

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 110
Week 44
01.11.04
Routine Phase

Prepared by: M. Walker (OPS-OFO)

LIST OF CONTENTS

1	General.....	3
2	Summary of Activities.....	3
3	Satellite Status.....	3
3.1	Platform	3
3.1.1	AOCS	3
3.1.2	Power	3
3.1.3	Thermal.....	3
3.1.4	OBDH.....	3
3.1.5	RFS	4
3.2	Payload	4
3.2.1	SPI	4
3.2.2	IBIS	4
3.2.3	JEM-X	5
3.2.4	OMC.....	6
3.2.5	IREM	6
4	Ground Facilities.....	6
4.1	Mission Operations Centre.....	6
4.2	Ground Stations & Network.....	6
4.3	Science Ground Segment.....	6
4.3.1	ISOC	6
4.3.2	ISDC.....	7
5	Special Events.....	7
6	Anomalies.....	7
7	Future Milestones	8
8	Appendix.....	9
8.1	Overview of Revolutions	9
8.2	Consumables	9
8.2.1	Detailed Fuel Book-keeping.....	9
8.3	Detailed Satellite Information	9
8.3.1	AOCS Summary Operations Report 23/10/2004-29/10/2004	9
8.3.2	SPI Operations.....	10
8.3.3	IBIS Operations.....	13
8.3.4	JEM-X Operations.....	17
8.3.5	OMC Operations	19
8.3.6	IREM Operations	19

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1 General

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

It addresses the activities from 23.10.04 until 29.10.04 (both dates inclusive) and covers the revolutions 248 & 249.

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 IC443 (RA 06:42:4.00; DEC +22:27:28.0), the Sagittarius arm tangent (RA 19:00:1.43; DEC +06:55:17.0) and the Galactic Plane. The activities consisted of staring, raster 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.

2 slews (1OSL and 1CSL) were missed from the Timeline due to problem (delay) during the station handover between DSS24 and REDU on DoY 301.

The fuel consumption over the period between 23/10/2004 and 29/10/2004 was 0.155 kg. The remaining propellant is in the order of 167.0645 Kg.

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

3.1.2 Power

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

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

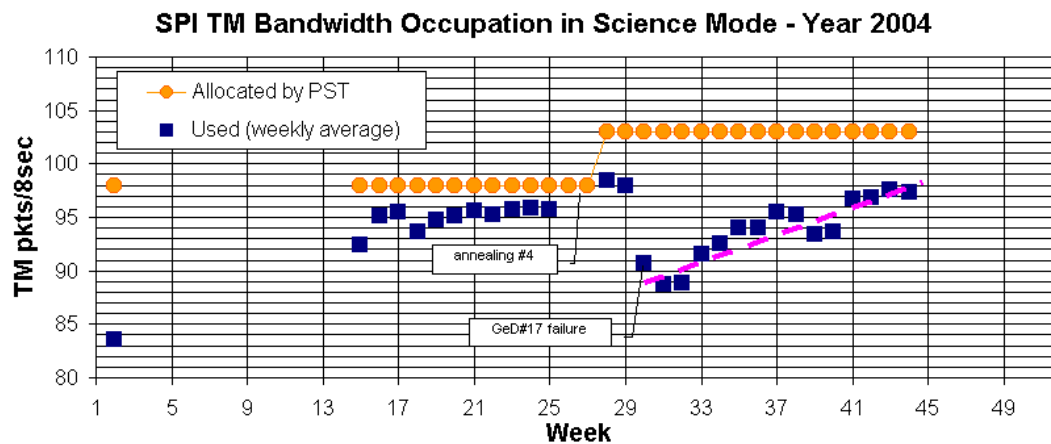
The RF subsystem is working properly. The link margin is sufficient to ensure proper TM reception and execution of commands with the ranging channel enabled.

3.2 Payload

3.2.1 SPI

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 blanking.

The instrument was kept in photon-by-photon mode with spectra TM enabled, an assigned TM bandwidth in the science observation windows of 103 pkts/cycle and an actual average occupation of 97.3 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.

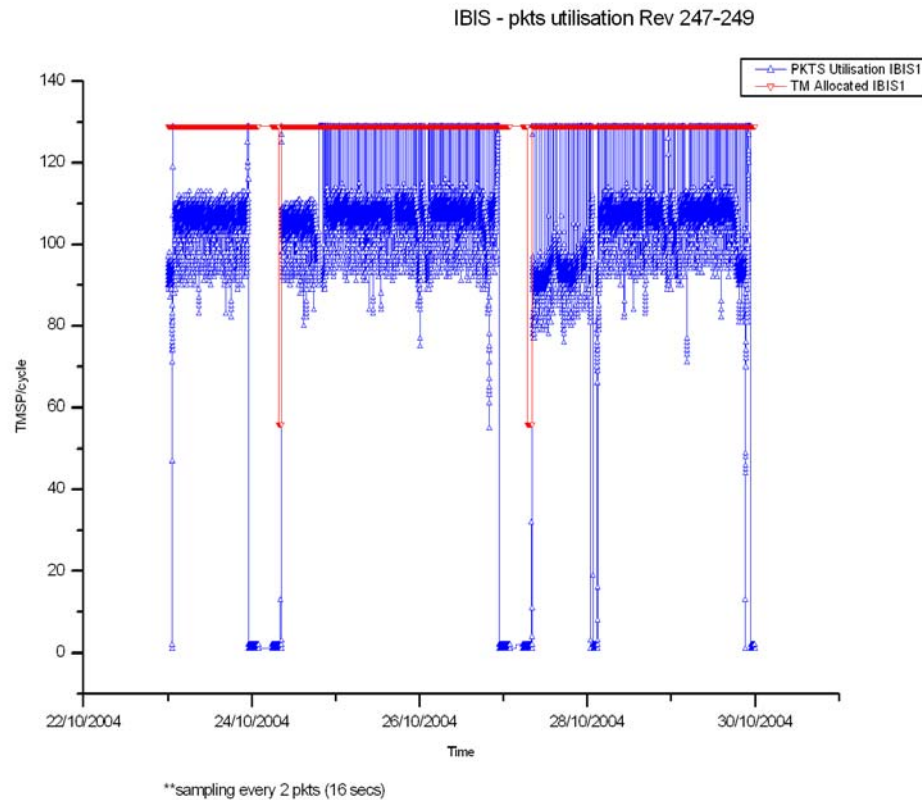
3.2.2 IBIS

The overall status of the unit is Nominal.

On DoY 302 an automatic reset of the IREM SW forced the transition of the unit to Stand-By with the VETO High Voltages and ISGRI Biases OFF.

During the reporting period the PST Allocation to IBIS was 129 TMSP / Cycle. The mean IBIS Bandwidth usage was 106 TMSP / Cycle, down 3.4 on last week.

A plot of the IBIS 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 an IREM S/W reset (see AR INT_SC-96), JEM-X1 science operations were interrupted between 2004-10-28T01:43Z (JEM-X1 to transition to Safe mode) and 2004-10-28T03:50Z (JEM-X1 recovered to Data Taking mode). JEM-X1 was then operated in Data Taking mode without IREM protection from this time until 2004-10-28T08:58Z, when IREM was recovered and all the IREM RMC protections for JEM-X1 were re-enabled. The activation of JEM-X1 was performed with the IODB values for the high voltage, which is currently 80 RAW. Thus, JEM-X1 was operated with a microstrip gas gain voltage (dV) of 80 RAW rather than the current nominal value of 79 RAW between 2004-10-28T03:50Z and the end of science observations in revolution 249 (2004-10-29T21:23Z).

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 189 OMC pointings executed nominally, 6 were 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.

On DoY 302.01.42.54z an automatic reset of IREM S/W (SEU#15), which impacted the instruments, forcing them to Safe Configuration occurred.

After the Payload reconfiguration, the unit was successfully recovered and currently no degradation of the performances is reported.

Solar Activity

The observation period was characterized by low solar activity.

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, 6 pointing were lost due to a cancelled pass.

4.1 Mission Operations Centre

The performance of the MOC was in general good in the reporting period, although there were problems with the link between MOC and ISDC.

4.2 Ground Stations & Network

The performance of the ground stations and Network was in general good this week. There were some problems with TM drops from both ground stations, a pointing was lost after a late handover from Redu to DSS-24. The overall performance though was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. AO-3

New proposals have started to be entered.

2. Mission planning

PSF's up to rev 255 received. Revolutions up to 253 have been planned. TSF's received up to rev 249. No re-planning performed this week and no ToO request received.

3. Observation status

No ECS/OCS activity since last week.

4. ISOC science data archive

No new data available. Agreement to ship archive hardware to Spain in November agreed. Investigations into how to copy proprietary status information from ISDC to ISOC has been started.

5. ISOC system

Version 10.6.0 is still operational. Version 10.6.1 is planned to be installed next week. This version will contain a modification to the sequence of moves of the centre of the 5 x 5 dither pattern as requested by ISWT.

