

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 104
Week 38
20.09.04
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 11.09.04 until 17.09.04 (both dates inclusive) and covers the revolutions 234 & 235.

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 and the Galactic Centre. The activities consisted of 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.

Several slews were missed from the Timeline due problems at the ground station.

The fuel consumption over the period between 10/09/2004 and 17/09/2004 was 0.184 kg. The remaining propellant is in the order of 167.902 Kg on the 17th 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.

The instrument was 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 95.2 pkts/cycle.

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

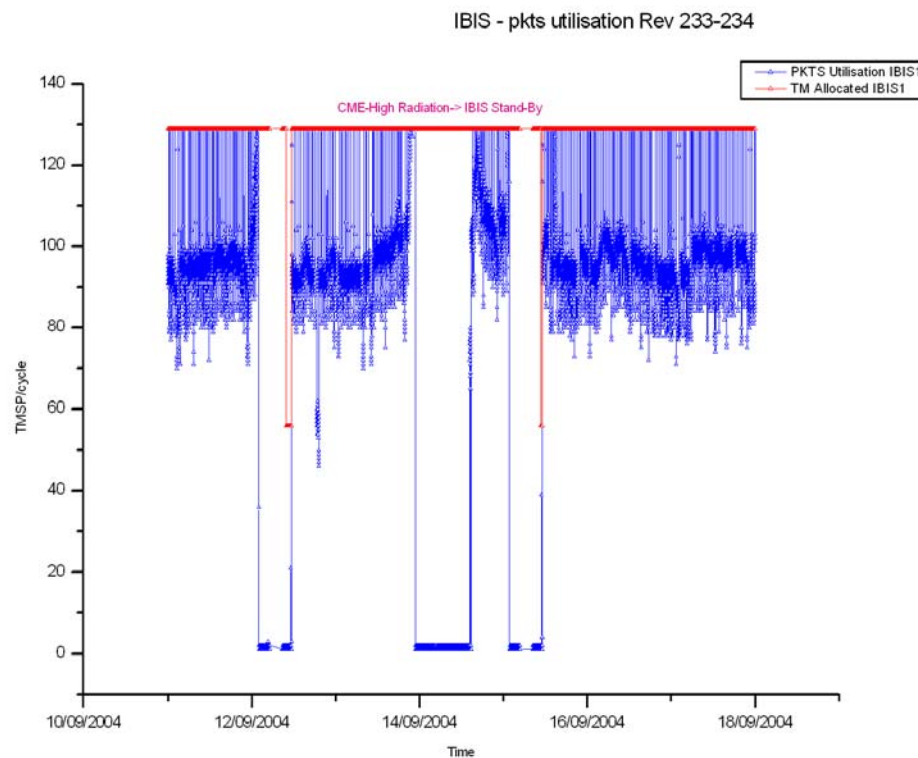
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

The overall status of the unit is Nominal.

On 13/9/2004 high radiation caused by a Solar Coronal Mass Ejection (CME) , triggered the unit to a switch to a Safe configuration.

During the reporting period the PST Allocation to IBIS was 129 TMSP / Cycle. The mean IBIS Bandwidth usage was 99.3 TMSP / Cycle, down 3.2 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 remained dormant (DFEE OFF), with a TM allocation of 1 packet/cycle.

Due to high background radiation conditions, JEM-X1 made an autonomous transition to Safe mode in revolution 234 at 2004-09-13T21:08Z. It was recovered back to Data Taking mode at 2004-09-14T21:46Z. During this time, an IREM S/W reset occurred but this had no impact on JEM-X1 science operations as JEM-X1 was already in Safe mode.

On 2004-09-16, between 04:58:27Z and 06:04:19Z, there were several occurrences of out of limits on the TM parameters K5119 SOFTWARE TRIGGER and K5136 BUFFER LOSS.

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 221 OMC pointings executed nominally, 24 were missed, mainly due to high radiation.

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.

On DoY 258, at 09:11z an automatic reset of IREM S/W (SEU#14) was reported. As the instruments were already in Safe configuration due to a high radiation environment caused by solar activity, the SEU had no impact. The IREM unit was successfully recovered and currently no performance degradation is noted.

Solar Activity

The observation period was characterized by high solar activity. An M4-class solar flare erupted near sunspot 672 on Sept 12th and hurled a coronal mass ejection (CME) toward Earth. The particles cloud sparked a strong geomagnetic storm and high radiation condition, when it arrived on the night of Sept. 13, causing the automatic transition of the payloads to Safe configuration as triggered by IREM counters.

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

There was one minor incidence of an error sending data to the consolidator, but that was all.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. A DSS-16 pass was lost this week owing to maintenance problems, but it occurred during a period of high radiation, and 3 of the instruments were in safe mode anyway. There were three other instances of short TM drops from DSS-16, 2 of which caused the loss of a pointing each. The overall performance was still over 95%.

4.3 Science Ground Segment

4.3.1 ISOC

1. AO-3

The AO was opened to the public as planned on September 13th.

2. Mission planning

PSFs: complete up to revolution 240.

POS and POD: revolutions 237 and 238 have been planned.

TSFs: complete up to revolution 237.

3. Observation status

New ECSs have been received for revolutions 223 to 225 inclusive, as well as for 207 (an old one). OCS generation has not been performed this week. It will follow early next week.

4. ISOC science data archive

Nothing new to report.

5. ISOC system

The ISOC system version 10.5.1 was installed on September 13th as planned. Meanwhile, version 10.6.0 is also ready (including customised dithers and version 3.7 of the OMC pointing software) and is operational as from September 17th.

6. Problems

Nothing to report.

4.3.2 ISDC

Status of ISDC observation processing on 20/09/2004:

- 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 255, at 03:51, the TM from DSS-16 dropped. The impact was the command sequence DEBPG200 failed release, this was later sent at 03:56 manually, rescuing pointing 02330069.
- On DoY 256, at 15:33, two external commands from ISDC were received to put OMC into TRIGGER mode, the second of these was rejected, without impact.
- On DoY 257, at 20:47, there was an error sending data to the consolidator.
- On DoY 258, at 02:32, due to problems with the amplifier at DSS-16, the pass had to be delayed. The AOCS etc was disabled in the timeline. At 03:38 contact was restored, but the timeline could not be re-started before 04:54, just in time for the handover. The impact was pointings 02340065 through to 02340068 were lost, however OMC, IBIS and JEMX were in SAFE mode at this time anyway, reducing the impact.
- On DoY 261, at 18:00, there was a drop in TM from DSS-16, a minute later the TC dropped as well, the links were recovery shortly after, but pointing 02350103 was missed.
- Later, at 23:29, another drop in TM from DSS-16 caused the loss of pointing 02350113, the corresponding DR# is G124813.

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

AR id	Date Occurrence	Subject	Segment	Status
INT_SC-92	08/09/2004	IBIS- VETO calibration, bottom and lateral counters reported reduced...	Payload	Pending
INT_SC-93	13/09/2004	IREM Anomaly: Reset of IREM_CSCI S/W #13, 10/09/2004	Payload	Open

Doc. Title : INTEGRAL Mission Report #104
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
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INT_SC-94	15/09/2004	IREM Anomaly: Reset of IREM_CSCI S/W #14, 14/09/2004	Payload	Open
INT-2642	09/09/2004	TC Completion Verification remains 'UNKNOWN' incorrectly	IMCS	Pending
INT-2643	13/09/2004	OMC: TIGGER command rejected.	ISDC	Pending
INT-2644	14/09/2004	DoY 255_04 TM Link Drop from Goldstone	NASA Station	Pending
INT-2645	16/09/2004	Incorrect IBIS parameter in ICP for revolution 237	ISOC	Pending
INT-2646	17/09/2004	INTEGRAL LCTF system in Redu out of order	FDS	Pending

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 234

The observations in revolution 234 consisted of a GPS lasting ~22.5 hours, followed by a GCDE, performed for the remaining ~38.5 hours of observation time.

Revolution 235

In revolution 235 a GCDE was performed throughout the available observation time (~62 hours).

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.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

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.
2004-09-03T10:01:17.000Z	168.2553	F	Automatic TM processing.
2004-09-04T20:15:36.000Z	168.2395	F	Automatic TM processing.
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.

This report was generated Fri Sep 17 08:00:15 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 11/09/2004-17/09/2004

AOCs operations were executed from the Automatic Timeline.

During this period, 160 Open Loop Slews, 105 Closed Loop Slews and 4 Momentum Bias were executed. 6 slews were missed or executed manually. This is equivalent to a 2.3%.

11/09/04 (Day of Year 255, Revolution 233)

Nothing to report.

