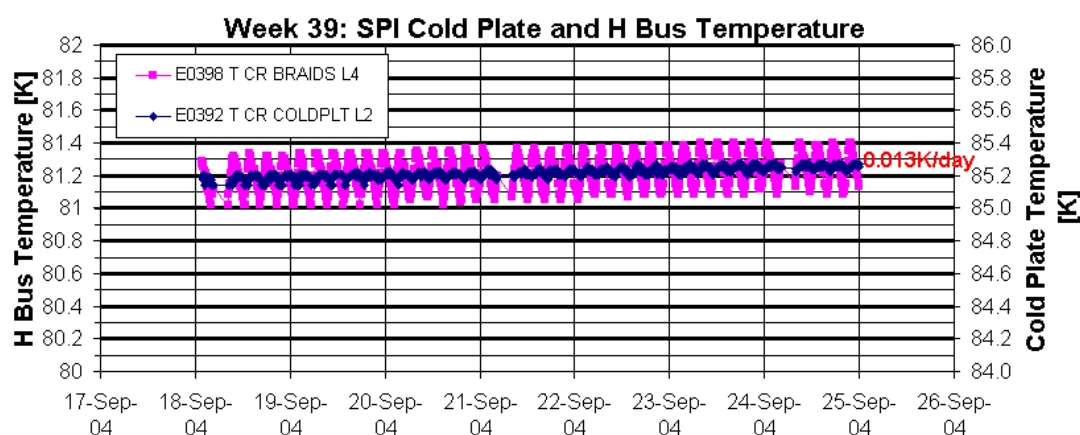
Nothing to report.

8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The performance of the cryocooler is nominal. The cold plate temperature was maintained at 85K $\pm$ 1K with the expected small positive drift.

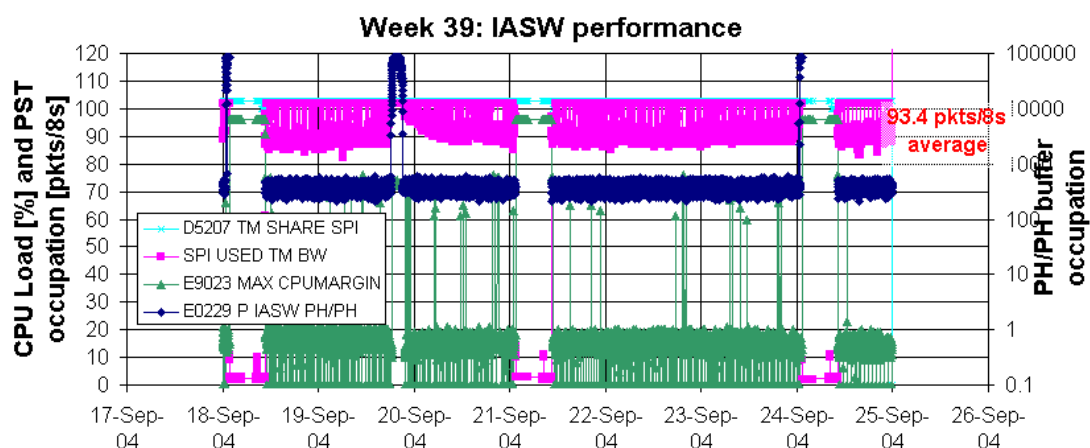
The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



IASW/DPE:

The performance of the IASW/DPE is nominal.

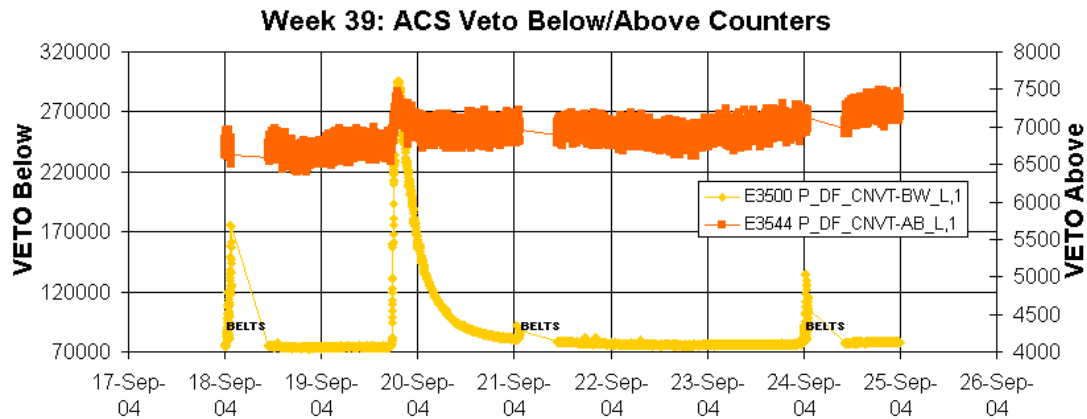
The following diagram shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period. The saturation of the buffer on 19th September is due to background following increased solar activity.



ACS:

The performance of the ACS is nominal.

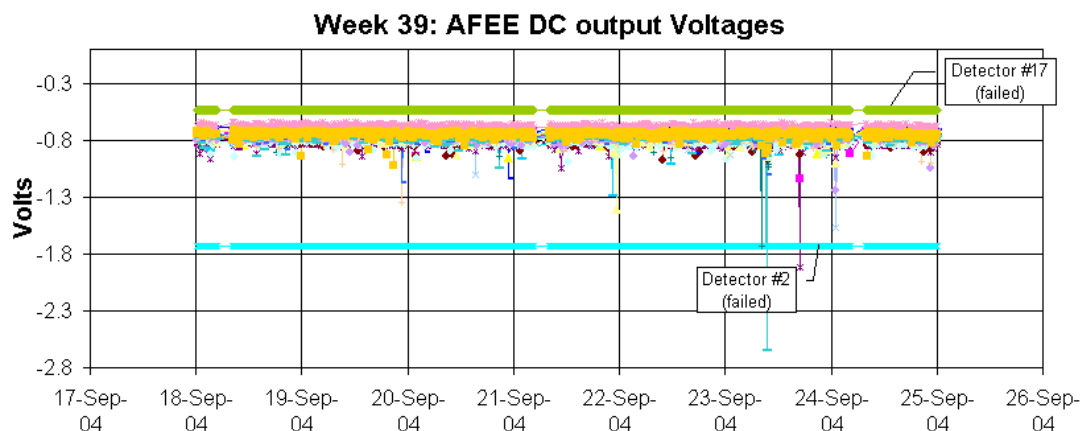
The following plot shows the ACS overall count rate evolution during the reporting period. The peak on 19th – 20th September is due to background following increased solar activity.



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.

