

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 153
Week 34
29.08.05
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 20.08.05 until 26.08.05 (both dates inclusive) and covers the revolutions 349 and 350

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 XTE J1818-245 (RA 18:18:25.20; DEC -24:32:31.2); the Galactic Bulge region (RA 17:45:36.00; DEC -28:55:60.0); Centaurus A (RA 13:25:27.60; DEC -43:01:08.8); the Galactic Centre field (RA 17:45:40.00; DEC -29:00:28.0); the galactic disk $l < 0$ (RA 16:18:32.00; DEC -50:22:26.0) and the Norma Arm. The activities consisted of raster and hexagonal dithering and grid 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.

11 slews (5 OSL, 6 CSL) were not executed from the Timeline during this period, due to problem on FDS, on NCTRS and delayed handover REDU-DSS24.

The SAS1A- X and -Y thresholds as calculated from the calibration performed on 13/06/2005, normalized to the square of the earth-Sun distance and quantized to 0.039 mA/LSB, were updated on 24/08/2005 (DoY 236) at 21:10z.

The fuel consumption over the period between 16/08/2005 and 25/08/2005 was 0.1871 kg. The remaining propellant is in the order of 159.6414 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

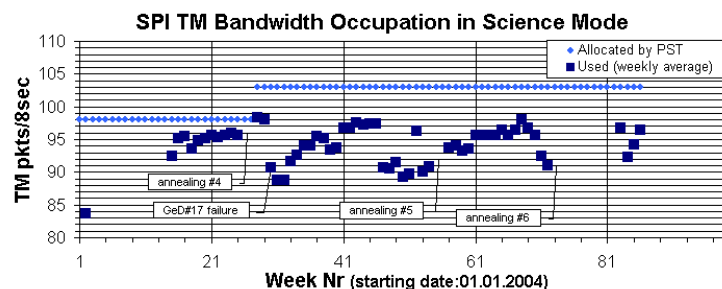
3.2.1 SPI

The overall status of the instrument is nominal.

During the reporting period, the instrument has been 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 average occupation of 96.4 pkts/cycle. The Stirling compressors are working well, maintaining the detector cold-plate temperature within 85+/-1K.

The increased radiation background due to solar activity between 23rd and 25th August might have affected Science data collection in this period.

The following plot shows the TM bandwidth occupation information.



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

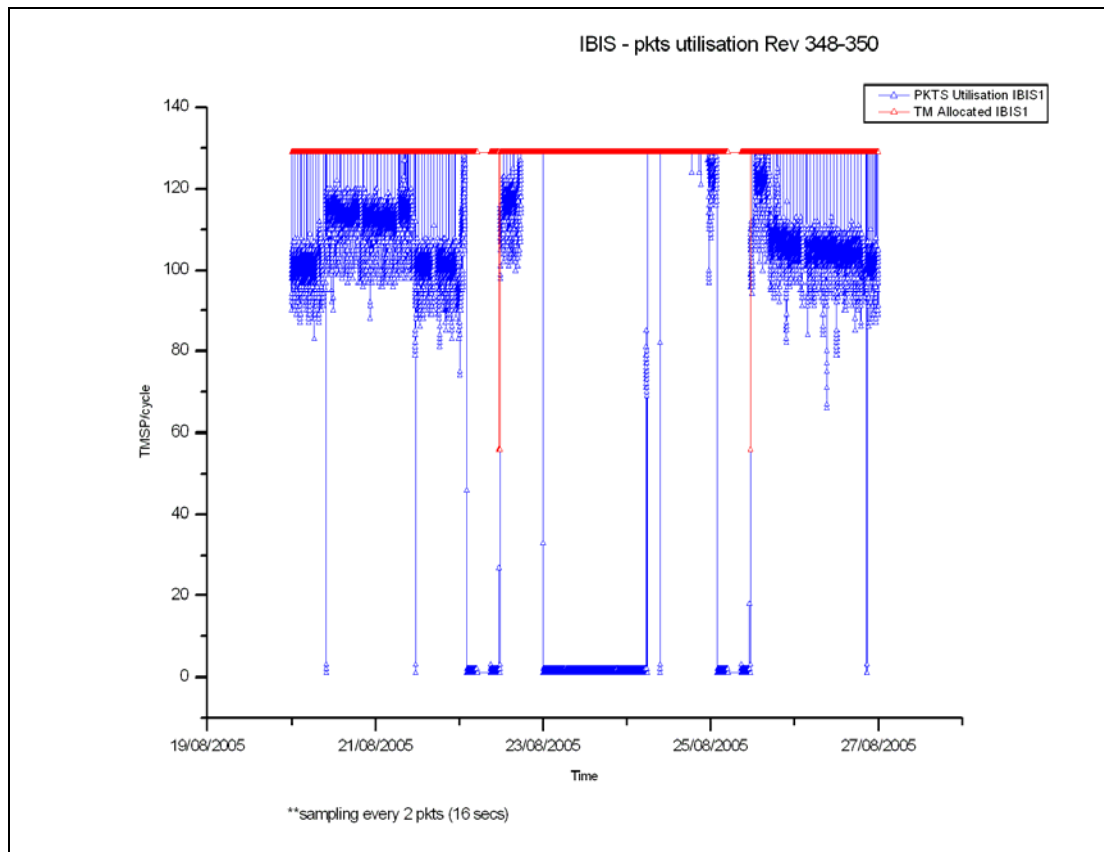
3.2.2 IBIS

The Overall status of the unit is Nominal.

The week was characterised by high solar activity, which forced IBIS into stand-by mode during revolution 349.

During the reporting period, the PST allocation to IBIS was most of the time 129 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 113.25 TMPS/cycle, up 11.46 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 and JEM-X2 was dormant (DFEE OFF) with a TM allocation of 1 packet/cycle.

Due to continued activity of a known hotspot on the detector plate, several spikes continued to be observed on the JEM-X1 count rates until 2005-08-25 at ~17:00Z. In addition, high levels of the SW Trigger caused an autonomous transition of JEM-X1 to Safe mode on 2005-08-22 at 15:55Z. JEM-X1 was recovered to Data Taking mode at 17:22Z, with the SW Trigger Limit set to 40000. However due to the development of high background conditions soon after this, JEM-X1 was then commanded back to Safe mode at 18:24Z and the SW Trigger Limit reset to 25000. JEM-X1 remained in Safe mode until it was activated nominally by the Timeline at the start of revolution 350 (on 2005-08-25 starting at 11:30Z).

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.

OMC operations were performed by the automatic Timeline. OMC was operated in Science Normal mode during science observations, with a TM allocation of 5 packets/cycle.

During this reporting period, 102 of the 173 planned science pointings for OMC were executed nominally, 3 were interrupted due to high radiation, 63 lost to the same, 3 lost to Flight Dynamics problems and 2 to AOCS problems.

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

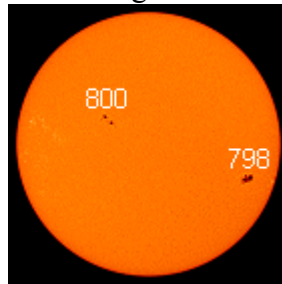
3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by high solar activity.

Fast growing sunspot 798 hurled 2 Coronal Mass Ejections on August 22 (cf. picture). These M-solar flares reached Earth on August 23 and on.



Reference: www.spaceweather.com

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

4 Ground Facilities

The performance of the Operational ground facilities very good this week, 183 slews were executed correctly, 11 slews were missed due to problems on-board and on-ground. The overall performance was below the 95% requirement, however high radiation meant JEM-X and OMC were in SAFE mode for much of the time reducing the impact.

4.1 Mission Operations Centre

The performance of the MOC was very good this week, 3 pointings were lost due to problems with the FDS, and another to communications problems between the FDS & IMCS. The overall performance was well above the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week although 1 pointing was lost to NCTRS-A problems, and 2 to a delayed 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. Mission planning

PSF's up to revolution 356 have been received. Planning has been done up to revolution 354. The corresponding files have been sent to MOC and ISDC. Two ToO requests were received. One of them, on the target SGR 1818-20 was not approved since this region is being observed anyway at this time. The other ToO on the pulsar HETE J1900.1-2455 is still under consideration. The visibility period only starts 8 September. The week has experienced heavy planning and replanning activities. See problems below. First revolution 350 had to be urgently replanned due to the problem with different constraint checks between ISOC and MOC. This was resolved by ISOC forcing a dummy observation causing half an hour delay of the problematic pointing(s). Revolution 351 experienced the same problem. At the same time there was also introduced more ToO observation time of the target XTE J818-245. This revolution has been manually manipulated by MOC by deleting not possible pointings. Some was lost in revolution 349 of this ToO observation due to bad space weather causing the instruments to switch off. The revolutions 352 to 354 that are currently planned all contain a dummy observation at the beginning of the revolution causing around half an hour of lost science time each revolution. The TSF's up to revolution 350 now received.

2. Observation status

ECS's for revolutions 338 and 340 have been received. The corresponding OCS's have been sent. No extra time has been credited. However 60 Ksec of extra time was credited to a ToO proposal for target XTE J1818-245 due to bad weather. The observation has been rescheduled as soon as possible, i.e. in revolution 351.

3. ISOC science data archive

It has been agreed to include a demo of the ISDA at the X-ray conference in El Escorial. A similar demo will also be included in the ADASS conference also in El Escorial. The ISDA hardware has been upgraded with an additional 4 Tbyte array.

4. ISOC system

A version 11.1 of the ISOC system has been used. No problems encountered.

5. Next Announcement of Opportunity (AO 4)

The next call for proposals from the science community (AO 4) will be done in Spring next year. The AO period itself starts in mid August 2006. This week planning for the preparation for this AO was kicked off in a telecon with the Mission Manager and the Project Scientist in ESTEC and ISOC. Then the frame work was agreed. The period

for call for proposals was tentatively agreed to be from 27 March 2006 to 5 May 2006. Internal kick off in ISOC will be done next week.