6. Problems

Nothing new to report.

7. Move to ESAC / Vilspa

The ISOC operational hardware is now available in Spain together with the network. Last week the ISOC system has been successfully installed on the computers. The system is now in principle working but some tuning is still necessary. The test of the IFTS to be used when Spain is active was supposed to be tested this week. However, it had to be postponed a second time due to a delay in the upgrade of Network at MOC. The test will be repeated on the 2nd November 2004.

4.3.2 ISDC

Status of ISDC observation processing on 01/11/2004:

- Latest Standard Analysis completed: observation 02700020001 (3C 273, Revolution 207) on 31/10/2004
- 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 297, at 00:52, bad frames were received from DSS-16, there was no impact. At 01:02, the TCP was swapped from 1 to 2 as a precaution. The corresponding DR# is G104914.
- Later, at 13:30, the imca was showing yellow in the MMI global overview, due to the application launcher using 10% of the available cpu. This task was restarted on sun127 at 13:36 curing the problem.
- On DoY 299, at 02:24, due to a hit on the line, the TM & TC links with Redu dropped. At 02:27 the links were restored, without impact to the Timeline.
- At 09:00, there were data gaps on VC0 TM from Redu. There was no impact.
- On DoY 300, at 02:08, the handover from DSS-24 to Redu was delayed owing to the carrier being brought down late. The impact was pointing 02480059 was lost. The corresponding DR# was N-102443.
- At 08:54 there was a VC0 TM data gap from Redu. There was no impact.
- At 12:16, there was an error sending data to isds for about 2 seconds. No further action was taken, the system recovered autonomously.
- On DoY 301, at 10:14, there was a 2 second drop in the TM link with Redu, there was no impact.
- At 12:31, all link with Redu dropped, due to a hit-on-the-line. At 12:34, the links were back without impact.
- At 13:54, there was a brief data gap in TM from Redu, again no impact.
- On DoY 302, an IREM SEU caused JEM-X, IBIS & OMC to go to SAFE mode. See appendix for details.
- On DoY 303, at 12:55, the link isds-isdc was disconnected. TM started flowing once again at 13:05 after both the IFRD & ISDS machines were stopped and re-started. At 15:45, the link again became disconnected. At 15:52, TM was flowing again after the IFRD & ISDS machines were restarted.

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

AR id	Creation Date	Subject	Segment	Status
INT_SC-96	28/10/2004	IREM Anomaly: Reset of IREM_CSCI S/W #15, 28/10/2004	Payload	Open
INT-2668	28/10/2004	Rev. 247; 248; 249 TM Gaps from Redu	ESA Stations	Pending
INT-2669	01/11/2004	IDDA and IDDB Restart	CCC	Pending

7 Future Milestones

The Next eclipse season starts on the 23rd November 2004, and continues until the 17th December 2004. There will be a total of 9 eclipses, with a maximum duration of 57 minutes 41 seconds on 8th December 2004.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 248

The observations in revolution 248 consisted of a staring observation of IC443 (RA 06:42:4.00; DEC +22:27:28.0) lasting ~11 hours, followed by a raster dithering observation of the Sagittarius arm tangent (RA 19:00:1.43; DEC +06:55:17.0), performed for the remaining ~49 hours of observation time.

Revolution 249

The observations in revolution 249 consisted of a GPS lasting ~16 hours, followed by a raster dithering observation of the Sagittarius arm tangent (RA 19:00:1.43; DEC +06:55:17.0), performed for the remaining ~45.5 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.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2004-10-13T17:34:42.000Z	167.3817	F	Automatic TM processing.
2004-10-14T23:39:34.000Z	167.3397	F	Automatic TM processing.
2004-10-15T07:19:50.000Z	167.3314	F	Automatic TM processing.
2004-10-15T15:57:19.000Z	167.2968	F	Automatic TM processing.
2004-10-18T00:38:54.000Z	167.2747	F	Automatic TM processing.
2004-10-18T06:46:15.000Z	167.2646	F	Automatic TM processing.
2004-10-19T17:16:10.000Z	167.2332	F	Automatic TM processing.
2004-10-21T06:33:34.000Z	167.2191	F	Automatic TM processing.
2004-10-22T16:45:21.000Z	167.1977	F	Automatic TM processing.
2004-10-24T06:23:41.000Z	167.1802	F	Automatic TM processing.
2004-10-24T19:23:59.000Z	167.1656	F	Automatic TM processing.
2004-10-25T17:00:41.000Z	167.1399	F	Automatic TM processing.
2004-10-27T06:15:17.000Z	167.1296	F	Automatic TM processing.
2004-10-27T15:07:26.000Z	167.1141	F	Automatic TM processing.
2004-10-27T22:16:39.000Z	167.0645	F	Automatic TM processing.

This report was generated Fri Oct 29 08:00:19 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 23/10/2004-29/10/2004

AOCS operations were executed from the Automatic Timeline.

During this period, 73 Open Loop Slews, 135 Closed Loop Slews and 6 Momentum Bias were executed. 2 slews were missed. This is equivalent to a 1 %.

23/10/04 (Day of Year 297, Revolution 247)

Nothing to report.

24/10/04 (Day of Year 298, Revolution 247-248)

Nothing to report.

25/10/04 (Day of Year 299, Revolution 248)

Nothing to report.

26/10/04 (Day of Year 300, Revolution 248)

Slews missed from the Timeline due to delay in the station handover Goldstone to Redu: Due to a delay in the station handover Goldstone (DSS24) to Redu, the slew 02480059 (OSL) was missed from the Timeline and 02480060 (CSL) performed manually. During the period from 01:37Z to 2:40Z INTEGRAL was staring in the attitude of PID 02480058.

27/10/04 (Day of Year 301, Revolution 248-249)

Flickering of the Pointing-Bit at the end of open loop slew due to Roll Error: At the end of open loop slew 02490002 the error in roll with respect to the Sun-Steering-Law assumed roll angle was $\sim +180$ 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 02490001. 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.

28/10/04 (Day of Year 302, Revolution 249)

Nothing to report.

29/10/04 (Day of Year 303, Revolution 249)

Nothing to report.

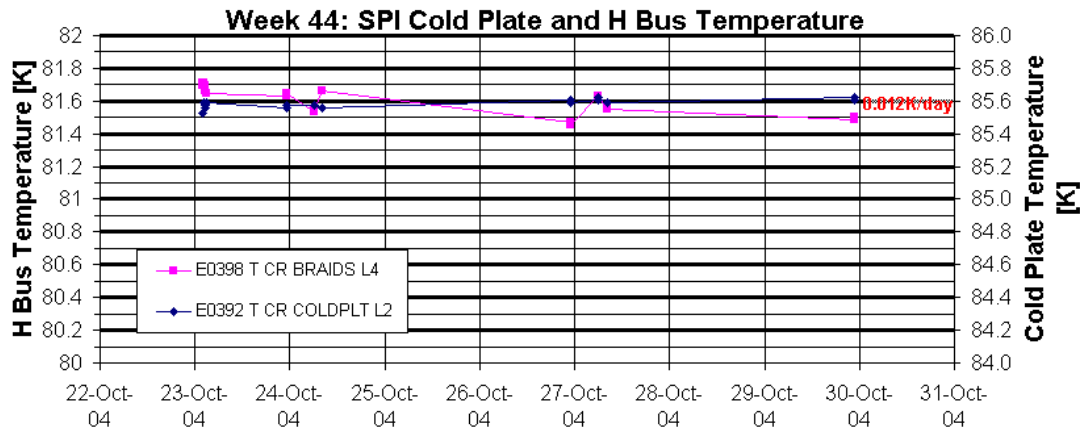
8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The performance of the cryo-cooler is nominal.

The cold plate temperature was maintained at 85K $\pm$ 1K showing the expected small positive drift.

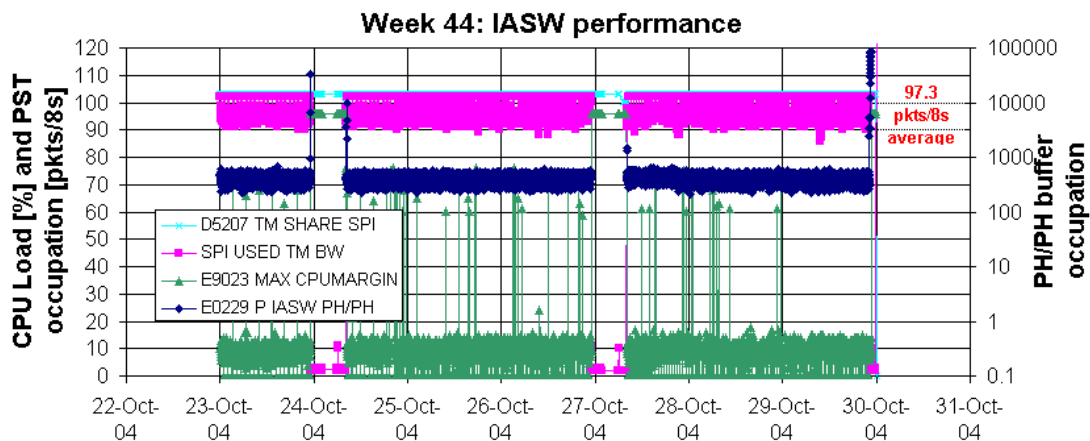
The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



IASW/DPE:

The performance of the IASW/DPE is nominal.

