

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 236
Week 13
02.04.07
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 24.03.07 until 30.03.07 (both dates inclusive) and covers the revolutions 543 and 544.

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 consisted of 2 hexagonal dithers of the Galactic Bulge Region (RA 17:45:36.00, DEC -28:56:00.0), a raster dither of Orion OB1 (RA 05:17:00.30, DEC +01:47:17.7), a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), a raster dither of the Galactic Plane Region 3 (RA 19:43:54.33, DEC +23:53:25.4) and a raster dither of GX 339-4, which was a Target of opportunity (RA 17:02:49.50, DEC -48:47:23.0).

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.

Three slews were missed from TL during the observation period due to problem on guide stars selected for slew execution.

Performed the migration of the Flight Dynamics System to the new operational platform.

The fuel consumption over the period between 22/03/2007 and 28/03/2007 was 0.0956 Kg. The remaining propellant is in the order of 147.5267 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 has been 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

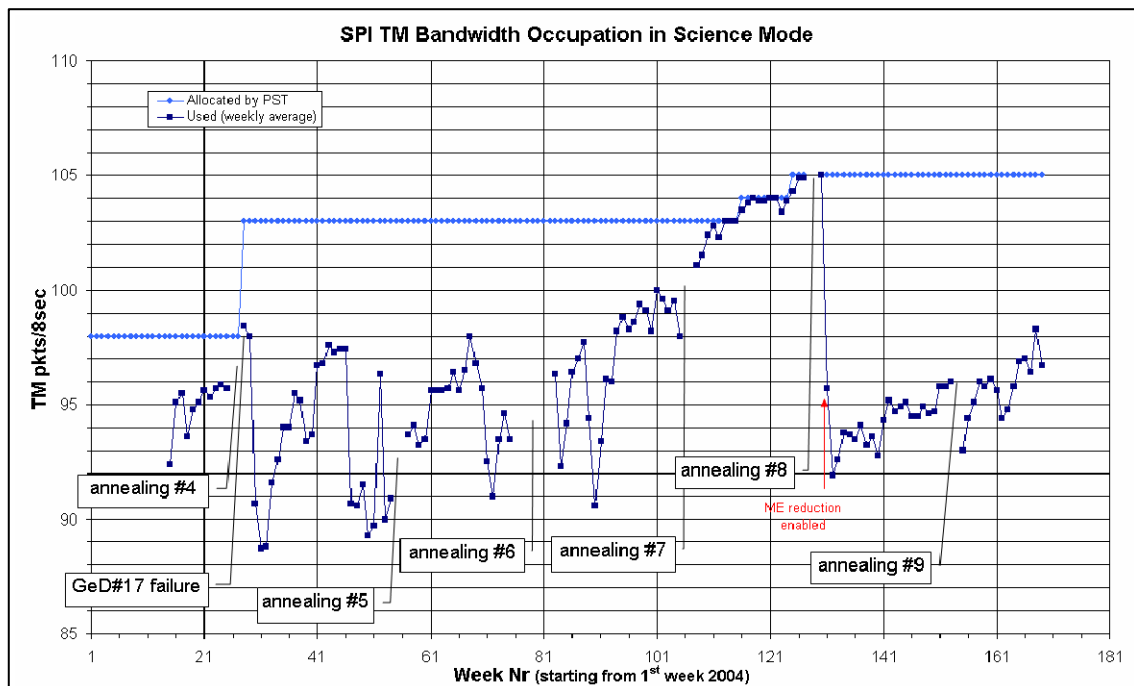
3.2.1 SPI

Following the 9th annealing, which ended on 22nd December, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operating at a lower HV setting of 3.5kV (instead of 4kV). The energy resolution of GeD#4 was recovered with this annealing. Detector #2 is failed since 06.12.2003 and detector #17 since 17.07.2004.

The Stirling compressors are working nominally, maintaining the Germanium detectors at 80 +/-1K. The stroke of all four compressors has been set to 40 since 03.02.2007 at 13:16Z.

During science operations, the instrument was kept in photon-by-photon mode with spectra TM enabled. The assigned TM bandwidth in the science observation windows was 105 packets/cycle, with an average telemetry occupation of 96.7 packets/cycle.

The following plot shows the assigned and the average occupation of the SPI TM bandwidth.



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

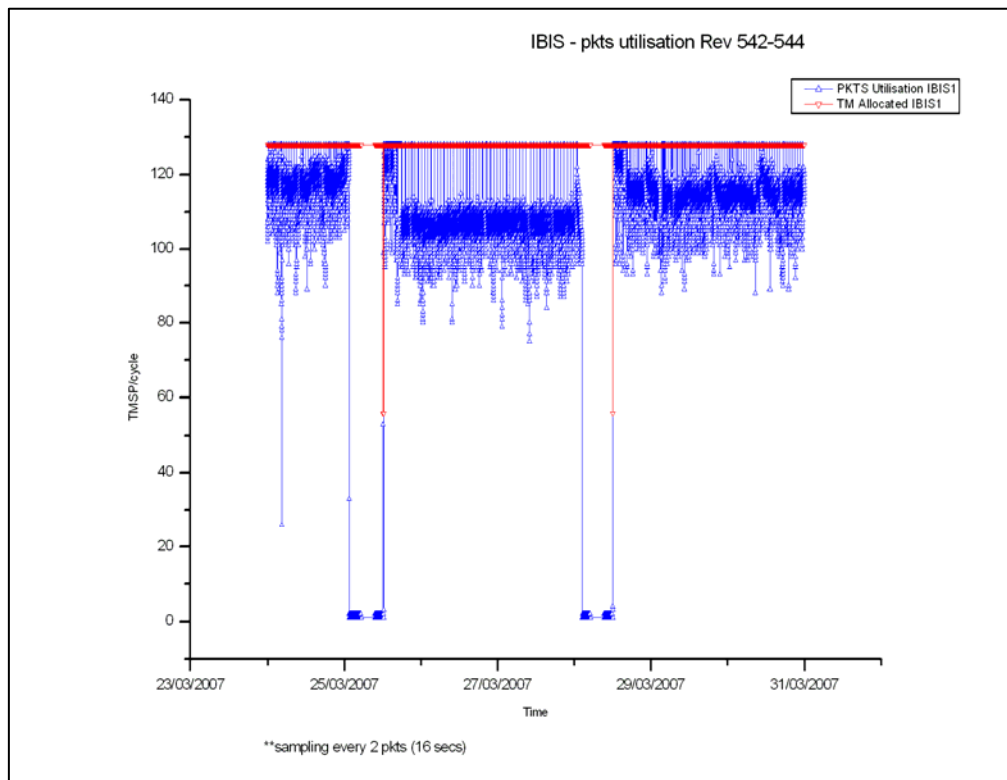
3.2.2 IBIS

The overall status of the unit is nominal.

On 25/03/2007 (DoY 2007.084) IBIS went into Safe configuration at 01:34Z due to the IREM SEU #45. The unit was not recovered as the Belts entry time was planned in the timeline at 02:49Z.

During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 112.52 TMPS/cycle, down 7.14 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 with a TM allocation of 8 packets/cycle during science observations. JEM-X2 was dormant (DPE OFF) with no TM slots allocated.

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, 163 of the 167 planned science pointings for OMC were executed nominally. Two pointings (05420083 and 05430002) were missed due an IREM SEU and associated recovery. Two pointings (05440025-05440026) were missed due to a failure in performing the associated slews as the commanded guide star could not be found.

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 25/03/2007 at 01:34Z, the IREM SEU #45 occurred. The unit was recovered as per procedures and was back into INTEGRAL mode at 03:38Z.

Solar Activity

The observation period was characterised by low solar activity.

Small sunspots (947, 948 and 949) crossed the surface of the sun this week. They posed no threat of strong solar flare.

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 Operational ground facilities performance was good this week. Four science pointings were lost. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. The overall performance was nearly 100%.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were, however, 2 occasions of data drops from Redu, and 3 from DSS-24. There was no impact. The overall performance was well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSFs are available and observations have been planned up to revolution 551.

A TOO request has been received for the Soft Gamma Repeater SGR 1806-20 which will be dealt with next week, but re-planning of one revolution is probable.

TSF's up to revolution 544 have been received.

2. Observation status

ECS files have been received and processed up to revolution 537.

3. ISOC Science Data Archive

A status meeting was held on 27 March discussing the remaining work on the next ISDA release. Also the next developments for the INVITE tool have been settled.

4. ISOC system

Version 14.5 has been tested successfully and will be installed after Easter.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 02/04/2007:

- Latest Standard Analysis completed: observation 04200560171 (GX 339-4, Revolution 536) on 02/04/2007.

- Latest products archived: observation 04200560171 (GX 339-4, Revolution 536) on 02/04/2007.

- Latest observation products sent to the observer: observation 04200340013 (GRS 1915+105, Revolution 535) on 01/04/2007.

5 Special Events

6 Anomalies

The following problems were reported that impacted operations:

- During the perigee passage from revolution 543 to 544, the INTEGRAL Flight Dynamic System moved to the new ORATOS-O platform. This caused 3 problems of TPF delivery. The operator had to manually generate the TPF update for the subsequent slews.

- On DoY 2007.084 (25/03/2007) at 21:06Z due to a loss of Guide Star, pointing 05430015 was missed.
- On DoY 2007.088 (29/03/2007) at 05:20Z the Guide Star was not found causing the loss of pointings 05440025 and 05440026.

The following anomaly report was entered into the ARTS system this week:

AR id	Date Created	Subject	Segment	Status
INT_SC-181	28/03/2007	IREM Anomaly: Reset of IREM_CSCI S/W #45, 25/03/2007	Payload	Open

7 Future Milestones

The following activities are foreseen in the next few weeks.

- IMU Calibration and Health Check 10/04/2007 Rev. 548
- RMU-B Health Check 10/04/2007 Rev. 548
- Summer eclipse season starts 18/04/2007 Rev. 550
- Periodic Thruster Torque rescaling 24/07/2007 Rev. 583

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 543

The observations in revolution 543 began with a hexagonal dither of the Galactic Bulge Region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. It continued with a raster dither of Orion OB1 (RA 05:17:00.30, DEC +01:47:17.7), lasting ~52.5 hours up to the end of the revolution.

Revolution 544

The observations in revolution 544 began with a hexagonal dither of the Galactic Bulge Region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. It continued with a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), lasting ~5.6 hours. This was followed by a raster dither of the Galactic Plane Region 3 (RA 19:43:54.33, DEC +23:53:25.4), lasting ~3.9 hours. Finally a raster dither of GX 339-4, which was a Target of opportunity (RA 17:02:49.50, DEC -48:47:23.0), lasting ~41.9 hours was performed up to the end of the revolution.

Throughout these observations, all instruments were in their nominal science modes, except JEM-X2, which is switched off. The TM allocation was IBIS 128; SPI 105; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2007-03-10T11:15:21.000Z	147.8492	F	Automatic TM processing.
2007-03-11T21:44:52.000Z	147.8042	F	Automatic TM processing.
2007-03-13T11:04:56.000Z	147.7933	F	Automatic TM processing.
2007-03-13T23:32:58.000Z	147.7798	F	Automatic TM processing.
2007-03-16T10:54:00.000Z	147.7652	F	Automatic TM processing.
2007-03-17T21:08:44.000Z	147.7164	F	Automatic TM processing.
2007-03-19T10:42:16.000Z	147.6978	F	Automatic TM processing.
2007-03-20T20:20:19.000Z	147.6410	F	Automatic TM processing.
2007-03-22T10:30:15.000Z	147.6223	F	Automatic TM processing.
2007-03-22T16:28:00.000Z	147.5993	F	Automatic TM processing.
2007-03-25T10:17:03.000Z	147.5925	F	Automatic TM processing.
2007-03-25T16:50:08.000Z	147.5701	F	Automatic TM processing.
2007-03-26T20:29:08.000Z	147.5498	F	Automatic TM processing.
2007-03-28T10:04:56.000Z	147.5418	F	Automatic TM processing.
2007-03-28T15:59:52.000Z	147.5267	F	Automatic TM processing.

This report was generated Fri Mar 30 08:00:41 GMT 2007

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, 24/03/2007 –30/03/2007

AOCS operations were executed from the Automatic Timeline.

During this period, 80 Open Loop Slews, 102 Closed Loop Slews and 5 Momentum Biases were executed.

3 slews (1 CSL, 2 OSL) were missed from TL during the observation period due to loss of guide star and problem on the STR unit during the S/T process.