6. Problems

When MOC processed the revolution 350 they detected a problem with a couple of early pointings in the revolution. In the ISOC system there was no problem detected. It is supposed to be the same software running in both places. This problem will be further investigated. Until resolved we are losing about half an hour of science in every revolution.

After installing a new router in ESAC last week the sending of files to MOC and ISDC does not work without manual intervention. The problem is still under investigation. If not resolved by Monday next week the old router will be reinstalled again.

4.3.2 ISDC

Status of ISDC observation processing on 29/08/2005:

- Latest Standard Analysis completed: observation 03201020001 (Crux Arm, Revolution 322-325) on 16/08/2005
- Latest products archived: observation 03201020001 (Crux Arm, Revolution 322-325) on 18/08/2005
- Latest observation products sent to the observer: observation 02201540001 (Coma Cluster, Revolution 315-319) on 28/07/2005

5 Special Events

None

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 233, at 07:34, the FDS failed to create the tpf update for slew 03480050. During the recovery, the tpf for slew 03480051 arrived late further delaying the resumptions of operations. At 08:50, the timeline was recovered, but at 08:59, an AOCS command failed (A3189 Start guide star). Time timeline was finally recovered at 09:42. The impact was the loss of pointings 03480050, 03480051 & 03480052.
- At 16:57, the FD update for slew 03480063 failed to arrive, the recovery tool was used to create the update, there was no impact.
- On DoY 234, at 03:01, there was an error sending data to the isds. There was no impact.
- At 12:53, the error message idda, IADDS-B ARC, Error, Software, MADDS-B/AUX is not extracting THF Files, was received in the Event Log. The analyst was informed, there was no impact.
- On DoY 235, at 13:08, there was an FDS alarm: "updateslew failed to validate IPF (TV)". There was no impact.

- On DoY 236, at 03:15, the idda icon on the Global MMI turned briefly red, before returning to green, there was no impact.
- At 11:53, there was an FDS alarm: “updateslew failed to validate IPF (TV)”. There was no impact.
- At 12:03, there was a TPF error: Task referenced in TPF not existing on source, the impact was pointing 03490057 was lost and had to be manually uplinked.
- At 12:40, while trying to restart the NCTRS-A MMI, the NCTRS-A itself crashed. The system was restored at 12:57, and the timeline recovered with a manual slew at 13:35, the impact was the loss of pointing 03490058.
- At 23:02, the handover from Redu to DSS-24 was delayed by ~15 minutes. The impact was the loss of pointings 03490077 & 03490078, the slew to the attitude of 03490079 being executed manually.
- On DoY 237, from 15:14 to 15:17, there was no TM flow from isds to ISDC while the Firewall was being rebooted. Also at this time there was a short VC0 TM gap from Redu. There was no impact.
- On DoY 238, at 02:32, a guide star problem caused AIMU to switch on. The AOCS sub-system was disabled. The timeline was recovered manually at 03:45, after a slew from the attitude of 03500020 to 03500022. The impact was the loss of pointing 03500021.

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

AR id	Date Created	Subject	Segment	Status
INT-2784	23/08/2005	FDS: update slew failing during TV check of TPFs	FDS	Pending
INT-2785	30/08/2005	Delayed station handover from REDU to DSS-24	NASA Station	Closed

7 Future Milestones

Change of communication protocol to ESA Station from X25 to TCP IP: The testing has been performed. The release is not yet operational because an upgrade of the communications set-up is required.

Another patch of the IMCS is planned for September/October, which should fix a couple of problems.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 349

The observations in revolution 349 began with a raster dithering observation of XTE J1818-245 (RA 18:18:25.20; DEC -24:32:31.2) lasting ~30 hours, followed by a hexagonal dithering observation of the Galactic Bulge region (RA 17:45:36.00; DEC -28:55:60.0) lasting ~4 hours. A raster dithering observation of Centaurus A (RA 13:25:27.60; DEC -43:01:08.8) was then performed for ~9.5 hours, followed by a raster dithering observation of the Galactic Centre field (RA 17:45:40.00; DEC -29:00:28.0), performed for the remaining ~16 hours of observation time.

Revolution 350

The observations in revolution 350 began with a hexagonal dithering observation of the Galactic Bulge region (RA 17:45:36.00; DEC -28:55:60.0) lasting ~3.5 hours, followed by a raster dithering observation of the galactic disk $l < 0$ (RA 16:18:32.00; DEC -50:22:26.0) lasting ~27 hours. A grid observation of the Norma Arm was then performed for the remaining ~29 hours of observation time.

Throughout these observations all instruments were in their nominal science modes, except for 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

2005-08-04T19:44:05.000Z	160.0337	F	Automatic TM processing.
2005-08-07T10:36:59.000Z	160.0224	F	Automatic TM processing.
2005-08-08T21:23:19.000Z	159.9946	F	Automatic TM processing.
2005-08-10T10:25:55.000Z	159.9780	F	Automatic TM processing.
2005-08-11T20:35:11.000Z	159.9539	F	Automatic TM processing.
2005-08-13T10:13:23.000Z	159.9361	F	Automatic TM processing.
2005-08-14T20:18:14.000Z	159.9032	F	Automatic TM processing.
2005-08-16T10:01:14.000Z	159.8886	F	Automatic TM processing.
2005-08-16T18:54:11.000Z	159.8285	F	Automatic TM processing.
2005-08-19T09:52:34.000Z	159.8062	F	Automatic TM processing.
2005-08-20T09:09:40.000Z	159.7680	F	Automatic TM processing.
2005-08-22T09:44:25.000Z	159.7524	F	Automatic TM processing.
2005-08-23T22:19:49.000Z	159.7280	F	Automatic TM processing.
2005-08-25T09:32:57.000Z	159.7155	F	Automatic TM processing.
2005-08-25T12:11:29.000Z	159.6414	F	Automatic TM processing.

This report was generated Fri Aug 26 08:00:33 GMT 2005

8.3 Detailed Satellite Information

This section contains some detailed information concerning the various subsystems of the satellite and instruments.

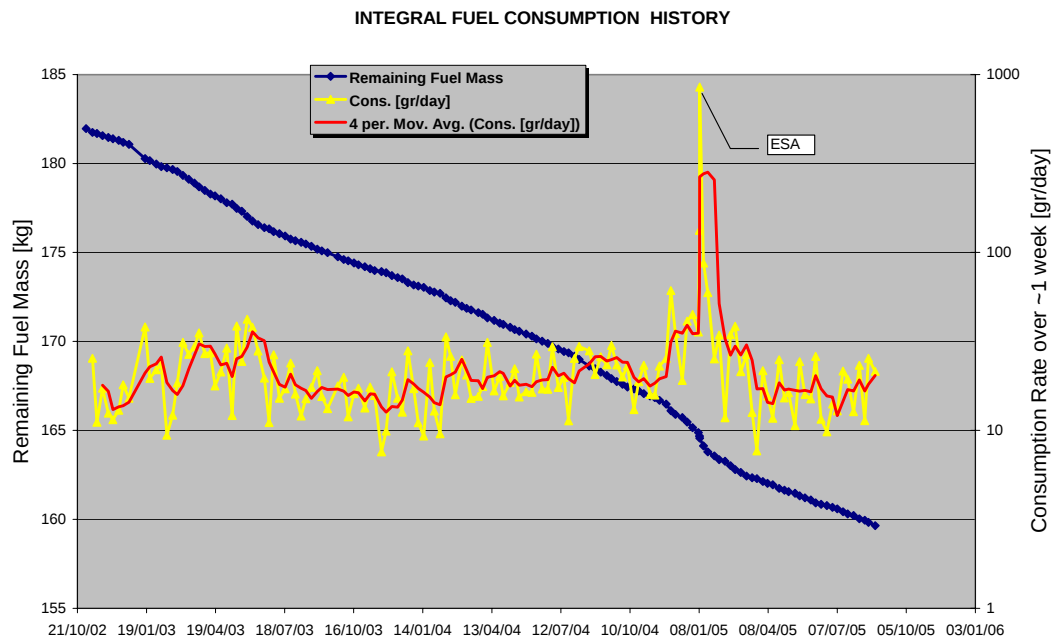
8.3.1 AOCS SUMMARY OPERATIONS REPORT, 20/08/2005 – 26/08/2005

AOCS operations were executed from the Automatic Timeline.

During this period, 109 Open Loop Slews, 74 Closed Loop Slews and 5 Momentum Bias were executed (TL + manual recovery). 11 slews (5 OSL, 6 CSL) were not executed from the Timeline during this period, due to problem on FDS, on NCTRS-A and a delayed handover REDU-DSS24.

This is equivalent to a ~5.8 % of the total number of slews planned (188).

The fuel consumption over the period between 01/11/2002 and 25/08/2005 is shown in the plot below.



20/08/05 (Day of Year 232, Revolution 348)

Nothing to report.

21/08/05 (Day of Year 233, Revolution 348)

FDS failed to validate TPF for slew update: due to a problem on FDS (Test and Validation processes for the TPF update of slew ID 03480050 failed) the slew ID 03480050 (OSL) was missed and the AOCS s/s was disabled in TL at 07:34z.. A first manual recovery (OSL) was successfully performed to the attitude of PID 03480050. The next slew (OSL) for PID 03480051 was manually updated but the TPF did not arrive in time and this forced the operator to a new recovery.

A second manual recovery (OSL) was attempted to the attitude of PID 03480051. The next slew (CSL) for PID 03480052 was manually updated and executed from TL. The AOCS s/s was re-enabled in TL at 08:50z.

Slews missed from the Timeline: At 08:59z, due to a problem during the Search and Track process for slew ID 03480052 (guide star to be tracked on slot# 2 not found,

guide star ID 6839-371 at CCD location Y=-19455 Z=-19704), the TC A3189 (Start Guide Star) failed release due to static PTV failure. The problem on S/T process was originated by the mapping used (with the S/C still slewing) for the attitude reconstruction during the update of slew 03480052 in TL.