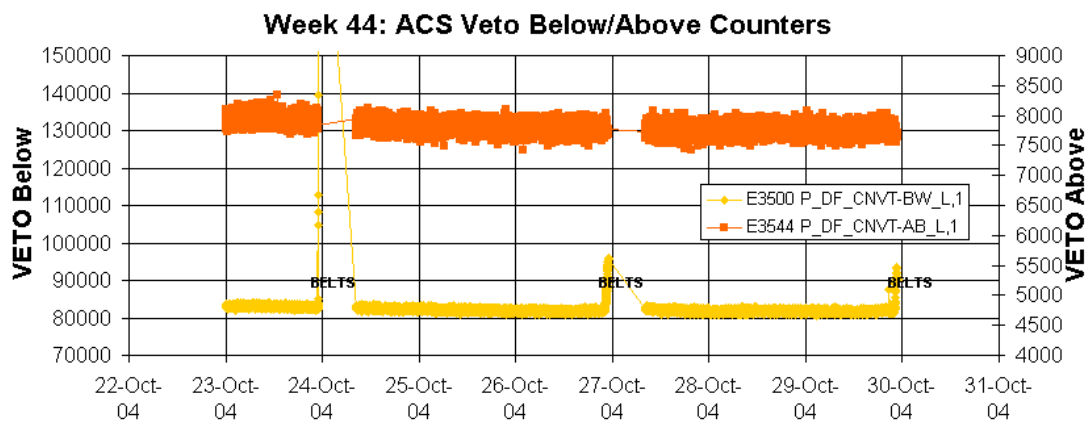
The following diagram shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal.

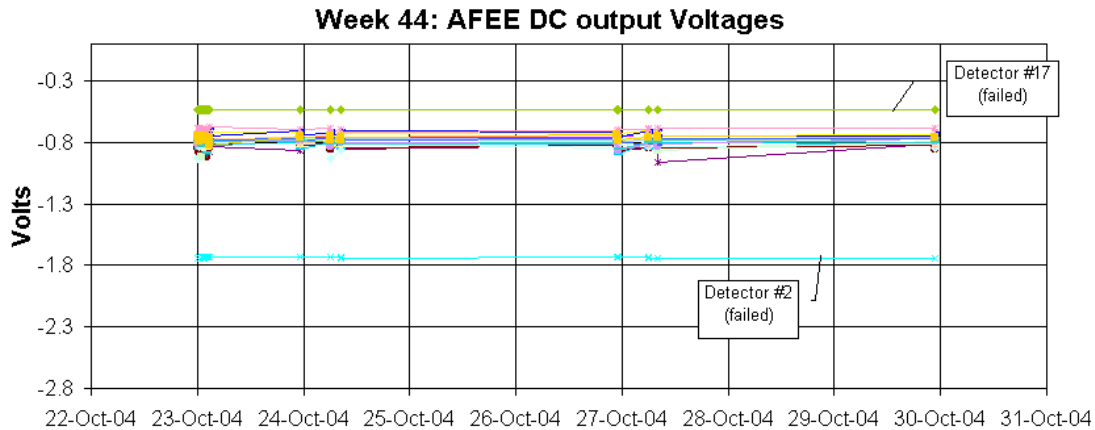
The following plot shows the ACS overall count rate evolution during the reporting period.



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.

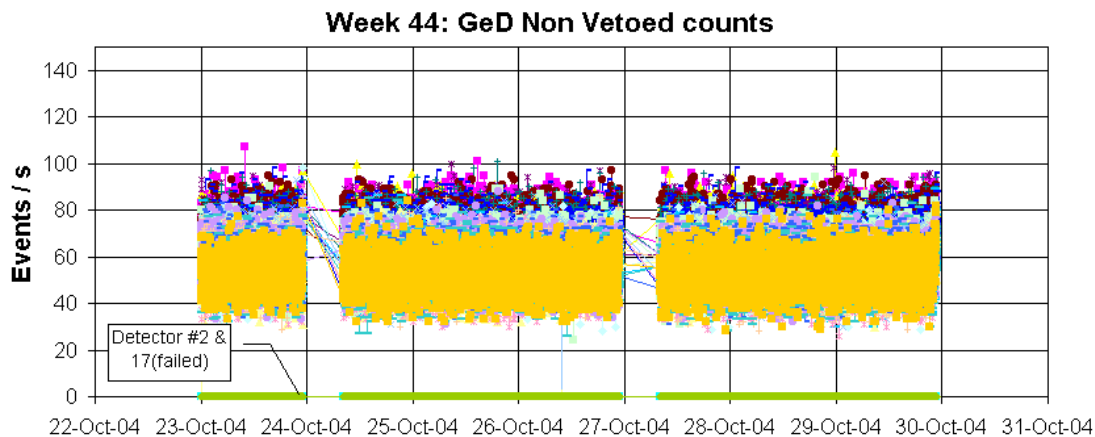
The following plot shows the AFEE dc output signals during the reporting period.



DFEE:

The performance of the unit is nominal.

The following plot shows the Non Vetoed event rates, 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.

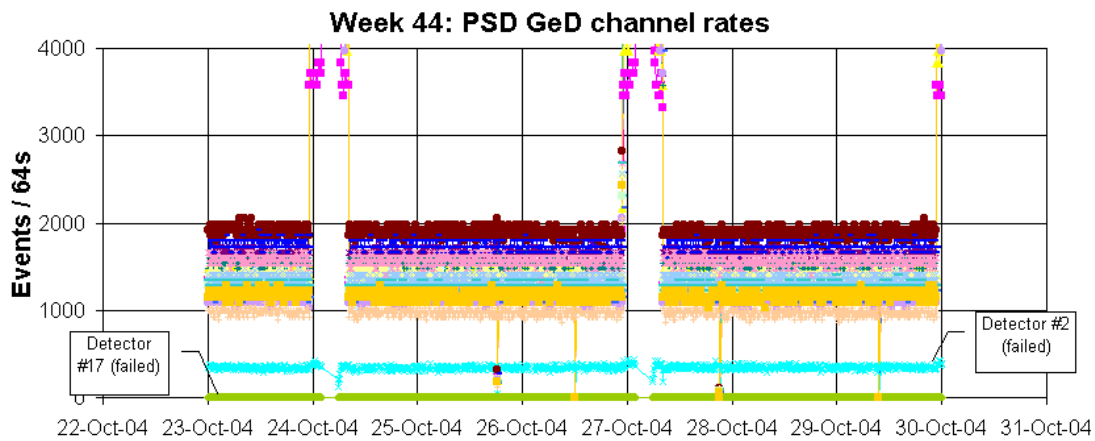


PSD:

The performance of the unit is nominal, though the malfunction of the channel rates blanking reproduced itself also this week (see AR INT_SC-90 for a detailed description of the anomaly).

An IASW patch is under final acceptance testing at Cern to enable the Sci HK TM downlink inside the radiation belts. This would allow the deletion of the Out-Of-Limit currently defined for the PSD channel rates, thus removing the false alarms associated to the malfunction.

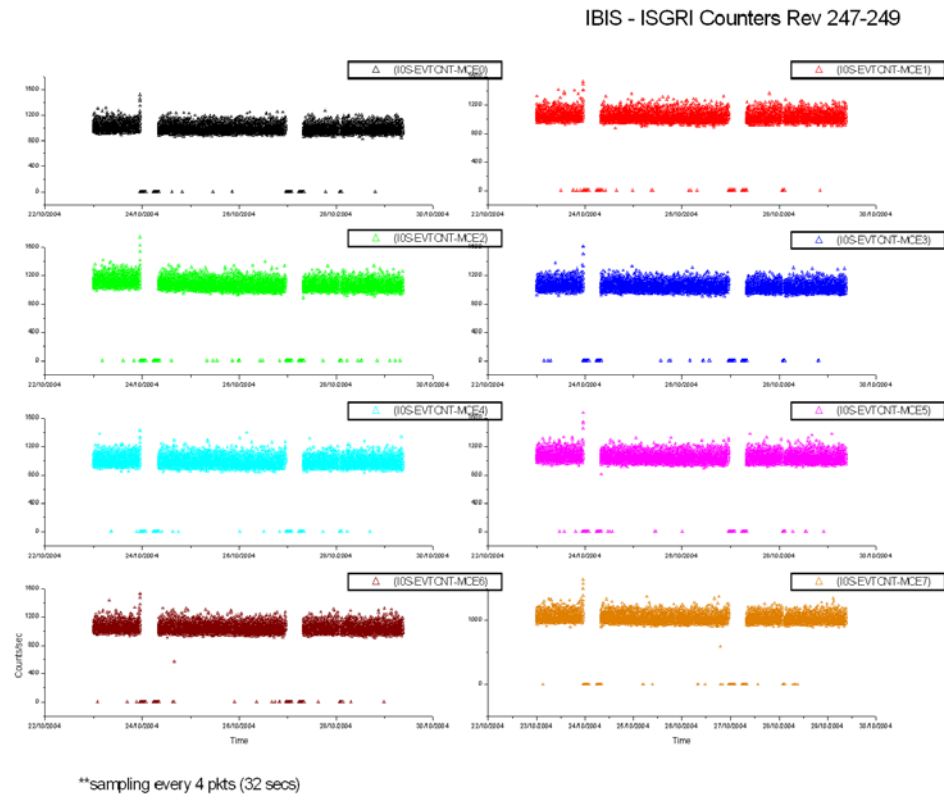
The following plot shows the PSD channel rates during the reporting period.