Performed the migration of the Flight Dynamics System to the new operational (O-) platform. Reported, few crashes of the ORATOS Job Scheduler: since the automatic restart only run every few minutes some jobs were omitted because the job scheduler was down in the meantime. Affected jobs were the update jobs for the following slews: update of CSL 05440011, CSL 05440014 and CSL 05440019.

The OTF was not reached during the last part of PID 05430014, due to loss of guide star.

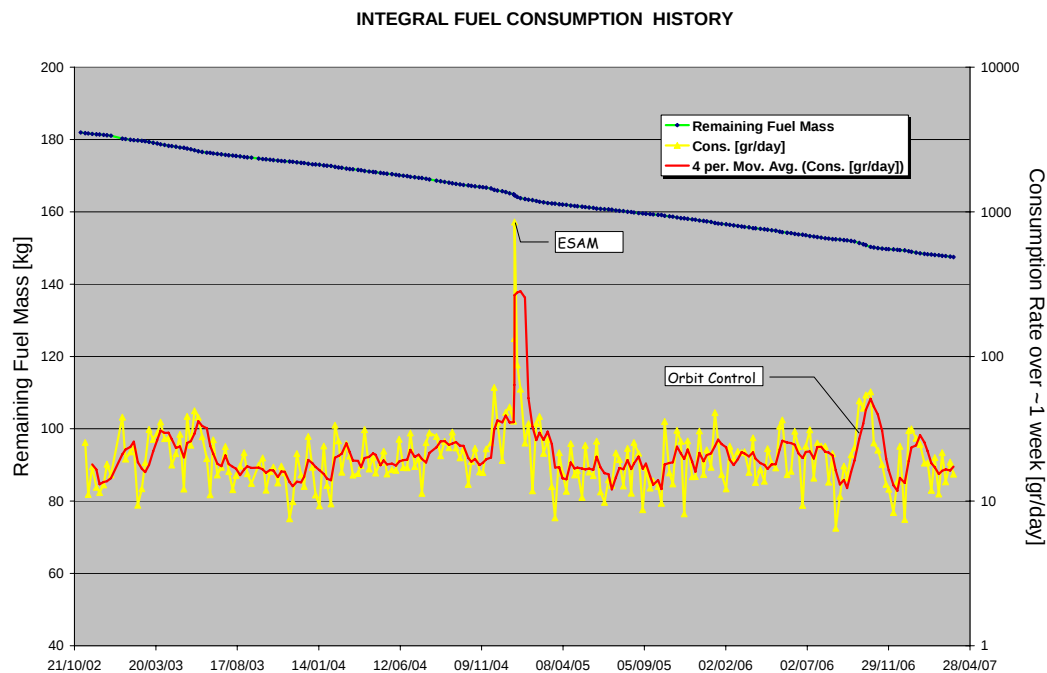
This is equivalent to $\sim 1.6\%$ of the total number of slews planned (182).

Orbit Control

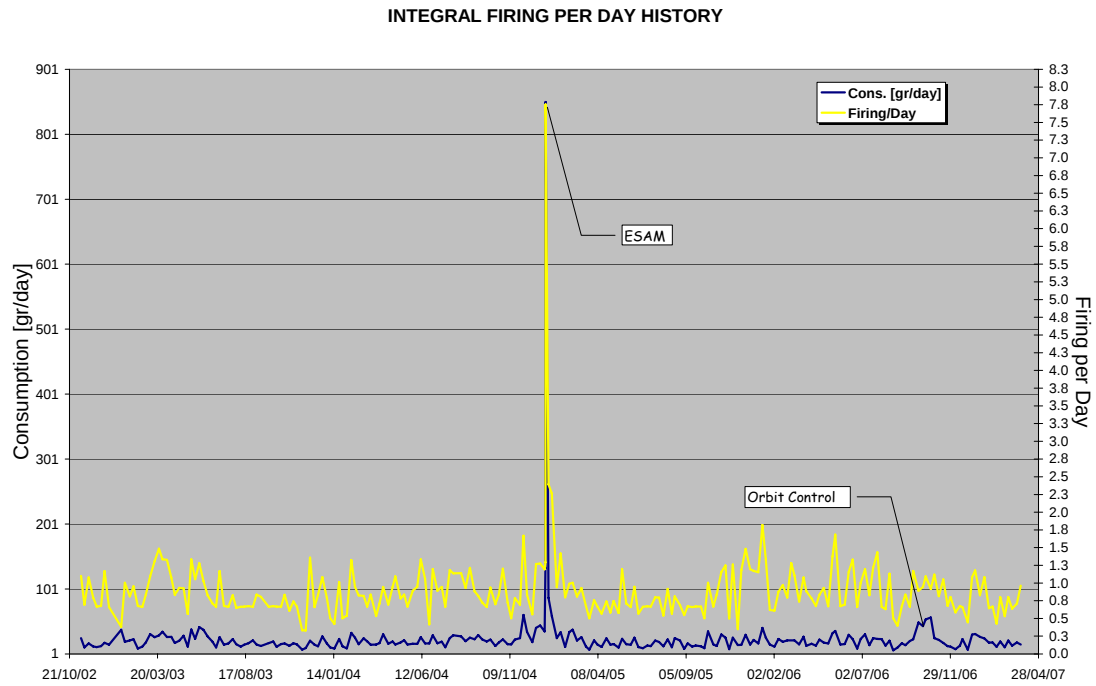
No update.

Fuel consumption

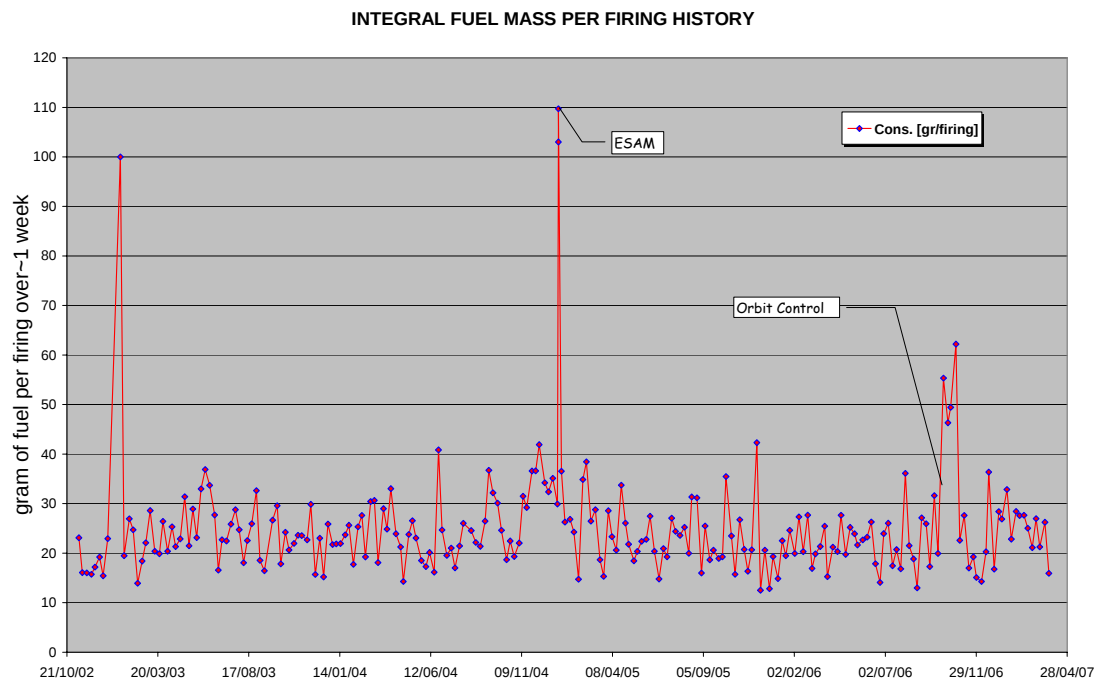
The fuel consumption (total, grams per day) over the period between 01/11/2002 and 28/03/2007 is reported in the plot below.



The firing per day over the period between 01/11/2002 and 28/03/2007 is reported in the plot below.

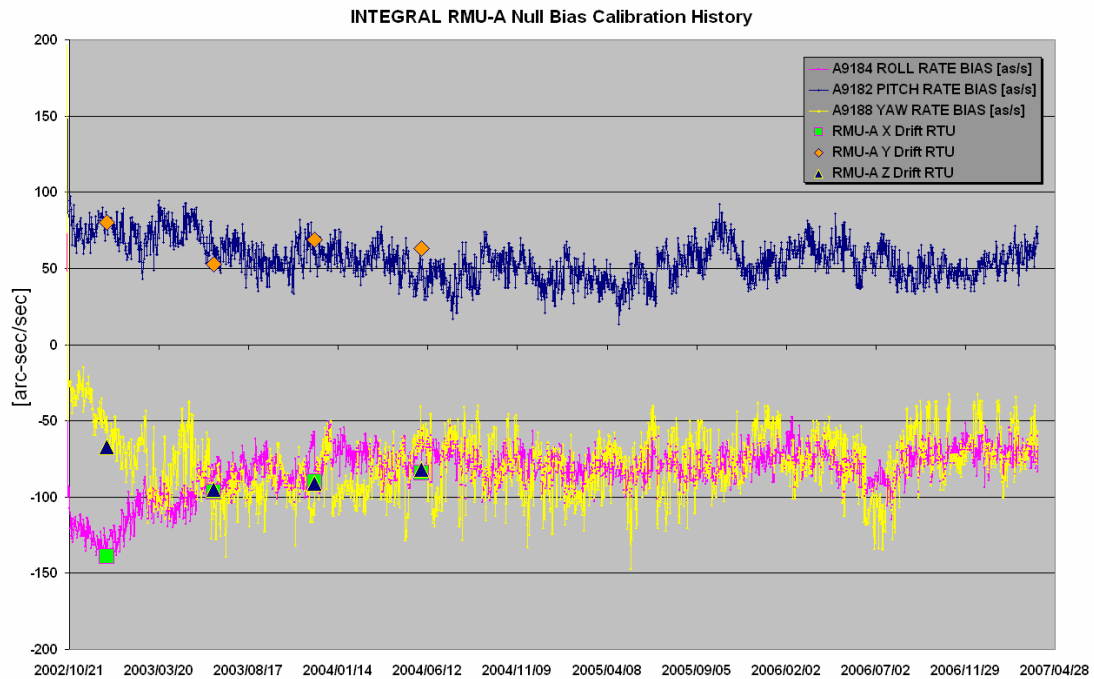


The fuel per firing over the period between 01/11/2002 and 28/03/2007 is reported in the plot below.

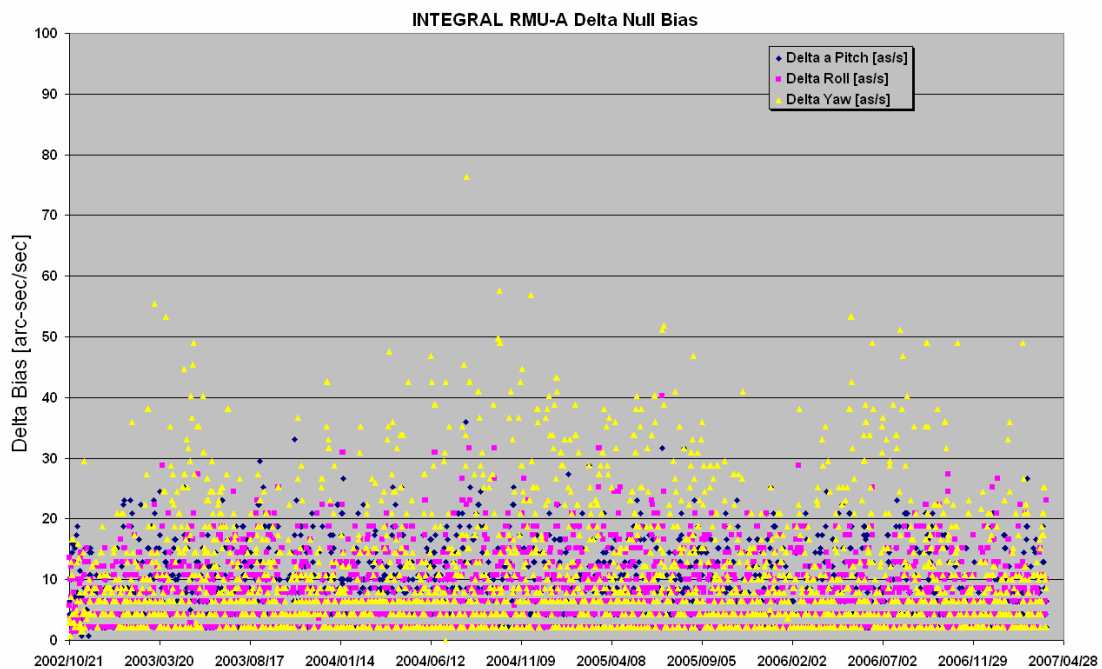


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 30/03/2007 is reported in the plot below.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 30/03/2007 is reported in the plot below



24/03/2007 (Day of Year 083, Revolution 542)

Problem on REDU station: at 09:12z due to a problem on REDU, the TM link dropped out: as consequence the mapping commands after slew ID 05420062 failed release.