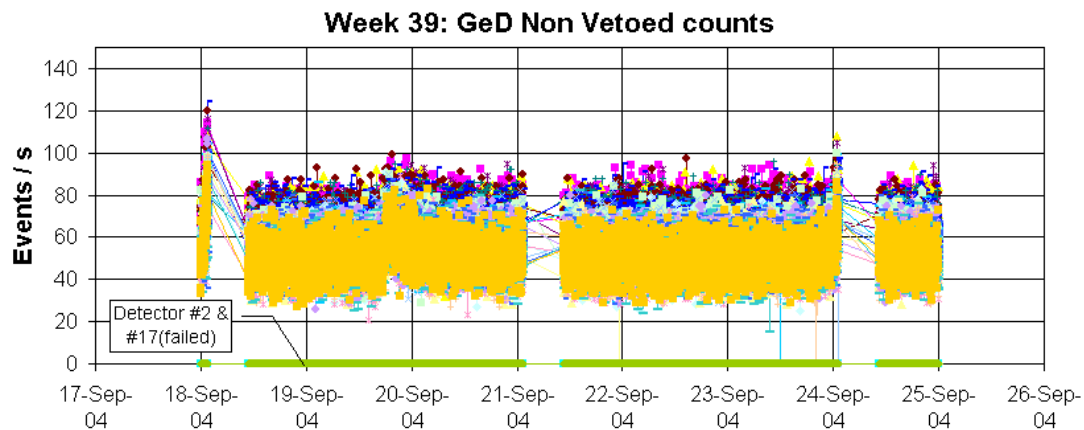
The following plot shows the AFEE dc output signals during the reporting period.



DFEE:

The performance of the unit is nominal.

The following plot shows the Non Vetted event rates - i.e. the rate of the events acquired and transmitted to ground 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.

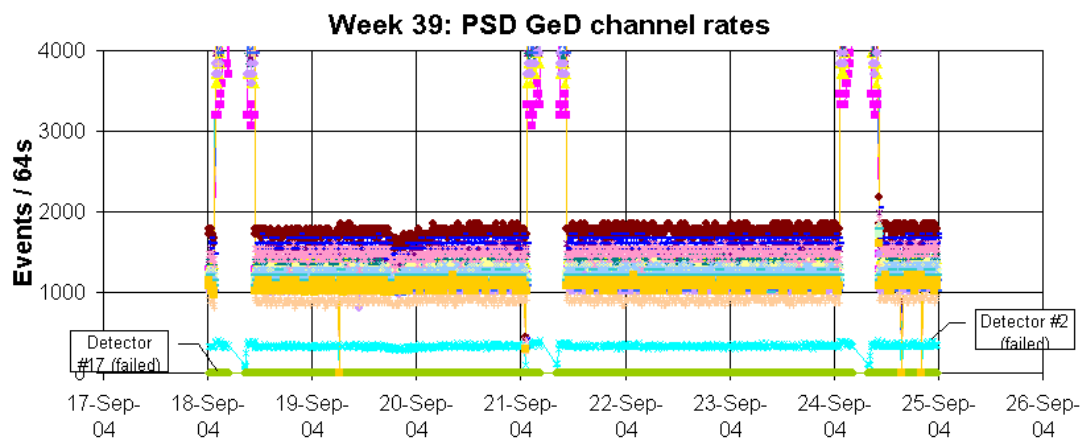


PSD:

The performance of the unit is nominal, though the malfunction of the channel rates transitory blanking reproduced itself 4 times this week (see spikes to zero in the following plot and AR INT_SC-90 for a detailed description of the anomaly).

A IASW patch is under development at Cessr to allow the Sci HK TM downlink inside the radiation belts. This would allow the deletion of the Out-Of-Limit currently defined on the PSD channel rates, thus removing the false alarms associated to the malfunction.

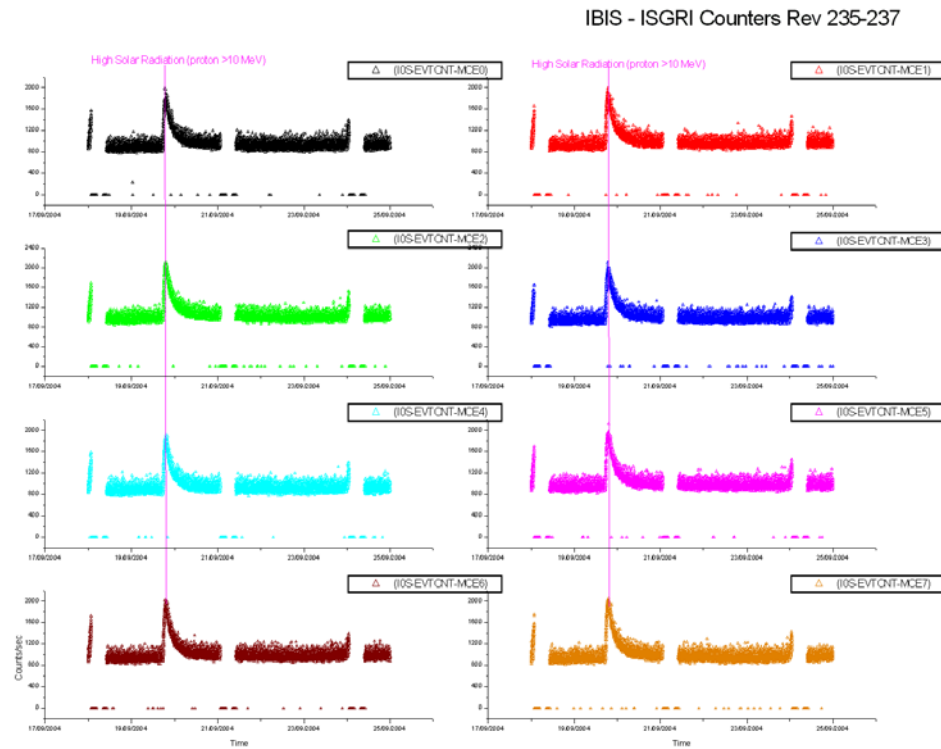
The following plot shows the PSD channel rates during the reporting period.



8.3.3 IBIS Operations

IBIS Event Counters Plots.

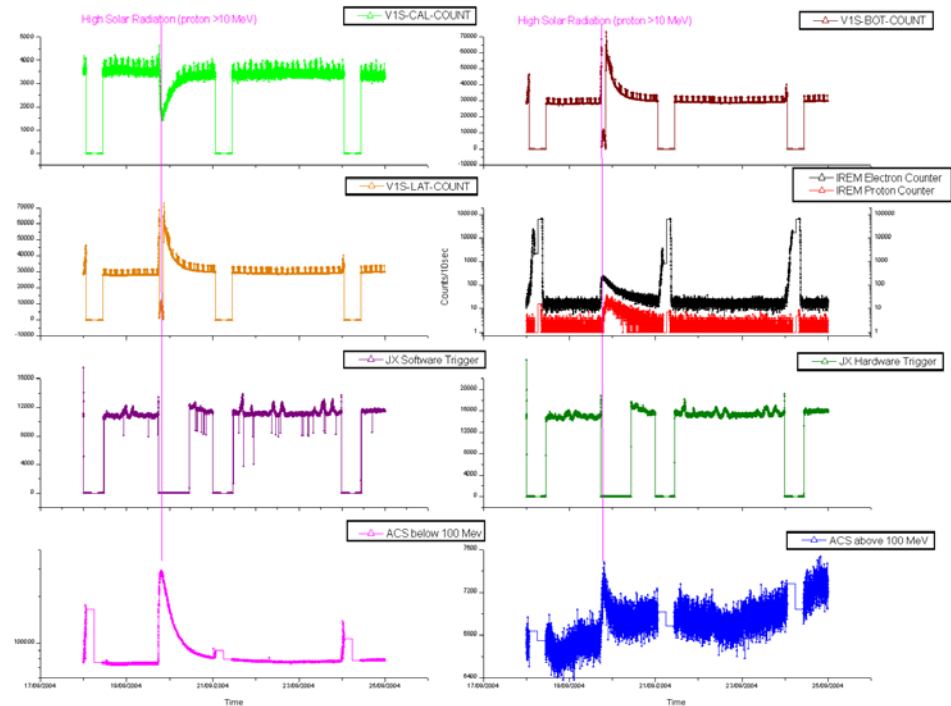
ISGRI Counters:



VETO vs Payloads Counters:

The week was characterised by high solar activity. A proton event (energy >10 MeV) on the night between the 19th and 20th, also seen by the GOES satellites, triggered an automatic transition of JEM-X1 (due to IREM electron counter) and OMC (due to IREM proton counter) to Safe configuration. The VETO unit reported the occurrence of this event with the wrap around of the Bottom and Lateral counters (more details in the IBIS daily report).

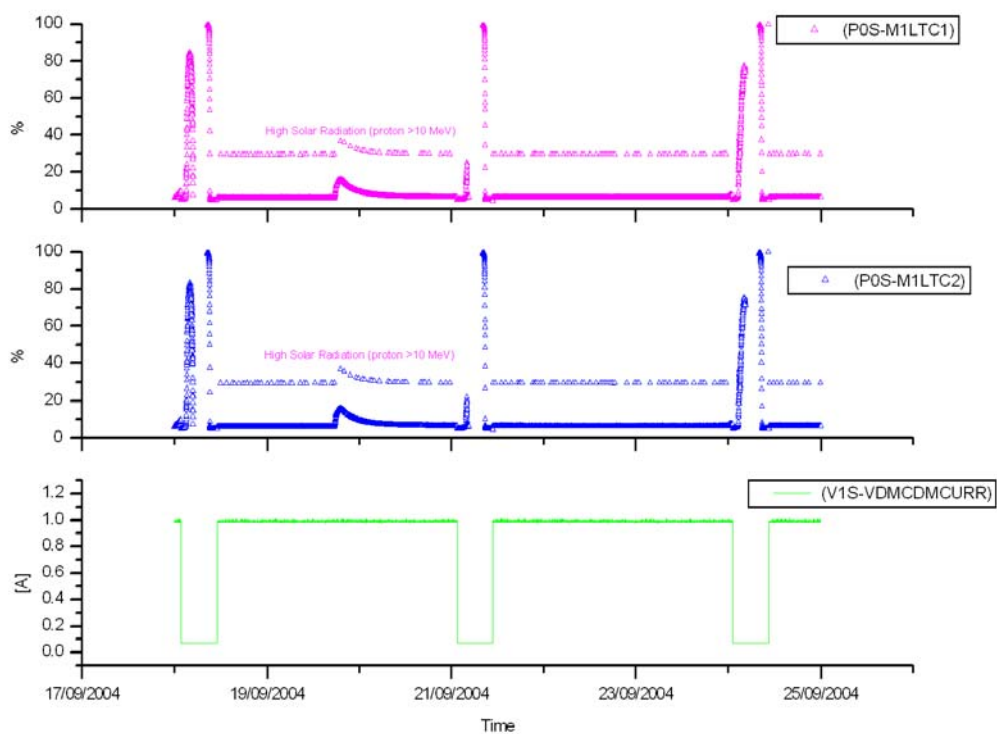
IBIS-VETO vs Payloads Counters Rev 235-237



*with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec

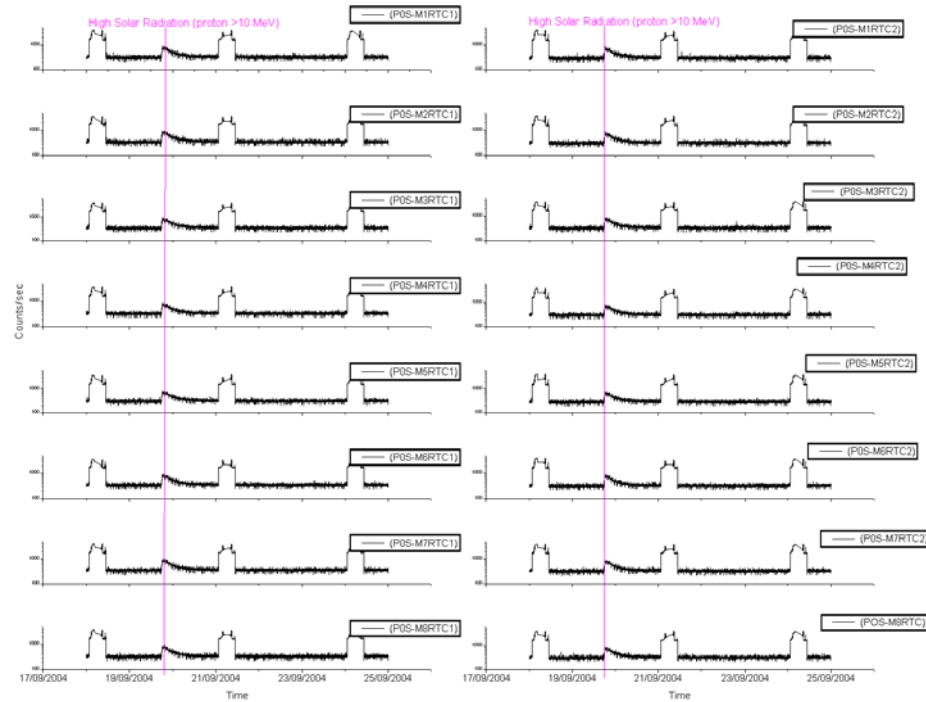
Veto Current:

IBIS-VETO Current & PICsIT dead times Rev 235-237



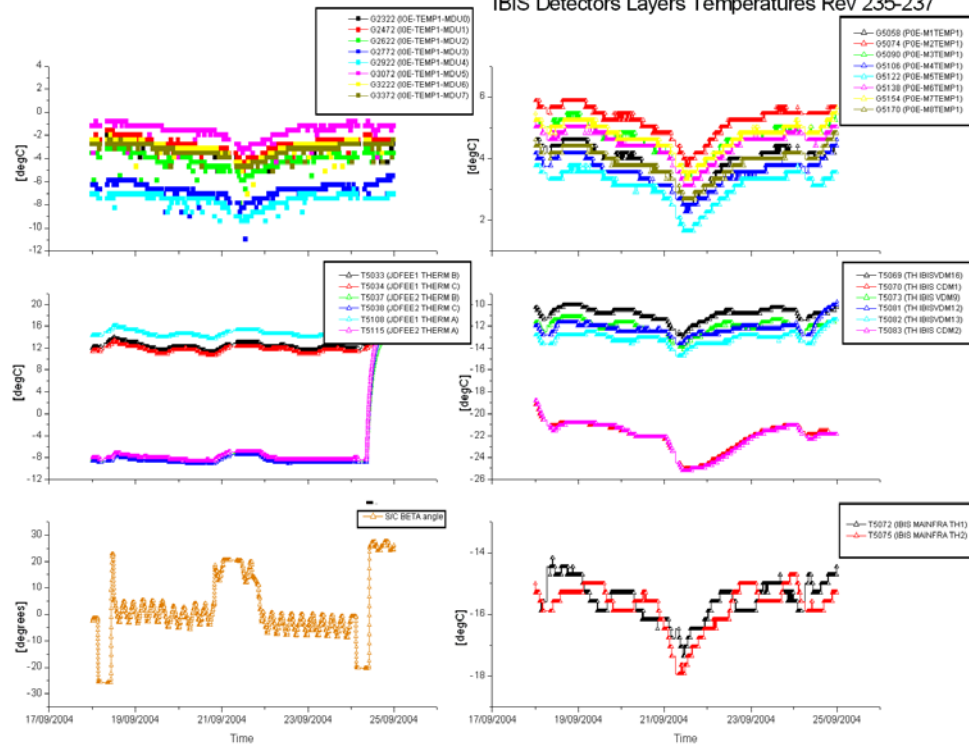
Picsit Counters

IBIS - PICsIT Counters Rev 235-237



IBIS Detectors Layers Temperatures

IBIS Detectors Layers Temperatures Rev 235-237



IBIS daily report

DOY 2004.262 (18/09/04)

Nothing to report.

DOY 2004.263 (19/09/04)

At 17:50Z high count-rates from IREM were reported. These were caused by proton radiation associated with solar activity. The event was dominated by protons of energy >10 MeV causing an increase of the IREM electron counter (probably due to secondary reactions with the S/C structure). JEM-X1 and OMC were thus triggered to go to Safe Mode, but the levels were well below the IREM thresholds set for IBIS. During the event, from 18:12Z until 20:24Z, a wrap around of the VETO Bottom and Lateral counters at ~65000 counts/sec was reported. This unexpected behaviour is under investigation by the PIs together with an efficiency evaluation of the VETO rescaling factors introduced at the beginning of the year 2004 (see AR INT_SC-95).

DOY 2004.264 (20/09/04)

The high radiation condition continued throughout the day with repeated occurrences of the VETO calibration counter (G6061) in OOL for a few TM cycles. The IREM count-rates remained well below the thresholds set for IBIS, the unit was monitored and no further action was taken.

DOY 2004.265 (21/09/04)

At 08:39Z, during the Belt passage, there were many occurrences 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.

DOY 2004.266 (22/09/04)

Nothing to report.

DOY 2004.267 (23/09/04)

Nothing to report.

DOY 2004.268 (24/09/04)

At 03:53Z, inside the Radiation Belts, the PDM5 counter semimodule #1 (parameter G5022) was observed to be out of limit (warning High) , due to the PICsIT detectors being nominally ON without the VETO anticoincidence system, as required by the PIs.

At 08:30Z, during the Belt passage, there were many occurrences 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.

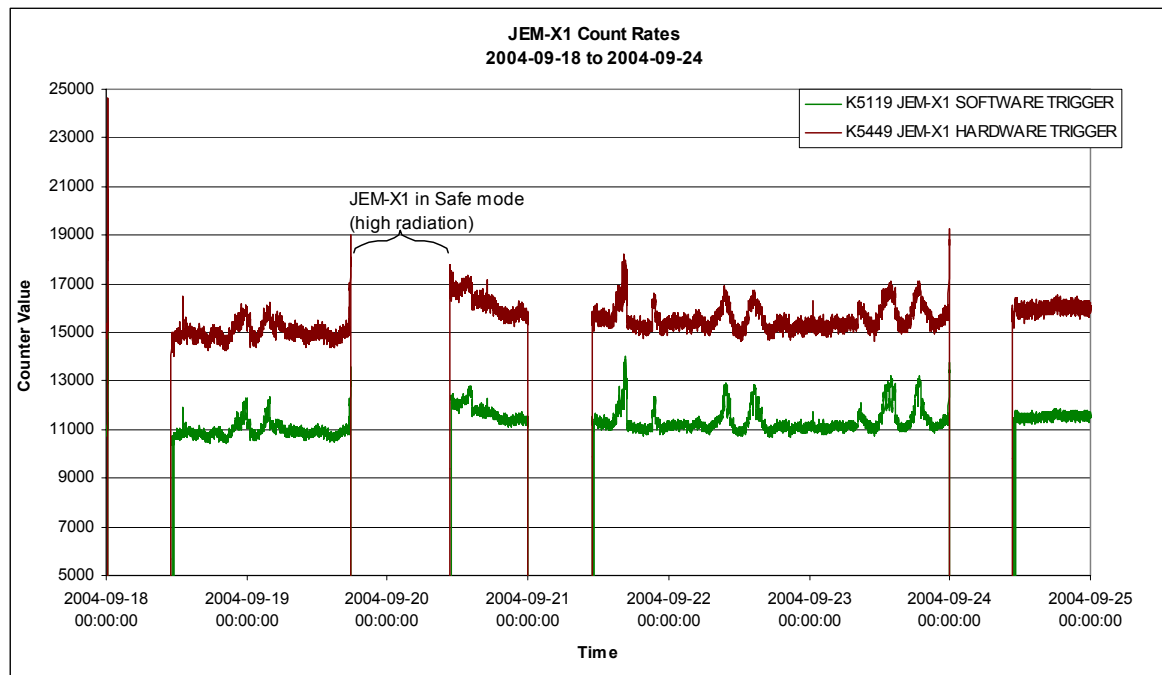
At 8:47Z following the OR-171 the JEM-X2 DFEE was reactivated. The reactivation had no impact on the IBIS temperatures, confirming the conclusion reached in the past tests.

At 10:03Z an overflow of the noisy pixel address buffer in MCE1 (parameter G2014) was reported. The Alarm returned within limits after few TM cycle. No further action was taken.