8.3.3 IBIS Operations

IBIS Event Counters Plots.

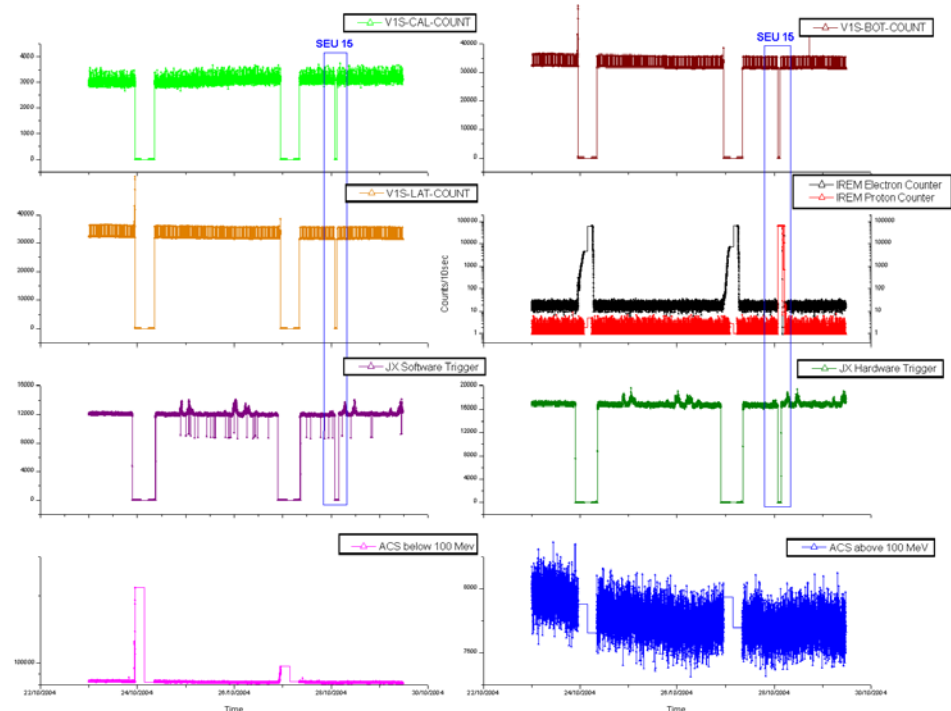
ISGRI Counters:



VETO vs Payloads Counters

The week was characterised by low solar activity. An automatic reset of the IREM SW (SEU #15) occurred on DoY 302.01.42.54z, which had an impact on the instruments, forcing them to Safe Configuration.

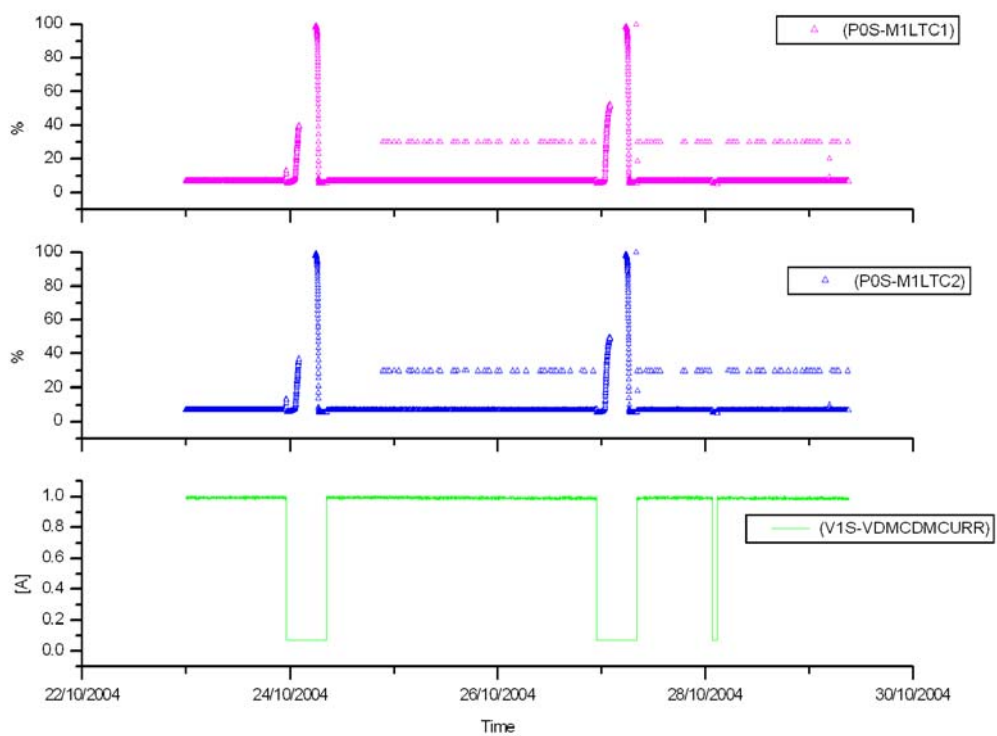
IBIS-VETO vs Payloads Counters Rev 247-249



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

Veto Current:

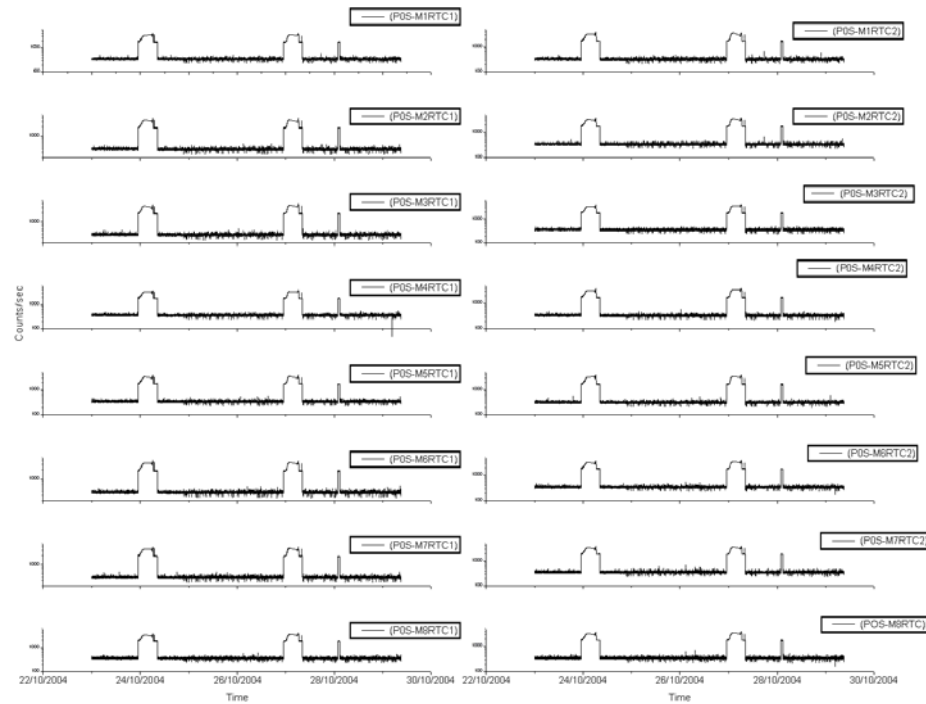
IBIS-VETO Current & PICsIT dead times Rev 247-249



**sampling every 4 pkts (32 secs)

Picsit Counters:

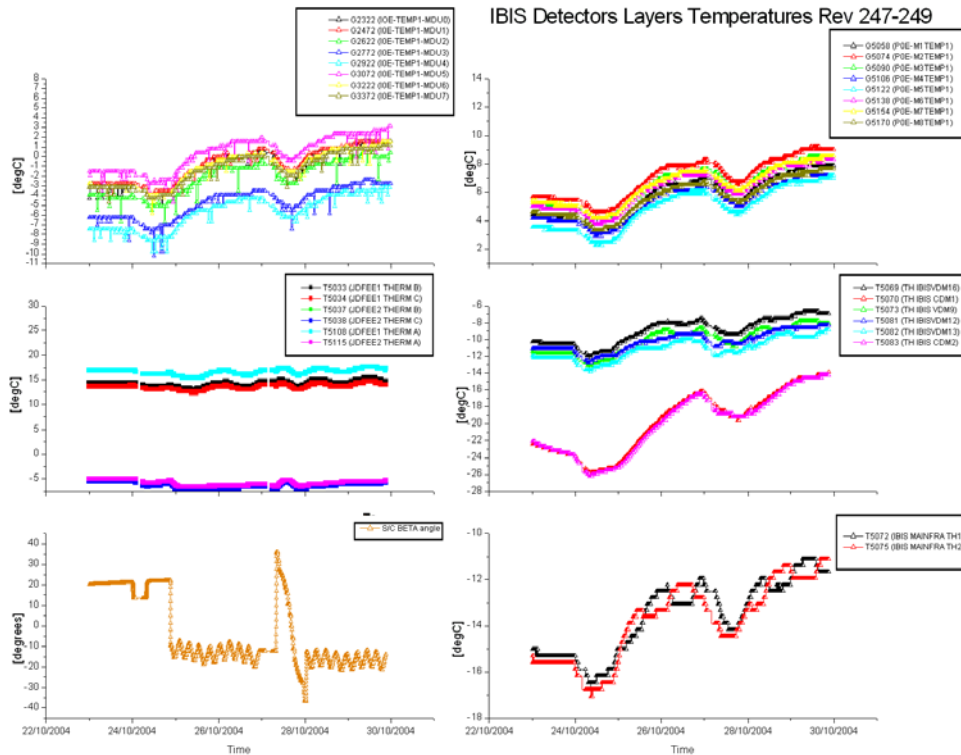
IBIS - PICsIT Counters Rev 247-249



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures

IBIS Detectors Layers Temperatures Rev 247-249



**sampling every 8 pkts (64 secs)

IBIS daily report

Recently there have been many occurrences of the Veto 28 V PMT set by IASW (parameter G8015) in out of limits (warning high >29.4 V) for few TM cycles. This value is set by the IASW and not through the payloads PPDU or VETO power interface. The parameter toggled out/in limits reaching the limit value 29.4 V triggering the warning condition. During the event the VETO PMTs were OFF as it is nominally inside Radiation Belts and no further action was taken. Clarification is ongoing with the IBIS PIs.

DoY 2004.297 (23/10/04)

At 01:02Z the IBIS/PICsIT Histograms (S7,S5 pkts) generation process stopped: the anomaly is due, as previously (see INT_SC-52-66), to the setting of GSHF (Ground Station Handover Flag) coinciding with the starting of the S5 (PICsIT Calibration Histogram) process, which happened during the Station Handover from REDU to DSS16 at 00:03Z. According to the OR-109 the operator applied FCP_IBIS1_312 forcing the downloading of the PICsIT Histograms. At 01:20Z the unit went back in Scientific Standard Mode. No new AR was generated because the problem is known and the specific procedure is available (resolution of GS Coord. Meeting 13-9-03).

DoY 2004.298 (24/10/04)

Nothing to report.

DoY 2004.299 (25/10/04)

Nothing to report.

DoY 2004.300 (26/10/04)

At 11:43Z the parameter G2028 (ISGRI Overflow of the noisy pixel address buffer in MCE2) reported OOL (SCC Fail) for few TM cycles. According to the Payloads FDIR document no action was taken.

DoY 2004.301 (27/10/04)

At 08:21Z a few occurrences (3) of the OEM APID 1280 ID 131 Class 2 <<IBIS IASW HEPI Data included Time overflow error>> were reported. According to the Payloads FDIR document no action was taken.

DoY 2004.302 (28/10/04)

At 01:43Z an IREM automatic transition to Standard Mode (reset of the CSCI S/W, SEU number 15) occurred. The anomaly affected the instrument status via the BCPKT forcing the automatic transition of IBIS to Stand-By with the VETO High Voltages and ISGRI Biases OFF.

The recovery of the unit was completed at 03:59Z when the unit was re-enabled in the automatic scheduling system (see IREM report for the details).

DoY 2004.303 (29/10/04)

At 04:39 parameters G5068 and G5072 (PDM Y: Semimod X FIFO Error Flag) parameters families indicated OOL (SCC FAIL). According to the Payloads FDIR document (action P-FIF-1) no intervention was required. All the parameters returned within limits after few TM cycles.

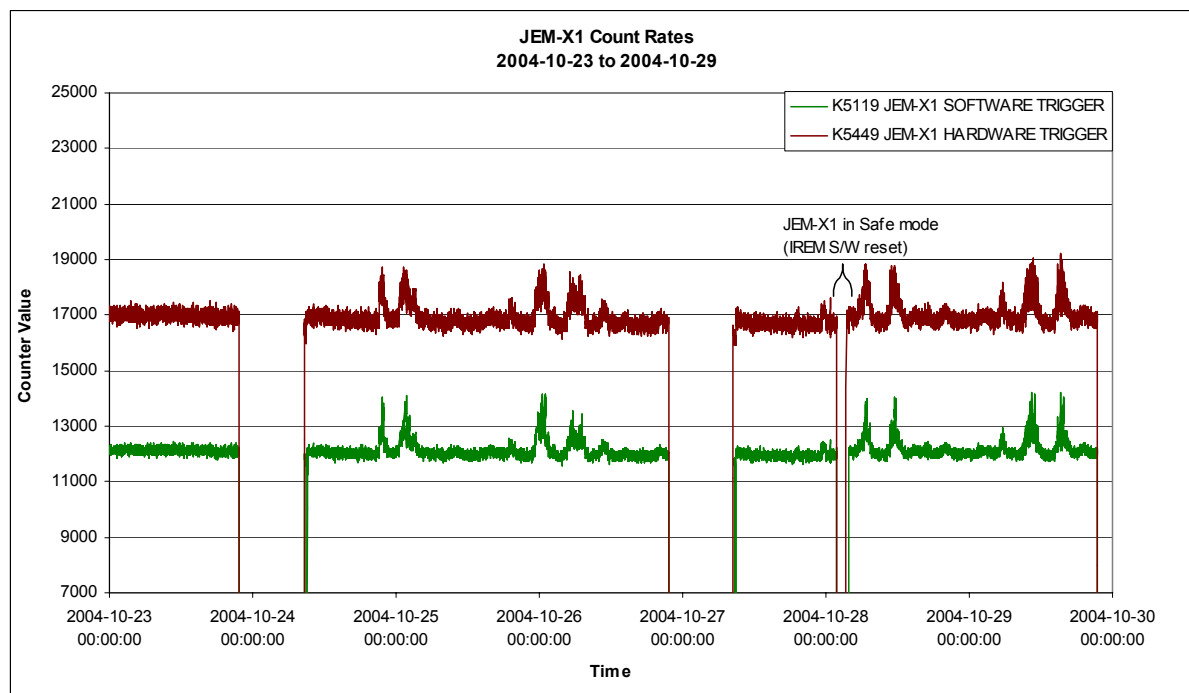
At 12:30Z the parameter G2056 (ISGRI Overflow of the noisy pixel address buffer in MCE4) showed OOL (SCC Fail) for few TM cycles. According to the Payloads FDIR document no action was taken.

At 21:11Z the IBIS/PICsIT Histograms (S7,S5 pkts) generation process stopped: the anomaly is due, as previously (see INT_SC-52-66), to the setting of the GSHF (Ground Station Handover Flag) coinciding with the starting of the S5 (PICsIT Calibration Histogram) process, which happened during the Station Handover from REDU to DSS16 at 19:06Z. According to the OR-109 the operator applied FCP_IBIS1_312 forcing the downloading of the PICsIT Histograms. At 21:21Z the unit was returned to Scientific Standard Mode. No new AR was generated as the problem is known and the specific procedure is available (resolution of GS Coord. Meeting 13-9-03).