12/09/04 (Day of Year 256, Revolution 233-234)

Nothing to report.

13/09/04 (Day of Year 257, Revolution 234)

Nothing to report.

14/09/04 (Day of Year 258, Revolution 234)

Slews missed from the Timeline due to station problem (Goldstone DSS-16): Due to a problem, DSS-16 could not support INTEGRAL from 02:32 (the planned station handover time) to 03:38. Slews 02340065 to 02340068, both inclusive, were missed from the Timeline. To rejoin the Timeline a manual open loop slew was performed to the attitude of PID 02340068. Slew 02340069 executed from the Timeline.

15/09/04 (Day of Year 259, Revolution 234-235)

Flickering of the pointing-bit due to pitch error: At 19:16:19 an undetected false event on the STR caused a jump of 37 arc-seconds in the Y position of the guide star and flickering of the pointing-bit, which was not seen at BCP level. The magnitude 8.5 guide-star was picked by the ACC after an open loop slew at CCD location [8840, -19945].

16/09/04 (Day of Year 260, Revolution 235)

Nothing to report.

17/09/04 (Day of Year 261, Revolution 235)

Slew missed from the Timeline due to station problem (Goldstone DSS-16): Execution of slew 02350113 failed from the Timeline due to a short drop in TM from DSS-16 (DR# G124813). To rejoin the timeline a manual open loop slew was performed to the attitude of PID 02350114 at 23:53. PID 02350114 was not affected.

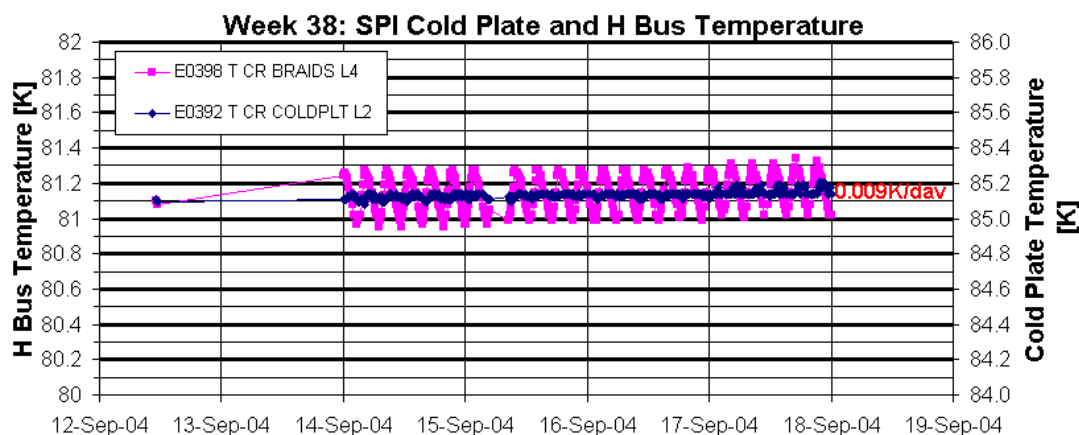
8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The performance of the cryo-cooler is nominal.

The cold plate temperature was maintained at 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.

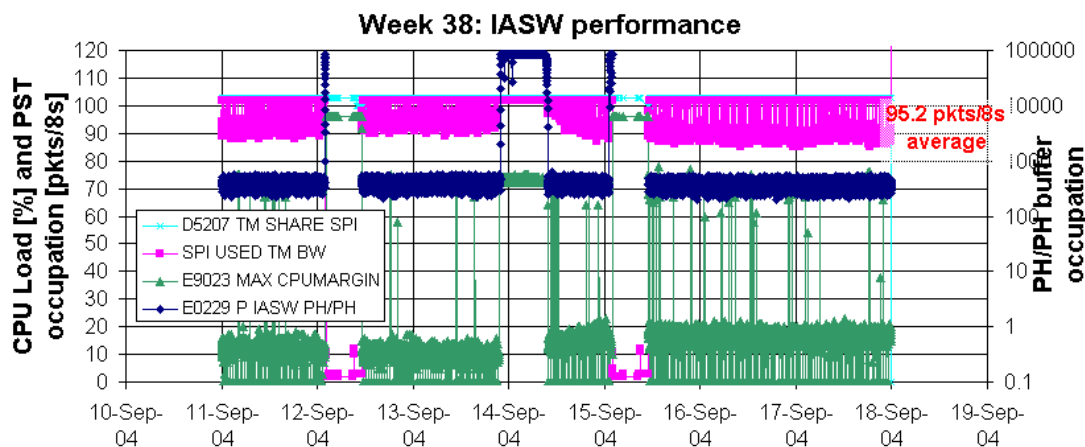


IASW/DPE:

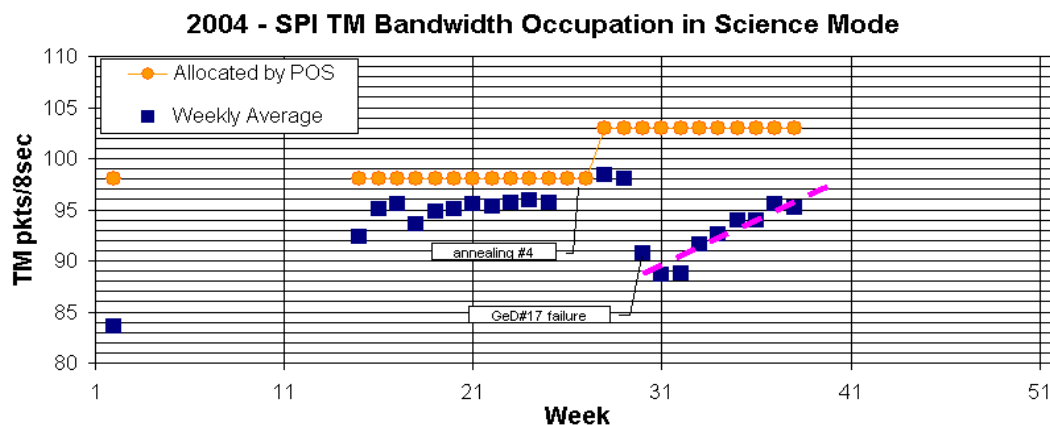
The performance of the IASW/DPE is nominal.

The average TM bandwidth occupation was 95.2 pkts/cycle in the science observation 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 saturation of the buffer on 14th September is due to background following increased solar activity.



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

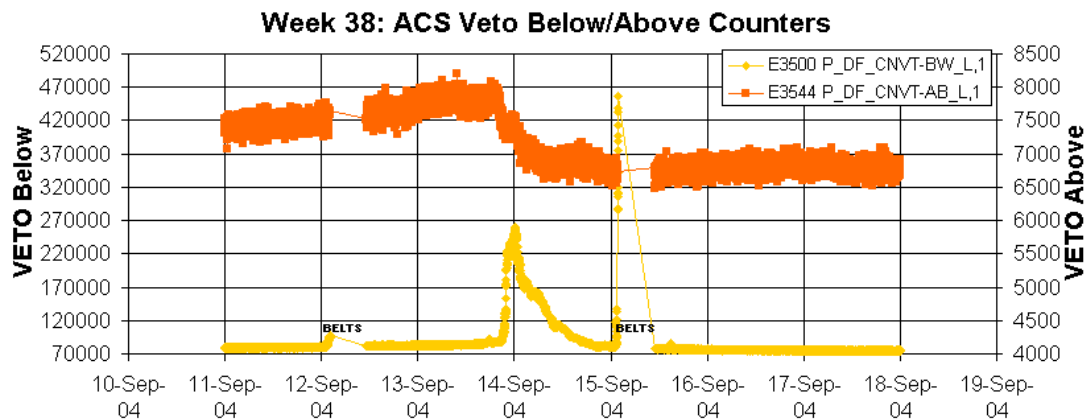


ACS:

The performance of the ACS is nominal.