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

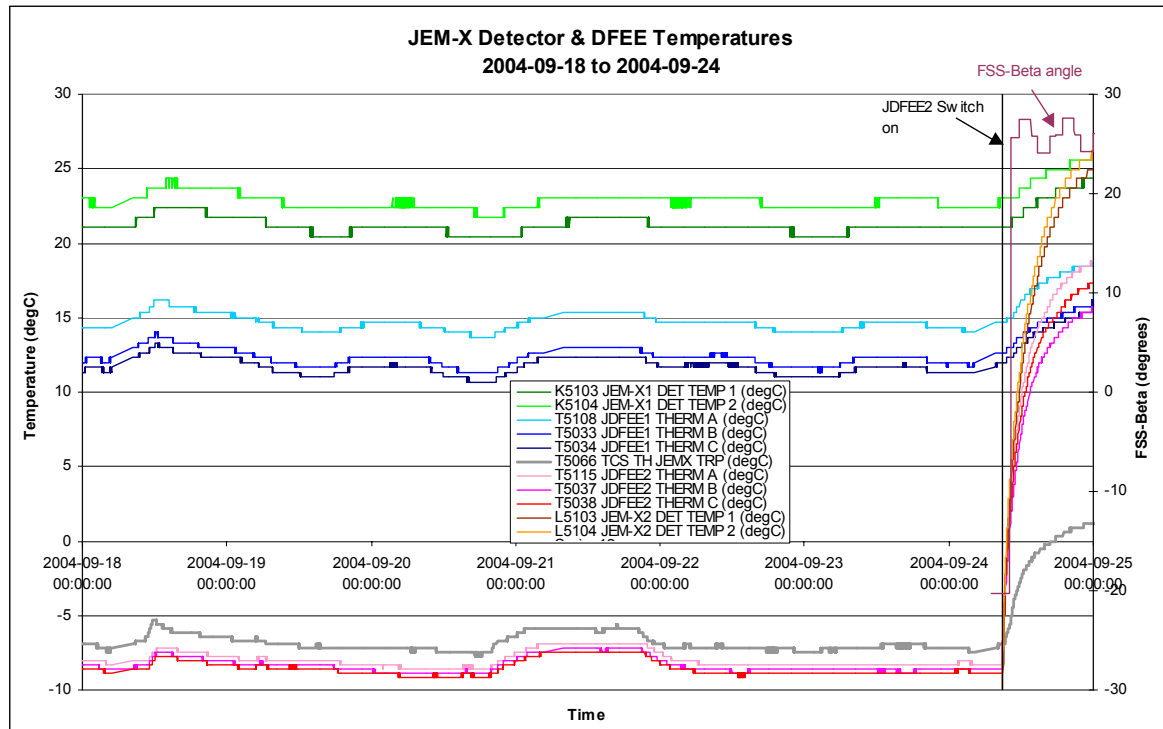
JEM-X Detector and DFEE temperatures over the reporting period are displayed in the following graph, along with the temperature on the detector bench between the two units².

The effect of switching on the JEM-X2 DFEE at 2004-09-24T08:51Z can be clearly seen. The JEM-X1 DFEE and Detector temperatures increased by ~3degC and those of the JEM-X2 DFEE by ~25degC in the 15 hour period following the switch on (as

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)

indicated in the graph, there were no considerable variations in the FSS-Beta angle during most of this period).



8.3.4.3 JEM-X Daily Report

2004-09-18 (DOY 262, Rev 235-236)

Nothing to report

2004-09-19 (DOY 263, Rev 236)

At 17:41Z the following radiation monitoring parameter from IREM went Out of Limits:

K5317 RAD MONITOR 3 (Dose Counter) value = 74

and, after remaining out of limits for 2 TM cycles, caused JEM-X1 to transition to Safe mode autonomously (issuing OEM 231 JEM-X1 AUTO EVENT 1). At 18:53Z commanding to JEM-X1 was disabled from the automatic Timeline.

JEM-X1 remained in Safe mode for the rest of this day.

2004-09-20 (DOY 264, Rev 236)

At 09:51Z JEM-X1 performed an autonomous recovery to Setup mode (issuing OEM 233 JEM-X1 AUTO EVENT 3), after the IREM RMCR values had returned below the JEM-X1 Safe thresholds.

The recovery of JEM-X1 for science operations was started at 10:27Z with the procedure FCP_JEM1_1010 (JEM-X1 Configuration Setting for Science Ops). At

10:59Z JEM-X1 was then commanded back to Data Taking mode by the procedure FCP_JEM1_0044. Commanding to JEM-X1 from the Autostack was re-enabled at 11:02Z and JEM-X1 operations continued nominally.

2004-09-21 (DOY 265, Rev 236-237) to 2004-09-23 (DOY 267, Rev 237)

Nothing to report

2004-09-24 (DOY 268, Rev 237-238)

In line with OCR-177, the JEM-X2 DFEE was switched back on at the start of revolution 238. The operations were performed according to INT_OR_0171, with the key points in the operations as follows:

- 08:47Z Procedure FCP_JEM2_0021 JEMX2 DFEE ACTIVATION started. As this activation was done inside the radiation belts, the first step in the procedure was to execute procedure FCP_JEM2_0120 to disable JEM-X2 reactions to IREM Radiation Monitor Counters and Broadcast Packet radiation belt entry/exit times.
- 08:51Z JEM-X2 DFEE switched on.
- 09:02Z Procedure FCP_JEM2_0021 JEMX2 DFEE ACTIVATION completed, with JEM-X2 reactions to IREM Radiation Monitor Counters and Broadcast Packet radiation belt entry/exit times re-enabled (JEM-X2 autonomous transition to Safe mode at this time as still inside the radiation belts).
- 09:03Z Procedure FCP_JEM2_0040 JEMX2 TRANSITION TO SAFE executed to command JEM-X2 to Safe mode.

Following the reactivation of the JEM-X2 DFEE some out of limits were received on the JEM-X2 Detector pressures as follows:

- L5101 DET PRESSURE 1 went Soft Low out of limits (value=132650) at 08:53:23Z and returned within limits at 12:27:55Z, then continuing to fluctuate in and out of limits until returning stably within limits at 12:32:11Z.
- L5102 DET PRESSURE 2 went Soft Low out of limits (value=135200) at 08:51:07Z and returned within limits at 13:42:35Z, then continuing to fluctuate in and out of limits until returning stably within limits at 13:52:19Z.

This drop in the JEM-X2 Detector pressure is related to the temperature decrease of the JEM-X2 Detector due to the JEM-X2 DFEE switch off and is also occasionally observed during eclipse season, when the DFEE is reactivated following an eclipse.

8.3.5 OMC Operations

On DoY 263, at 19:32:40, the background radiation exceeded the threshold for OMC, which switched to SAFE mode, the instrument was recovered at 08:11:39 on the following day and continued with SCIENCE mode at 08:32:17. However, a radiation spike at 09:18:02 put it back into SAFE once more. The instrument was recovered to STAND-BY at 09:27:05, and returned to SCIENCE at 09:36:17. The impact was pointings 02360064 through to 02360085 were lost, then 02360086 was executed

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nominally and 02360087 was interrupted. Operations continued nominally with 02360088 onwards.

On DoY 264, at 13:47, due to link problems with Redu pointing 02360096 was lost, and pointing 02360097 was commanded manually about 4 minutes late.