The AOCS s/s was disabled in TL at 08:59z

A first manual recovery was attempted from attitude of PID 03480051 to the attitude of PID 03480053. The next slew (OSL) for PID 03400053 was manually updated and executed from the Timeline.

The AOCS s/s was re-enabled in TL at 09:42z.

The following slews were not executed from TL while recovering the AOCS s/s: 03450050(OSL)-51(OSL)-52(CSL).

STR 1750 processor fault: at 16:47:39z a STR1750 processor fault occurred during the execution of the PID 03480062. The sequence of the events was:

16:46:26z Close Loop Slew End for PID 03480062
16:47:28z Mapping start
16:47:39z Mapping End prematurely (aborted)
16:47:39z IMU 1 ON
16:47:39z New automatic mapping commanded by the ACC.

16:57:39z IMU 1 OFF

The Fault is likely due to the presence of an extended object (cluster NGC 5139 Omega Cen, Mi 3.5) in the same CCD column of the guide star (ID 8252-890), Mi 7.35 at CCD location [20473, 9297], determining a mapping duration shortened to ~10 secs.

No impact reported on the TL.

22/08/05 (Day of Year 234, Revolution 348-349)

Nothing to report.

23/08/05 (Day of Year 235, Revolution 349)

FDS failed to validate TPF for slew update: Due to a problem on FDS (Test and Validation processes for the TPF update of slew ID 03490028 failed) the AOCS s/s was disabled in TL at 13:21z. The slew (OSL) for PID 03490028 was manually updated and executed by TL.

The AOCS s/s was re-enabled in TL at 13:28z.

No impact reported on the TL.

24/08/05 (Day of Year 236, Revolution 349)

Slew missed from the Timeline: Due to a problem in communication between the FDS-IMCS (task referred in TPF not existing in MCS), the slew ID 03490057(CSL) failed release and the AOCS s/s disabled in TL at 12:05z. A manual recovery was then performed to the attitude of PID 03490057. The next slew (CSL) for PID 03490058(CSL) was manually updated. The AOCS s/s was re-enabled in TL at 12:39z.

The following slew was not executed from TL while recovering the AOCS s/s: 03490057(CSL).

Slew missed from the Timeline: Due to a problem on NCTRS-A (task reported problem and was restarted), the slew ID 03490058(CSL) failed release and the AOCS s/s disabled in TL at 12:41z. A manual recovery was then performed to the attitude of PID 03490059. The next slew (OSL) for PID 03490060 was manually updated and executed from the Timeline. The AOCS s/s was re-enabled in TL at 13:35z.

The following slew was not executed from TL while recovering the AOCS s/s: 03490058(CSL)-59(OSL).

Update of the SAS 1 X and Y thresholds in FDCE:

Due to the expected ageing of the SAS solar cells, an off-line calibration is performed periodically in order to evaluate the SAS-1 output current for different sun aspect angles. The effect of ageing is a relaxing of the angular threshold: this means that to reach a certain FDE threshold the excursion in attitude from the current pointing will get larger with time. Considering that SAS response reduces of ~20% over 5 years and a variation of 2% is allowed before re-adjusting the thresholds, this percentage corresponds to a period of 6 months considering the ageing of the SAS linear with the accumulated dose, as reported in the reference documents (INT-MA-AI-0001 sect. 5.2.2.33.2.2.2, INT-PR-MMB-0005 sect. 4-2 and INT-MOC-AOCS-TN-1002-TOS-OGI sect. 4.8).

The old SAS (a,b) scale factors (taking into account the quantisation of 0.039 mA/deg and normalised respect the square of Earth-Sun distance) for SAS sun angles α and β were respectively:

$$\begin{aligned}b &= 0.895095 & \text{SAS-Y threshold} &= 3.354 \text{ mA (86 dec)} \\a &= 0.919901 & \text{SAS-X threshold} &= 3.432 \text{ mA (88 dec)}\end{aligned}$$

The new SAS -1 X and Y thresholds as calculated from the calibration performed on 13/06/2005, normalized to the square of the earth-Sun distance and quantized to 0.039 mA/LSB are

$$\begin{aligned}b &= 0.829756 & \text{SAS1-Y threshold} &= 3.198 \text{ mA (82 dec)} \\a &= 0.867033 & \text{SAS1-X threshold} &= 3.354 \text{ mA (86 dec)}\end{aligned}$$

In the above calculations were considered **a** and **b** ~ 1 and both the X and Y thresholds set to 3.760 mA at BOL. The results give an indication of degradation $\sim 4.7\%$ /12 months for the Y threshold and $\sim 2.3\%$ / 12 months for the X threshold. Following the evaluation performed after the SAS calibration, the SAS1 X and SAS1 Y thresholds were updated to the new values on 24/08/2005 (DoY 236) at 21:10z.

Slew missed from the Timeline: Due to a delayed handover REDU-DSS24 (see DR# G105988), the slew ID 03490077(CSL) failed release and the AOCS s/s disabled in TL at 23:10z. A first manual recovery (OSL) was then performed from attitude of PID 03490076 to the attitude of PID 03490079. The next slew (CSL) for PID 03490080 was manually updated and executed from the Timeline. The AOCS s/s was re-enabled in TL at 00:21z.

The following slews were not executed from TL while recovering the AOCS s/s: 03470077(CSL)-78(CSL)-79(OSL).

25/08/05 (Day of Year 237, Revolution 349-350)

Nothing to report.

26/08/05 (Day of Year 238, Revolution 350)

Occurrence of False Event: at 02.32.06z the guide star, Mi 8.5 star at CCD location [3014, -22132] was released due to false event and the IMU1 switched ON. The guide star Mi 8.4 at CCD location [7041, -7471] was picked in the first automatic mapping, which was kept afterwards. The AOCS s/s was disabled in TL at 02:32z and the slew ID 03500021 failed release.

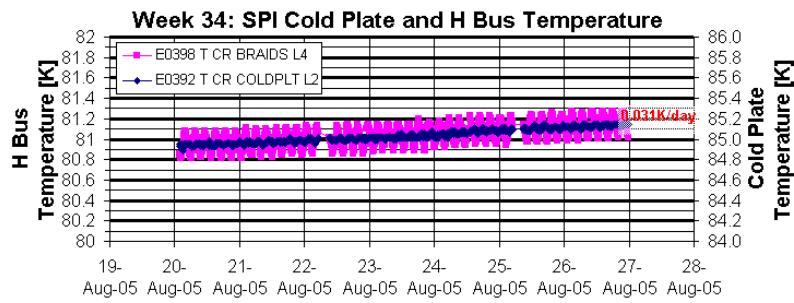
A first manual recovery was then performed from the attitude of PID 03500020 to the attitude of PID 03500022, the next slew (OSL) for PID 03500023 was manually updated and executed from the Timeline. The AOCS s/s was re-enabled in TL at 03:45z.

The operational impact was the OTF not reached during PID 03500020. The following slews were not executed from TL while recovering the AOCS s/s: 03500021(OSL)-22(CSL).

8.3.2 SPI Operations

Stirling compressors and Cryostat:

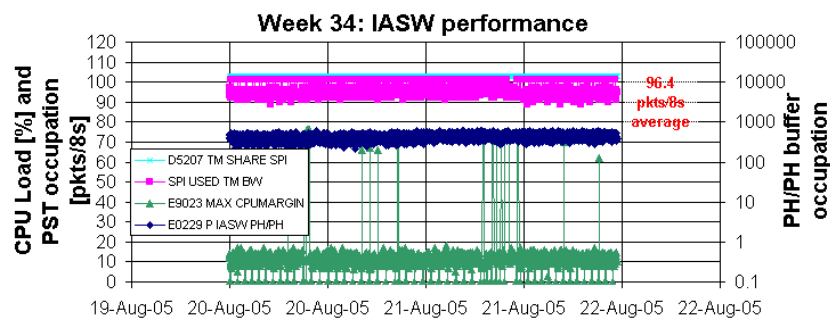
The performance of the compressors is nominal. The cold plate temperature was maintained at 85K $\pm$ 1K showing the usual positive drift with the expected slope. The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



DPE & IASW:

The IASW performance is nominal.

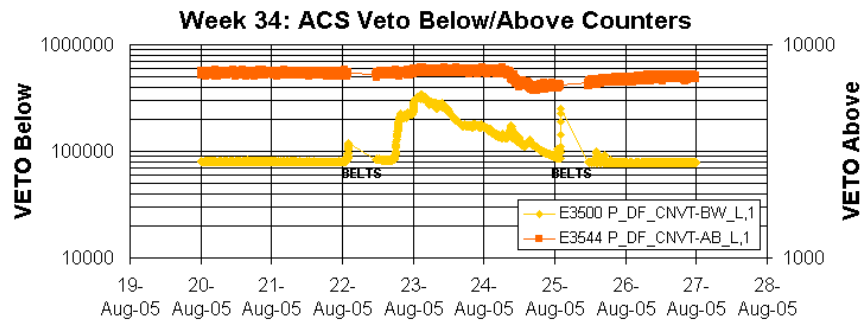
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal. High solar radiation is evident between 23rd and 25th August.

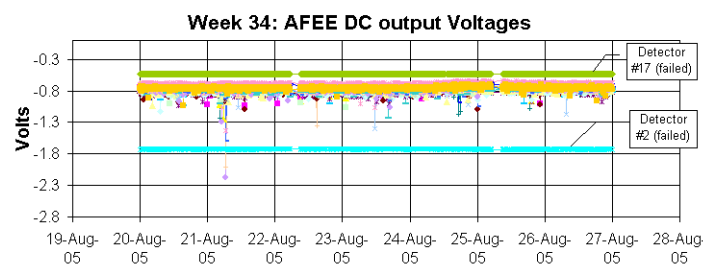
The following plot shows the ACS overall count rate evolution during the reporting period.