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

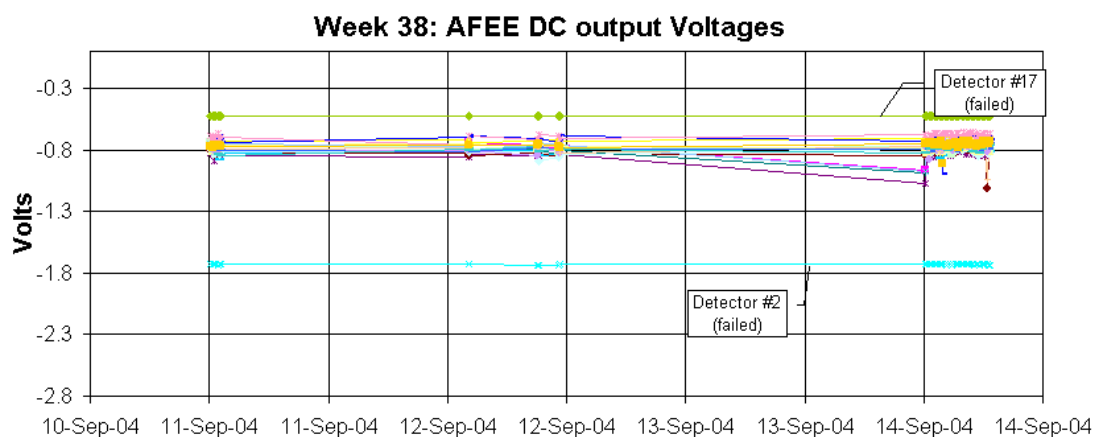
The peak on 14th September is due to background following increased solar activity.



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 (due to a problem in the TM retrieval system, the plo is affected by large data holes).

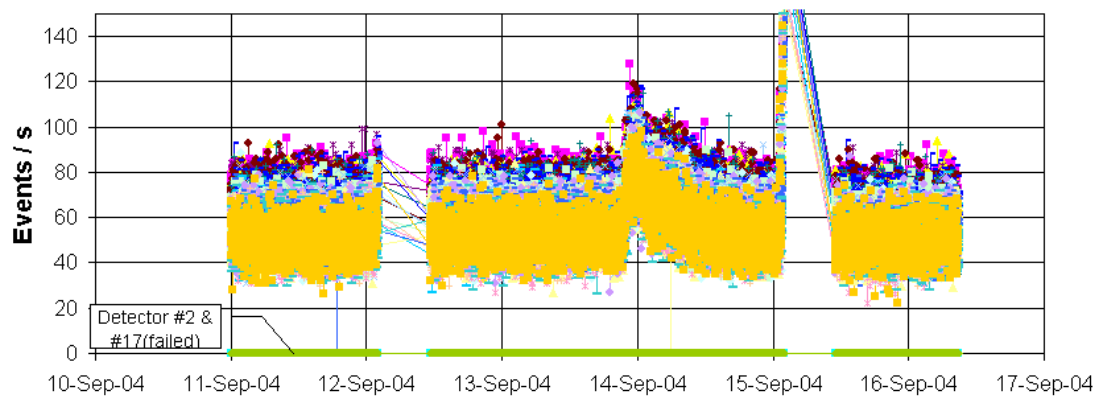


DFEE:

The performance of the unit is nominal.

The following plot shows the Non Vetoed 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.

Week 38: GeD Non Vetoed counts

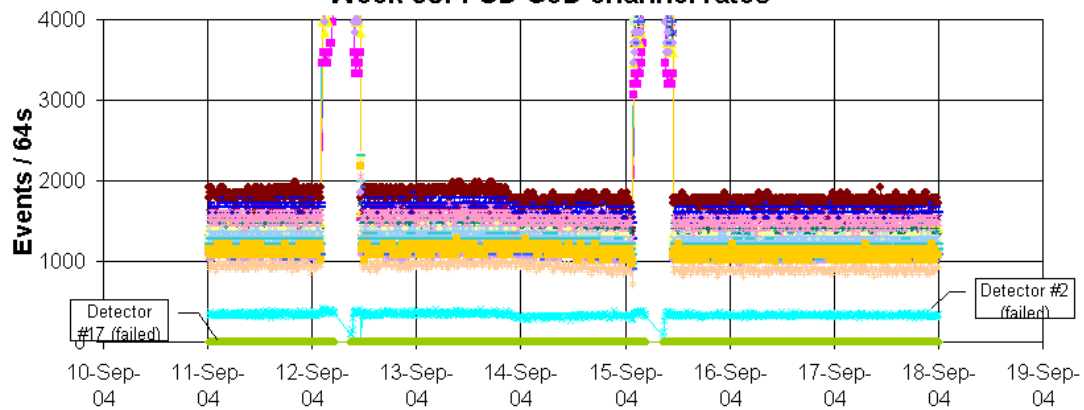


PSD:

The performance of the unit is nominal.

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

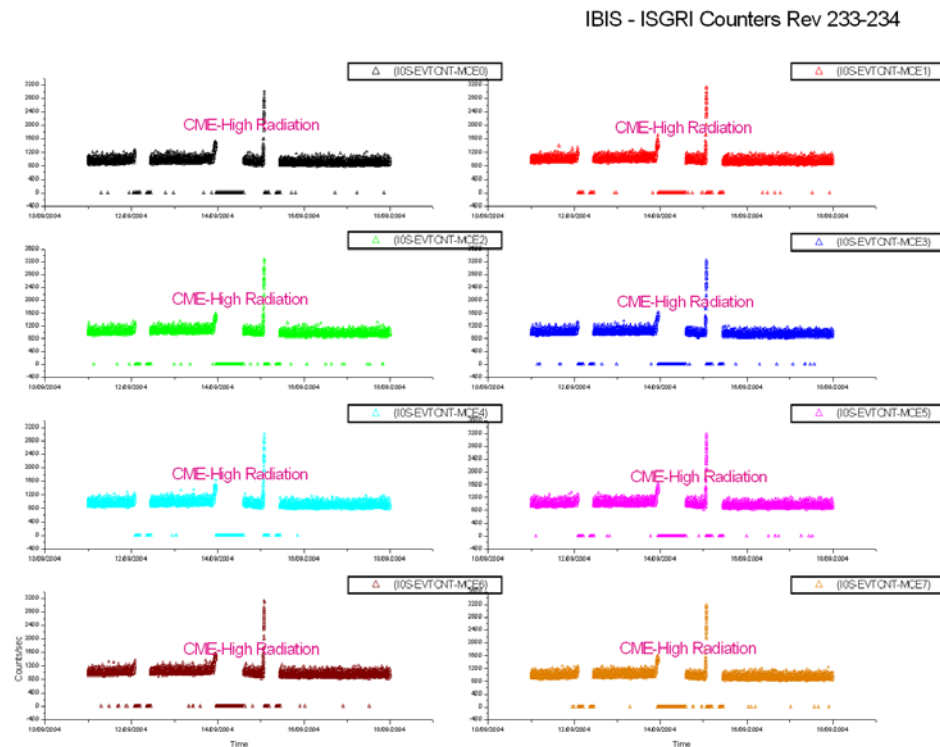
Week 38: PSD GeD channel rates



8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

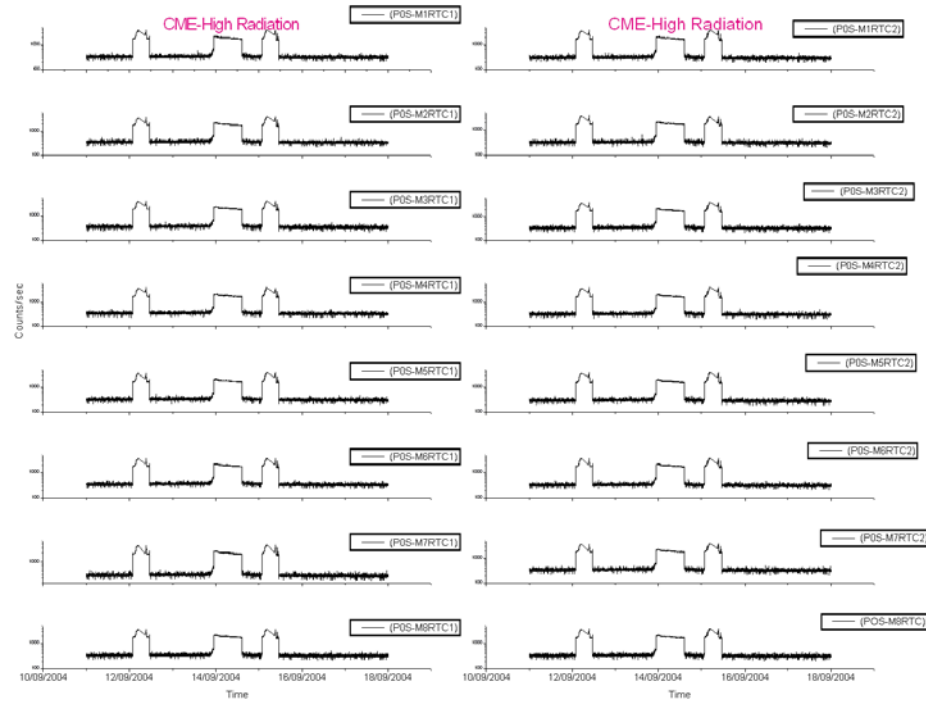


VETO vs Payloads Counters:

The week was characterised by high solar activity. An M4-class solar flare erupted near sunspot 672 on Sept 12th and the blast hurled a coronal mass ejection (CME) toward Earth. The particle cloud sparked a strong geomagnetic storm and high radiation condition, it arrived on the night of Sept. 13, causing the automatic transition of the payloads to Safe configuration as triggered by IREM counters.