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

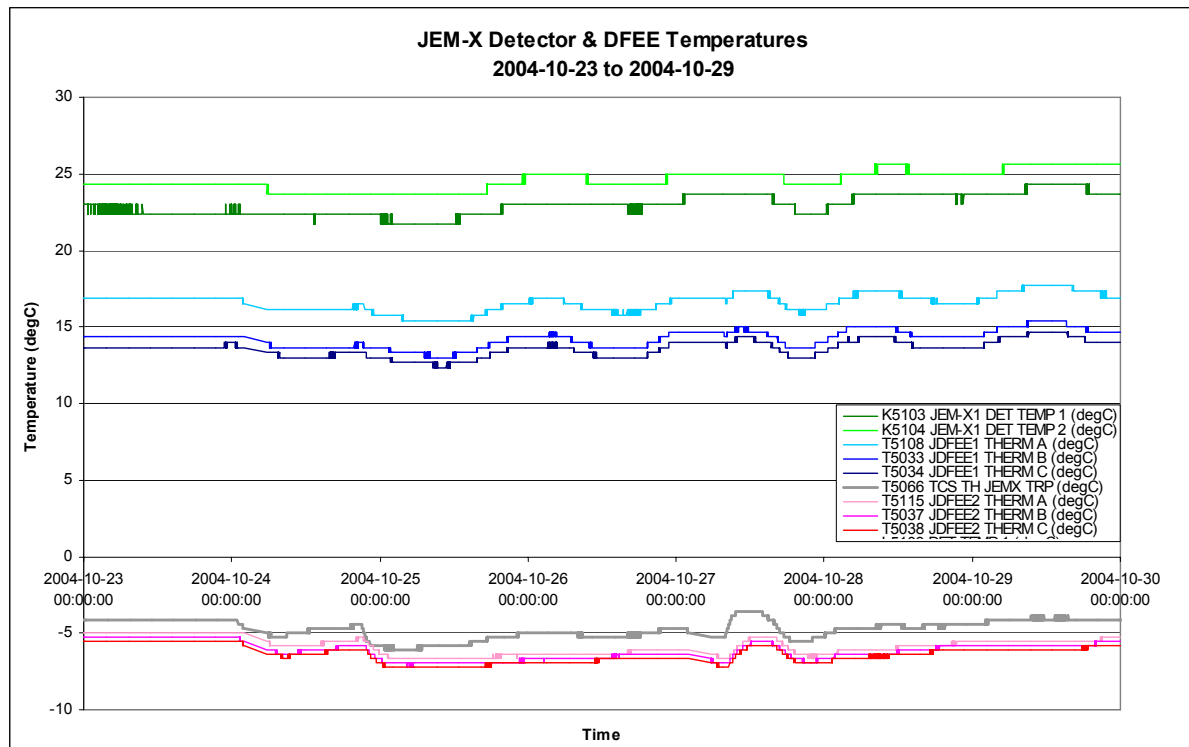
JEM-X count rates over the reporting period are displayed in the following graph¹.



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

2004-10-23 (DoY 297, Rev 247) to 2004-10-27 (DoY 301, Rev 248-249)

Nothing to report

2004-10-28 (DoY 302, Rev 249)

At 01:43Z an IREM S/W reset (# 15, ref: AR INT_SC-96) occurred, with all radiation monitor counters from IREM (TM parameters K5315-K5317) giving a value of 65535, causing JEM-X1 to transition to Safe mode, issuing OEM 231 JEM-X1 AUTO EVENT 1. Commanding to JEM-X1 was then disabled from the automatic Timeline at 01:45Z.

As part of the instruments' 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 02:26Z. JEM-X1 then transitioned to Setup mode and issued OEM 233 JEM-X1 AUTO EVENT 3.

² Data sampled (1 frame in 8)

The reconfiguration of JEM-X1 for the resumption of science activities was started at 03:19Z, with the procedure FCP_JEM1_1010. This was followed by procedure FCP_JEM1_0044 to command JEM-X1 back to Data Taking at 03:50Z.

The activation of JEM-X1 was performed with the IODB default values for the microstrip gas gain voltage (dV) of 80 RAW (rather than the current JEM-X1 nominal HV, set by ISOC via the POS, of 79 RAW).

At 03:53Z FCP_JEM1_0120 was executed to set the JEM-X1 broadcast packet overrides for the IREM Radiation Monitor Count flags (TM parameters K5474 to K5476) to DISABLED. Commanding to JEM-X1 from the automatic Timeline was then re-enabled at 03:59Z.

JEM-X1 was thus operated in Data Taking mode without IREM protection until IREM had been recovered and the IREM count rates had been monitored for ~2 hours to check their stability. Then, at 08:23Z FCP_DHS_1301 was executed to set the broadcast packet DRMC flag back to REGARD. At 08:58Z the JEM-X1 RMC flags were set back to ENABLED by procedure FCP_JEM1_0120.

JEM-X1 operations then continued nominally.

2004-10-29 (DoY 303, Rev 249)

Nothing to report

8.3.5 OMC Operations

On DoY 300, at 02:08, a delayed handover caused the loss of pointing 02480059. It was at this time that the M1130 command for that pointing was rejected:

```
2004.300.02.21.38.026 2004.300.02.21.27.764 1792 Real Time Rejection 131  
REJECTED TC1  
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=130,RESET IM M9068=1 FIX2=0  
M9069=943
```

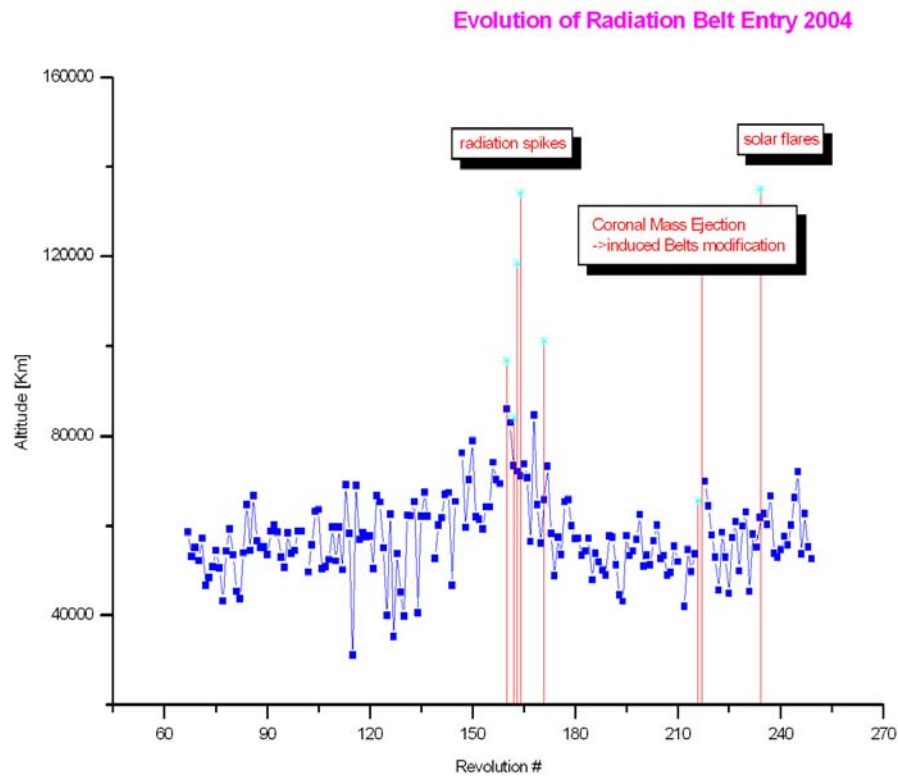
At 02:51, the M1500 command (STDBY) was sent manually, to configure the OMC for the next pointing, which commenced at 02:54, and was completed nominally.

On DoY 302 at 01:43:07, a SEU within the IREM unit caused the OMC to be switched to SAFE mode. It was recovered back to Stand-by at 03:58:18, the impact was pointings 02490029 to 02490033 were lost.

On DoY 297, at 23:09:03 and DoY 300, at 22:58:24, 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]
247	RAD ENTR R 2004-10-23T23:08:41Z	2004-10-23 22:50:30	62723.0	2004-10-23 23:58:37	53185.53
248	RAD EXIT R 2004-10-24T08:15:44Z	2004-10-24 06:40:30	>23170.8	2004-10-24 06:58:37	27712.85
248	RAD ENTR R 2004-10-26T22:58:03Z	2004-10-26 23:30:30	55261.3	2004-10-26 23:43:01	53727.09
249	RAD EXIT R 2004-10-27T08:05:35Z	2004-10-27 06:35:50	23177.0	2004-10-27 06:53:01	28632.64
249	RAD ENTR R 2004-10-29T22:45:59Z	2004-10-29 23:41:02	52595.0	2004-10-29 23:33:01	53112.91

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
247	PROTON_RAD_ENTR 2004-10-24 05:28:37	13742.51
248	PROTON_RAD_EXT 2004-10-24 05:38:37	14954.38
248	PROTON_RAD_ENTR 2004-10-27 05:13:01	13357.31
249	PROTON_RAD_EXT 2004-10-27 05:23:01	14469.04

IREM daily report

DoY 2004.302 (28/10/04)

At 01:43Z a local reset of the IREM CSCI S/W (SEU #15) was reported: The incident was the same as those which occurred 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 and 14/09/04. The status of the unit, before the anomaly, was nominal, here is the summary:

- 1) temperatures nominal
- 2) LCL current nominal
- 3) The last HK before the anomaly HV, 5V and 6V voltages inside limits
- 4) The anomaly occurred at 2004.302.01.42.54z at 131828 km altitude. 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 01:45z, 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. The unit was still showing 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 the entire register bank give a status word BC80 HEX = 48256 DEC = 1011110010000000, ie. The unit is still reporting the status as if it was in Integral mode but the checksum failure flag is now 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 08:26Z.