A manual update in TL of the next slew ID 05420063 was performed at 09:59z and the AOCS enabled in TL.

No impact on TL.

25/03/2007 (Day of Year 084, Revolution 542-543)

STR loss of guide star: at 21:05:57z the guide star was lost during the last part of PID 05430014. As automatic reaction the ACC switched ON the IMU 1 and an automatic mapping was commanded. The AOCS s/s was disabled at 21:09z and slew ID 05430015 failed release (no time for new update being the lost of guide star closer to the slew commanding).

The guide star (ID 4750-239) was Mi 8.35 @ CCD location [-3106, -21845].

After the automatic mapping a new guide star was picked Mi 7.15 @ CCD location [1522, -14666].

A manual recovery was then performed from attitude of PID 05430014 to PID 05430015. The next slew ID 05430016 was manually updated in TL and the AOCS enabled in TL at 21:37z.

The reason of the lost of guide star is likely to be due to extended objects present in the STR FOV , as evidenced in the plot of the STR FOV below. The guide star ID 239 is in the centre of the image.

Problem on FDS: at 20:13z due to a problem on FDS, no update for slew ID 05440014 was generated.

A periodic job was referring to a wrong script after the migration of the Flight Dynamics System to the new operational (O-) platform. As a consequence, the Oratos Job Scheduler crashed periodically. Since the automatic restart only runs every some minutes some jobs have been omitted just because the job scheduler was down in the meantime.

A manual update in TL of the slew ID 05440014 was performed at 20:36z and the AOCS enabled in TL.

No impact on TL.

29/03/2007 (Day of Year 088, Revolution 544)

Problem on FDS: at 00:01z due to a problem on FDS, no update for slew ID 05440019 was generated.

A periodic job was referring to a wrong script after the migration of the Flight Dynamics System to the new operational (O-) platform. As a consequence, the Oratos Job Scheduler crashed periodically. Since the automatic restart only runs every some minutes some jobs have been omitted just because the job scheduler was down in the meantime.

A manual update in TL of the slew ID 05440019 was performed at 00:44z and the AOCS enabled in TL.

No impact on TL.

Star not found during S/T process: at 05:20z the execution of the slew ID 05440025 (CSL) failed release due to static PTV. The planned slew star (ID 8341-321), expected @ CCD location [22454, -20361], was not found during the STR search/track process and this caused the failure of the command sequence.

A manual recovery was then performed from the attitude of PID 05440024 to the attitude of PID 05440025. For the same reason above (same star not found during S/T) the sequence failed release again. Moreover, as consequence of the AOCS s/s disabled in TL, also the following slew ID 05440026 failed release.

From the star catalogue resulted that the star ID 8341-321 has $\sim$ Mi 7.0. The reduced margin wrt the magnitude threshold selected for the S/T process ($M_i=7.25$, $LSB \sim 0.25$ Mi), could have created problem (for STR) to identify (during a mapping) such star in the FOV. No TM image for such star was found by off-line processing the STR FOV.

A manual recovery from attitude from PID 05440024 to the attitude of PID 05440026 was performed at 06:38z. The next slew ID 05440027 was manually updated in TL and the AOCS enabled in TL at 06:48z.

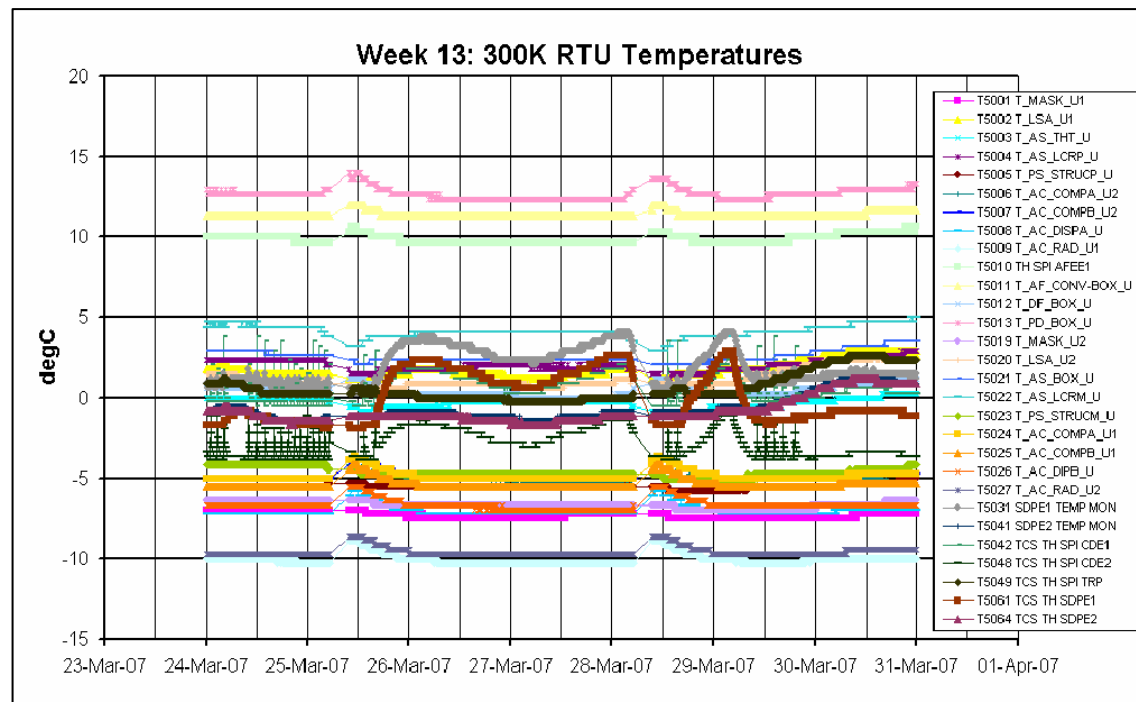
The following slews were not executed from TL: 05440025 (CSL)- 05440026(OSL).

30/03/2007 (Day of Year 089, Revolution 544)

Nothing to report.

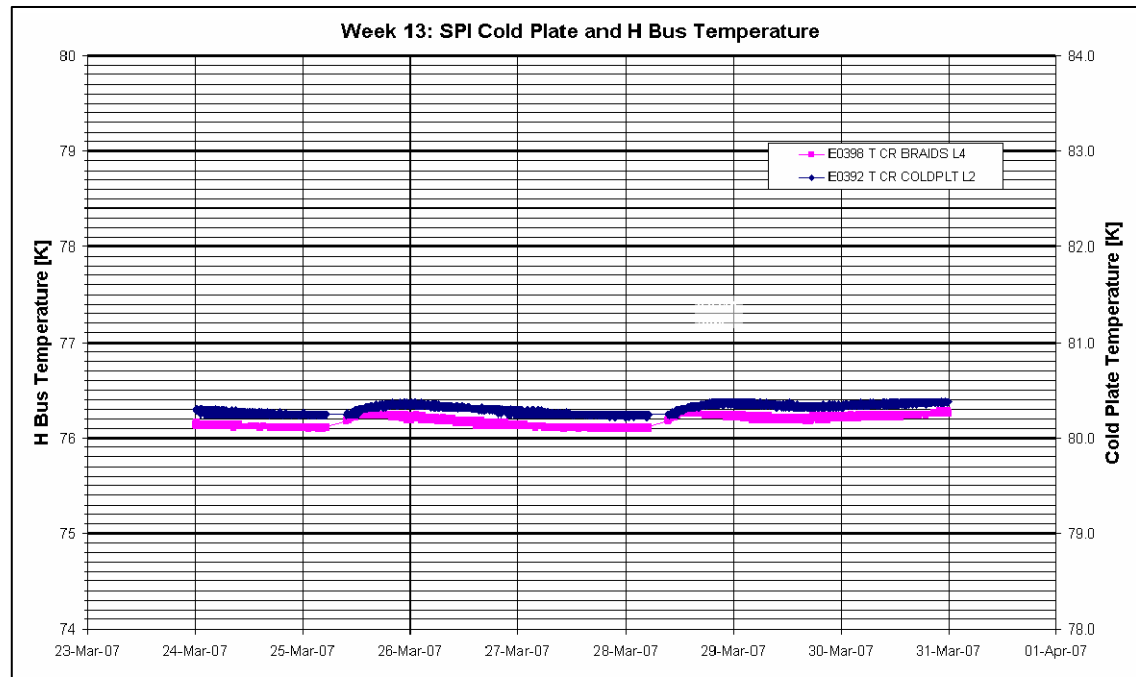
8.3.2 SPI Operations

Unit Temperatures: All the equipment temperatures are inside the operational limits. The following plot shows their evolution during the reporting period:



Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

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

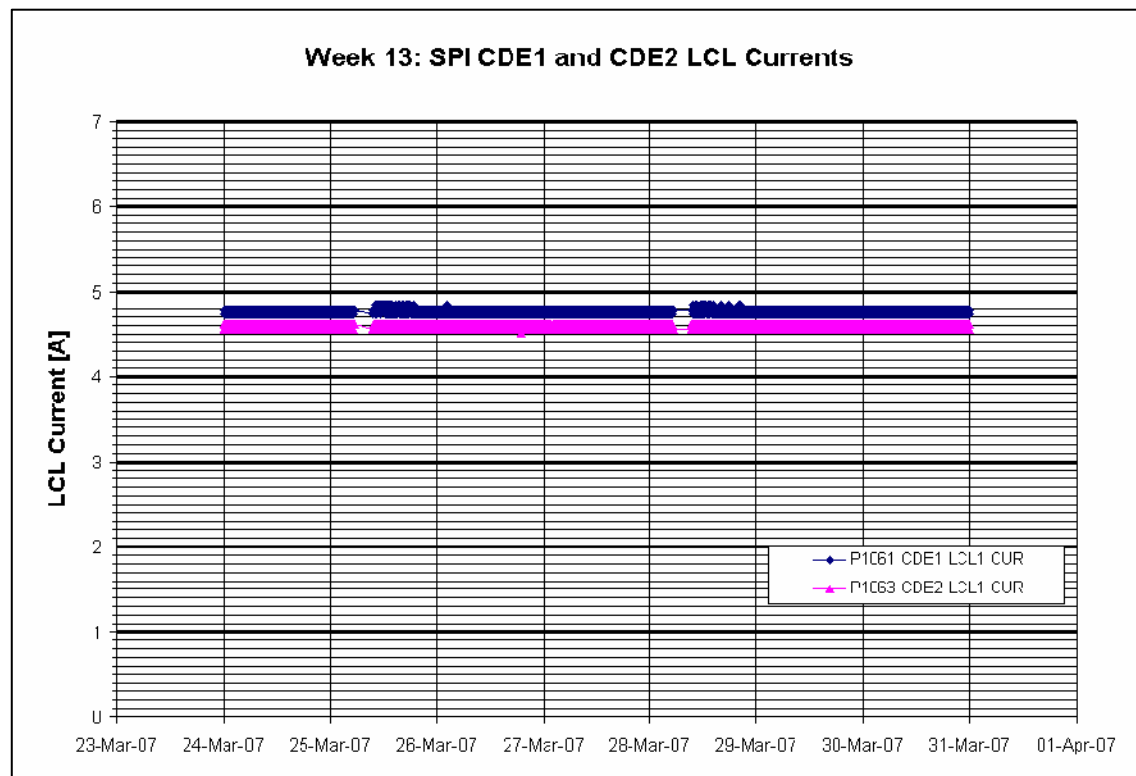


The stroke of all four compressors has been 40 since 03-02-2007 at 13:16Z.