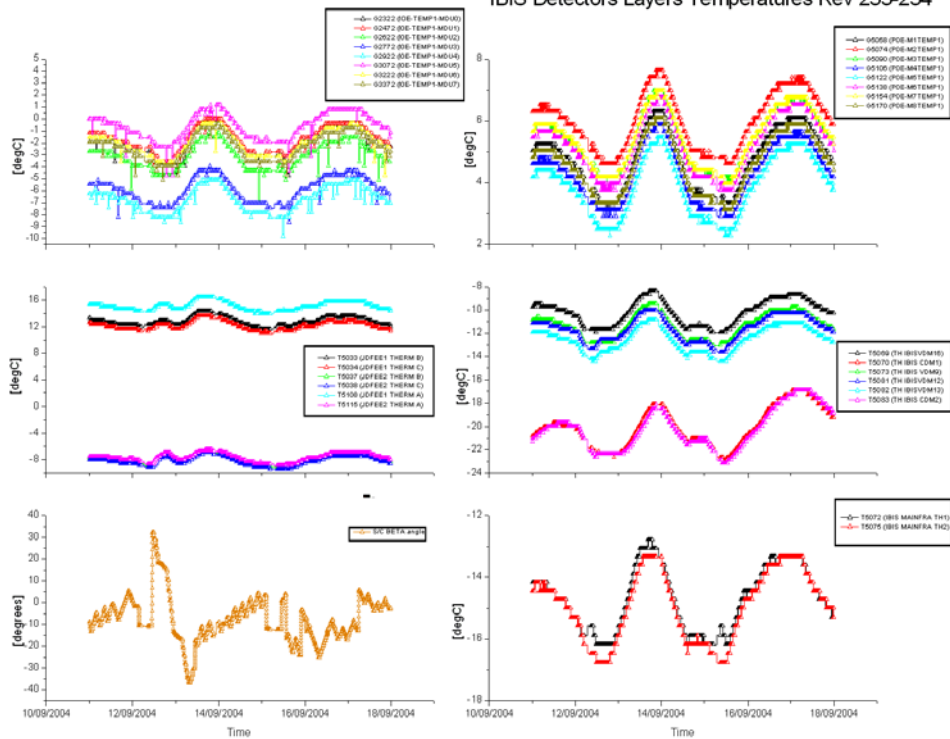
Picsit Counters

IBIS - PICsIT Counters Rev 233-234



IBIS Detectors Layers Temperatures

IBIS Detectors Layers Temperatures Rev 233-234



IBIS daily report
DoY 2004.255 (11/09/04)

Nothing to report.

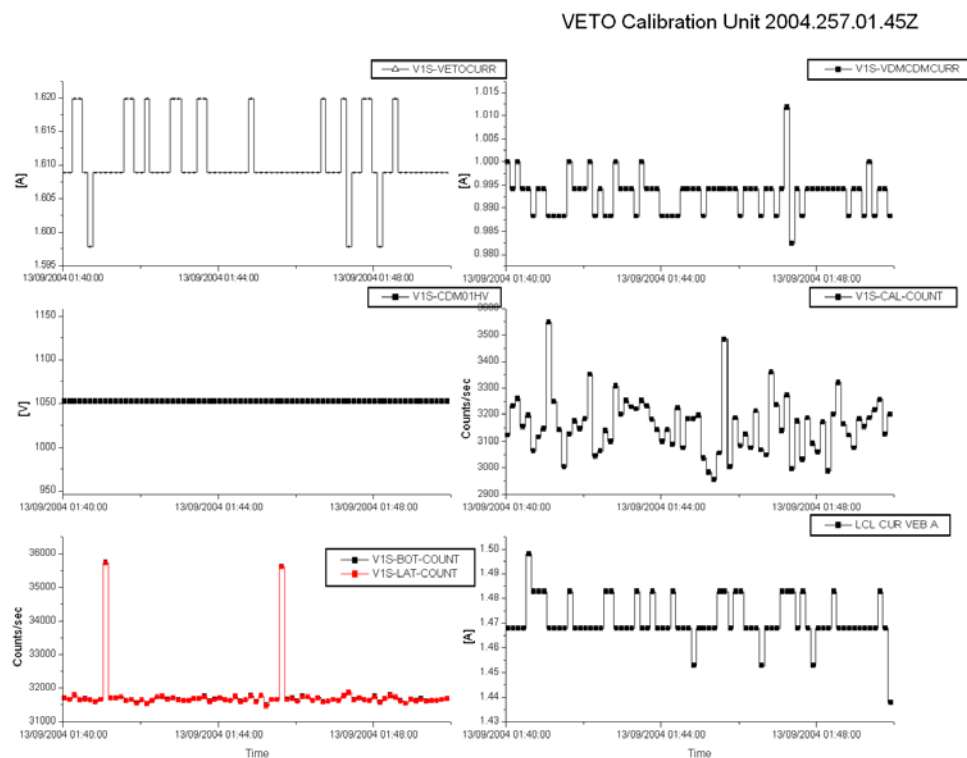
DoY 2004.256 (12/09/04)

At 10:47Z, below the critical altitude ascending, the OEM APID 1280 Class 0 ID 169 << HK OUT OF SYNCH>> was repeatedly received. According to the Payload Recovery document no further action was taken (the rate of the OEM generation was <1 OEM/30 sec).

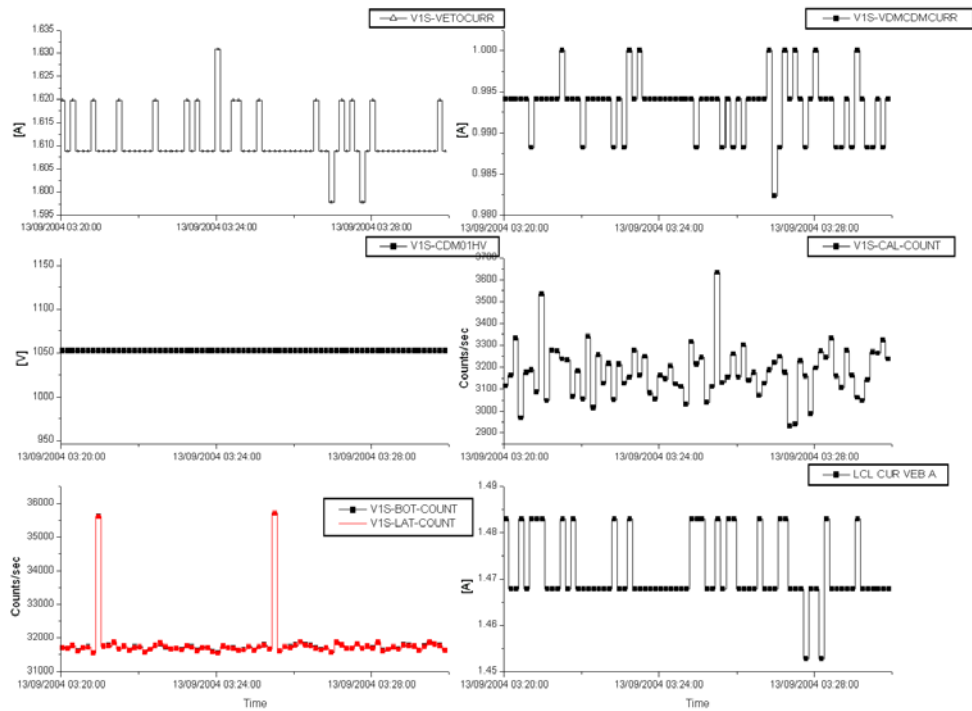
At 10:55Z an overflow of the noisy pixel address buffer in MCE3 & 5 (parameters G2042 & G2070) were observed. The Alarms returned within in limits after few TM cycle. No further action was taken.