On DoY 264, at 19:15:37, the following OEMs were received:

```
2004.264.19.15.37.437 2004.264.19.15.24.787 1792 Real Time Anomaly 5 OMC
CSSW INT ER
      FIX6=0 M9079=2 M9080=5 M9074=4 M9067=5531
2004.264.19.15.37.348 2004.264.19.15.24.787 1792 Real Time Exception 7 OMC
CONSTRAINT D
      M9073=4, IASW TASK 4 M9079=1 M9080=7 M9076=22 M9067=20216
```

These are sometimes triggered when the OMC is viewing an extended object, and are not serious.

On DoY 264 from 19:13 to 20:41, OMC operations were interrupted to perform a manual reaction wheel bias. The impact was pointings 02360106 to 02360108 inclusive were missed.

On DoY 268 at 10:38:57, an external TRIGGER command was received, the reaction was entirely nominal.

No Commands were rejected this week.

On DoY 262 at 01:40:54, DoY 265 at 01:26:29 and DoY 268 at 01:13:49, OMC was switched by the Timeline to SAFE mode, at the nominal times.

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]
236	RAD_EXIT R 2004-09-18T10:46Z	18/09/2004 09:15Z	>23151	18-Sep-2004 09:34	28376
236	RAD_ENTR R 2004-09-21T01:26Z	21/09/2004 02:23Z	<60300	21-Sep-2004 02:19	52891
237	RAD_EXIT R 2004-09-21T10:32Z	21/09/2004 08:55Z	>>23156	21-Sep-2004 09:19	28163
237	RAD_ENTR R 2004-09-24T01:13Z	24/09/2004 00:24Z	<66684	24-Sep-2004 01:59	53752

Reference

Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

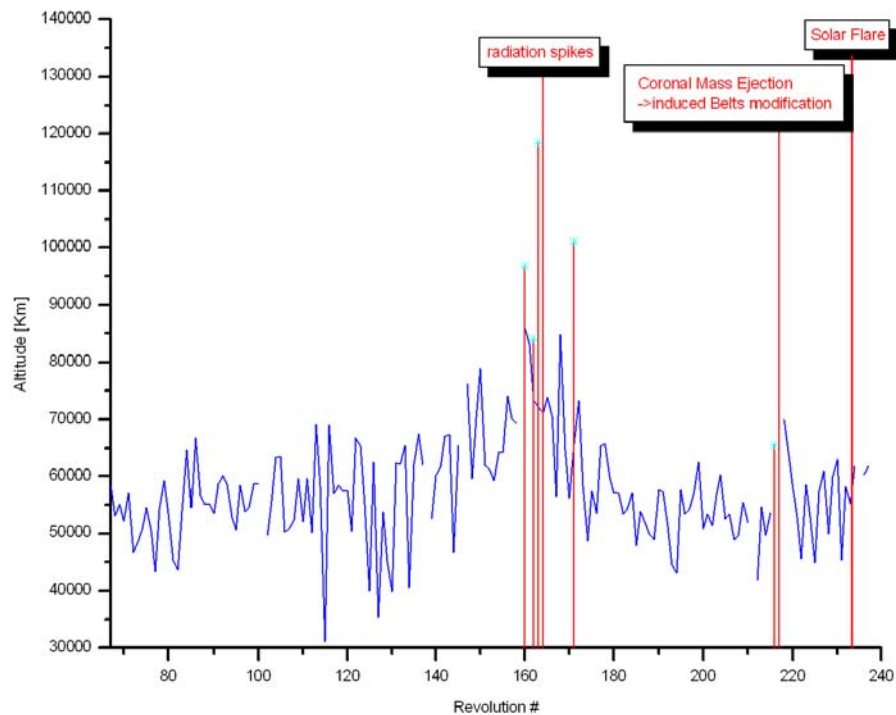
Large error vs reference (more than 30 minutes)

Radiation Spike

Proton Belts

REV		Proton CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
235	PROTON_RAD_ENTR	18-Sep-2004 07:54	12994
236	PROTON_RAD_EXT	18-Sep-2004 08:14	15392
236	PROTON_RAD_ENTR	21-Sep-2004 07:39	12896
237	PROTON_RAD_EXT	21-Sep-2004 07:59	15238

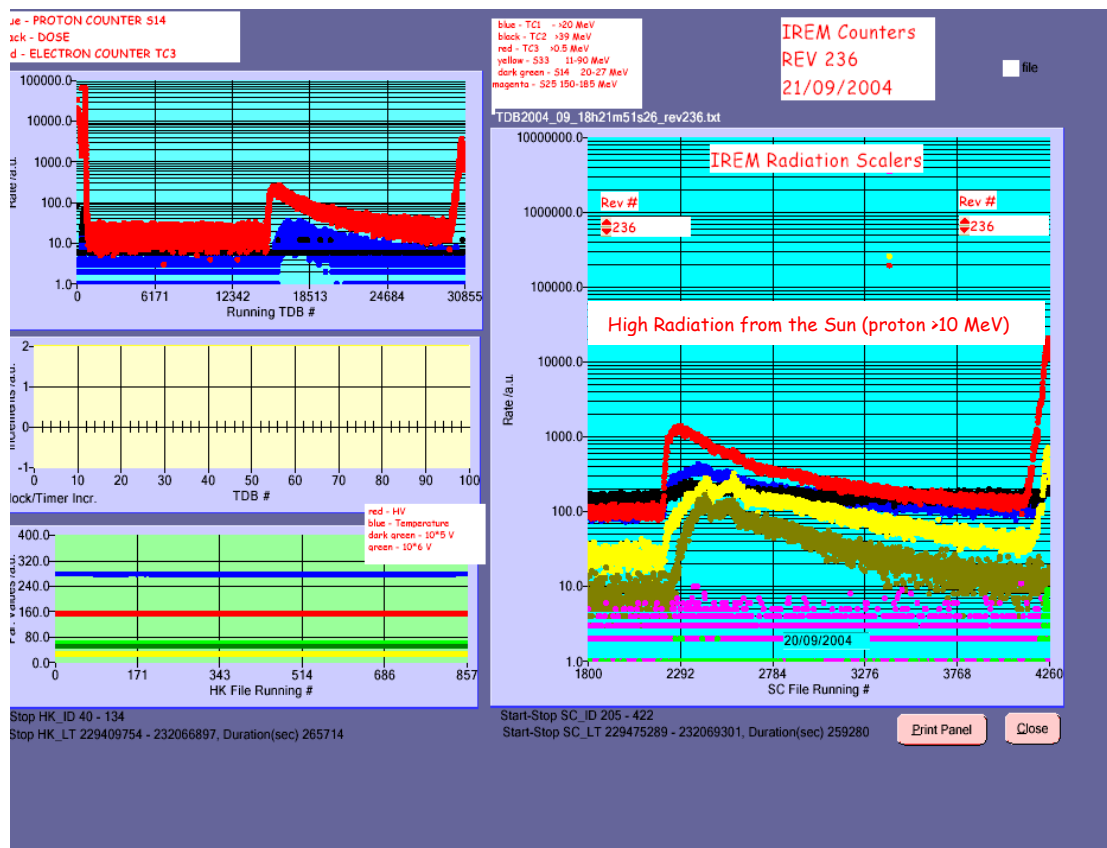
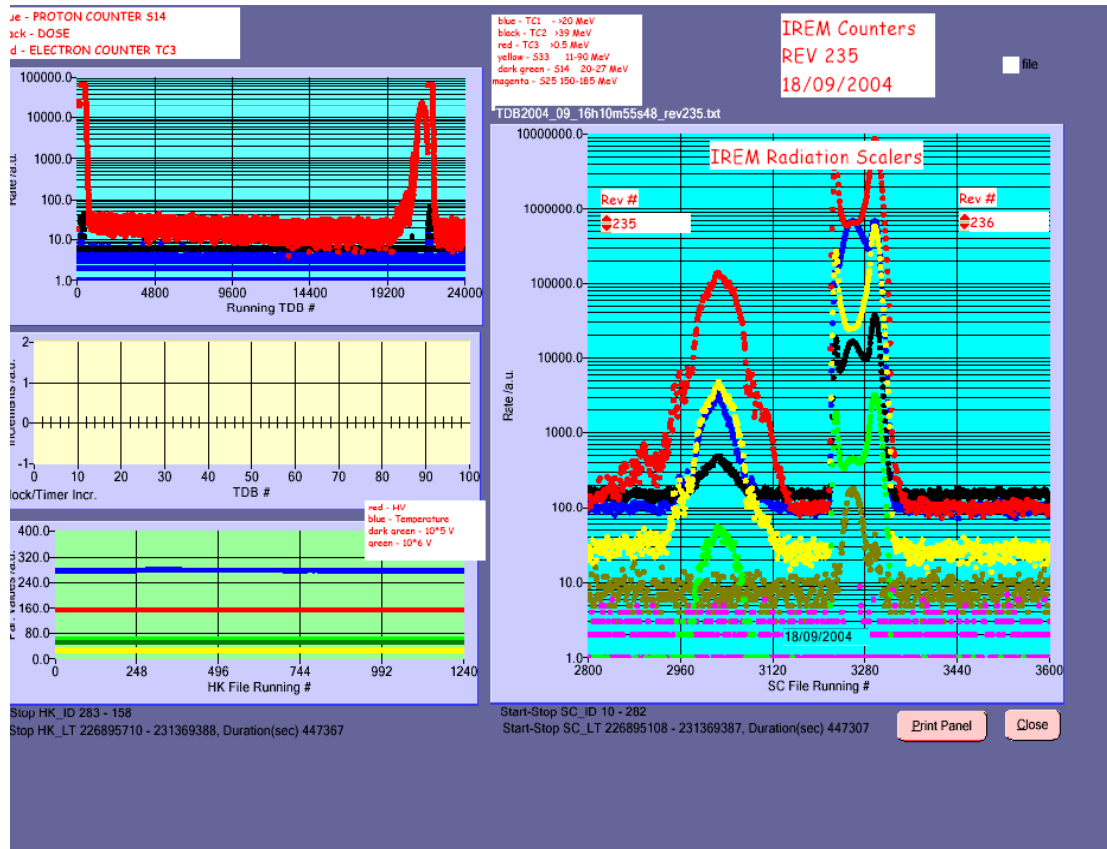
Evolution of Radiation Belt Entry 2004