AFEE and Germanium Detectors:

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

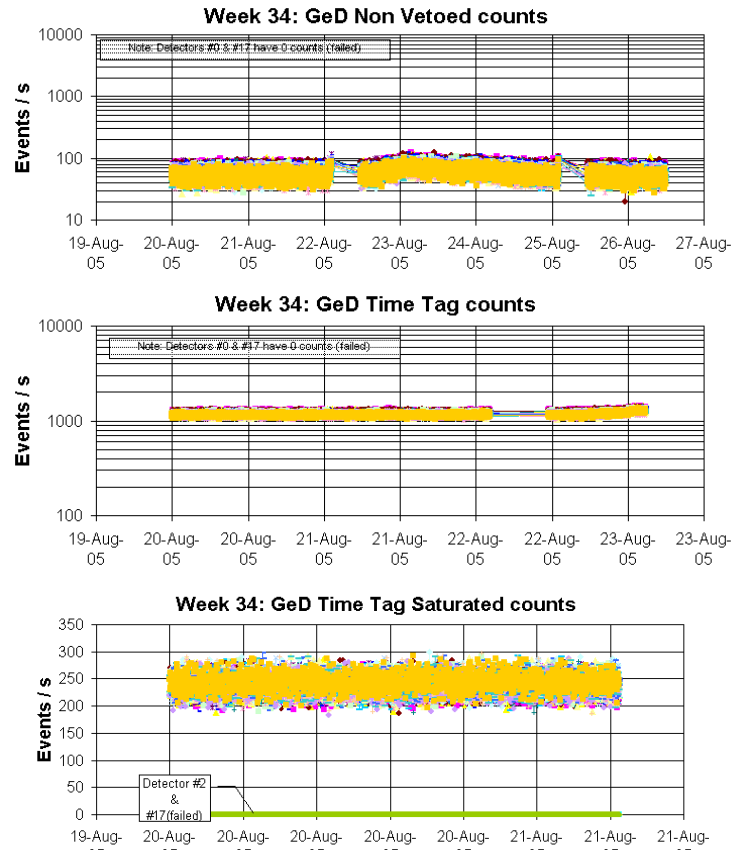
The following plot shows the dc voltage offset of the detector channels during the reporting period.



DFEE:

The performance of the unit is nominal.

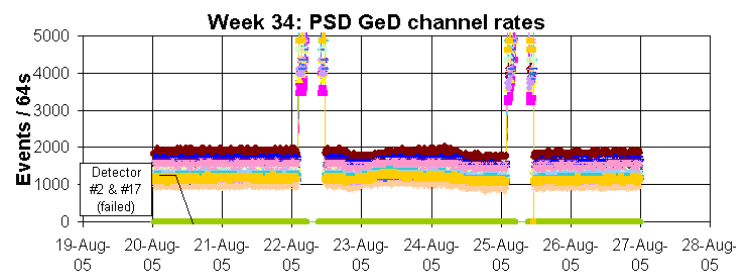
The following plots show the count rates of the detectors during the reporting period (due to problems in the data retrieval tool, some gaps are presents).



PSD:

The performance of the unit is nominal.

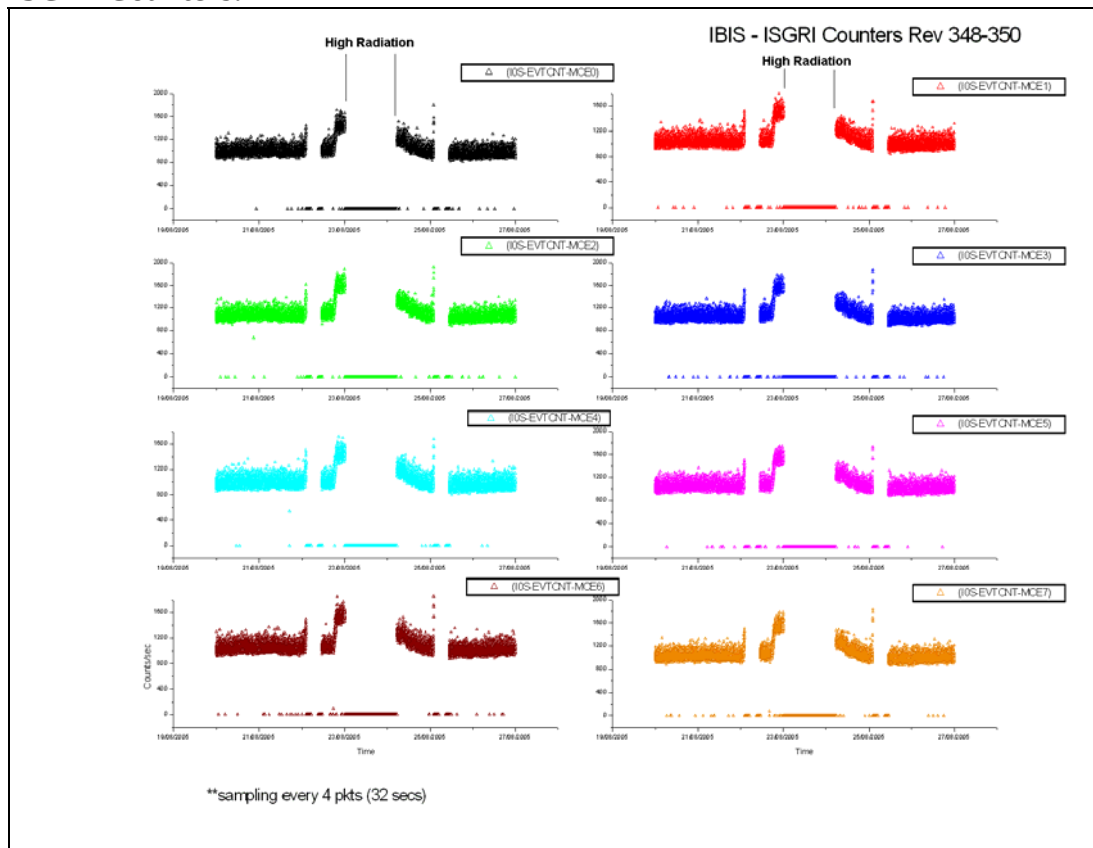
The following plots show the PSD channel rates during the reporting period.



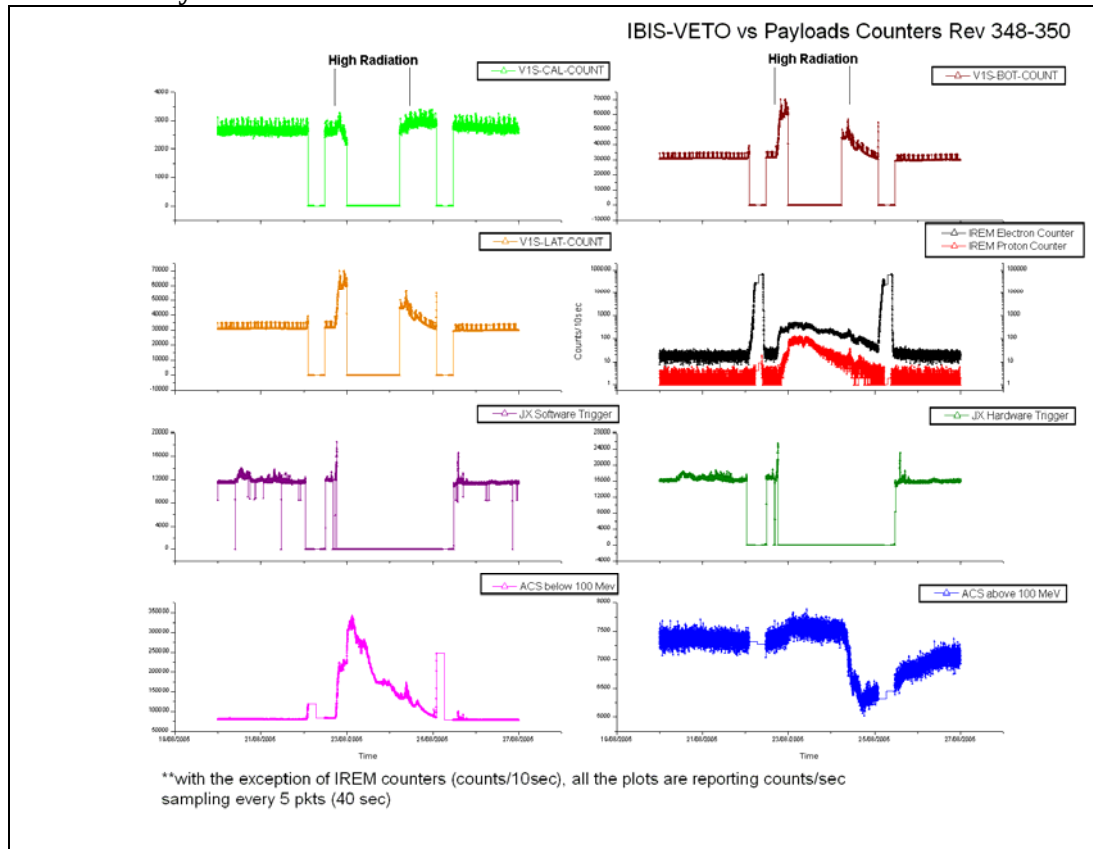
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