DoY 2004.257 (13/09/04)

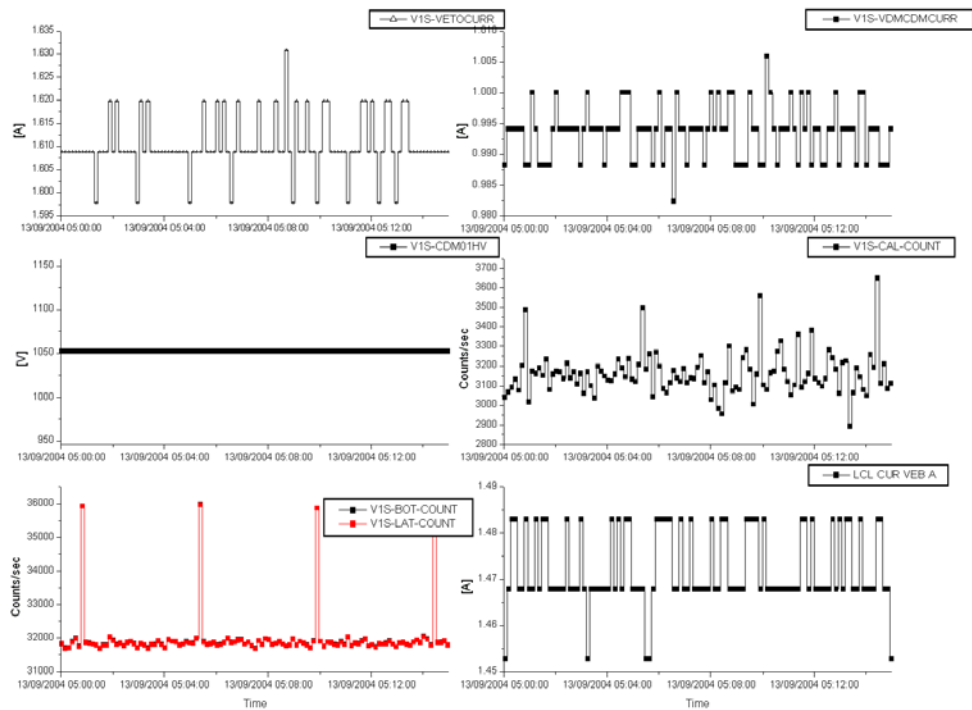
At 01:45Z, 03:27Z, 05:08Z and 15:30Z the VETO calibration counter (G6061) went out of limits (alarm low) for few TM cycles. During the events, no anomalous modification of the VETO total current and the VEB LCL current (over the LSB) was seen. No action was taken as from a preliminary analysis this behaviour is likely to be due to the natural decay of the on-board radioactive source, and has no relation with the reduced VETO count-rate anomaly observed previously (ref ARTS INT_SC-92). The following plots show the behaviour during the occurrences:

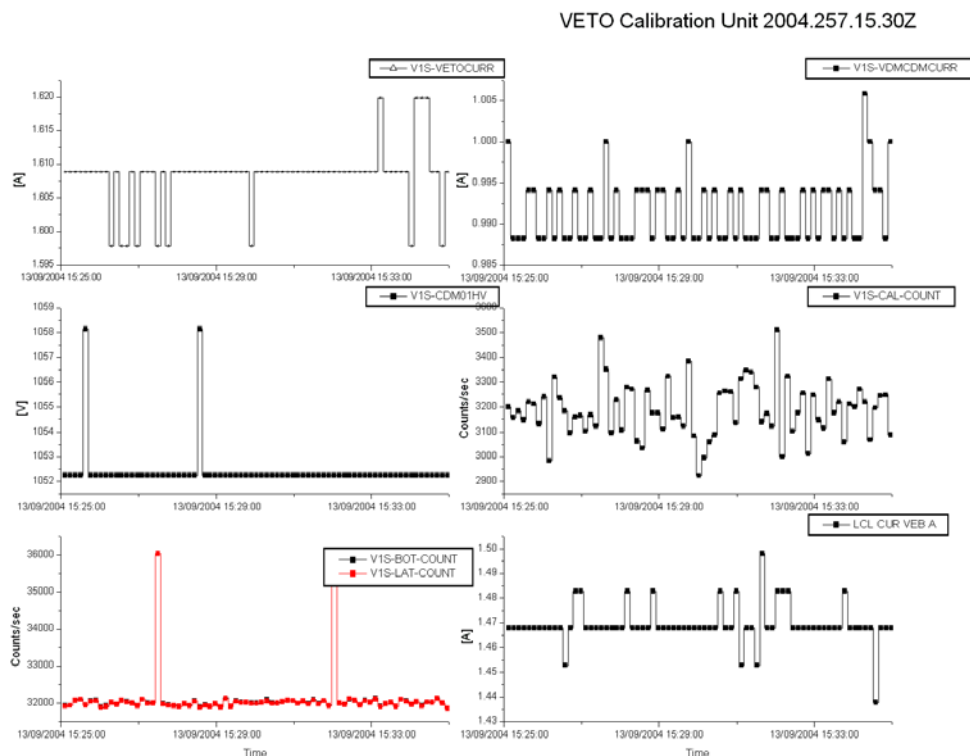


VETO Calibration Unit 2004.257.03.27Z



VETO Calibration Unit 2004.257.05.08Z





Since 22:00Z there were some occurrences of the valid event rate on HBRA interface (parameter G8080) and the VETO Lateral and Bottom counters (G6062-6063) out of limits (warning High) for few TM cycles due to High radiation condition originated by an M4-class solar flare that erupted near sunspot 672 on Sept 12th and hurled a coronal mass ejection (CME) toward Earth. No action was taken as at 22:59Z the unit autonomously performed a transition to Stand-By triggered by the IREM radiation counters in the BCPKT. At 23:06Z the IBIS s/s was disabled from the timeline.

DoY 2004.258 (14/09/04)

At 09:11Z there was an IREM SEU, which, did not affect IBIS as it was already in a Safe configuration due to the on-going high radiation environment.

At 14:52Z, after the radiation level dropped to 30% of the set thresholds, for 1 hour, the unit was recovered to Scientific Standard Mode and re-joined to the automatic timeline

DoY 2004.259 (15/09/04)

At 01:37Z some occurrences of the VETO Lateral and Bottom counters (G6062-6063) reported out of limits (warning High) for few TM cycles due to the proximity to the Radiation Belts. No action was taken. At 01:54Z the unit autonomously went to Stand-By triggered by the BCPKT.

At 01:41Z the number of events triggering the MCEs per second reported out of limits (parameter family G2013) for few TM cycles due to the proximity to the Radiation

Belts. No action was taken as at 01:54Z the unit autonomously went to Stand-By triggered by the BCPKT.

At 04:06Z, inside Radiation Belts, the PDM4 counter semi-module #2 (parameter G5018) was indicating out of limit (warning High), due to the PICsIT detectors being ON without the VETO anticoincidence system, as required by the PIs.

At 04:06Z, 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. The OEMs were continuously generated until LOS and again after AOS.

DoY 2004.260 (16/09/04)

Nothing to report.

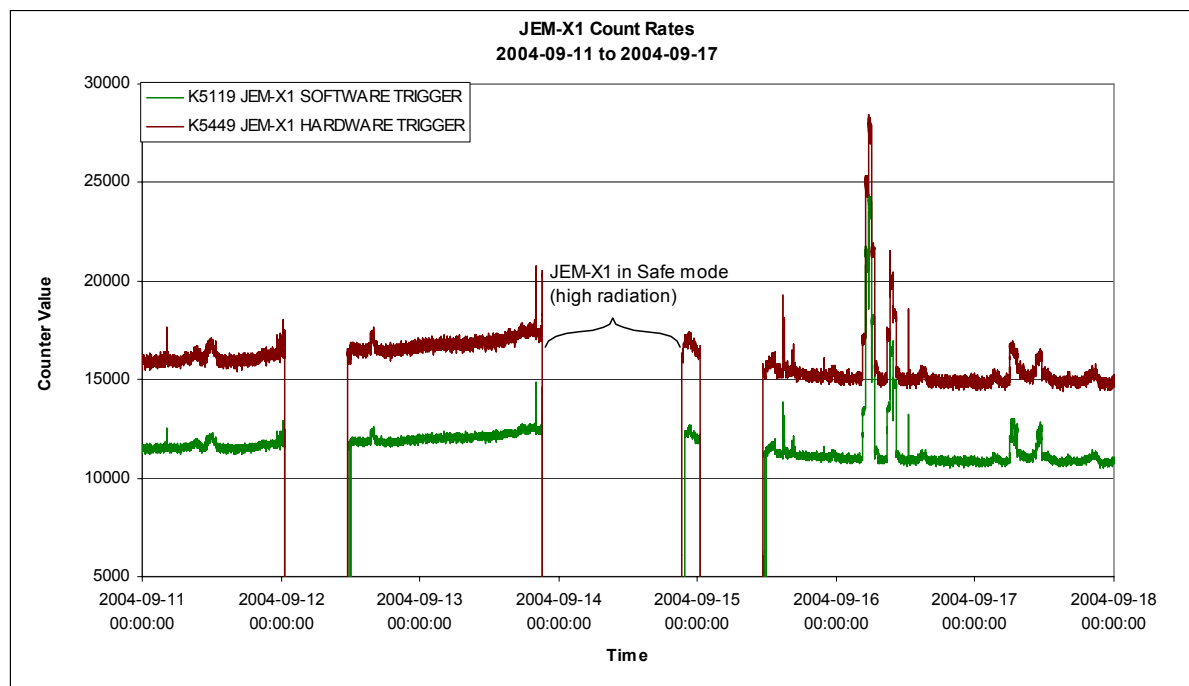
DoY 2004.261 (17/09/04)