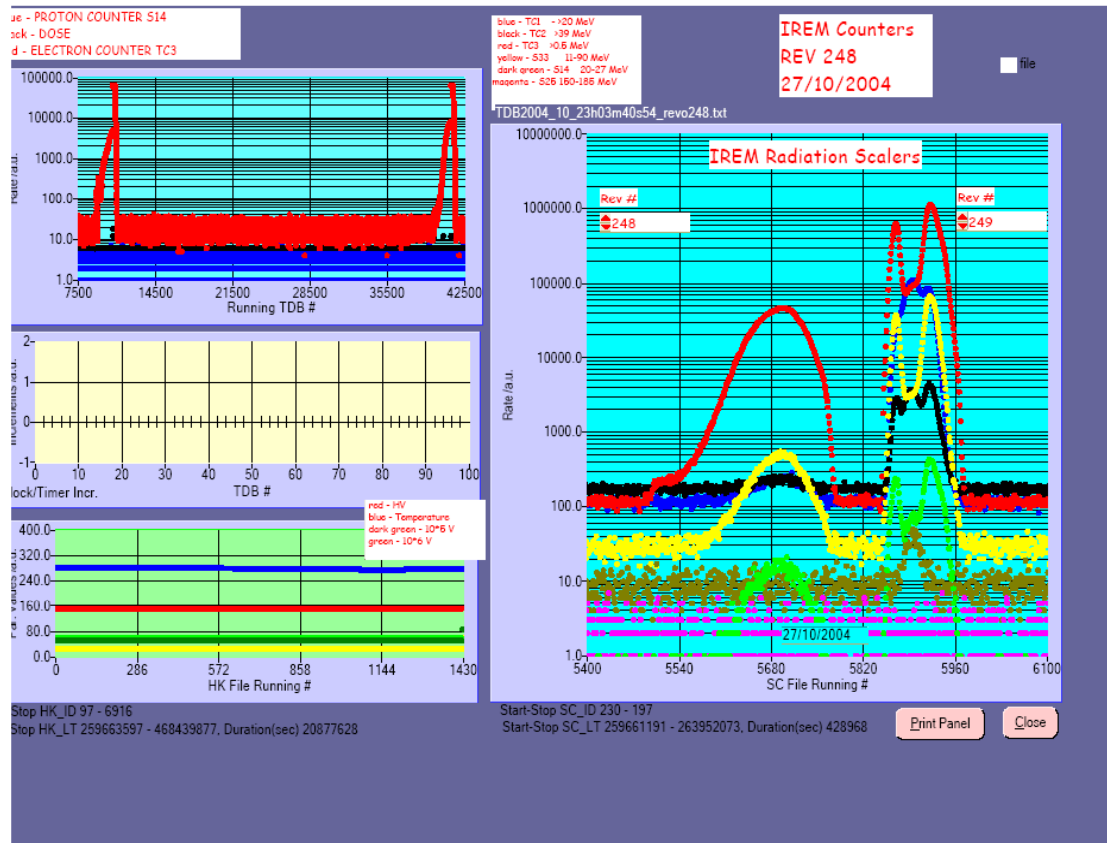
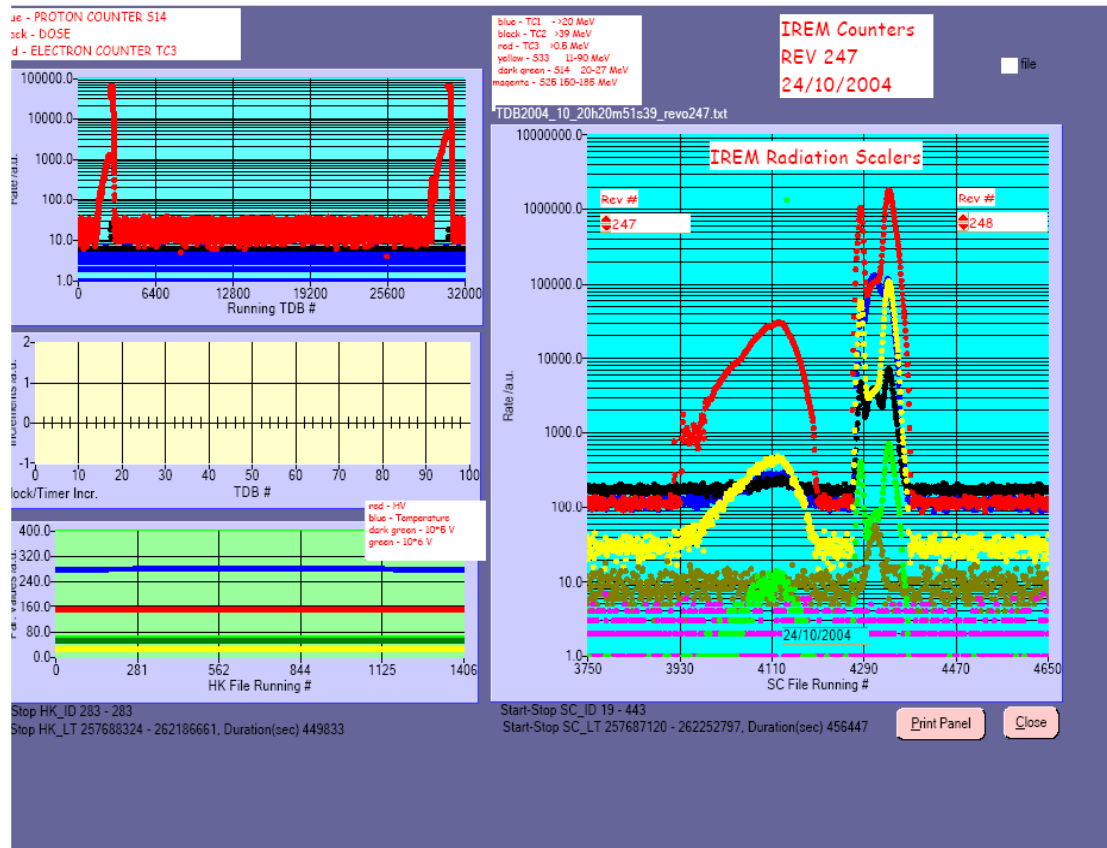
The IREM automatic transition to Standard Mode affected the instruments since it forced them to automatically enter Safe configuration, except for SPI whose automatism is disabled according to SPI PIs request.

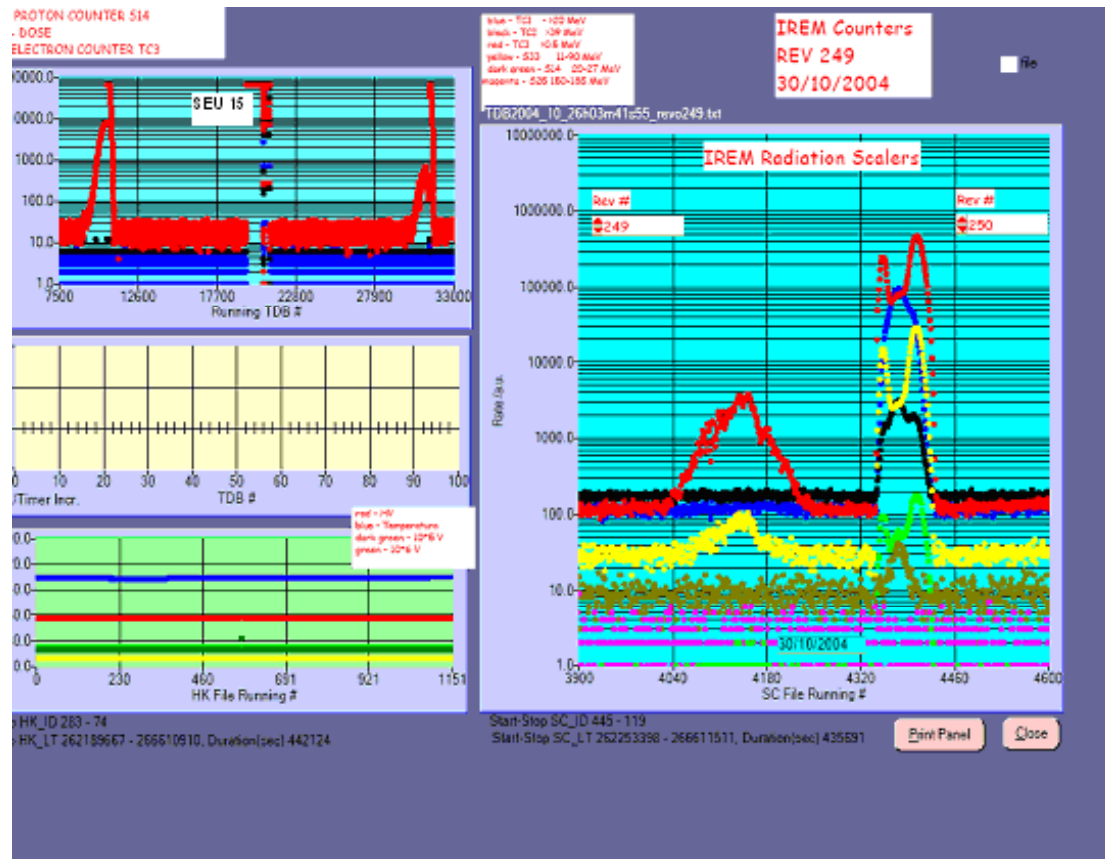
The recovery of the payloads was performed as follows:

- IBIS re-enabled at 03:07Z
- JEM-X1 re-enabled at 03:50Z
- OMC re-enabled in the automatic scheduling system at 03:58Z

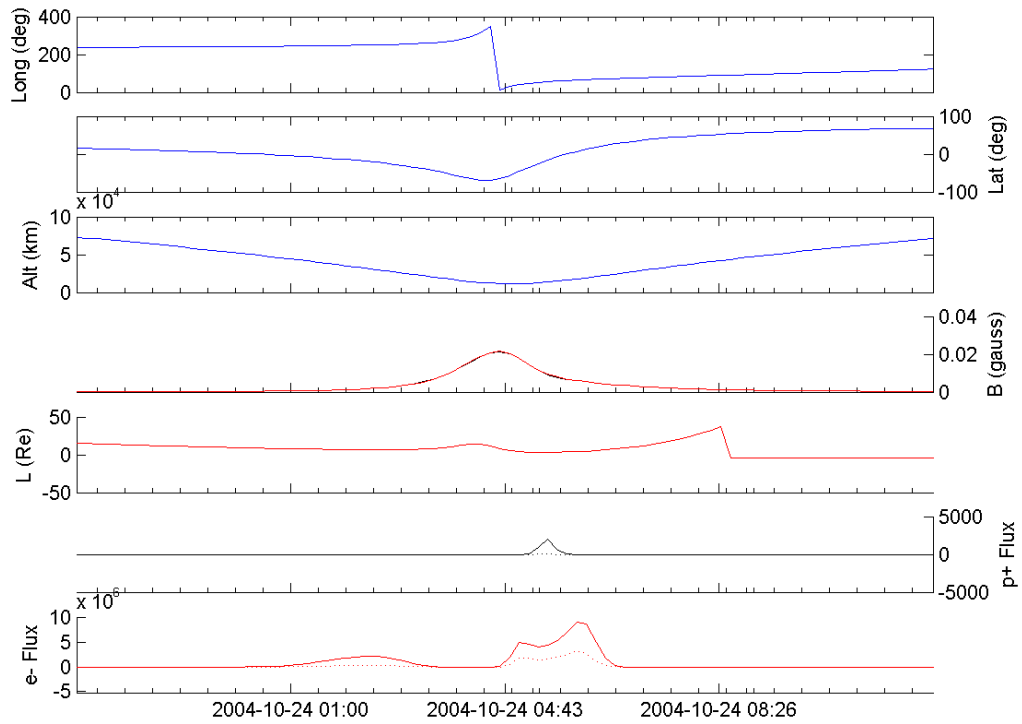
The cause of this S/W reset is still under investigation, but it is apparently due to the unit's memory device, which is sensitive to ionising radiation.

IREM radiation counters



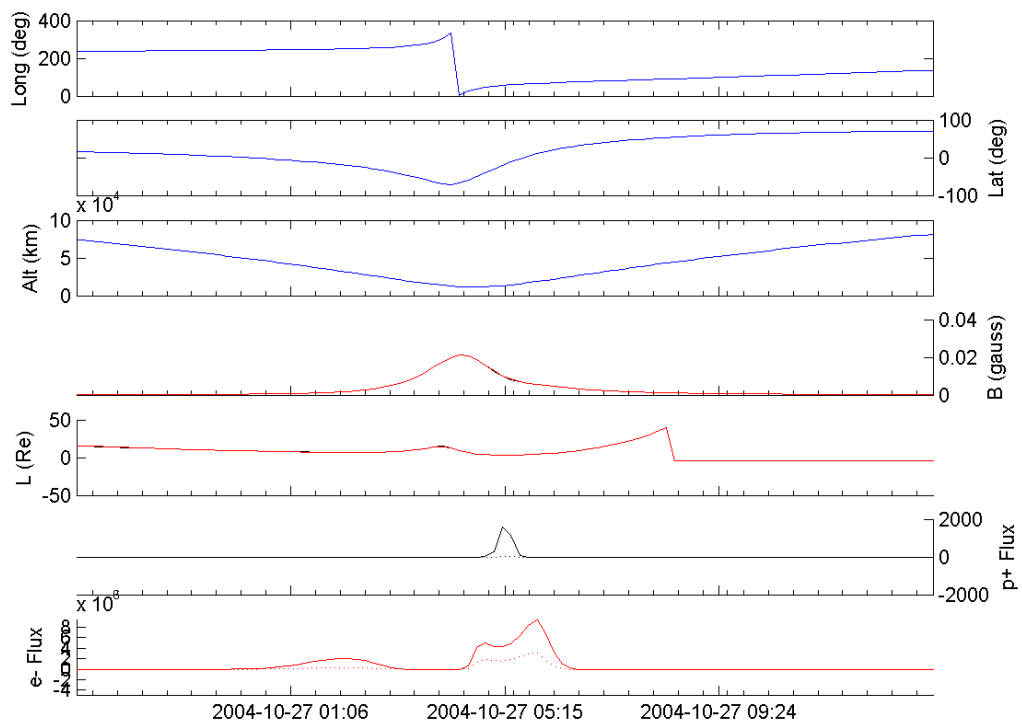


IREM Predicted Radiation Belt Passages. Rev 247



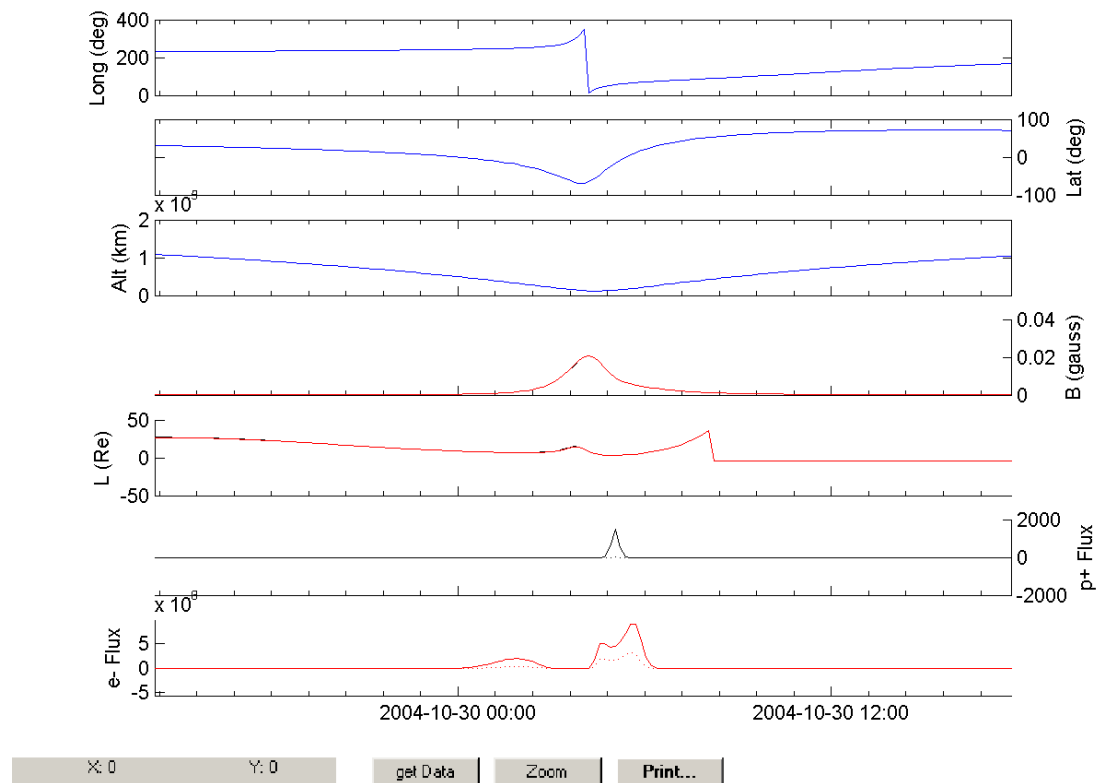
X: 0 Y: 0 C:\Documents and Settings\obergogn\INTE

Rev 248



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

Rev 249



SEC-GOES Observed Particles Fluxes.