The average LCL currents of the CDEs over the week were:

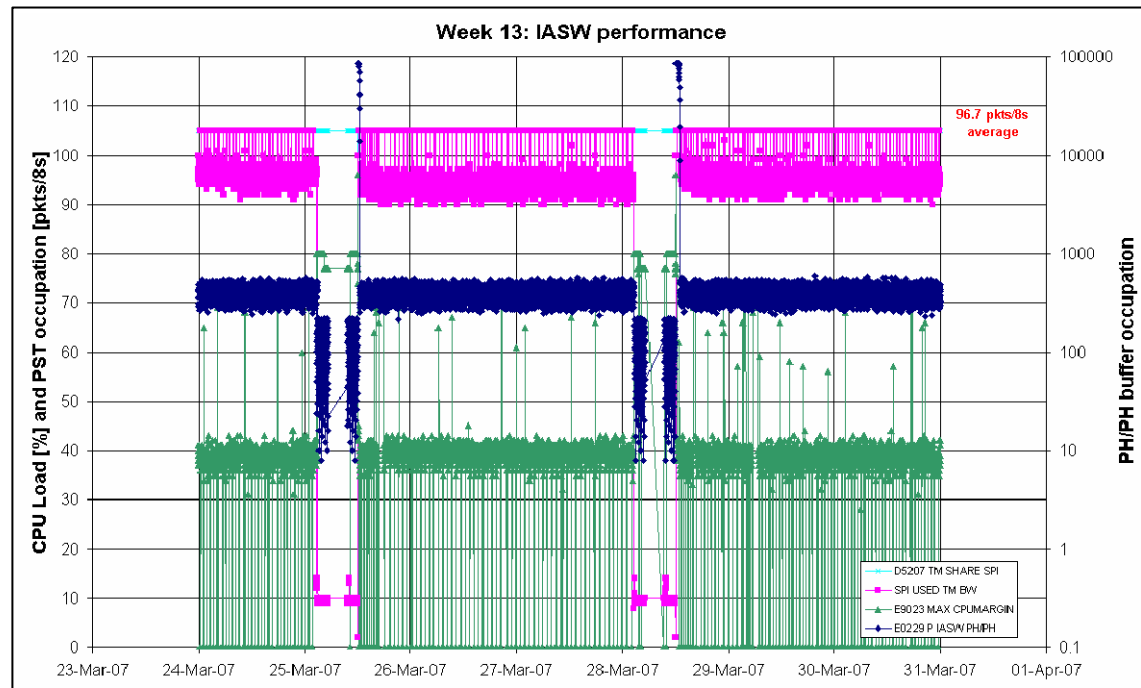
- Average CDE1 LCL Current = 4.77A
- Average CDE2 LCL Current = 4.58A

The following plot shows the evolution of the CDE currents during the reporting period.



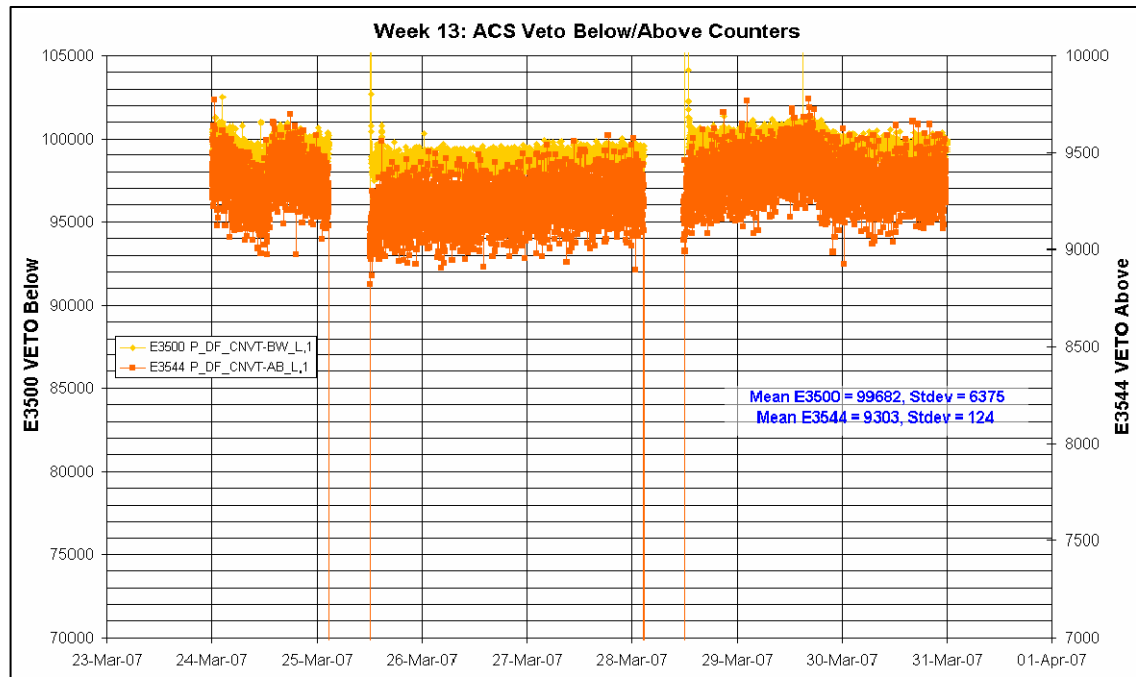
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is 433. The spectra scaling parameter was set to 9/19 SE.

The average TM bandwidth occupation of SPI was 96.7 packets/cycle over the science window, when the TM allocation was 105 packets/cycle. 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, except for FEE 81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162). FEE #57 is also still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

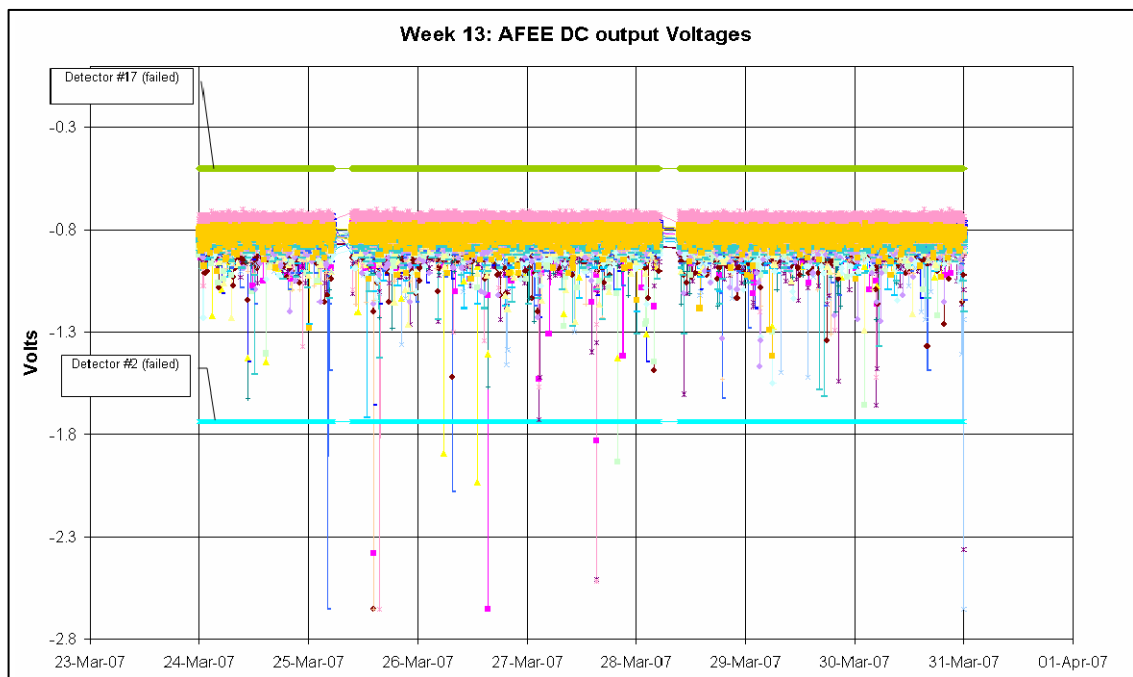
The following plot shows the ACS overall count rate evolution during the reporting period:



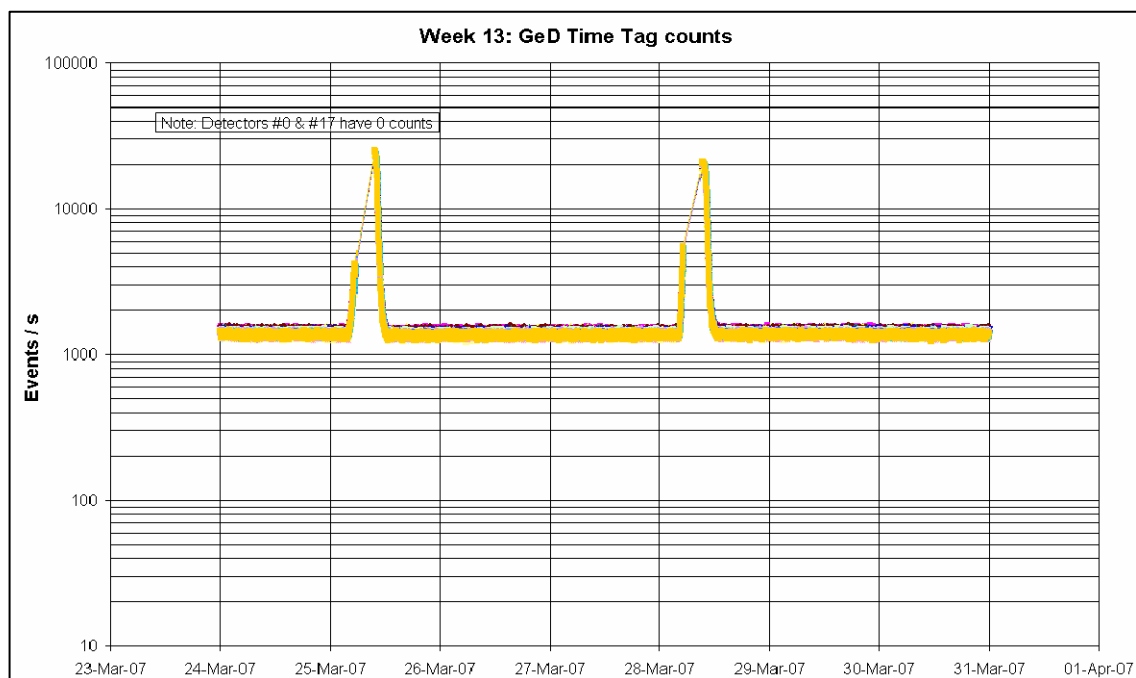
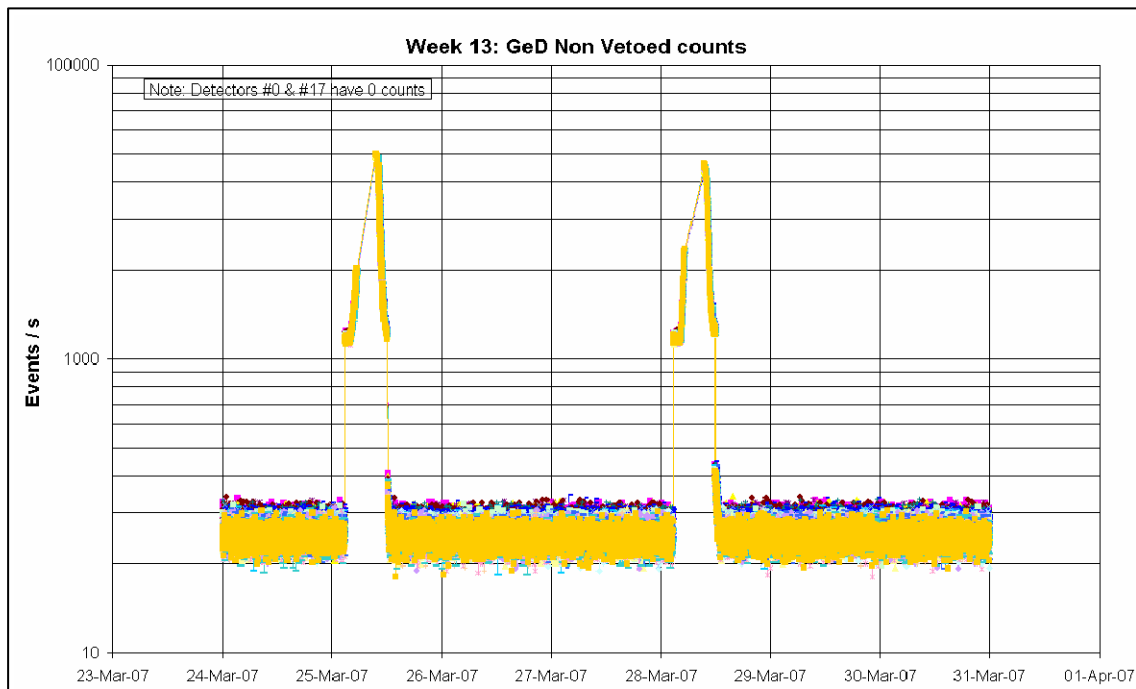
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution. The energy resolution of GeD#4 was recovered with the last annealing.