Nothing to report.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

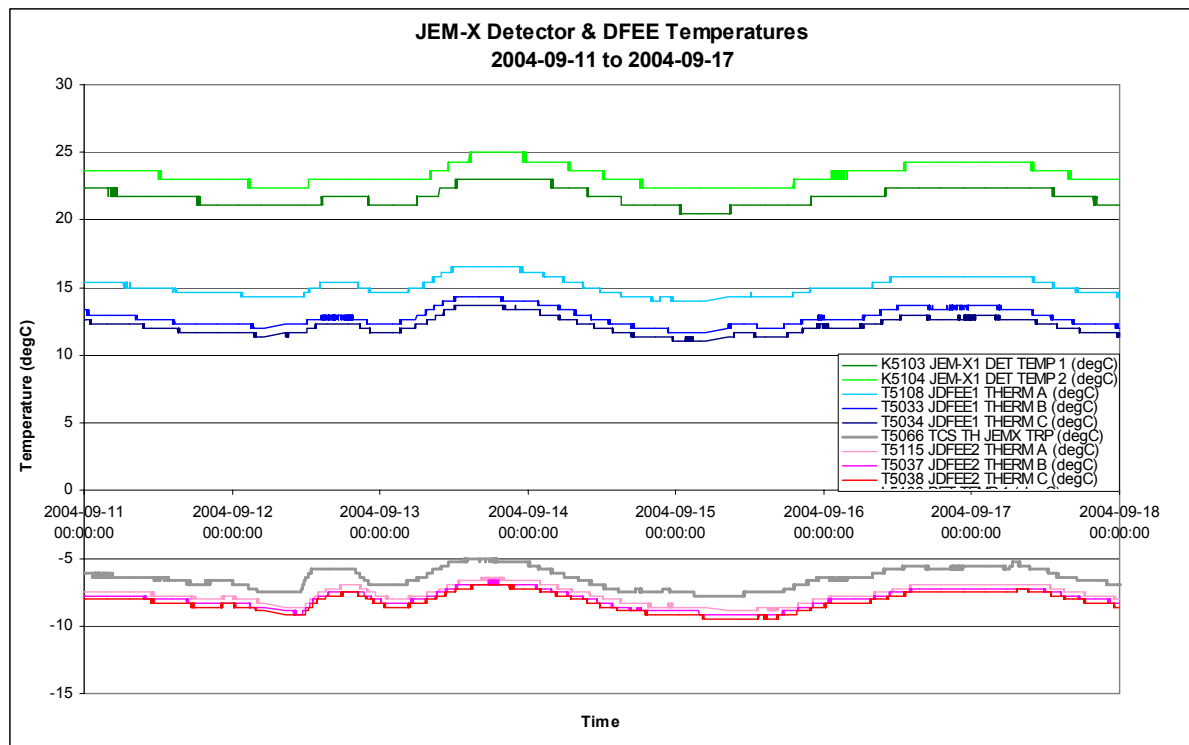
JEM-X count rates over the reporting period are displayed in the following graph¹.



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

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.



8.3.4.3 JEM-X Daily Report

2004-09-11 (DOY 255, Rev 233) to 2004-09-12 (DOY 256, Rev 233-234)

Nothing to report

2004-09-13 (DOY 257, Rev 234)

At 21:08Z the following radiation monitoring parameters from IREM went Out of Limits:

K5317 RAD MONITOR 3 (Dose Counter), value = 65, causing JEM-X1 to transition to Safe mode autonomously (issuing OEM 231 JEM-X1 AUTO EVENT 1). At 21:18Z commanding to JEM-X1 was disabled from the automatic Timeline.

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

2004-09-14 (DOY 258, Rev 234)

² Data sampled (1 frame in 8)

At 09:11Z an IREM S/W reset (# 14, ref: AR INT_SC-94) occurred, with all radiation monitor counters from IREM (TM parameters K5315-K5317) giving a value of 65535. This did not impact JEM-X1 as JEM-X1 was already in Safe mode.

As part of the recovery procedure in case of an IREM S/W reset, procedure FCP_DHS_1301 was executed to set the broadcast packet DRMC flag to DISREGARD at 09:36Z. JEM-X1 then transitioned to Setup mode and issued OEM 233 JEM-X1 AUTO EVENT 3.

Following the recovery of IREM, FCP_DHS_1301 was executed to set the broadcast packet DRMC flag back to REGARD at 14:00Z. At this time the background radiation levels, as reported by IREM, were still above the JEM-X1 safe thresholds, thus no recovery of JEM-X1 was planned for this time and the JEM-X1 RMC flags remained ENABLED. Therefore, once the broadcast packet DRMC flag was set back to REGARD, JEM-X1 transitioned back to Safe mode autonomously, issuing OEM 231 JEM-X1 AUTO EVENT 1.

At 19:48Z JEM-X1 performed an autonomous recovery to Setup mode (issuing OEM 233 JEM-X1 AUTO EVENT 3) after the IREM RMCR values had remained below the JEM-X1 thresholds for exiting from Safe mode for more than 10 minutes.

After waiting some time to verify that the radiation levels were stably within the JEM-X1 safe thresholds, the recovery of JEM-X1 for science operations was started at 21:13Z with the procedure FCP_JEM1_1010 (JEM-X1 Configuration Setting for Science Ops). At 21:46Z 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 21:55Z and JEM-X1 operations continued nominally.

2004-09-15 (DOY 259, Rev 234-235)

Nothing to report

2004-09-16 (DOY 260, Rev 235)

Between 04:58:27Z and 06:04:19Z, out of limits were received on the TM parameters K5119 SOFTWARE TRIGGER and K5136 BUFFER LOSS as follows:

- At 04:58:27Z K5119 SOFTWARE TRIGGER went soft out of limits (value = 20118), returning within limits at 04:58:59Z.
- At 04:59:07Z K5136 BUFFER LOSS went out of limits (value = 1025), returning within limits at 05:00:03Z.
- At 05:00:35Z K5119 SOFTWARE TRIGGER went soft out of limits (value = 20270), returning within limits at 05:30:59Z.
- At 05:31:07Z K5136 BUFFER LOSS went out of limits (value = 2725), returning within limits at 05:32:11Z.
- At 05:32:03Z K5119 SOFTWARE TRIGGER went soft out of limits (value = 20540) and then exceeded the hard limit at 05:33:31Z (value = 24321), after which it fluctuated between soft and hard OOL until it returned within limits at 06:02:11Z.

- At 06:03:15Z K5136 BUFFER LOSS went out of limits (value = 213), returning within limits at 06:04:19Z.

2004-09-17 (DOY 261, Rev 235)

Nothing to report

8.3.5 OMC Operations

On DoY 256, at 15:32:32, the following command was rejected:

```
2004.256.15.32.32.666 2004.256.15.32.24.280 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=8,TRIGGER M9079=3 M9080=131 M5001=61,IM B M9068=1 FIX2=0
M9069=2090
```

This command corresponds to a spurious TRIGGER command sent by ISDC, there was no impact.

On DoY 257, at 21:35:22, due to high radiation levels, OMC switched autonomously to SAFE mode. At 21:36, it was disabled in the automatic timeline and remained in that state until the following day at 14:36:57, when it was returned to STAND-BY, the impact being: pointing 02340055, which was interrupted near the end, (maybe this pointing can be saved), with pointings 02340056 through to 02340087 lost.

On DoY 258, from 02:32 until 03:38, there a ground station outage, which had no effect on OMC, which was in SAFE mode.