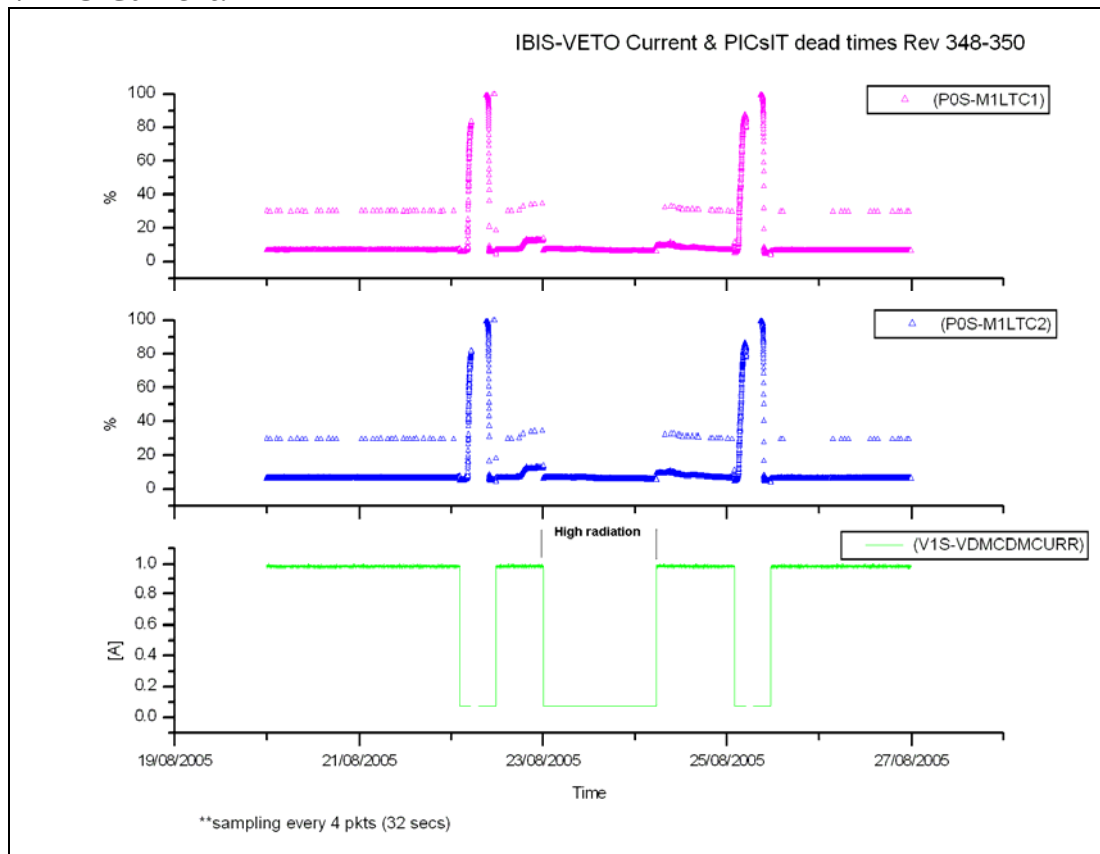


VETO vs Payloads Counters:

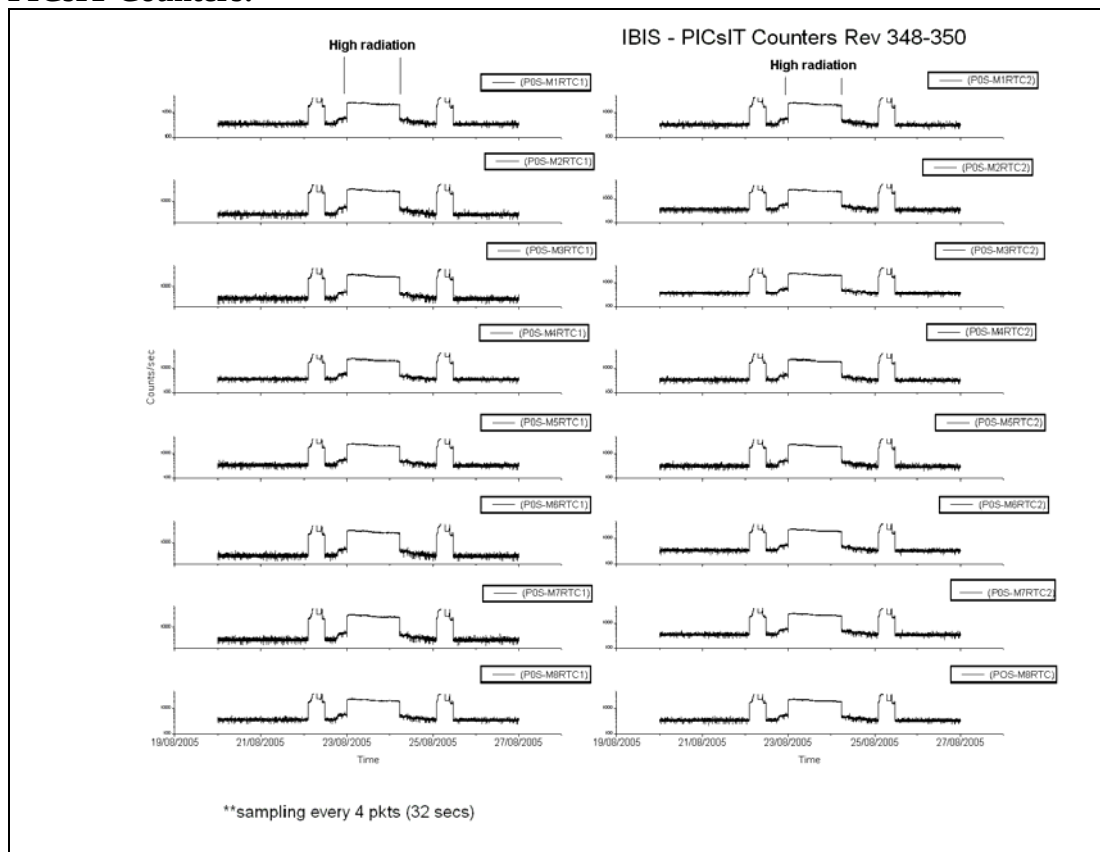


The week was characterised by high radiation.

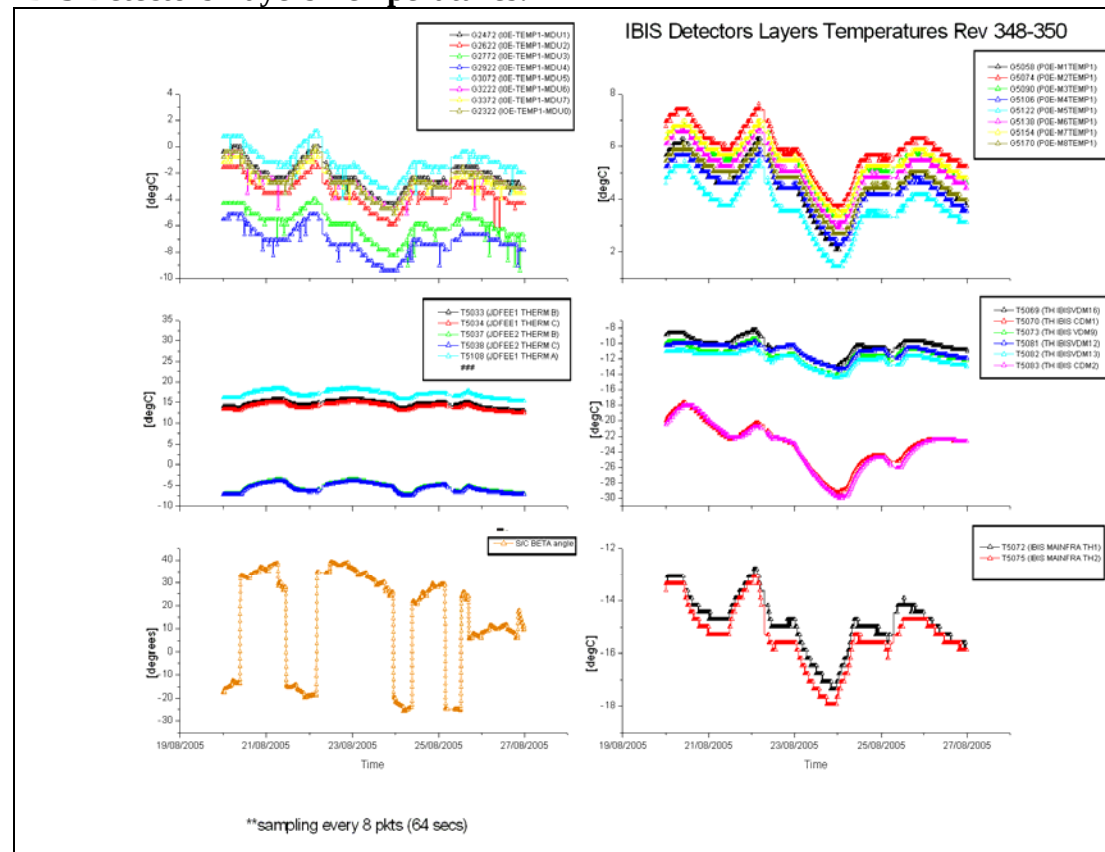
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2005.234 (22/08/2005)

At 02:13Z, TM parameter G8015 (28V PMT set by IASW) went OOL High with the value 29.4V. It went back inside limit at 11:40Z. As this happened inside the Radiation Belts, according to V-VLT-1, no action was taken.

At 09:47Z, TM parameter G5032 (P0S-M7RTC1) was reported OOL High and back. According to P-CNT-1, as this happened inside radiation belts, no action was taken.

From 18:46Z to 23:50Z, every hour, G8080 (S1E-VS HBRA-RT) was reported OOL High and back. As this was caused by high radiation environment, according to H-OVF-2, no action was taken.

At 18:47Z, due to high radiation environment, G6062 (V1S BOT COUNT) and G6063 (V1S LAT COUNT) went OOL High until DoY 2005.235 at 00:04Z when the IBIS automatism was triggered and IBIS went to Stand-by mode. According to V-BOT-1 and V-LAT-1, as this happened in high radiation environment, no action was taken.

From 23:33Z until DoY 2005.235 at 00:02Z, G6061 (V1S CAL COUNT) was toggling OOL low-low. As this happened in a high radiation background, according to V-CAL-1, no action was taken.

DoY 2005.235 (23/08/2005)

At 00:04Z, IBIS radiation automatism was triggered and IBIS went to Stand-By mode with the following OEMs being generated: (0,131) "IASW: Emergency switch off performed" and (0,128) "IASW: VETO VDM switch off performed due to automatism".