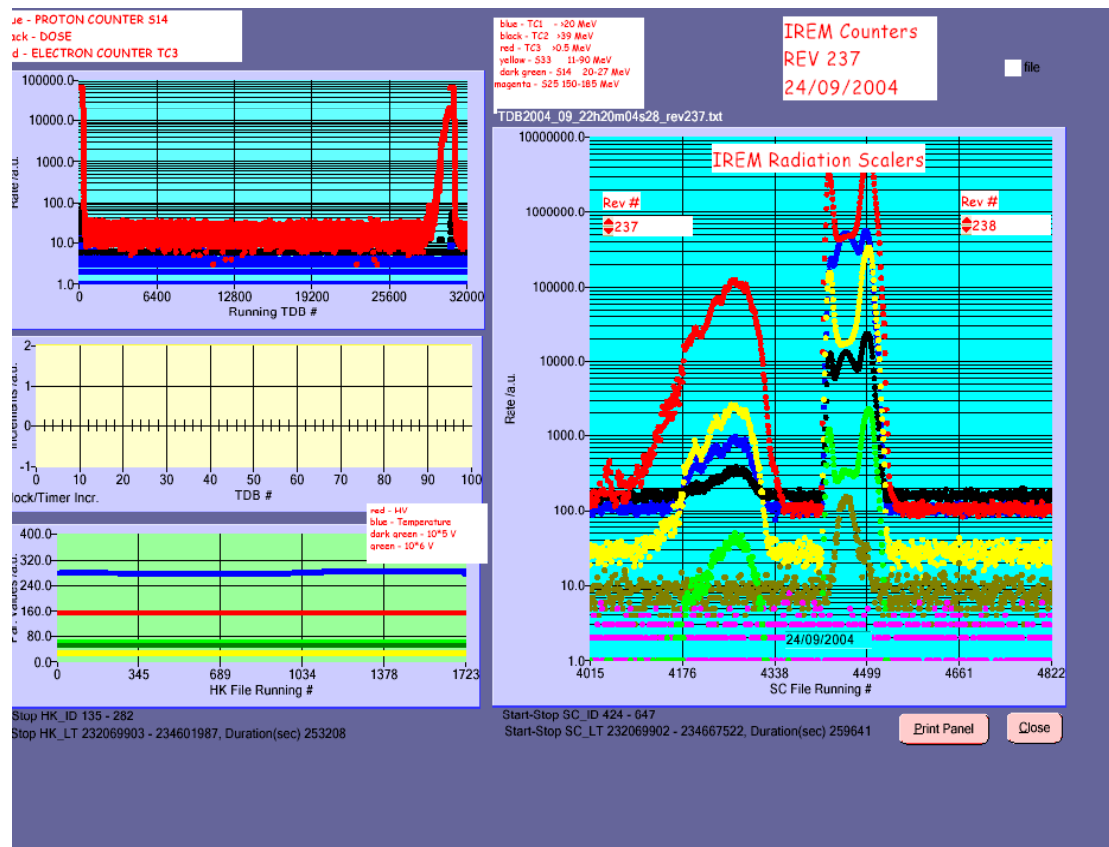


IREM daily report

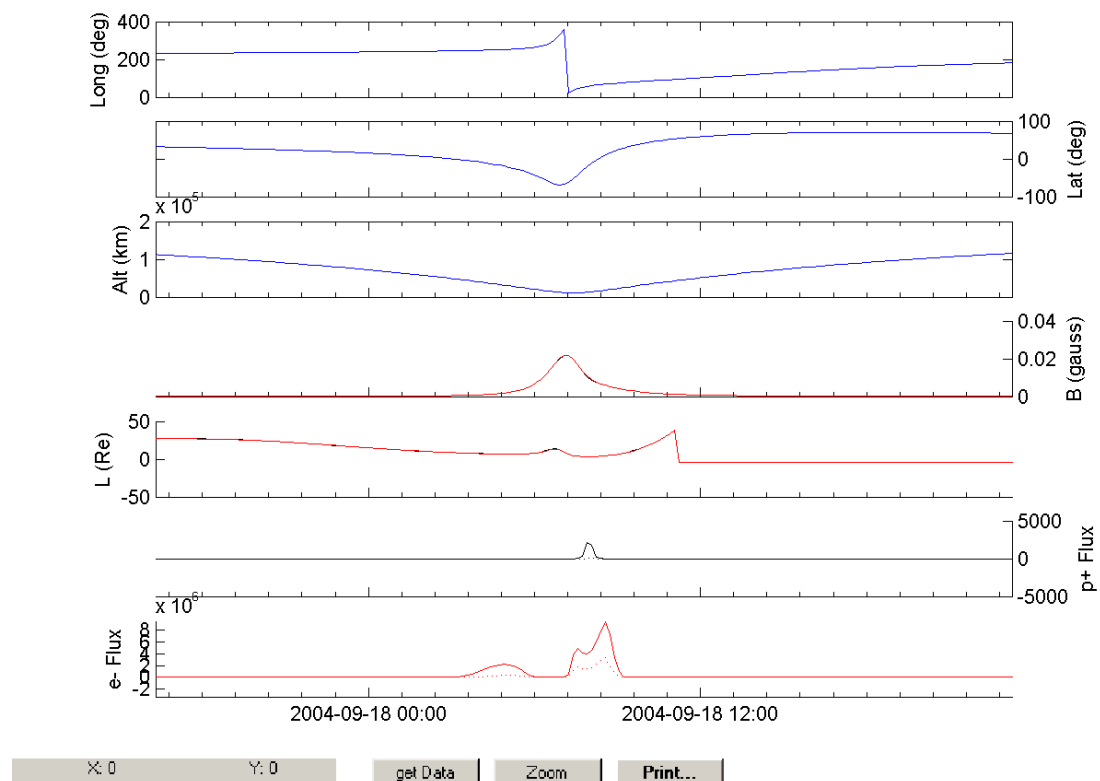
Nothing to report.

IREM radiation counters

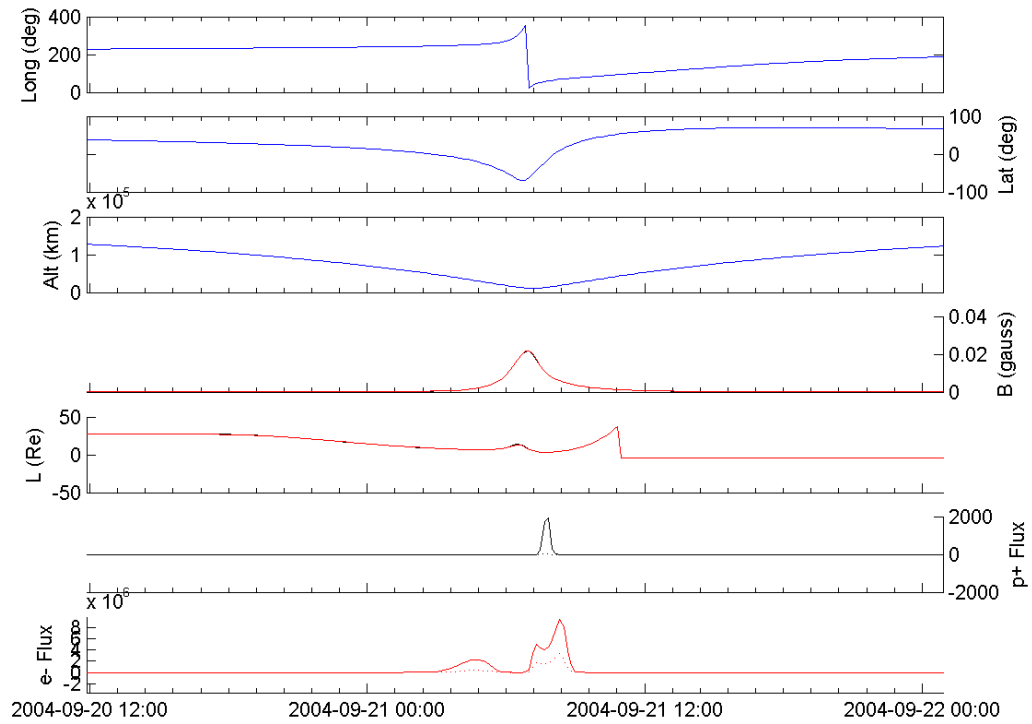




IREM Predicted Radiation Belt Passages.Rev 235

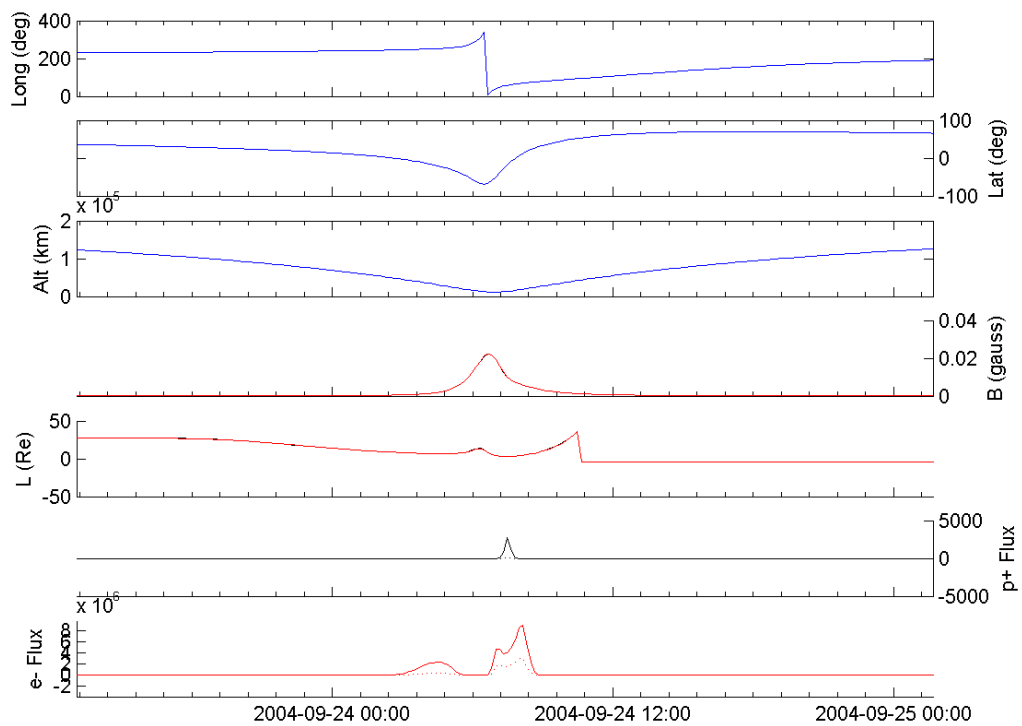


Rev 236



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

Rev 237



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

SEC-GOES Observed Particles Fluxes.