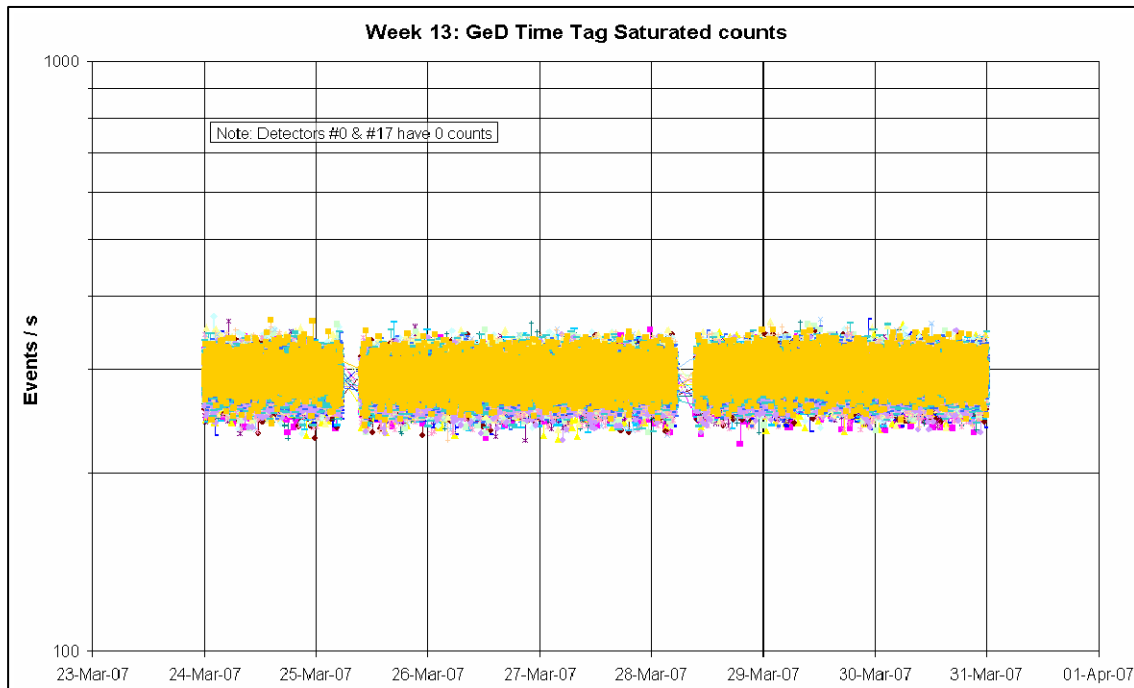
The GeD#12 HV remained at 3.5kV throughout the reporting period.

The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.

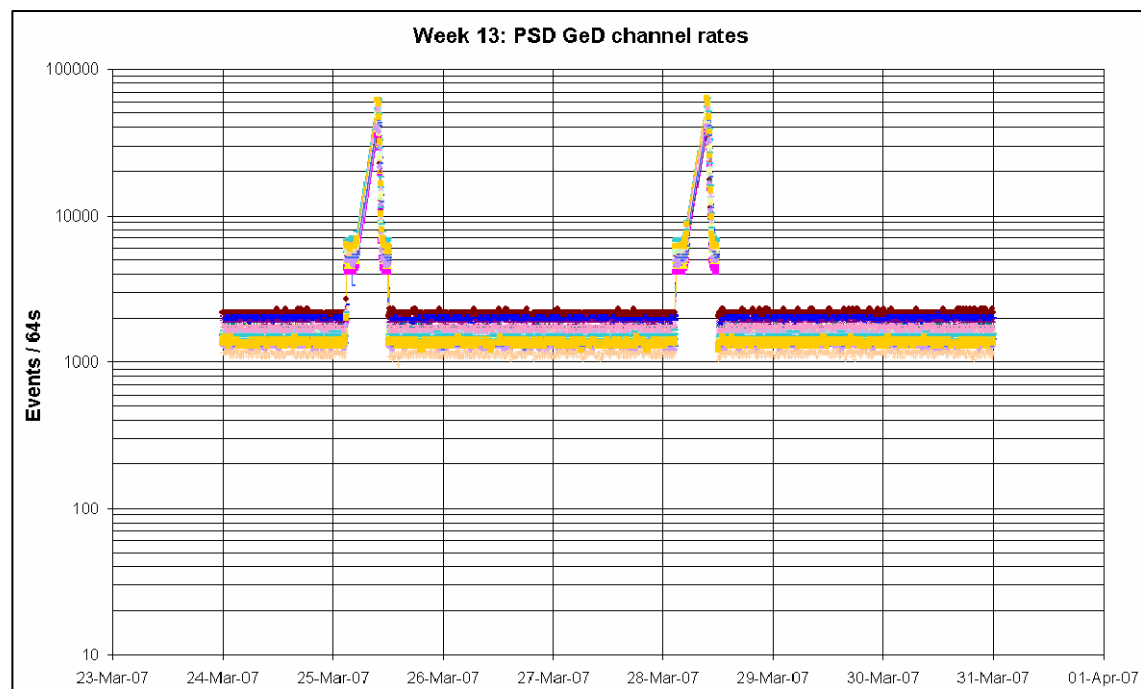


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





PSD: The health of the unit is nominal. The following plot shows the PSD channel rates during the reporting period.



Event Log:

The following non-nominal events occurred on SPI during the reporting period:

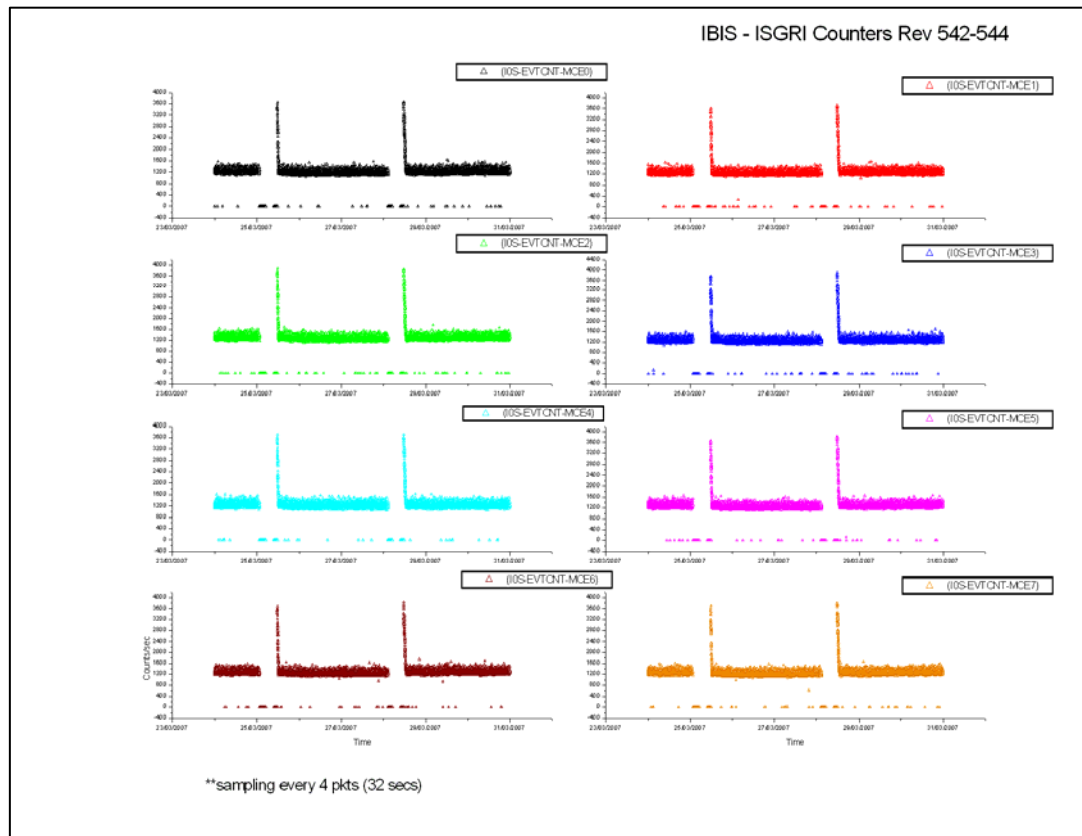
- On 2007-03-25 at 12:15:50Z the TM parameter E3500 P_DF_CNVT-BW_L went OOL High. This was just after radiation belt exit of revolution 543. It returned within limits at 12:24:14Z.

- On 2007-03-26 at 15:35:25Z OEM 1024 ID 243 EVENT SPI1 SPECTRA BUILDING NOT COMPLETED was received. This was during pointing ID 05430033. As it was a one-off occurrence, no action was taken.
- On 2007-03-28 at 12:02:46Z the TM parameter E3500 P_DF_CNVT-BW_L went OOL High. This was just after radiation belt exit of revolution 544. It returned within limits at 12:45:34Z.

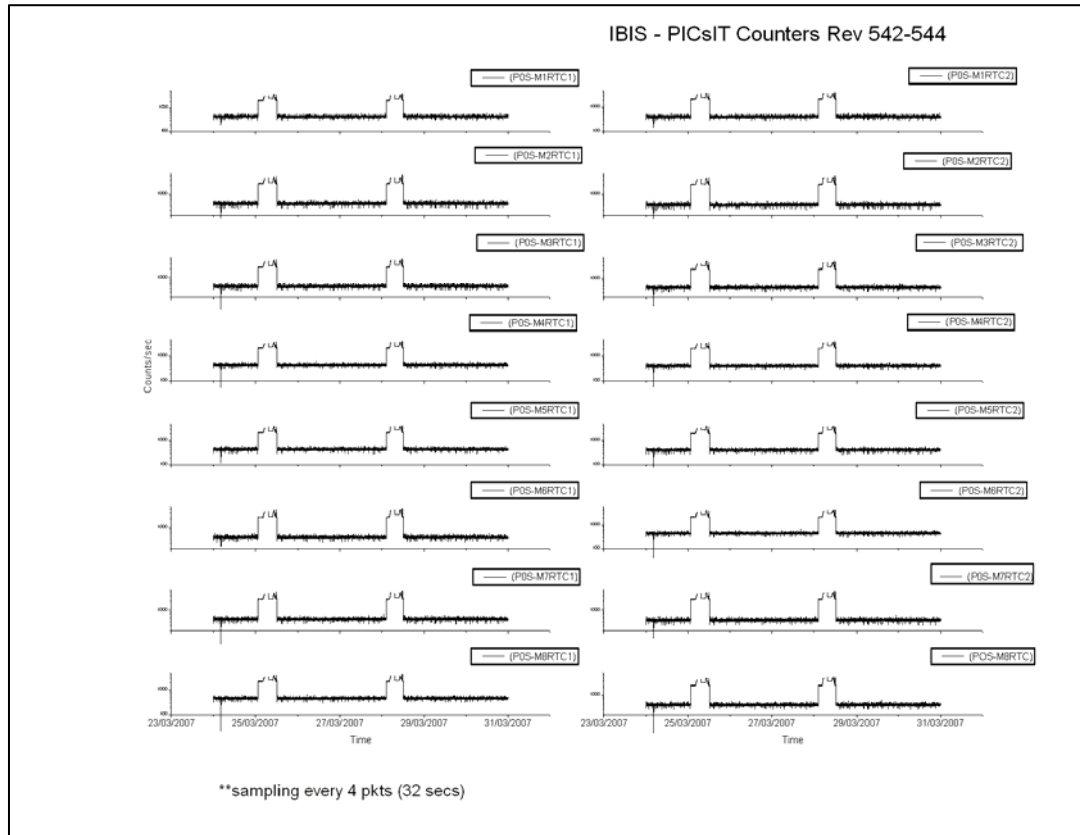
8.3.3 IBIS Operations

IBIS Event Counters Plots.