At 00:04Z, TM parameter G8015 (28V PMT set by IASW) went OOL High with the value 29.4V. It went back inside limit on DoY 2005.236 at 05:38Z when IBIS was manually sent back to Scientific Standard mode. As this happened during High Radiation with VETO off, no action was taken.

DoY 2005.236 (24/08/2005)

From 06:05Z to 11:45Z, G8080 (S1E-VS HBRA-RT) was reported toggling OOL high several times. As this was caused by high radiation environment, according to H-OVF-2, no action was taken.

At 08:57Z, due to high radiation environment, G6062 (V1S BOT COUNT) and G6063 (V1S LAT COUNT) were toggling OOL High until about 10:00Z when the background became finally rather quiet. According to V-BOT-1 and V-LAT-1, as this happened in high radiation environment, no action was taken.

DoY 2005.237 (25/08/2005)

At 01:59Z, due to high radiation environment, G6062 (V1S BOT COUNT) and G6063 (V1S LAT COUNT) went OOL high and back. According to V-BOT-1 and V-LAT-1, as this happened in high radiation environment, no action was taken.

At 02:01Z, TM parameter G8015 (28V PMT set by IASW) went OOL High with the value 29.4V. It went back inside limit at 11:28Z. As this happened inside the Radiation Belts, according to V-VLT-1, no action was taken.

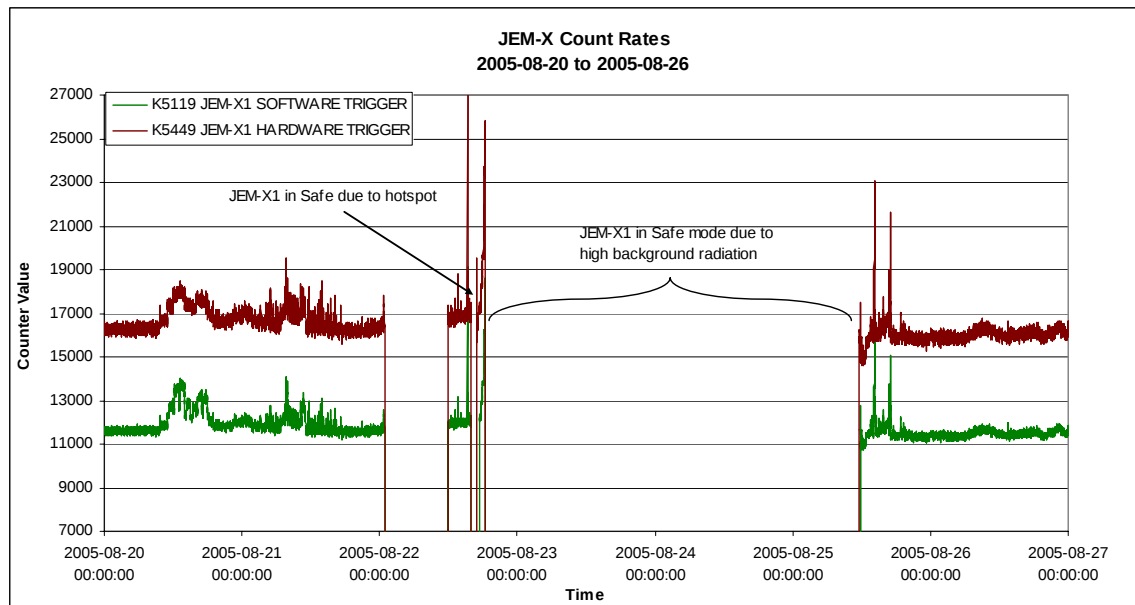
At 03:54Z, TM parameters G5017 (P0S-M4RTC1), G5018 (P0S-M4RTC2) and G5008 (P0S-M2RTC2) were reported toggling OOL High until 09:38Z. According to P-CNT-1, as this happened inside radiation belts, no action was taken.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

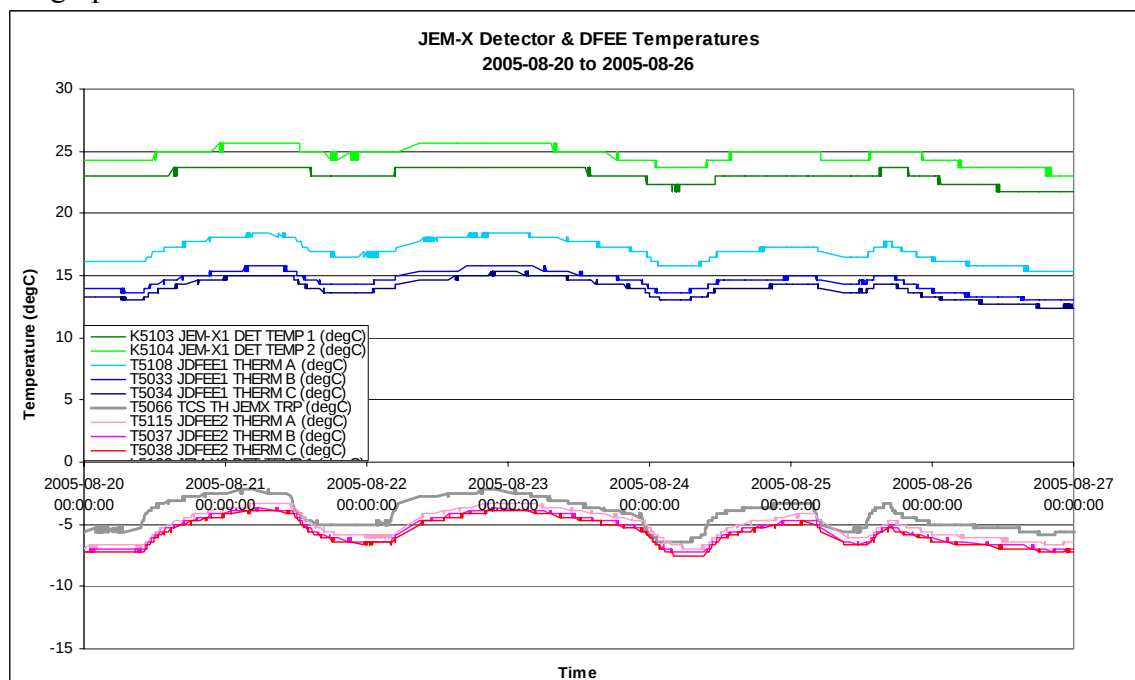
JEM-X count rates over the reporting period are displayed in the following graph¹.

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, along with the temperature on the detector bench between the two units, over the reporting period are displayed in the following graph².



8.3.4.3 JEM-X Daily Report

2005-08-20 (DOY 232, Rev 348)

Nothing to report

2005-08-21 (DOY 233, Rev 348)

² Data sampled (1 frame in 8)

At 15:22:44Z the TM parameter K5136 BUFFER LOSS went Out of Limits High (value = 213), returning within limits at the next TM cycle.

2005-08-22 (DOY 234, Rev 348-349)

At 15:16:52Z the TM parameter K5136 BUFFER LOSS went out of limits High (value = 2643), returning within limits at the next TM cycle.

At 15:55:08Z K5119 SOFTWARE TRIGGER went out of limits Alarm High (value = 25009), causing JEM-X1 to make an autonomous transition to Safe mode. The TM parameter K5462 DFEE STATE IASW transitioned to state Setup and thus OEM 189 JEM-X1 PROB DFEE 9 was received. Commanding to JEM-X1 from the Timeline was then disabled at 16:05Z. At 16:07:05Z FCP_JEM1_0040 was executed to command JEM-X1 to Safe mode, thereby setting K5462 DFEE STATE IASW to Safe as well and thus OEM 254 ERROR OFF was received.

After consultation with the JEM-X PI, and having monitored the IREM counters for a further ~30 minutes and observed that the IREM RMC parameters continued at their nominal values, it was decided to re-activate JEM-X1 as the transition to Safe was probably caused by excessive counts produced by a known hotspot. In addition, it was decided to increase the Software Trigger Limit from 25000 to 40000 in case that the increased count rates were due to the transient source being observed and to avoid a further transition to Safe during the ongoing Target of Opportunity observation. Thus the following operations were performed:

- 16:48:56Z FCP_JEM1_0041 JEMX1 TRANSITION TO SETUP
- 16:50:05Z FCP_JEM1_1010 JEMX1 CONFIGURATION SETTING FOR SCIENCE OPS
- 17:20:42Z FCP_JEM1_0070 to change the SW Integer Parameter 84 from 25000 RAW DEC to 40000 RAW DEC
- 17:22:46Z FCP_JEM1_0044 JEMX1 DATA TAKING

Commanding to JEM-X1 from the Timeline was then re-enabled at 17:34Z.

However, soon after the reactivation, a sharp increase in the JEM-X1 HW and SW Trigger rates, in coincidence with a similarly sharp increase in the IREM Electron counter, was observed (IREM Electron counter K5317 went Out of Limits High starting at 18:02:52Z). In addition, Out of Limits associated to high background began to be received on SPI. Therefore, JEM-X1 was commanded back to Safe mode and the Software Trigger Limit reset as follows:

- 18:24:07Z FCP_JEM1_0040 JEMX1 TRANSITION TO SAFE
- 18:25:11Z FCP_JEM1_0041 JEMX1 TRANSITION TO SETUP
- 18:26:01Z FCP_JEM1_0070 to change the SW Integer Parameter 84 back to 25000 RAW DEC
- 18:27:03Z FCP_JEM1_0040 JEMX1 TRANSITION TO SAFE

Commanding to JEM-X1 from the Timeline was then disabled and JEM-X1 remained in Safe mode for the rest of the day.

Later analysis by the JEM-X team confirmed that the first transition to Safe was indeed due to hotspot activity, as it was accompanied by high levels of buffer loss.