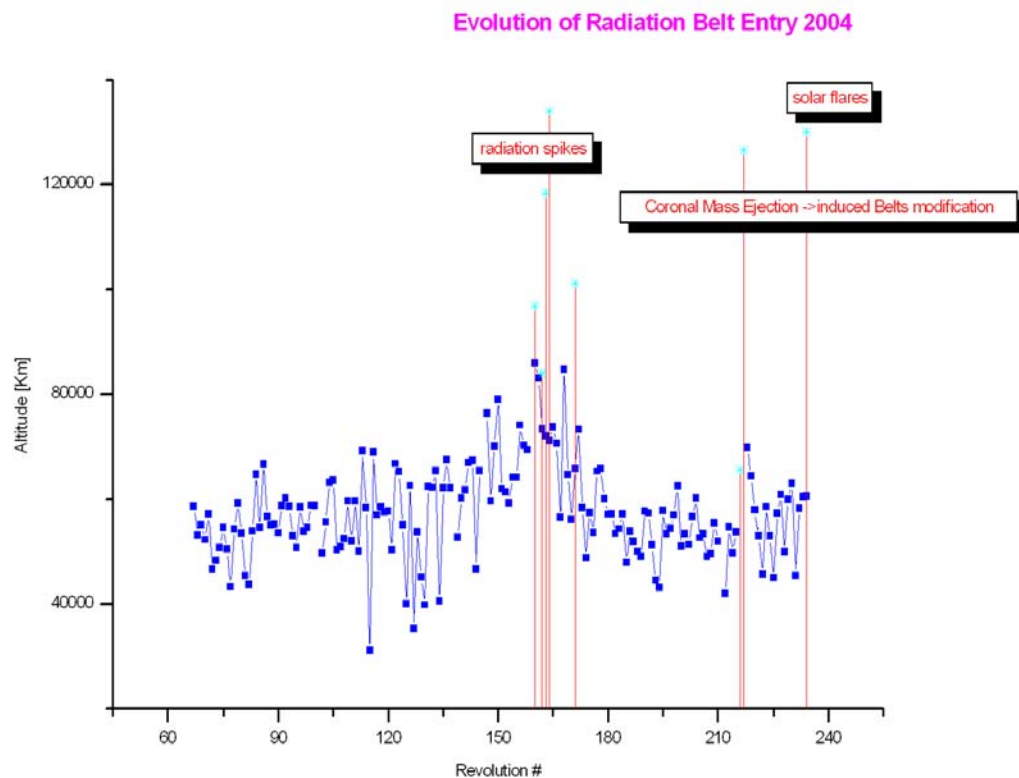
On DoY 258, at 09:11, there was an IREM SEU, which also had no effect on OMC, which was still in SAFE mode

On DoY 261, at 18:00, due to a drop in the links with the ground station, pointing 02350103 was missed. Later, at 23:29, another drop in TM caused the loss of pointing 02350113.

On DoY 256 at 02:07:17 and DoY 259 at 01:54:27, 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]
233	RAD ENTR R 2004-09-12T02:07:00Z	2004-09-12 02:41:08	>55225	2004-09-12 02:56:33	53926
234	RAD EXIT R 2004-09-12T11:12:28Z	2004-09-12 09:49:48	<27252	2004-09-12 09:56:33	26971
234	RAD ENTR R 2004-09-15T01:54:06Z	2004-09-15 01:36:12	>61884	2004-09-15 02:47:59	53314
235	RAD EXIT R 2004-09-15T10:59:20Z	2004-09-15 09:39:32	>>23145	2004-09-15 09:47:59	27764

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
233	PROTON_RAD_ENTR	2004-09-12 08:26:33	13097
234	PROTON_RAD_EXT	2004-09-12 08:46:33	15575
234	PROTON_RAD_ENTR	2004-09-15 08:07:59	12538
235	PROTON_RAD_EXT	2004-09-15 08:27:59	14813

IREM daily report

DoY 2004.258 (14/09/04)

At 09:11Z a local reset of the IREM CSCI S/W (SEU #14) occurred: as previously (see anomalies on 16/12/02, 01/01/03, 03/06/03, 11/07/03, 19/07/03, 05/08/03, 24/08/03, 26/12/03, 13/05/04, 16/05/04, 09/06/04, 12/06/04, 10/09/04) the status of the unit, before the occurrence of the anomaly, was nominal, here is a summary:

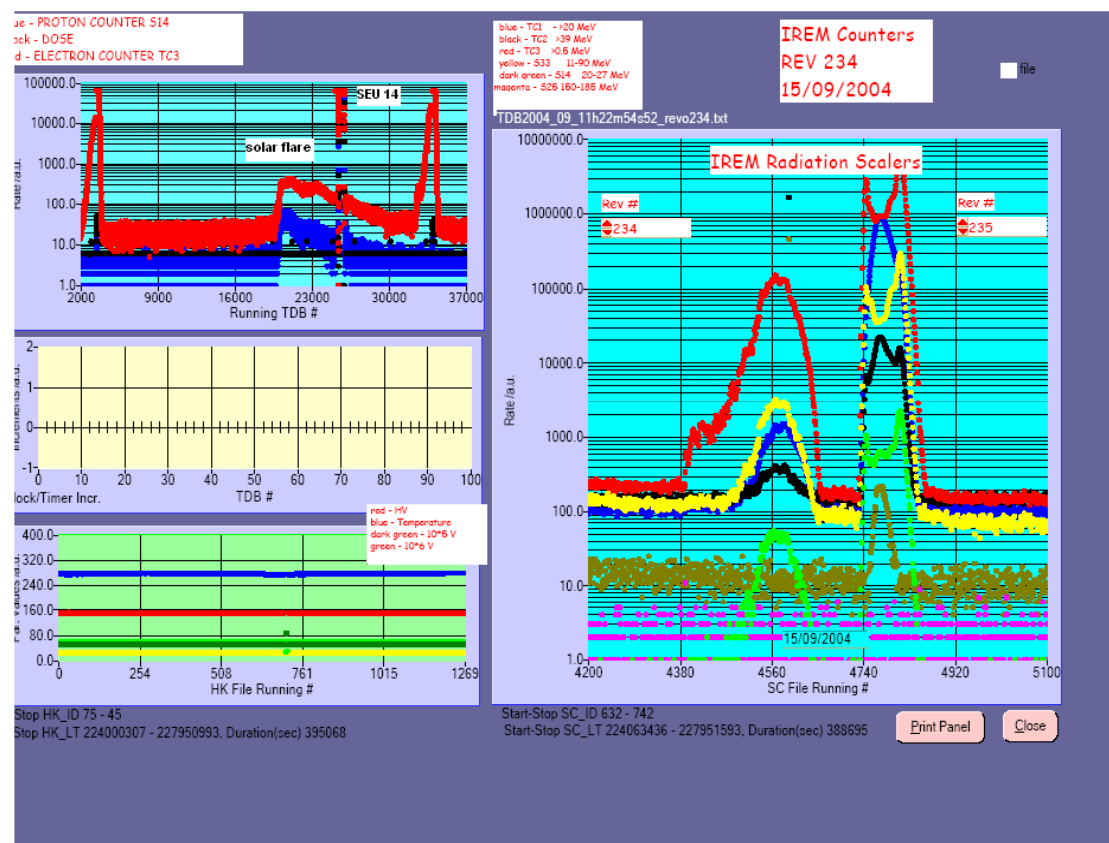
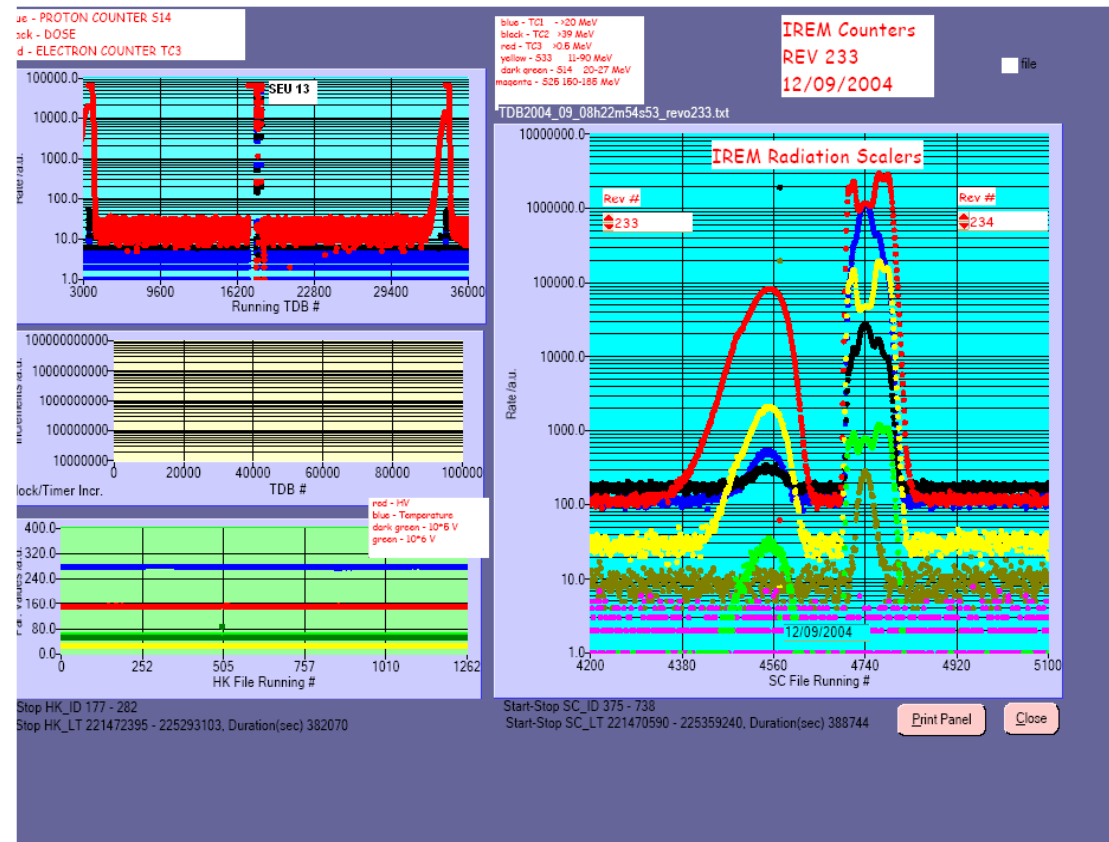
- 1) temperatures nominal
- 2) LCL current nominal
- 3) last HK before the anomaly HV, 5V and 6V voltages inside limits
- 4) the anomaly occurred at 2004.258.09.11.16z at about 136000 km and the unit performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex); just before the anomaly, radiation counters reported nominal values considering the position of the S/C along the orbit
- 5) the recovery of the unit started at 09:26z using procedure CRP_SYS_2570. The first dump of the status word after the anomaly shown a value of BCC0 HEX = 48320 DEC = 1011110011000000, ie. still the unit was reporting the status as if it was in Integral mode with counting ON, accumulation ON and checksum failure flag ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) dumping all registers bank gave a status word BC80 HEX = 48256 DEC = 1011110010000000, ie. the unit was still reporting the status as if it was in Integral mode but the checksum failure flag was OFF and the checksum counter in the register number 3 incremented of 1 unit.
- 7) The patch was performed successfully with the correct re-starting of the S/W. The operation was completed at 14:02Z.

The IREM automatic transition to Standard Mode did not affect the instruments since they were already into Safe mode due to a high radiation condition caused by the solar activity.

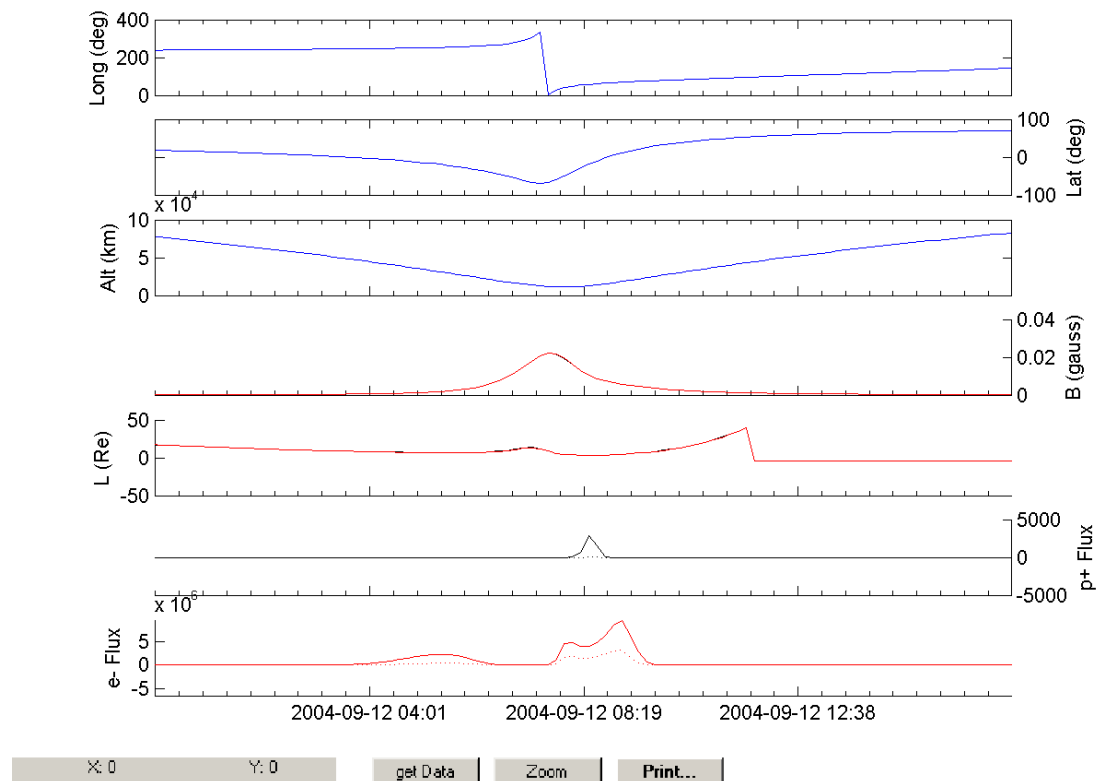
The cause of the IREM S/W reset is under investigation at MOC, but it is likely due to the unit's memory device, which is sensitive to ionising radiation (GCR). It is interesting to note that this event is the second of a presumed IREM SEU winter season, since the previous IREM S/W reset was reported on 10/09/2004.

This is the first case of an IREM reset during an on-going high radiation activity.

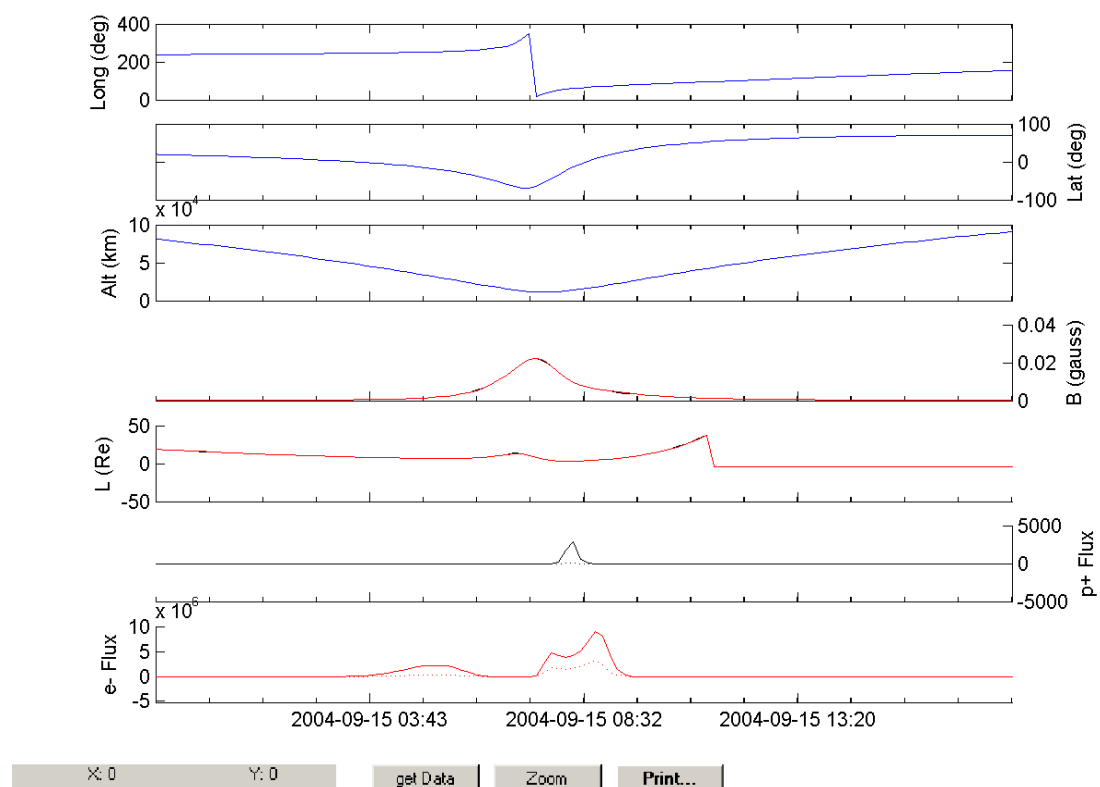
IREM radiation counters



IREM Predicted Radiation Belt Passages.Rev 233



Rev 234



SEC-GOES Observed Particles Fluxes.