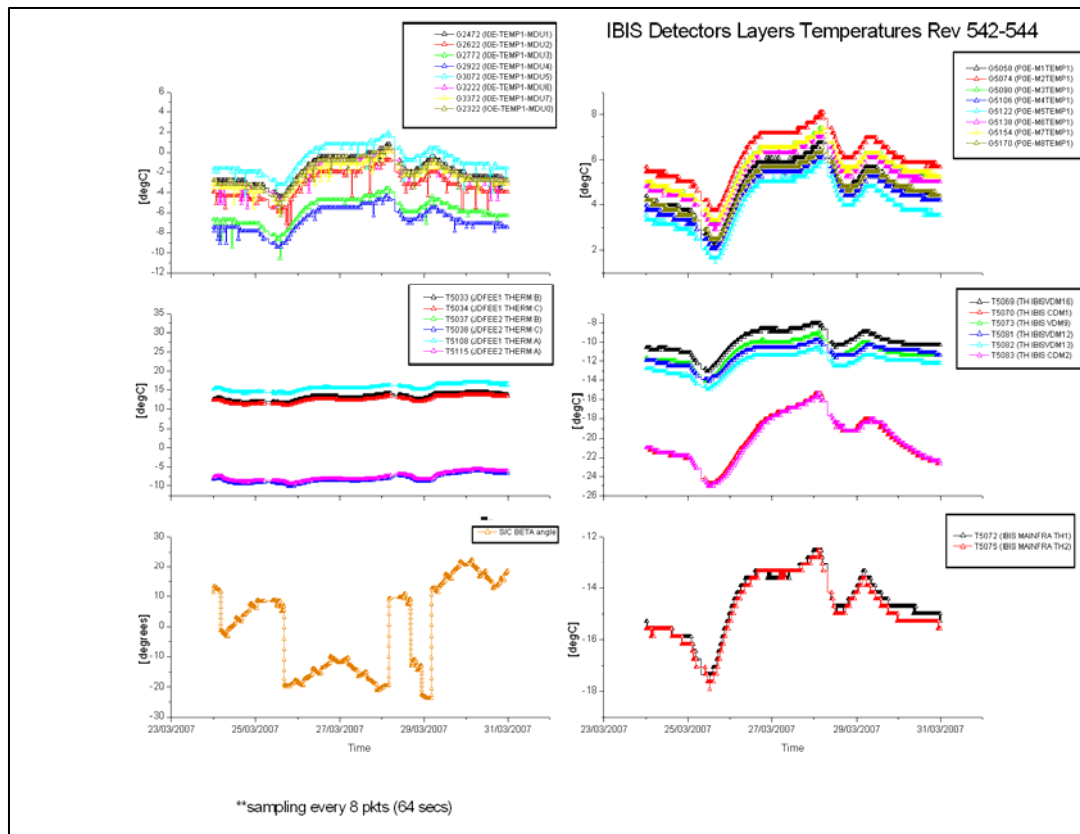
ISGRI Counters:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report:

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), families G5002 (P0S-Mi_RTC1) and G5003 (P0S-Mi_RTC2), families G2014 (I0E-OVFWPXADD-Mi) were reported at Radiation Belts passage.

DoY 2007.083 (24/03/2007):

At 04:21Z, parameters from TM families G5068 and G5072 (P0S-MiF1 and 2 ERRF) were reported failing SCC.

At 04:24Z, parameters from TM families G5002 and G5003 (P0S-Mi_RTC1 & 2) were reported OOL Low-low with the value 0.

At 04:27Z, the OEM APID 1280, class 0, id 132 “IBIS1 IASW HEPI RESYNCHRONISED” was reported.

According to FDIR, the coincidence of these 3 events flags a problem of synchronisation between the detectors and HEPI board. The unit fixed the problem automatically by a resynchronisation of the HEPI board. No action was required from the operator.

DoY 2007.084 (25/03/2007):

At 01:34Z, following the IREM SEU #45 IBIS switched automatically into Safe configuration. As the Belts entry were planned in the timeline at 02:49Z, it was decided by the operator to not recover the instrument.

At 11:49Z, after ISGRI calibration at the end of the Belts passage, TM family G2013 (I0S-EVTCNT_MCEi) was reported toggling OOL until Belts exit. This was due to the high radiation background at belts exit. No further action was taken.

DoY 2007.087 (28/03/2007):

At 11:36Z, after ISGRI calibration at the end of the Belts passage, TM family G2013 (I0S-EVTCNT_MCEi) was reported toggling OOL until Belts exit.

At 12:12Z, TM parameter G8080 (S1E-VS_HBRA-RT) was reported OOL High and back.

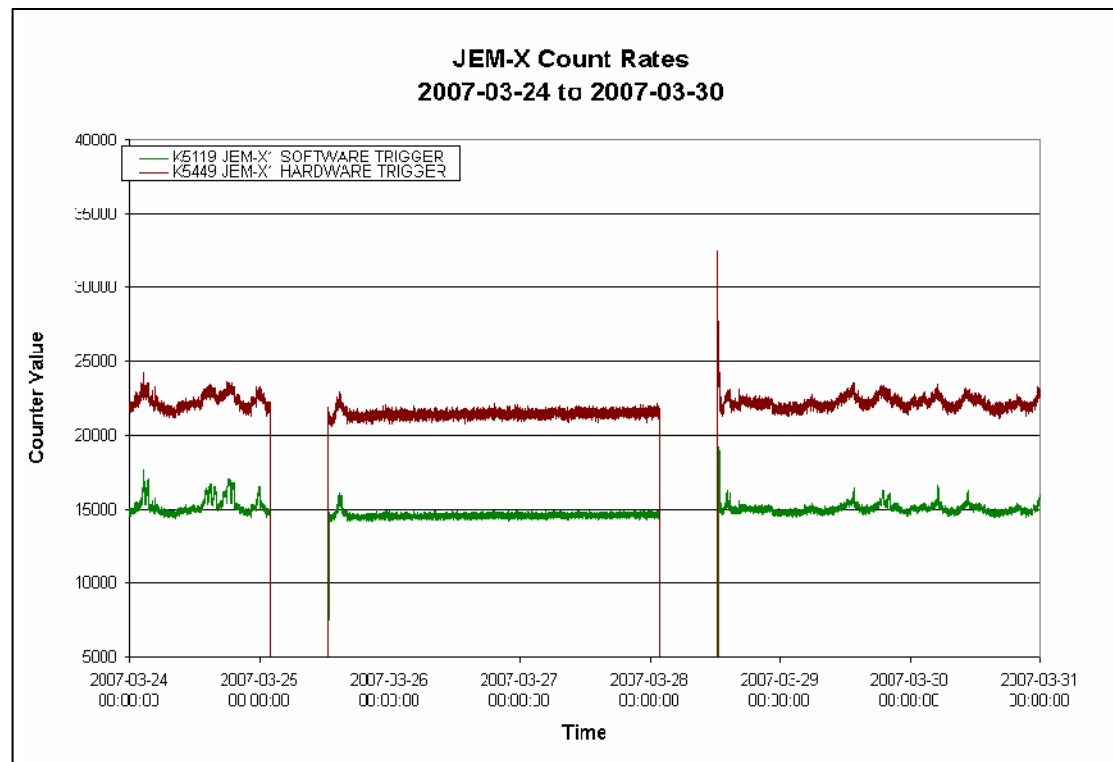
These 2 events were due to the high radiation background at belts exit. No further action was taken.

8.3.4 JEM-X Operations

JEM-X Count Rates:

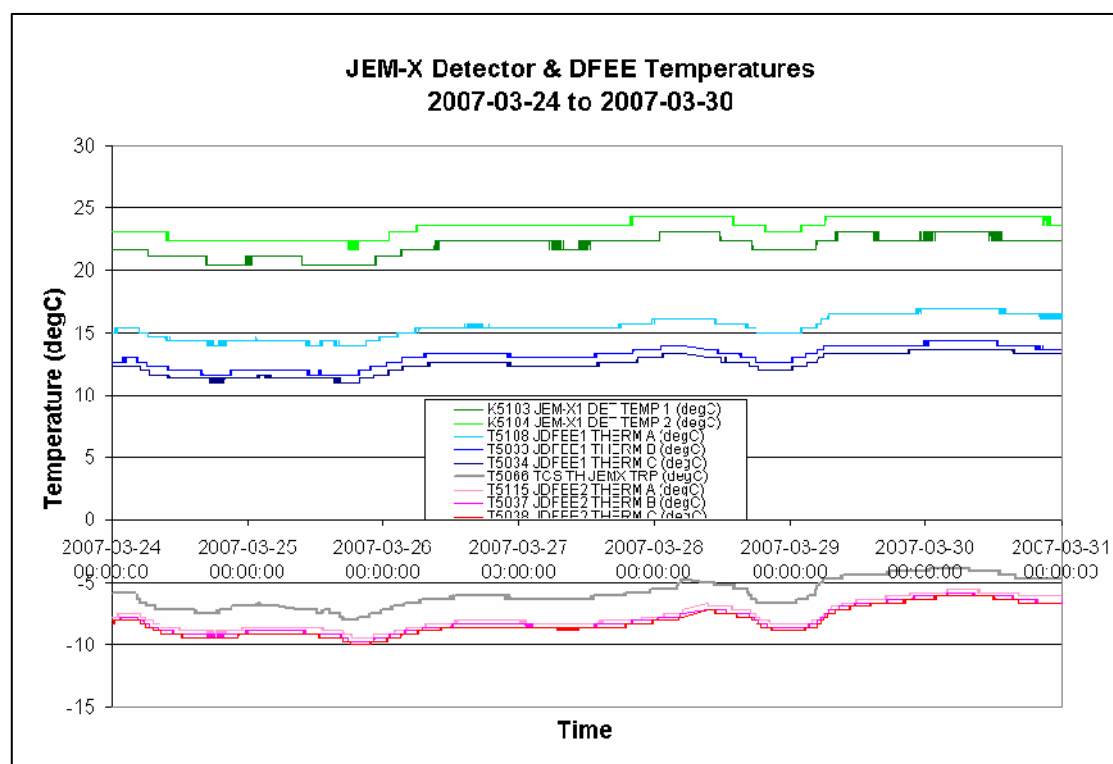
JEM-X count rates over the reporting period are displayed in the following graph¹.

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



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.



² Data sampled (1 frame in 8)

JEM-X Daily Report:

2007-03-24 (DOY 083, Rev 542)

JEM-X1 operations executed nominally.

2007-03-25 (DOY 084, Rev 542-543)

At 01:34:17Z an IREM SW reset (see INT_SC-181) caused the IREM RMC parameters K5315-K5317 to go OOL high (value = 65535). This did not affect JEM-X1 as the JEM-X reactions to IREM are disabled.

2007-03-26 (DOY 085, Rev 543) to 2007-03-27 (DOY 086, Rev 543)

JEM-X1 operations executed nominally.

2007-03-28 (DOY 087, Rev 543-544)

During the execution of the JEM-X1 activation ED KEHVAC01 from the Timeline, after the TC K0013 STATE DIAGNOSTIC was uplinked at 12:20:25Z, the following OEM was received:

12:20:44Z OEM 189 JEM-X1 PROB DFEE 9 (Unexpected DFEE state reported in HK)

as the TM parameter K5462 DFEE STATE IASW was reporting state DATA DUMP while K5022 DFEE STATUS was SETUP. This was because the DFEE output FIFO buffer was over half full at the time of termination of the diagnostic data collection (K5135 FIFO FULL LOSS = 3656 at 12:20:26Z) and thus the IASW did not recognise the autonomous transition of the DFEE back to SETUP (see JEM-X User Manual Section 3.7.5.2.3.6). The situation rectified itself when the next TC of the ED, TC K0009 STATE SETUP, was sent at 12:25:25Z, after which both TM parameters K5462 and K5022 reported SETUP and the following OEM was received:

12:25:32Z OEM 254 ERROR OFF.

The above filling of the DFEE buffer was due to high background radiation conditions after the expected radiation belt exit. Due to this high background, the following Out of Limits were also received:

- K5449 HARDWARE TRIGGER: OOL Warning High from 12:18:26Z to 12:21:38Z;
- K5136 BUFFER LOSS: OOL High at 12:26:58Z, returning within limits in the next TM cycle.

However the count rates were not high enough to cause a transition of JEM-X1 to Safe mode.

JEM-X1 operations continued nominally.

2007-03-29 (DOY 088, Rev 544) to 2007-03-30 (DOY 089, Rev 544)

JEM-X1 operations executed nominally.

8.3.5 OMC Operations

2007-03-24 (DOY 083, Rev 542)

OMC operations executed nominally.

2007-03-25 (DOY 084, Rev 542-543)

At 01:34:17Z an IREM SW reset (see INT_SC-181) caused OMC to make an autonomous transition to Safe mode. As this was only 1 hour before the planned transition to Safe mode before radiation belt entry of revolution 542, a recovery of the instruments was not attempted and therefore PID 05420083 was missed. At the start of revolution 543 the ED MEBEXT01 scheduled at 12:18:52Z failed release from the Timeline due to OMC still being in Safe mode. In addition, the Imaging EDs scheduled starting at 12:24:03Z for PID 05430002 failed. At 12:31:19Z FCP_OMC_0041 OMC EXIT FROM SAFE MODE was executed and the ED MEBEXT01 was re-uplinked manually at 12:32:02Z. OMC operations continued nominally from PID 05430003.

2007-03-26 (DOY 085, Rev 543) to 2007-03-28 (DOY 087, Rev 543-544)

OMC operations executed nominally.

2007-03-29 (DOY 088, Rev 544)

Due to the failure of slew IDs 05440025 and 05440026, as the planned guide star for these slews could not be acquired (see AOCS section), OMC remained in Science Normal mode and therefore the Imaging EDs for these pointings, scheduled starting at 05:23:50Z and 06:09:22Z respectively, failed. (EDs MEIM-A01 failed on-board acceptance with two occurrences of OEM 131 REJECTED TC1 each and EDs MEIMB101; MEIMB201 and MEIMB301 failed release.) At 06:38Z a manual recovery slew was performed and the Timeline was then updated. Slew ID 05440027, along with the OMC Imaging EDs for this pointing, were executed nominally from the Timeline.

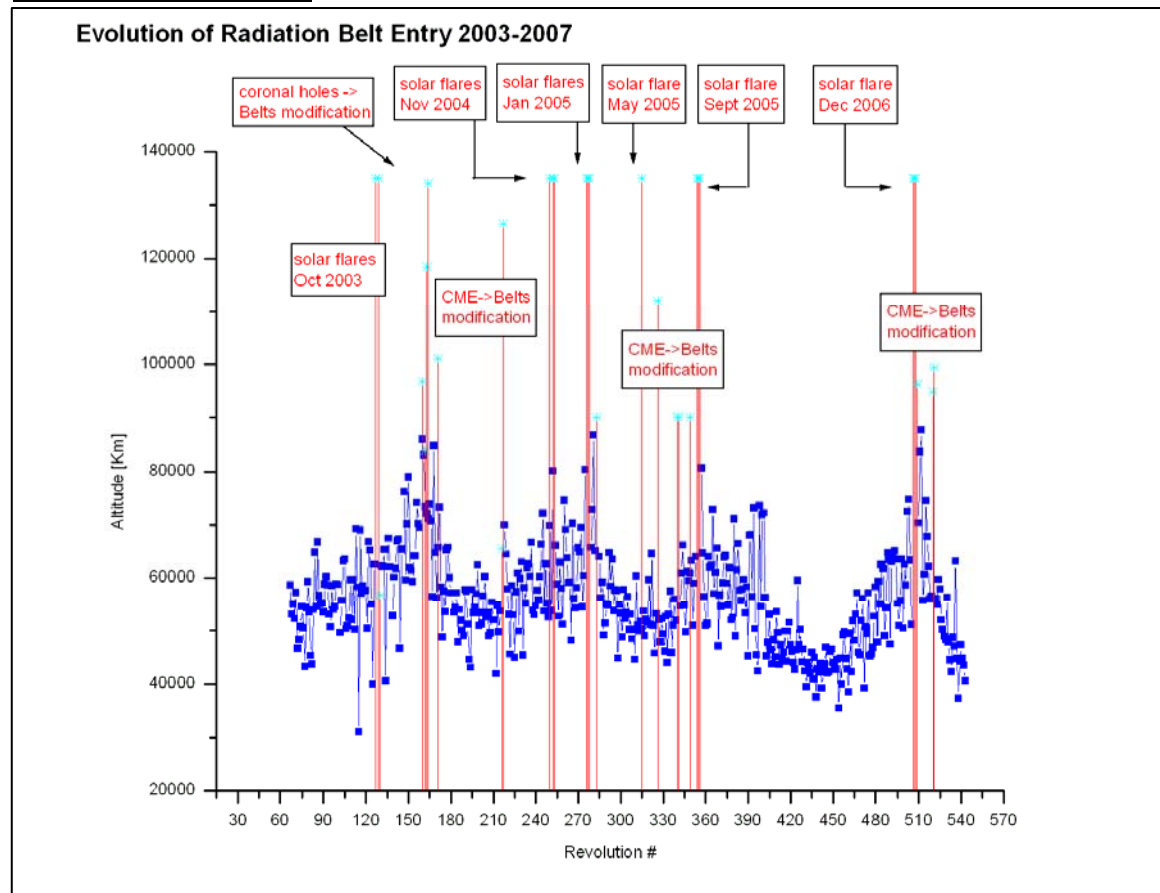
OMC operations continued nominally.

2007-03-30 (DOY 089, Rev 544)

OMC operations executed nominally.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

DoY 2007.084 (25/03/2007):

On 2007/03/25 at 01:34Z, a local reset of the IREM CSCI S/W (SEU #45) occurred as previously the status of the unit, before the anomalies, was nominal, here is a summary:

- 1) The temperatures were nominal
- 2) The LCL current was nominal
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits
- 4) The anomaly occurred at 2007.084.01.34.00Z at 65529.7km. The unit had 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 01:40Z using procedure CRP_SYS_2570. The first dump of the status word after the anomaly showed a value of BCC0 HEX = 48320 DEC = 1011110011000000, i.e the Checksum Failure flag shows YES. The unit was still 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) A dump of all the registers 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 this time OFF and the checksum counter in the register number 3 incremented by 1 unit.

7) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 03:38Z.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the PIs request.

The recovery of the payload was not performed since the Belts entry time was close in the timeline (02:49Z).

The cause of these S/W resets is still under investigation, but it is apparently due to the unit's memory device that is sensitive to radiation.

DoY 2007.087 (28/03/2007):

At 04:59Z, TC U4921 "INT GND LINK OFF" was uplinked from the timeline but failed CEV due to a late update of the TM desktop. The execution of the command was nevertheless checked by the operator in AND U001, and no further action was required.

At 09:58Z, TC U4920 "INT GND LINK ON" was uplinked from the timeline but failed CEV due to a late update of the TM desktop. The execution of the command was nevertheless checked by the operator in AND U001, and no further action was required.

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]
542	RAD_ENTR R 2007-03-25T02:49:39Z	2007-03-25 04:21:22	43494.4	2007-03-25 03:54:08	47134
543	RAD_EXIT R 2007-03-25T12:08:28Z	2007-03-25 12:11:46	45521.0	2007-03-25 11:44:08	41474
543	RAD_ENTR R 2007-03-28T02:36:58Z	2007-03-28 04:30:56	40558.2	2007-03-28 03:37:31	47667
544	RAD_EXIT R 2007-03-28T11:55:40Z	2007-03-28 11:58:26	<47264.6	2007-03-28 11:37:31	42436

Reference

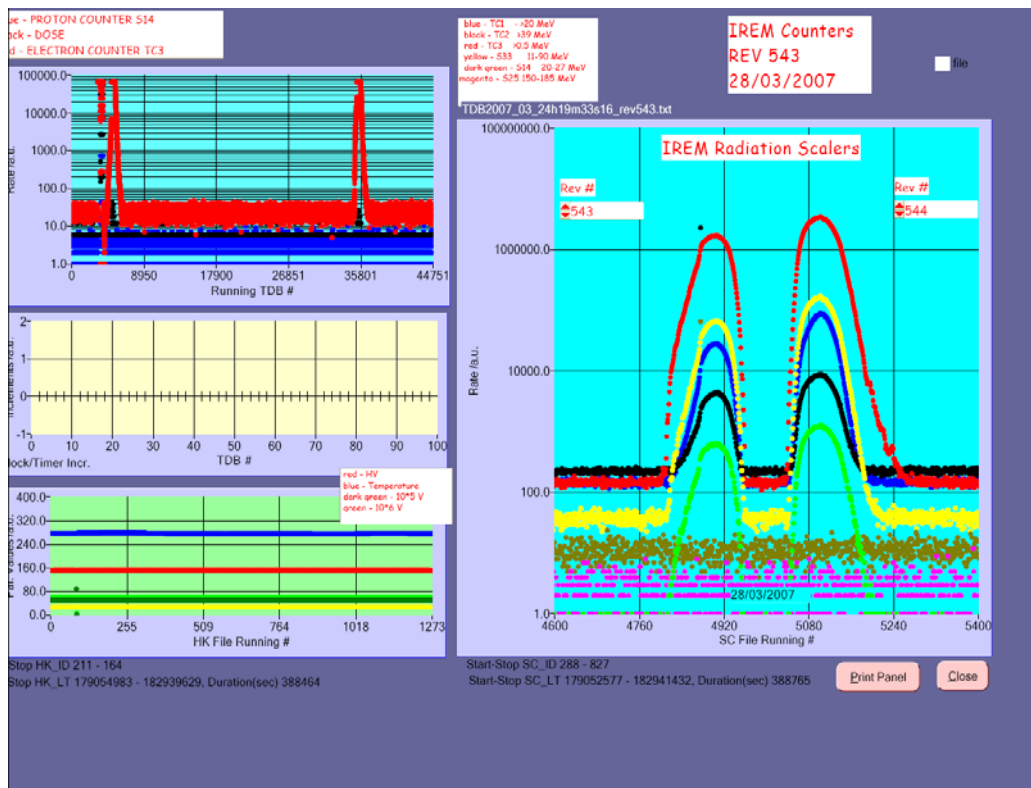
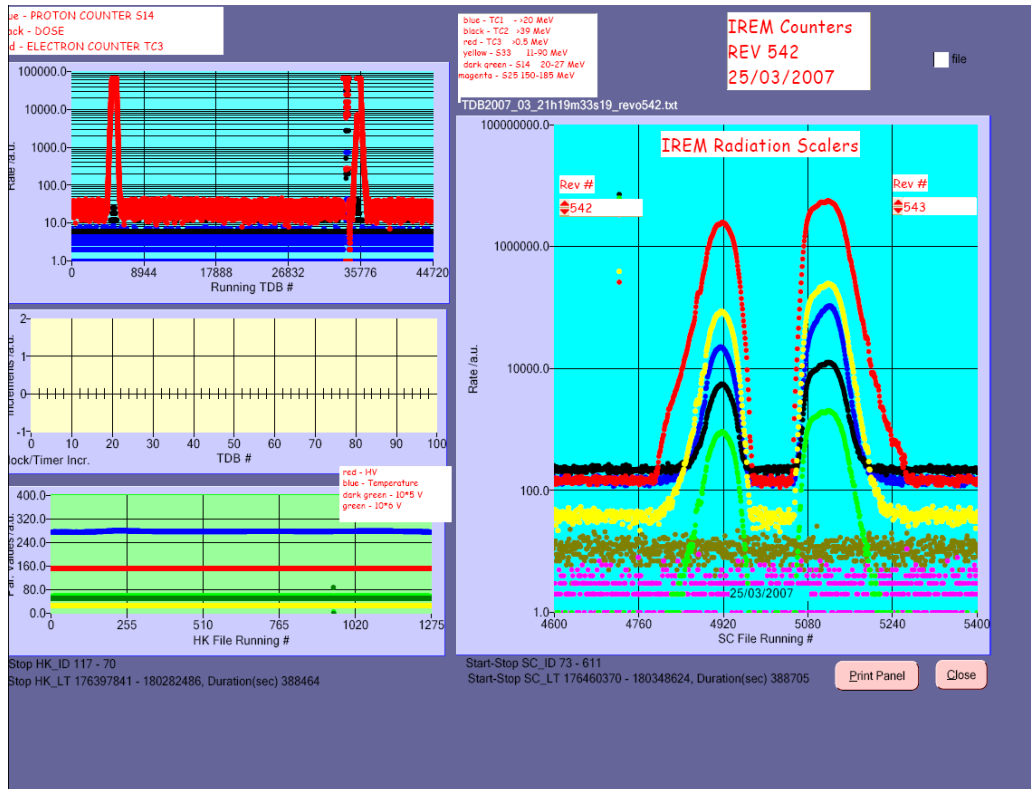
High radiation

Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

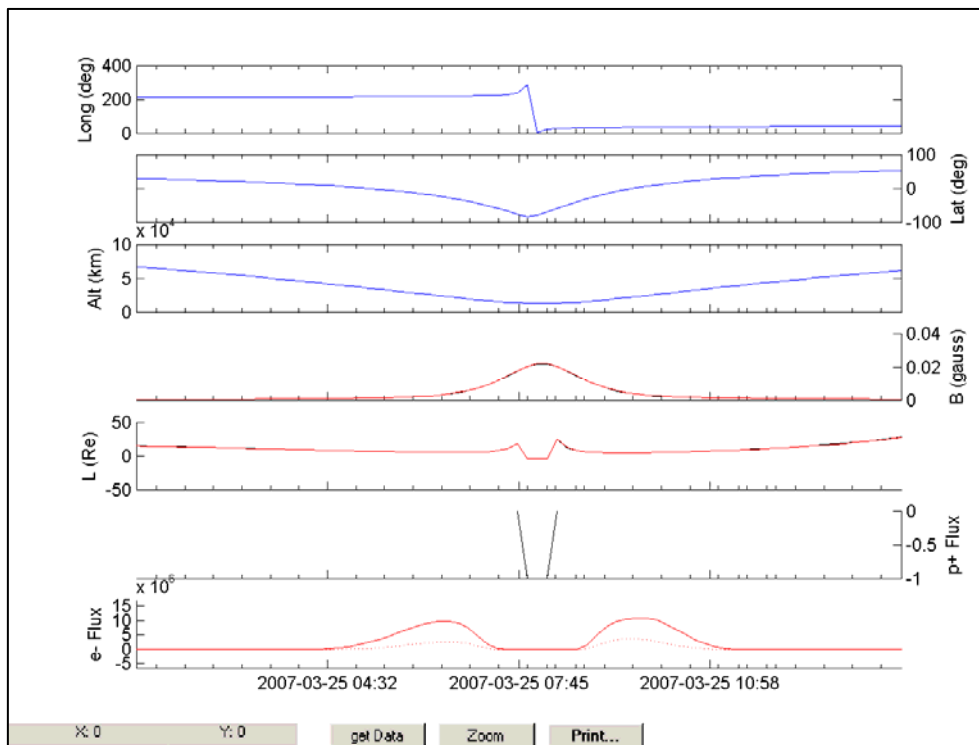
Large error vs reference (more than 30 minutes)

IREM radiation counters:

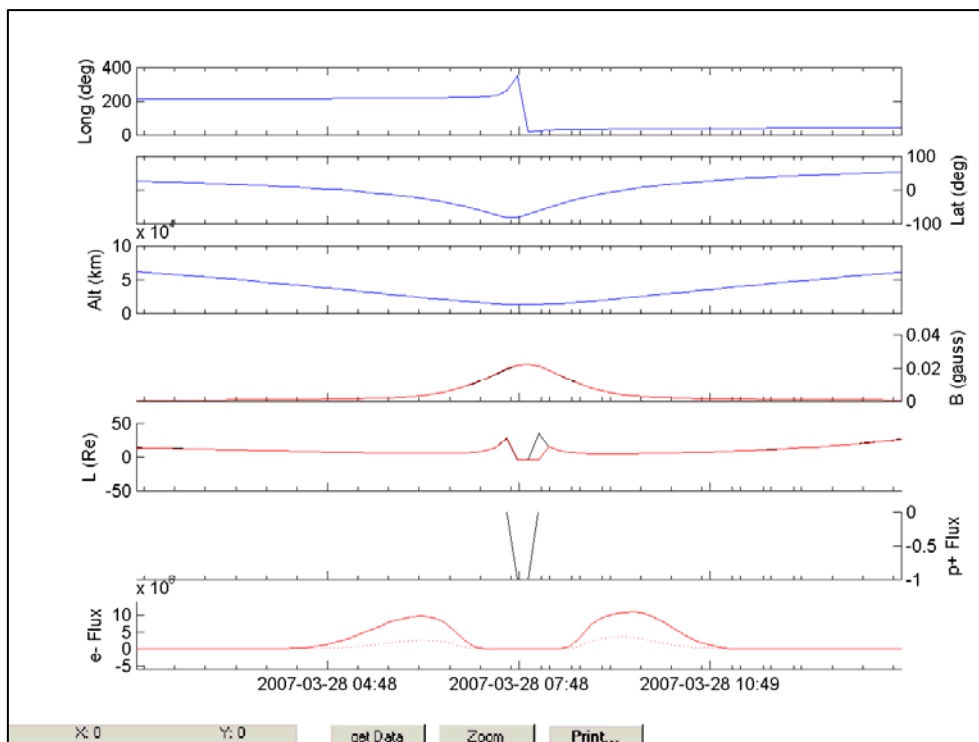


IREM Predicted Radiation Belt Passages

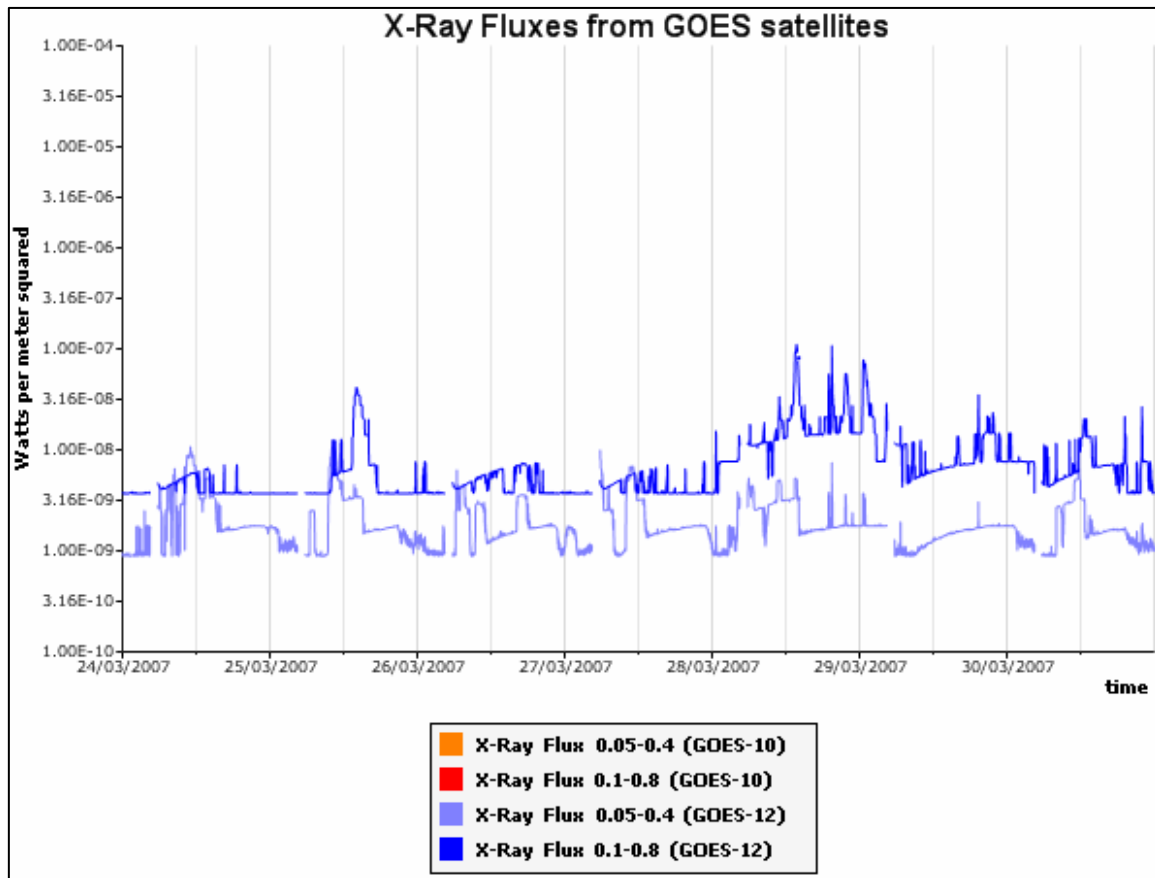
Rev 542



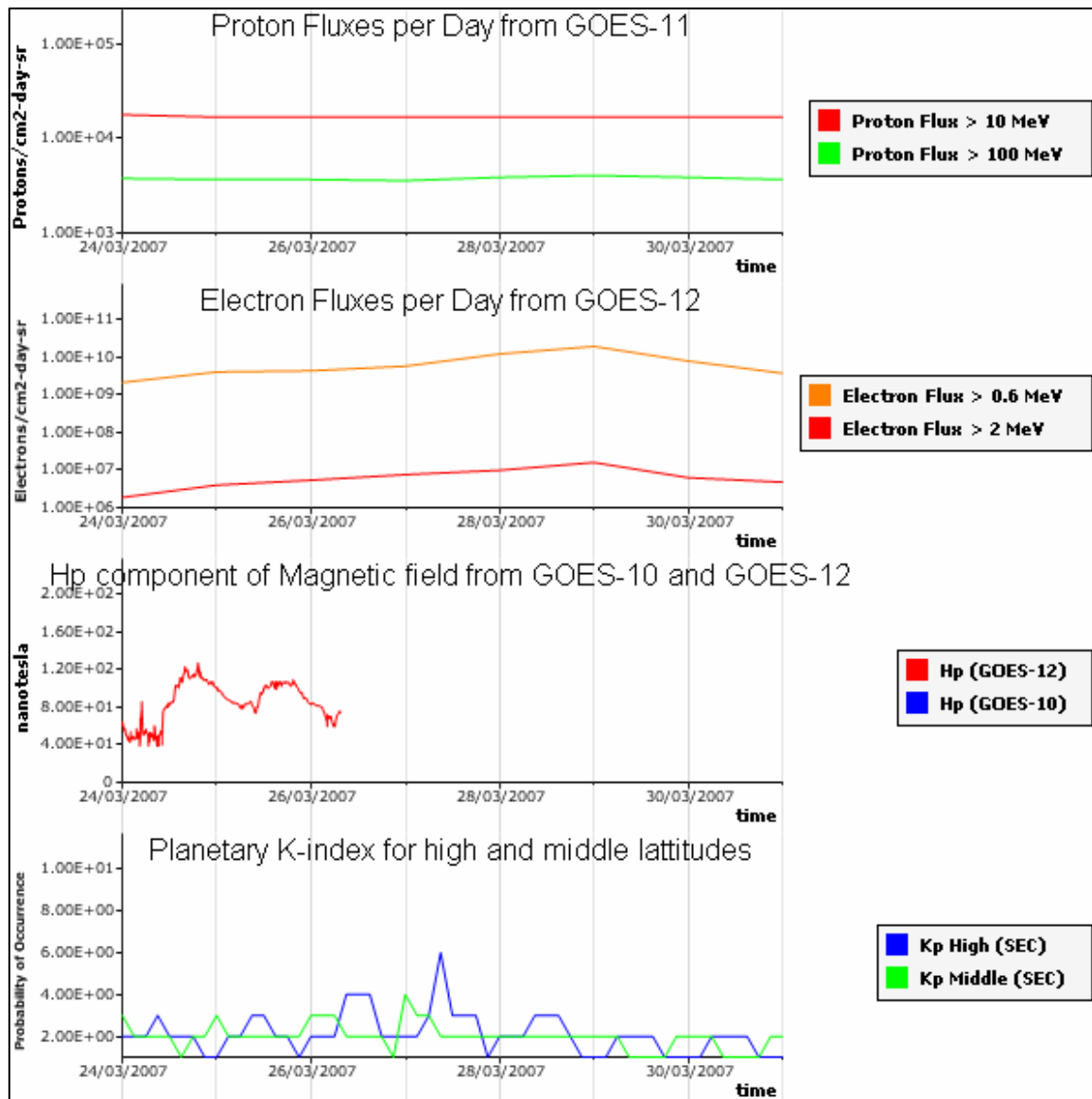
Rev 543



SEC-GOES Observed Particles Fluxes (using SEIS/RAT tool):



X-Ray fluxes start to be significant over 10^{-5} W/m^2 (corresponding to M-class flares). Above 10^{-4} W/m^2 , they correspond to strong X-class flares.



Proton and electron flux are reporting low radiation background this week.
 Hp component of the Geomagnetic Field is essentially parallel to the Earth's rotation axis. A drop near 0 nT is associated with a significant variation in the magnetic field.
 Kp index is based on ground magnetometers. Kp ≥ 5 features storm-level geomagnetic activity.