2005-08-23 (DOY 235, Rev 349) to 2005-08-24 (DOY 236, Rev 349)

Due to continuing high background conditions, JEM-X1 remained in Safe mode, with commanding from the Timeline disabled.

2005-08-25 (DOY 237, Rev 349-350)

JEM-X1 began the day in Safe mode and remained in Safe mode for the rest of revolution 349 due to continuing high background radiation. It was reactivated nominally from the Timeline at the start of revolution 350.

Following reactivation, the status of the unit was nominal, although occasional spikes continued to be observed on the count rates until ~17:00Z, after which ISDC also reported that the hotspot was no longer observable.

2005-08-26 (DOY 238, Rev 350)

Nothing to report

8.3.5 OMC Operations

2005-08-21 (DOY 233, Rev 348)

At 07:34, an FDS problem and problems during the subsequent recovery caused the loss of pointings 03480050, 03480051 & 03480052.

It was at this time the following commands were rejected:

2005.233.07.58.41.951	2005.233.07.58.49.413	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						
2005.233.07.58.48.326	2005.233.07.58.56.392	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						
2005.233.09.02.33.954	2005.233.09.02.40.375	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						
2005.233.09.02.40.454	2005.233.09.02.49.364	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						

Which correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) for pointing 03480050 & 03480052.

2005-08-22 (DOY 234, Rev 349)

At 21:08:22 due to rising levels of background radiation OMC switched to SAFE mode. It remained in this mode until DoY 236 at 11.07.25, when the unit was returned to Stand-by. The impact was the interruption after 1089 seconds from a scheduled duration of 3520 of 03490011 and the loss of pointings 03490012 through to 03490054, a total of 41 pointings, (for pointings 03490039 and 03490051 no OMC science was scheduled).

2005-08-22 (DOY 234, Rev 349)

At 15:53, after the CDMU protected memory was dumped, an OEM was received indicating the SECL system had activated the OMC lens heater as the temperature was too low.

2005-08-24 (DOY 236, Rev 349)

At 12:01:10, a radiation spike caused OMC to again switch to SAFE mode. It was returned to Stand-by at 13:47:18. The impact was the interruption after 841 seconds from a scheduled duration of 1800 of pointing 03490056, and the loss of pointings 03490057, 03490058 & 03490059. Other problems also impacted these pointings, but OMC was already in SAFE mode at the time. It was at this time the following commands were rejected:

2005.236.12.17.27.882	2005.236.12.17.36.656	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2005.236.12.17.34.132	2005.236.12.17.44.774	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2005.236.13.21.38.009	2005.236.13.21.43.862	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2005.236.13.21.44.509	2005.236.13.21.51.799	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								

Which correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) for pointings 03490057 & 03490059.

At 15:00:54, another radiation spike caused OMC to again switch to SAFE mode. It was remained in SAFE mode until the end of the revolution. The impact was the interruption after 105 seconds from a scheduled duration of 1800 of pointing 03490062, and the loss of pointings 03490063 through to 03490081. It was at this time the following commands were rejected:

2005.236.15.29.30.888	2005.236.15.29.35.954	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2005.236.15.29.37.263	2005.236.15.29.44.020	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2005.236.16.01.35.889	2005.236.16.01.43.501	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2005.236.16.01.42.139	2005.236.16.01.52.527	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								

Which correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) for pointings 03490063 & 03490064.

2005-08-26 (DOY 238, Rev 350)

At 02:32, AOCs problems caused the loss of pointing 03500021. An unsuccessful attempt was made to salvage this pointing, which caused the loss of 03500022. It was at this time the following commands were rejected:

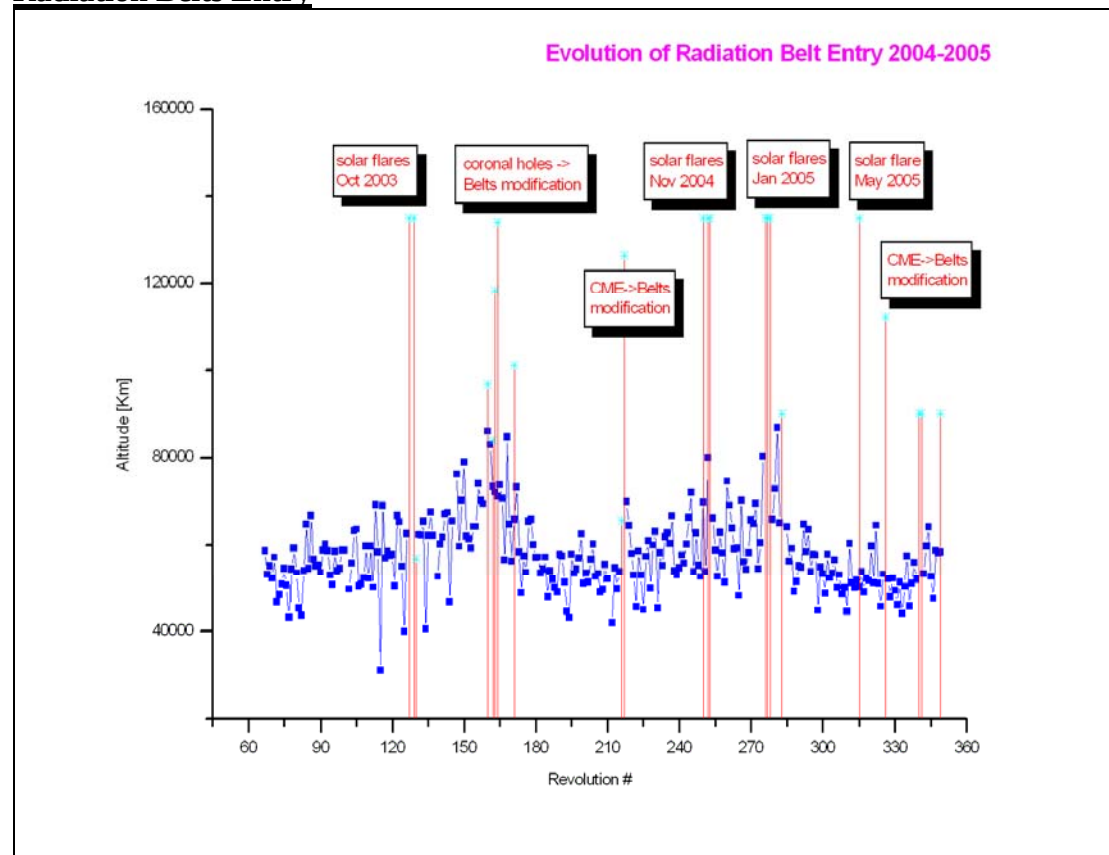
2005.238.03.41.03.968	2005.238.03.41.12.497	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2005.238.03.41.10.218	2005.238.03.41.20.385	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								

Which correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) for the latter pointing.

On DoY 234 at 02.13.10, OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

Nothing to report.

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Observed Entry/Exit Altitude [Km]	Electron CUT-OFF Predicted Entry/Exit	Predicted Entry/Exit Altitude [Km]
348	RAD_ENTR R 2005-08-22T02:13:08Z	2005-08-22 02:29:26	58209.4	2005-08-22 03:14:22	51757
349	RAD_EXIT R 2005-08-22T11:25:45Z	2005-08-22 10:26:14	>> 24892.1	2005-08-22 10:24:22	30495
349	RAD_ENTR R 2005-08-25T02:01:31Z	2005-08-25 02:14:06	58368.6	2005-08-25 03:00:14	52027
350	RAD_EXIT R 2005-08-25T11:14:46Z	2005-08-25 10:24:54	>>24901.4	2005-08-25 10:10:14	30076

Reference

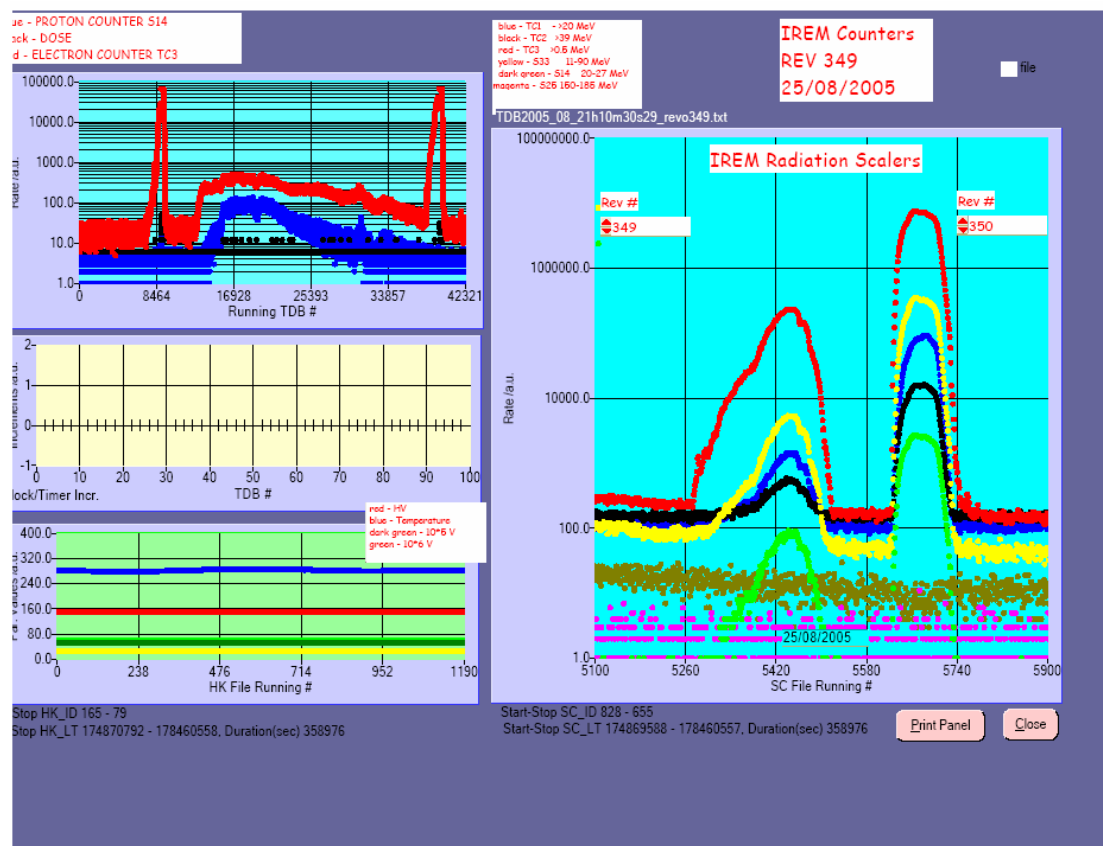
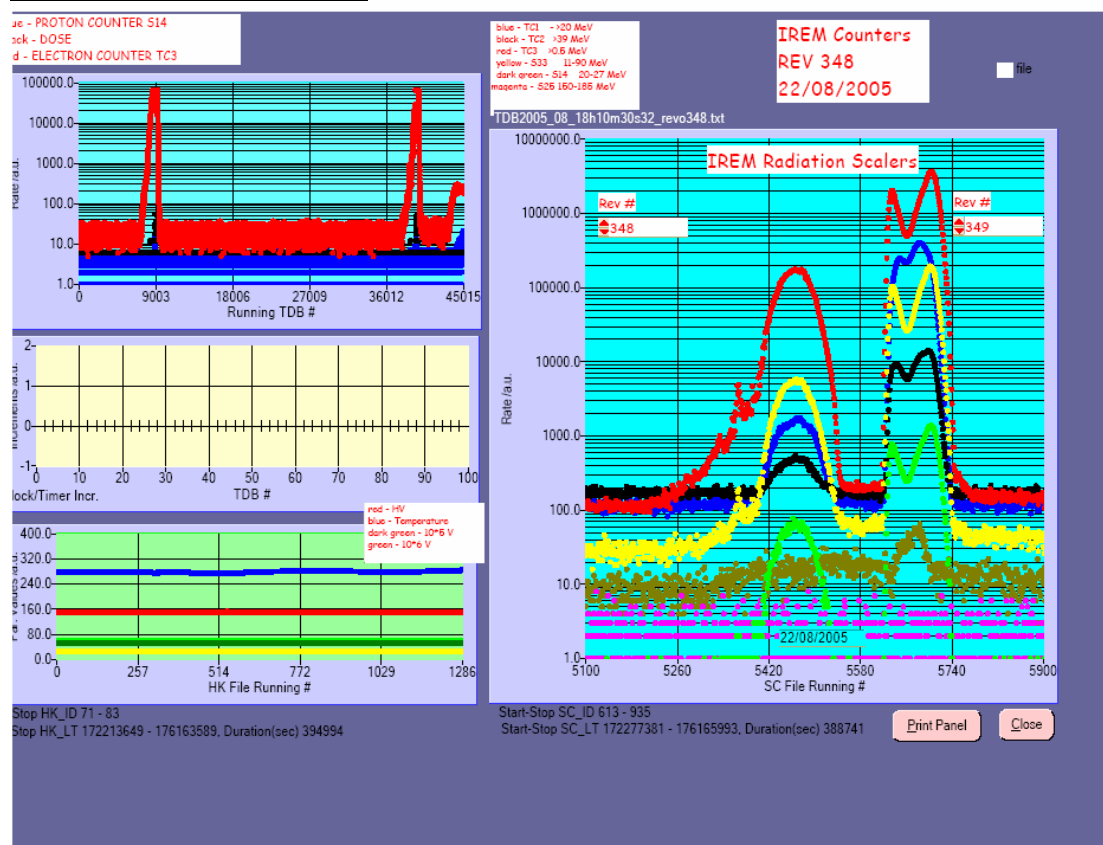
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

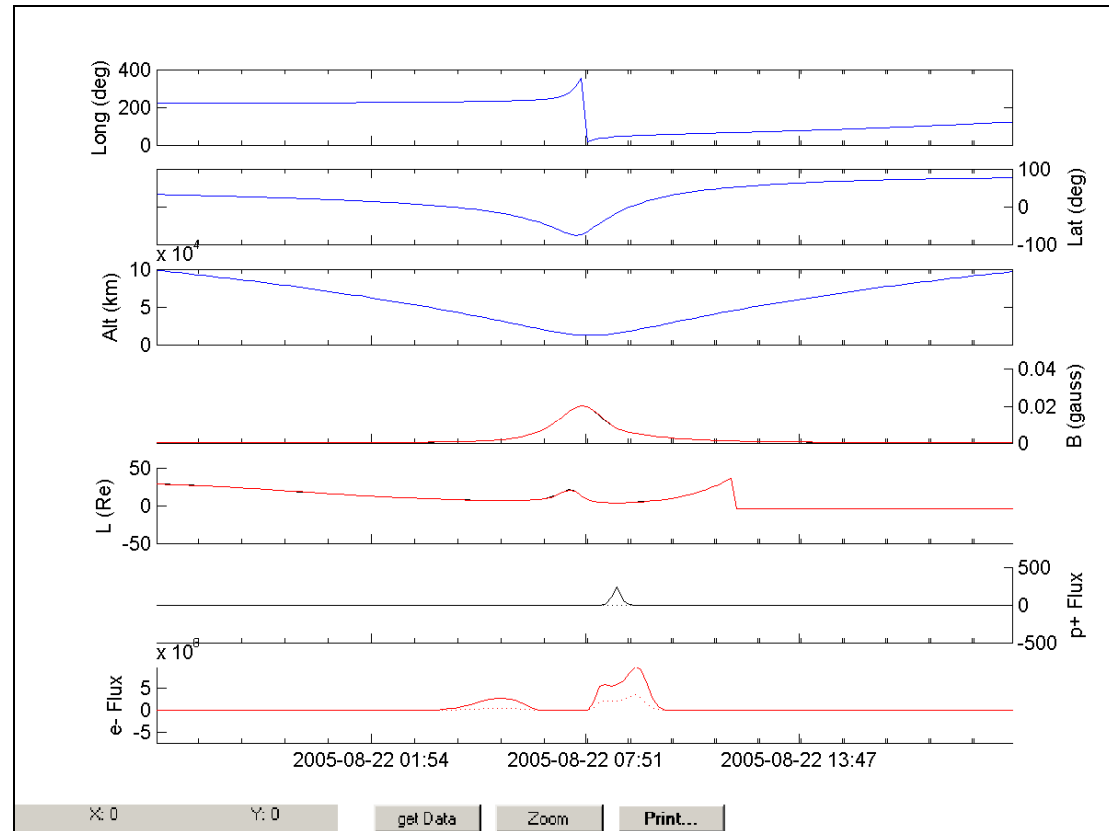
Radiation Spike

IREM radiation counters:

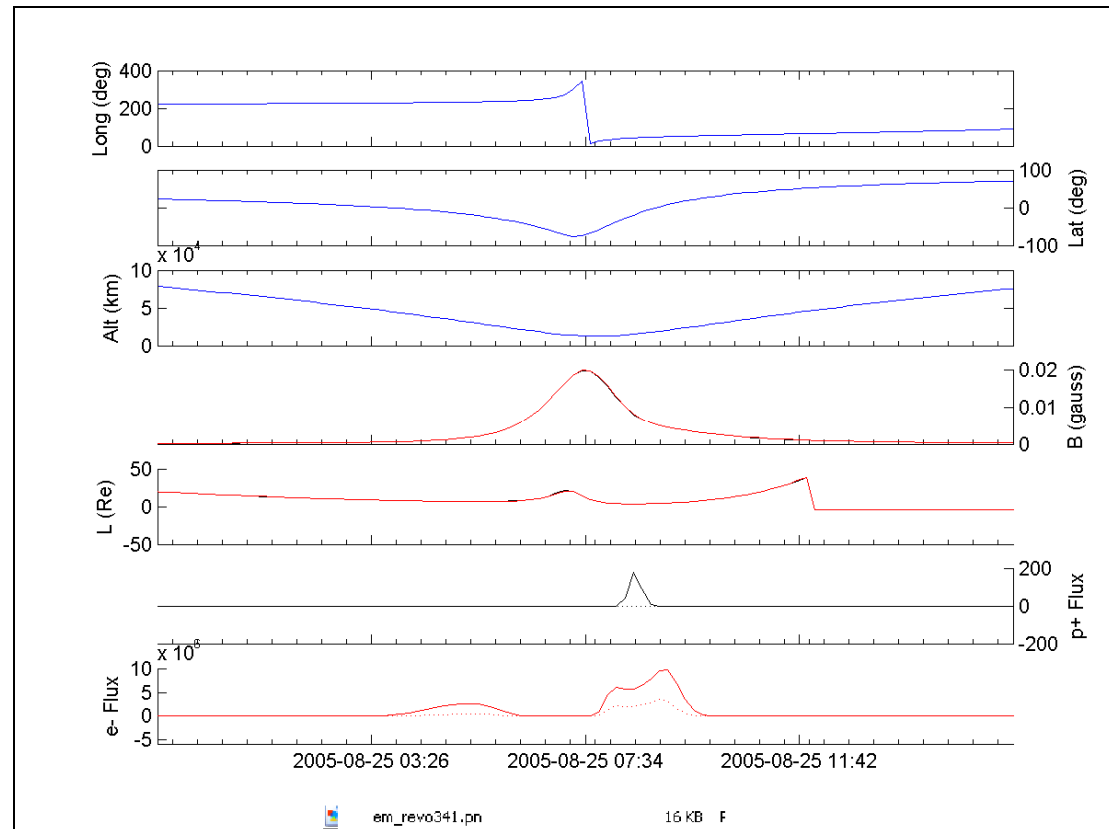


IREM Predicted Radiation Belt Passages:

Rev 348:



Rev 349:



SEC-GOES Observed Particles Fluxes:

