
EUROPEAN SPACE AGENCY
DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 249
Week 26
02.07.07
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 23.06.07 until 29.06.07 (both dates inclusive) and covers the revolutions 573, 574 and 575.

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 a raster dither, which was part of the XMM Large Scale Structure Survey (RA 02:18:00.00, DEC -07:00:00.0), two hexagonal dithers of the object GX 301-2. (RA 12:26:37.60, DEC -62:46:14.0), a hexagonal dither of the object EXO 0748-676 (RA 07:48:33.30, DEC -67:45:00.0), a Galactic Disk Latitude Scan (RA 12:26:37.60, DEC -62:46:14.0), a raster dither of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6), three Galactic Disk Latitude Scans at attitudes (RA 14:35:07.20, DEC -62:30:00.0), (RA 14:29:16.80, DEC -62:46:48.0) and (RA 14:16:00.00, DEC -59:06:36.0), and a raster dither of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6).

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.

Seven slews were missed from TL during the observation period, due to problem on DSS-27 and FDS.

The fuel consumption over the period between 23/06/2007 and 29/06/2007 was 0.0873 Kg. The remaining propellant is in the order of 145.5390 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.

On Tuesday 26th June the procedure to adjust the VC-0 CLCW ratio was executed.

The distribution of CLCWs in Integral VC-0 Telemetry was heavily weighted in favour of VC-0 TCs. This ratio had to be changed to enable us to use VC-7 for commanding. The ratio during the INSTRUMENT window was about 3.7:1, the aim of the operation was to reverse this ratio. The reason that this procedure is necessary is to allow us to use the SWA RF switch which is commanded via VC-7, the SWT RF Switch (commanded via VC-0) has been in use since February.2006. In order to minimize degradation of the RF path through the RFDU it was agreed to periodically swap the RF switch in use between SWT and SWA.

Basically the procedure to adjust the ratio is simply to switch back and forth between low and high bit rate until a satisfactory CLCW ratio is achieved. This was achieved at the second switch back to high bit rate.

Following this change all commanding to the Satellite should be done via VC-7 (Decoder 2), the EDs used to move the RF switch should be those which command RFDU SWA via Decoder 2.

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

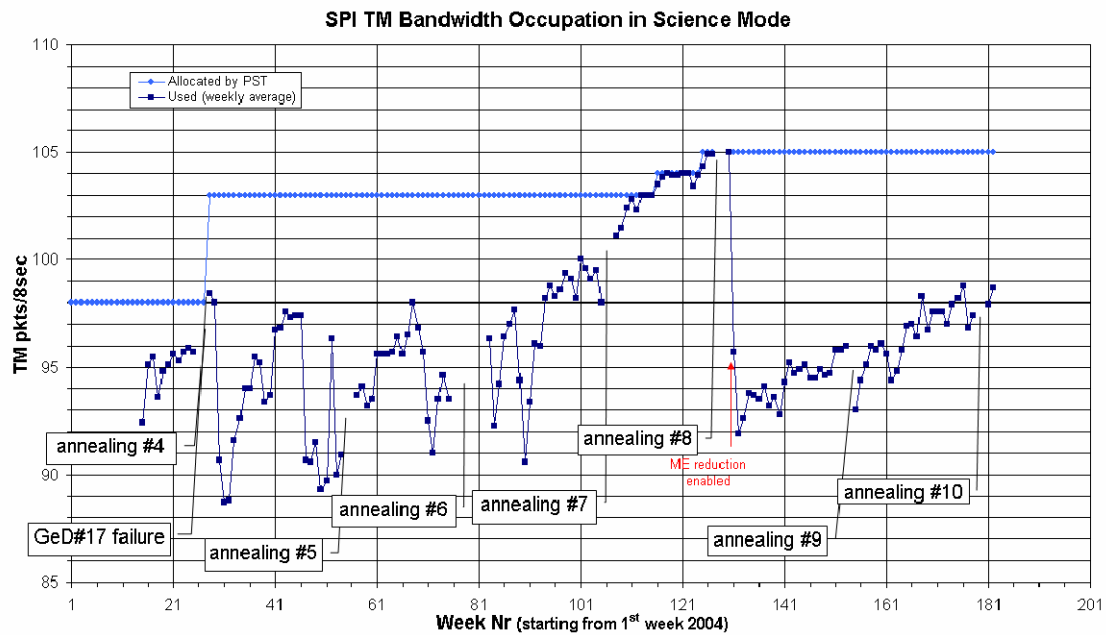
3.2.1 SPI

Following the 10th annealing, which ended on 17th June, 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). 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.

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 and the average telemetry occupation when the TM allocation was 105 packets/cycle was 98.7 packets/cycle.

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



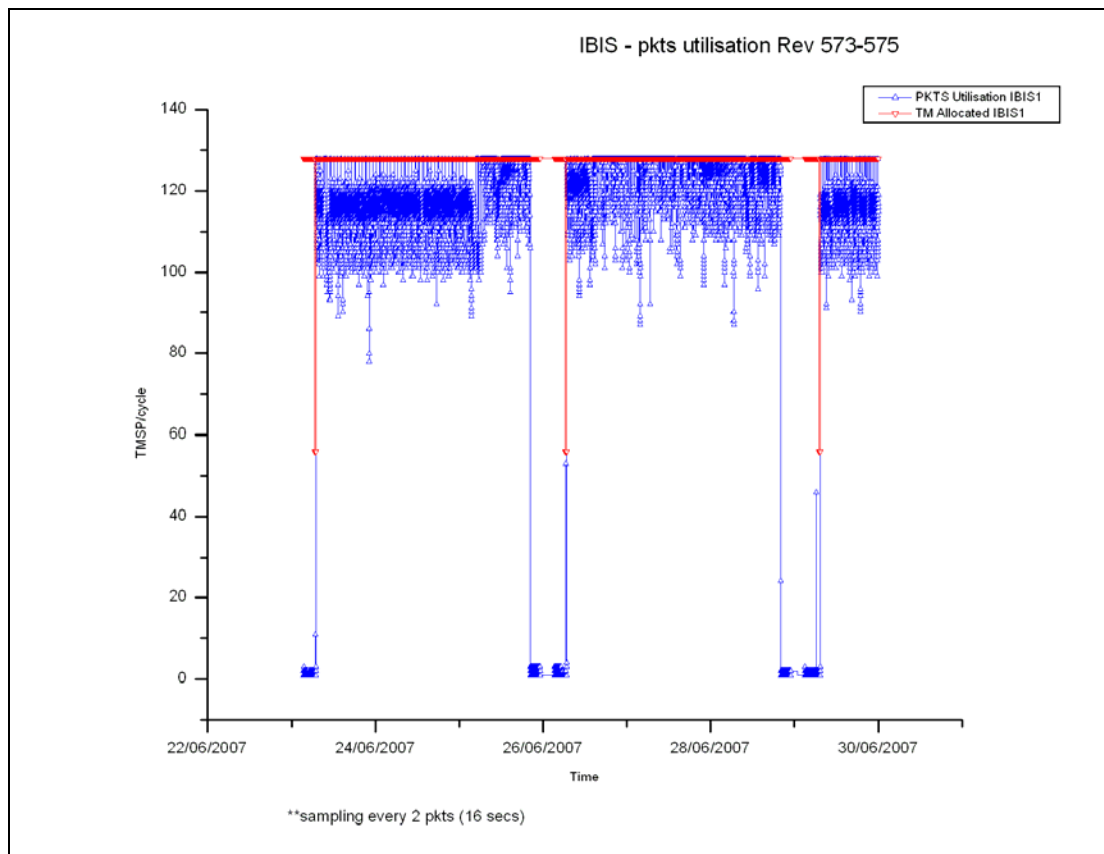
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

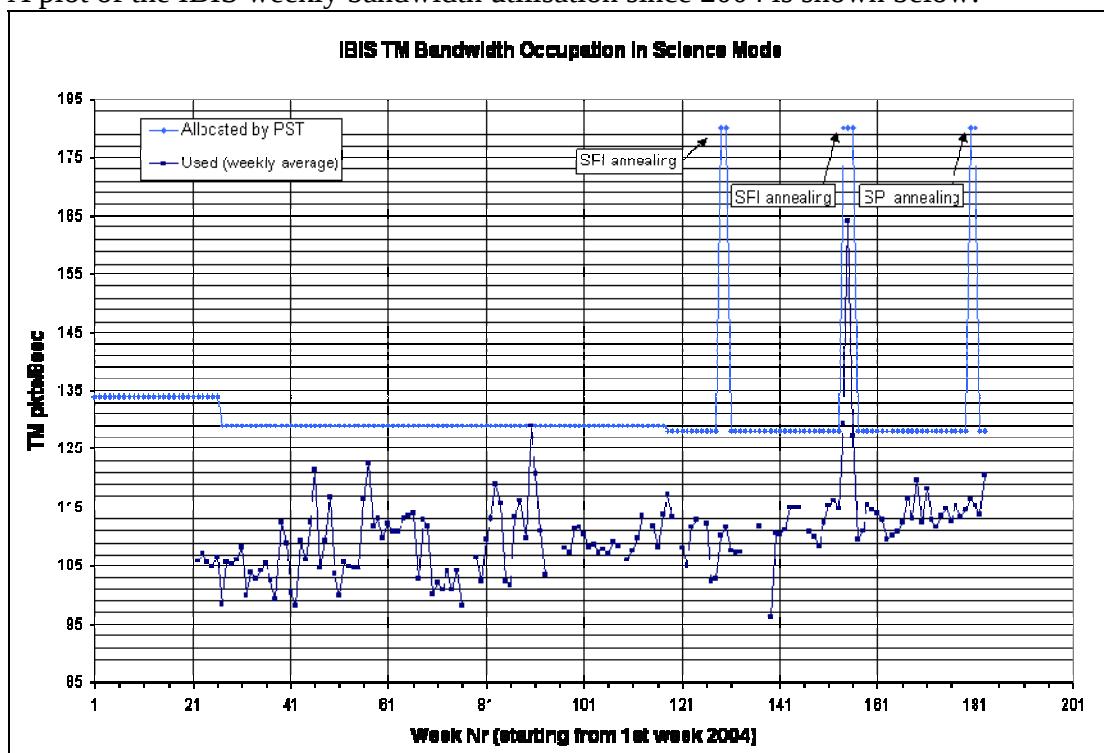
The overall status of the unit is nominal.

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 120.55 TMPS/cycle, up 6.81 on last week.

A plot of the IBIS TM utilisation during the observation period is shown below:



A plot of the IBIS weekly bandwidth utilisation since 2004 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.
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, 149 of the 152 planned science pointings for OMC were executed nominally, 3 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.

Solar Activity

The observation period was characterised by low solar activity.

The sun was blank during the first days of the observation period. On 26/06/2007 appeared sunspot 961 and on 29/06/2007 appeared sunspot 962. None of them posed a threat for strong solar flares.

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. Three pointings were lost to ground problems. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was very good this week. An FD problem led to the loss of 2 pointings. The overall performance was well over the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were however 6 occasions of a data drops from Redu, and 2 from DSS-27, one of which led to the loss of a Reaction Wheel Bias and a pointing, both of which had to be performed manually.. The overall performance was well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSFs are available up to revolution 582. Observations were planned up to 578. Further planning is complicated by the Galactic Latitude Scans which have complex constraints.

TSFs received up to revolution 574.

2. Observation status

ECS files have been received and processed up to revolution 563.

3. ISOC Science Data Archive

No news.

4. ISOC system

Version 15.0 still in use. Testing is ongoing on version 15.1 and has encountered some problems, the release is expected for next week.

5. Problems

IFTS problems re-occurred due to unannounced changes in the firewall permissions at ESAC. For the moment these seem to be fixed again.

The issue of a roll angle constraint violation (0.05 deg) in revolution 558 will not be further explored, according to Flight Dynamics.

4.3.2 ISDC

Status of ISDC observation processing on 02/07/2007:

- Latest Standard Analysis completed: observation 04200770002 (NGC 4151, Revolutions 561, 562 & 563) on 30/06/2007.

- Latest products archived: observation 04200320002 (EXO 0748-676, Revolution 566) on 30/06/2007.

- Latest observation products sent to the observer: 04700020002 (1E 1048.1-5937, Revolution 560) on 14/06/2007.

5 Special Events

6 Anomalies

The following problems were reported that impacted operations:

- On DoY 178, at 14:02, a drop in TM from DSS-27 led to the loss of a Reaction Wheel Bias. This was executed manually, and an attitude recovery performed. The Timeline was rejoined at 15:47. The impact was the loss of pointing 05740034. The corresponding DR# is G107851.
- On DoY 179 at 12:00, the FD job scheduler crashed, preventing the FD slew updates arriving. The cause of the problem was not immediately recognised, and the Timeline was manually recovered, only to be lost again. The impact was the loss of slews 05740065, and 05740067 & 05740068.

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

AR id	Date Created	Subject	Segment	Status
INT-2926	02/07/2007	Loss of Connectivity to simulator	COMMS	Pending

7 Future Milestones

The following activities are foreseen in the next few weeks.

- Periodic Thruster Torque rescaling 24th July 2007 in Rev. 583
- On Board Clock wrap around due 30th July 2007 in Rev. 585.

Appendix

The appendix includes various detailed information.

7.1 Overview of Revolutions

Revolution 573

The observations in revolution 573 began with a raster dither, part of the XMM Large Scale Structure Survey (RA 02:18:00.00, DEC -07:00:00.0), lasting ~42.2 hours. It continued with a hexagonal dither of the object GX 301-2. (RA 12:26:37.60, DEC -62:46:14.0), which lasted ~12.9 hours, until the end of the revolution.

Revolution 574

The observations in revolution 574 began with a hexagonal dither of the object EXO 0748-676 (RA 07:48:33.30, DEC -67:45:00.0), lasting ~6.9 hours. It continued with a hexagonal dither of the object GX 301-2. (RA 12:26:37.60, DEC -62:46:14.0), which lasted ~28.8 hours. This was followed by a Galactic Disk Latitude Scan (RA 12:26:37.60, DEC -62:46:14.0), which lasted ~17.1 hours. Finally, a raster dither of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6), which lasted ~2.1 hours was performed, until the end of the revolution.

Revolution 575

The observations in revolution 575 began with a series of Galactic Disk Latitude Scans (RA 14:35:07.20, DEC -62:30:00.0), for ~8.8 hours, then (RA 14:29:16.80, DEC -62:46:48.0), for ~8.8 hours, then (RA 14:16:00.00, DEC -59:06:36.0), for ~17.1 hours, then back to (RA 14:29:16.80, DEC -62:46:48.0), for a further ~8.3 hours, then back to (RA 14:35:07.20, DEC -62:30:00.0), for a further ~8.3 hours. Finally, a raster dither of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6), which lasted ~1.4 hours was performed, until 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.

7.2 Consumables

7.2.1 Detailed Fuel Book-keeping

2007-06-14T04:41:52.000Z	146.0429	F	Automatic TM processing.
2007-06-14T16:56:38.000Z	145.8719	F	ESAM monitoring
2007-06-14T19:17:52.000Z	145.7620	F	Post ESAM SSA to STA
2007-06-14T21:49:04.000Z	145.7480	F	Automatic TM processing.
2007-06-14T23:06:24.000Z	145.7000	F	Automatic TM processing.
2007-06-15T14:39:05.000Z	145.6940	F	Automatic TM processing.
2007-06-17T04:30:05.000Z	145.6840	F	Automatic TM processing.
2007-06-18T14:03:53.000Z	145.6596	F	Automatic TM processing.
2007-06-20T04:17:40.000Z	145.6431	F	Automatic TM processing.
2007-06-21T13:50:00.000Z	145.6263	F	Automatic TM processing.
2007-06-23T04:05:24.000Z	145.6173	F	Automatic TM processing.
2007-06-24T13:39:03.000Z	145.5785	F	Automatic TM processing.
2007-06-26T03:58:27.000Z	145.5648	F	Automatic TM processing.
2007-06-27T14:50:55.000Z	145.5460	F	Automatic TM processing.
2007-06-29T03:45:16.000Z	145.5390	F	Automatic TM processing.

This report was generated Fri Jun 29 08:00:07 GMT 2007

7.3 Detailed Satellite Information

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

7.3.1 AOCS SUMMARY OPERATIONS REPORT, 23/06/2007 –29/06/2007

AOCS operations were executed from the Automatic Timeline.

During this period, 67 Open Loop Slews, 101 Closed Loop Slews and 5 Momentum Biases were executed.

7 (CSL) slews were missed from TL, during the observation period, due to FDS failing update generation and drop in TM links on DSS-27 station.

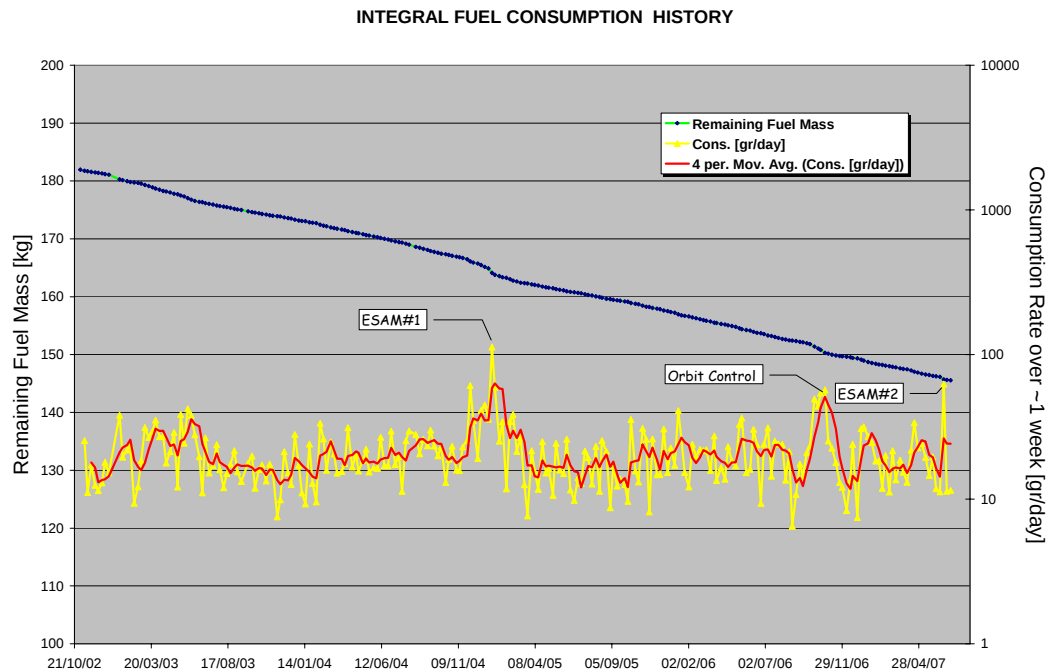
This is equivalent to ~4.1 % of the total number of slews planned (170).

Orbit Control

No update.

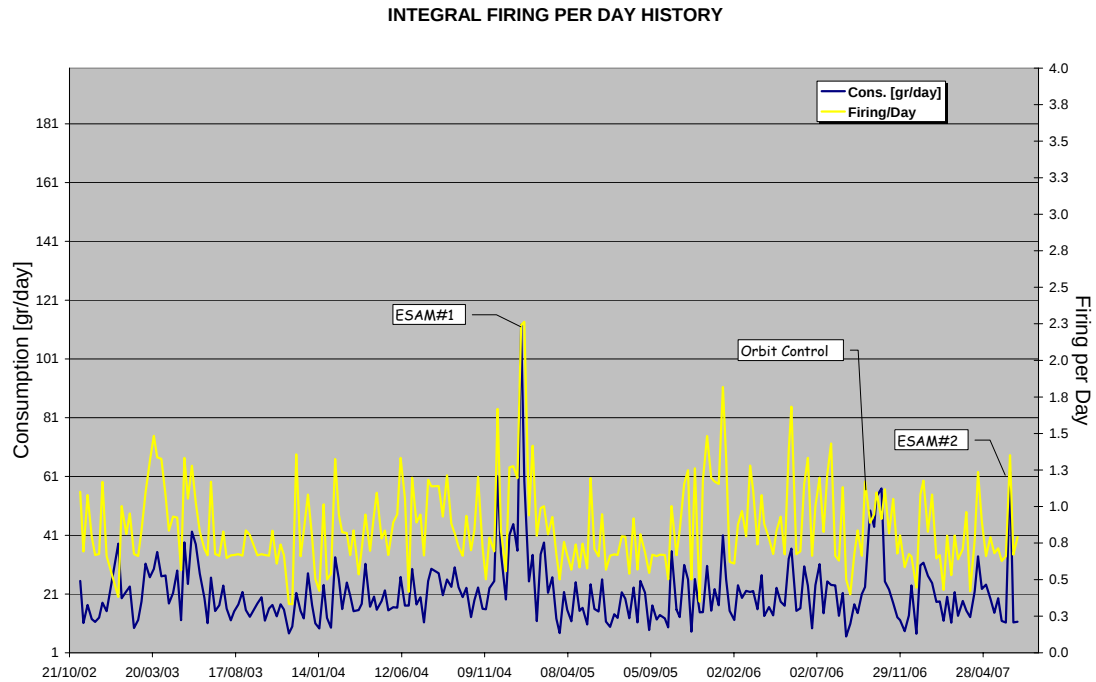
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 29/06/2007 is reported in the plot below.



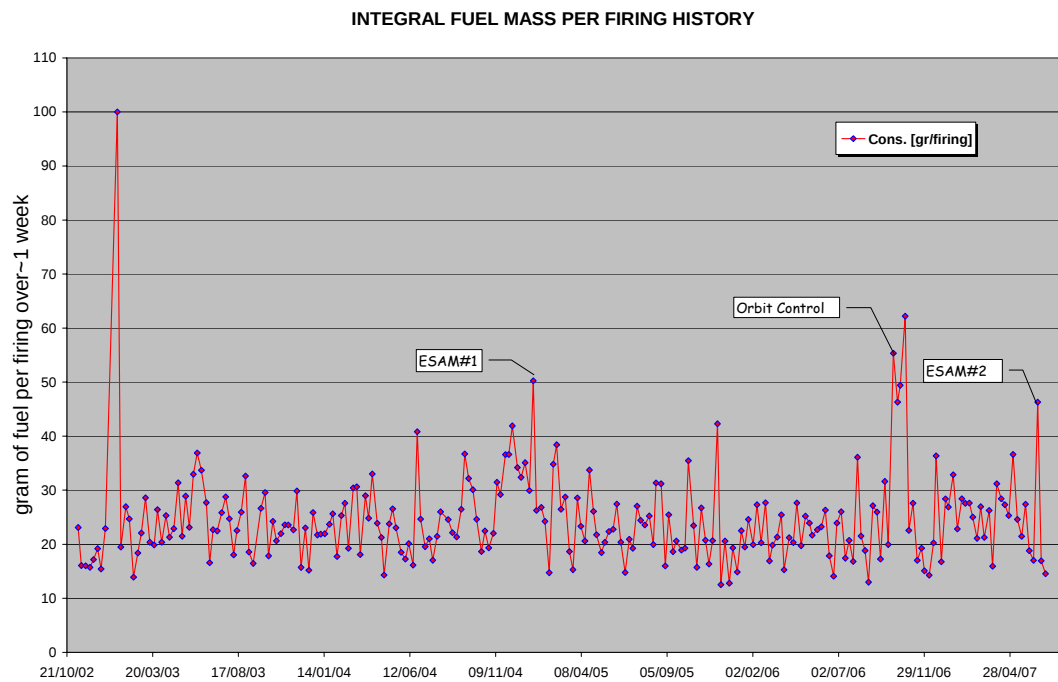
The plot above has been corrected to consider the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 29/06/2007 is reported in the plot below.



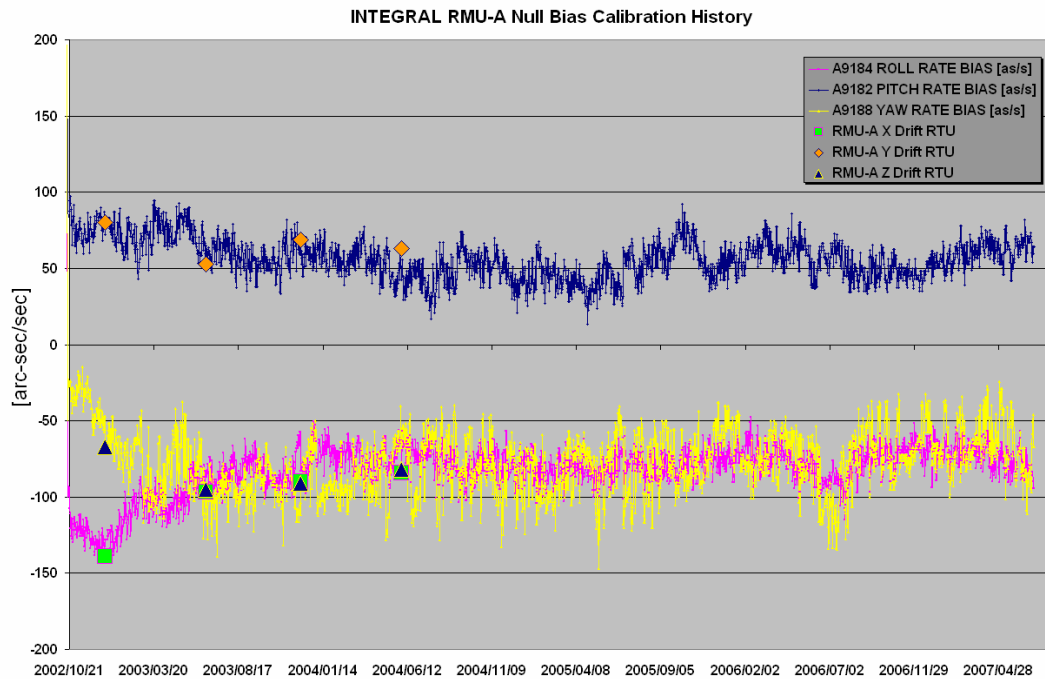
The plot above has been corrected to consider the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 29/06/2007 is reported in the plot below.

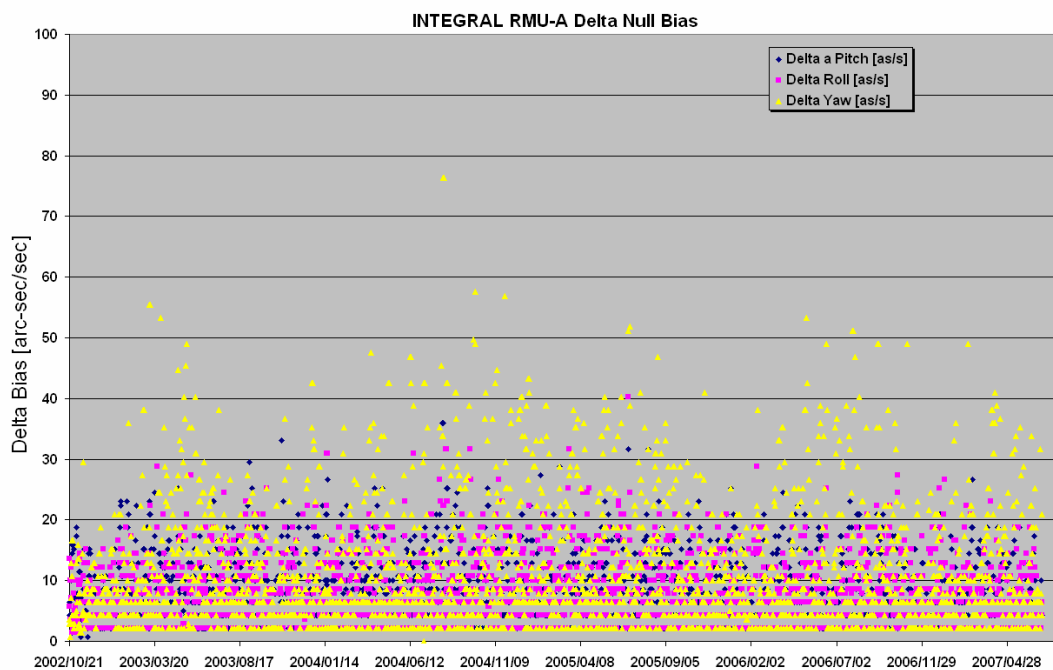


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 29/06/2007 is reported in the plot below.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 29/06/2007 is reported in the plot below.



23/06/2007 (Day of Year 174, Revolution 572-573)

Nothing to report.

24/06/2007 (Day of Year 175, Revolution 573)

Nothing to report.

25/06/2007 (Day of Year 176, Revolution 573)

Nothing to report.

26/06/2007 (Day of Year 177, Revolution 573-574)

Nothing to report.

27/06/2007 (Day of Year 178, Revolution 574)

Problem at DSS-27 station: at 14:02z, due to a drop of TM links at DSS-27 station, the command sequence for the planned RWB failed release while in execution.

A new mapping was manually commanded and the Bias recovery performed at 14:45z.

A new mapping was manually commanded and a slew recovery performed from the attitude of PID 05740033 to the attitude of PID 05740035, as close loop slew.

The next slew ID 05740036 was manually updated at 16:40z.

The following slews were missed in TL: 05740034-35(CSL)

28/06/2007 (Day of Year 179, Revolution 574)

FDS failed slew update: at 11:49z the FDS failed the update of slew ID 05740065. FDS reported an error during the update process: the ORATOS job scheduler stopped and was not restarted automatically. Update jobs for slews 05740065 through 05740069 were missed. The last update job before the crash ran at 2007/06/28 11:03:14, and the job scheduler operations was resumed with the update job for slew 05740070 at 2007/06/28 14:35:38.

A complex manual recovery was performed to the attitude of PID 05740069 and the next slew (05740070) manually updated in TL.

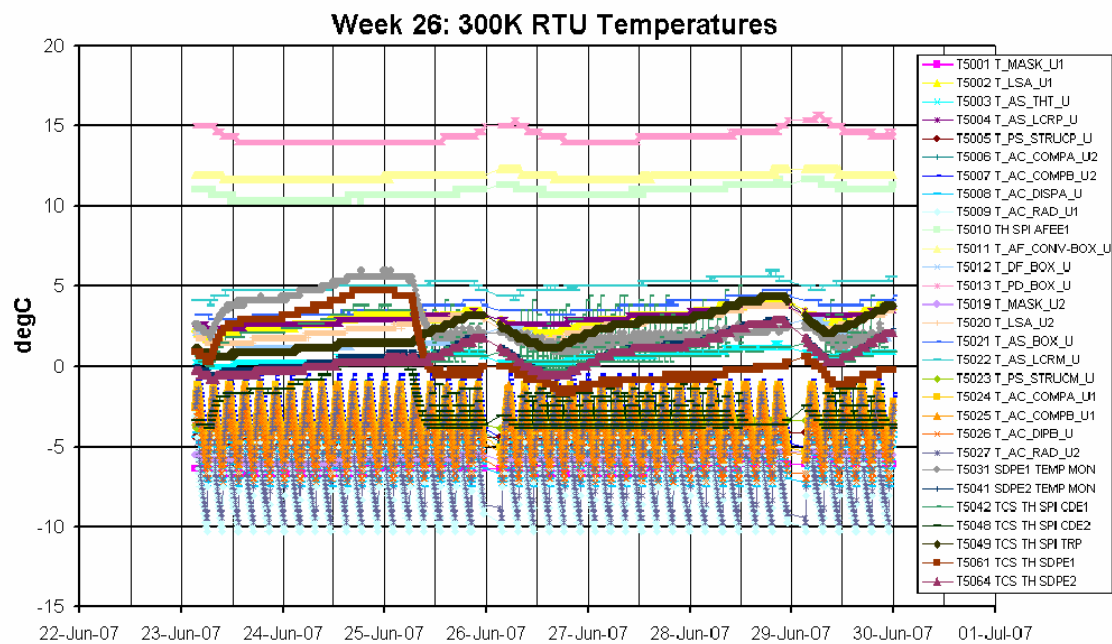
The following slews were missed in TL: 05740065-66-67-68-69(CSL)

29/06/2007 (Day of Year 180, Revolution 574-575)

Nothing to report.

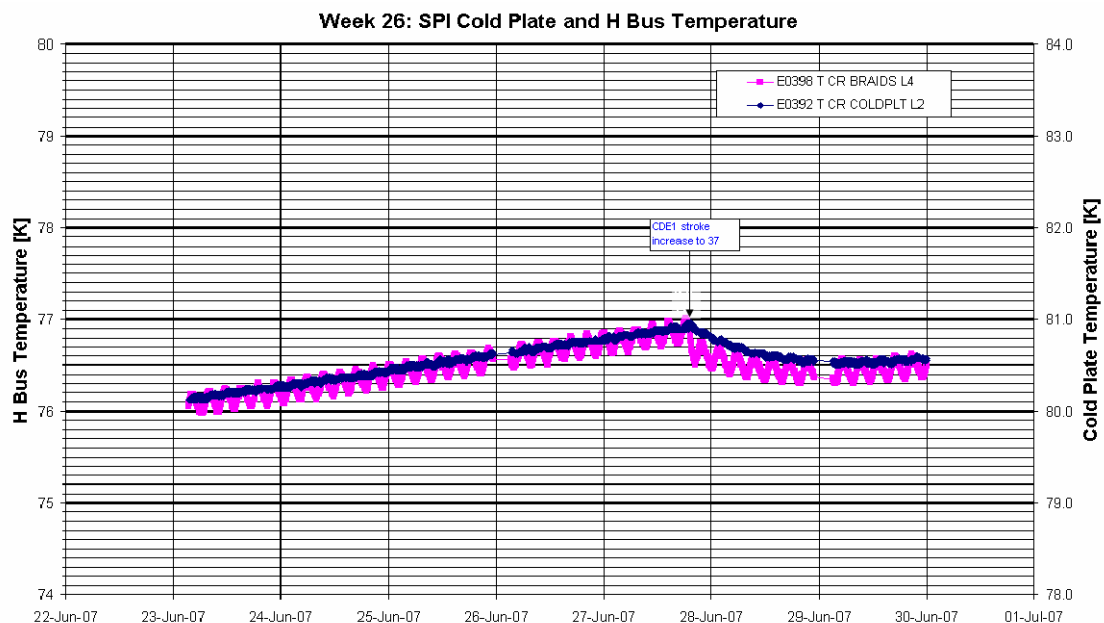
7.3.2 SPI Operations

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

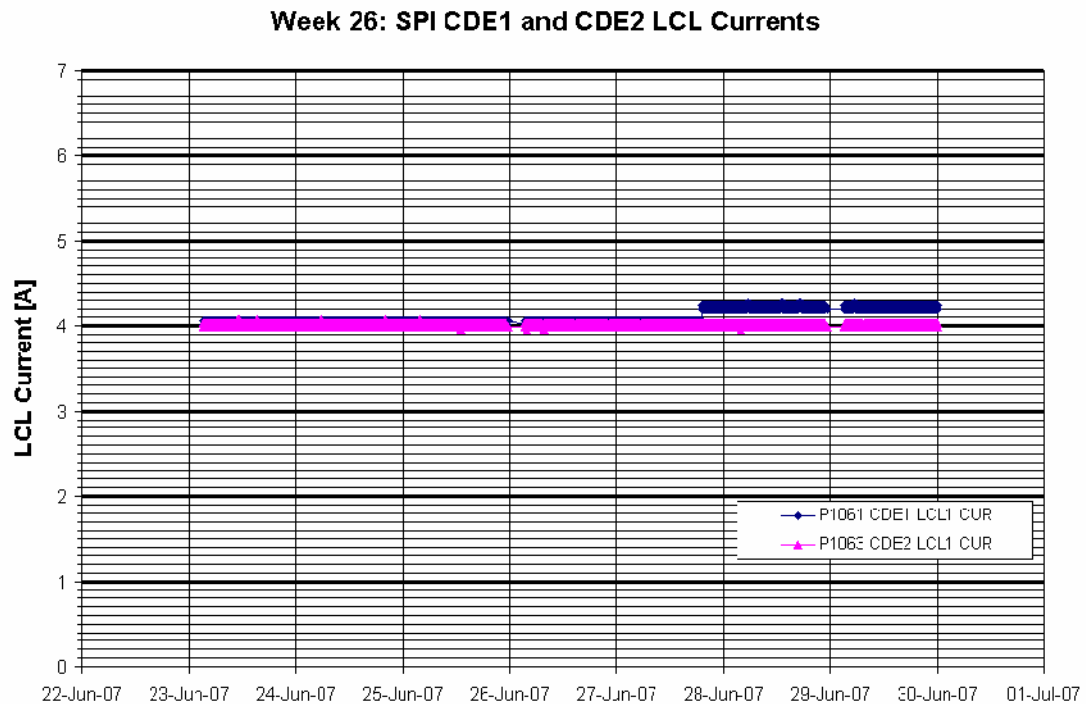


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K $\pm$ 1K. On 27/06/2007 at 19:18Z, the stroke of compressors A&B was increased to 37, after which it remained at 37 (and that of compressors C&D at 37) for the remainder of the reporting period.

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



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



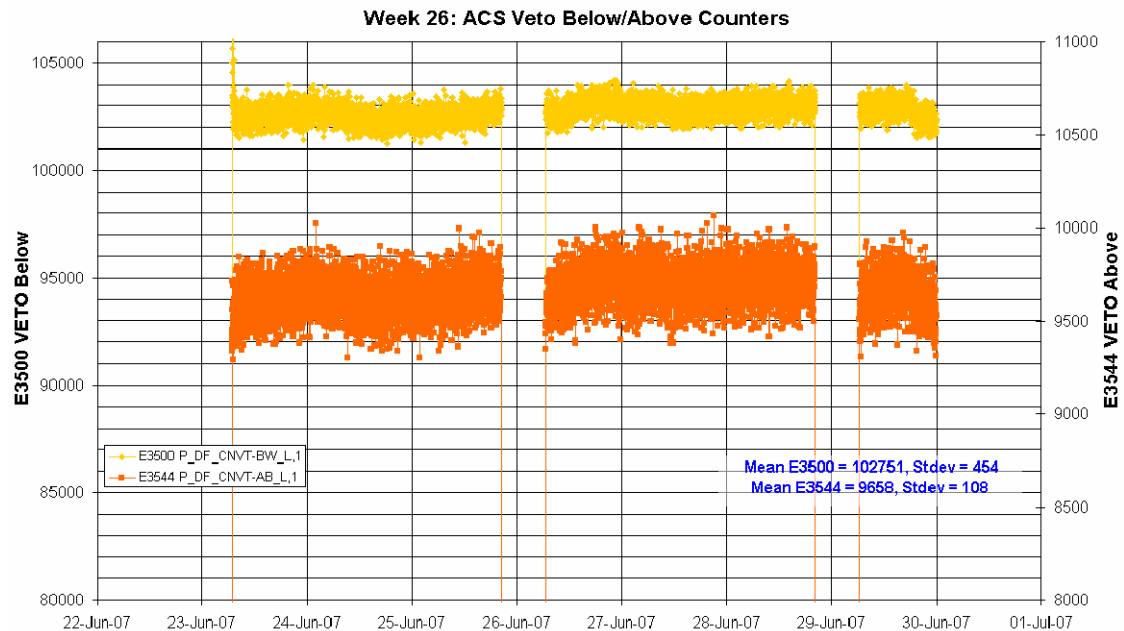
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is v433 patch #1 with the spectra scaling factor set to 9/19 SE. The average TM bandwidth occupation of SPI was 98.7 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

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



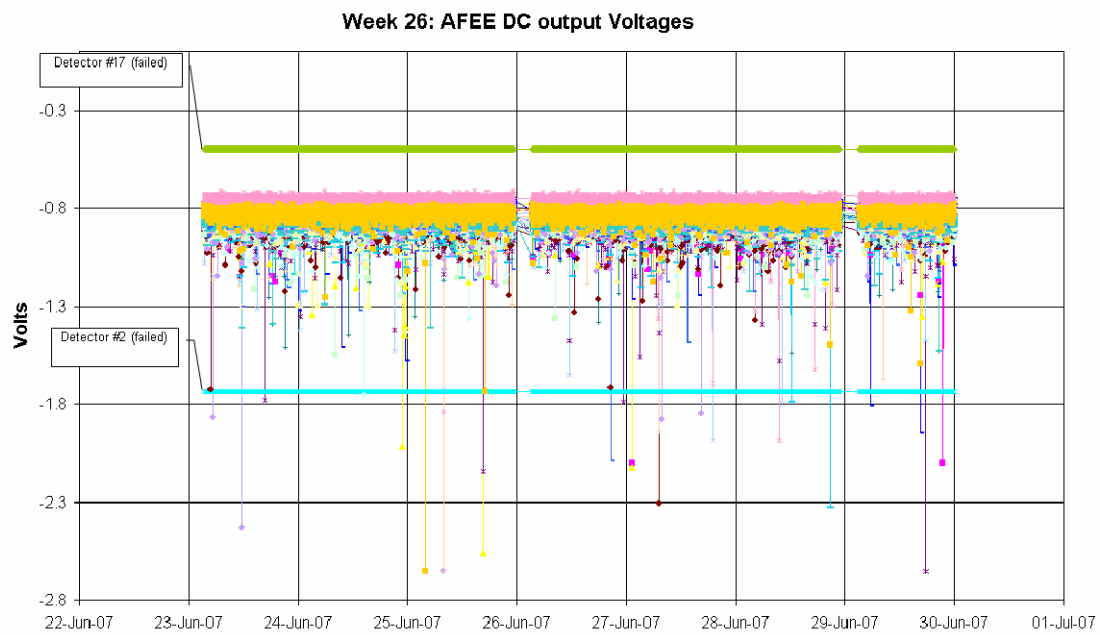
ACS: The performance of the ACS is nominal, except for FEE 81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

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

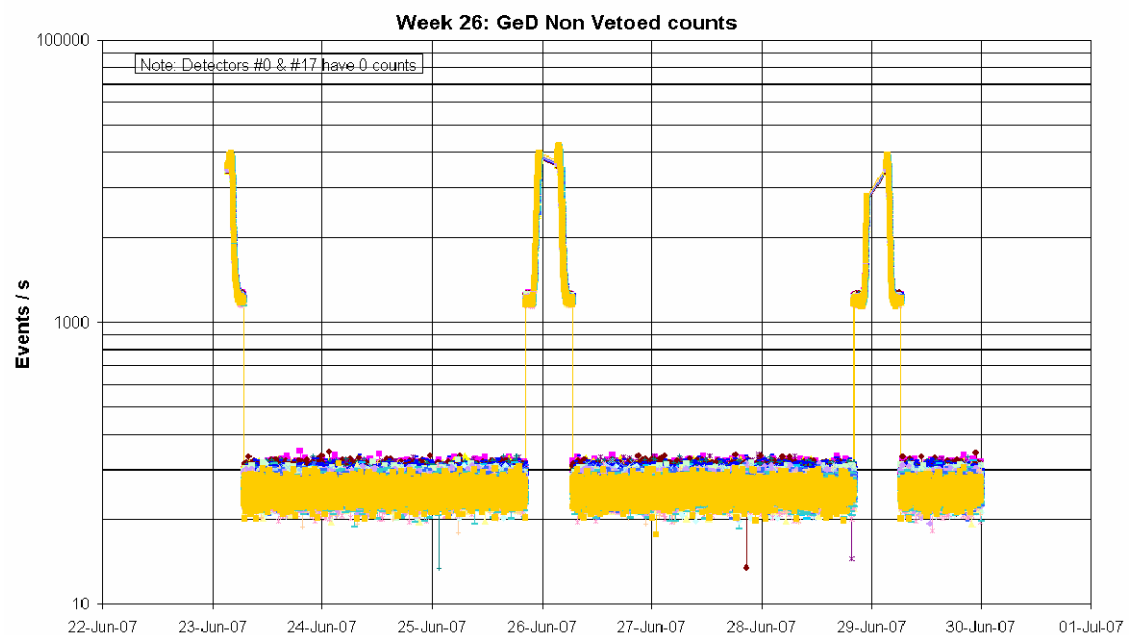


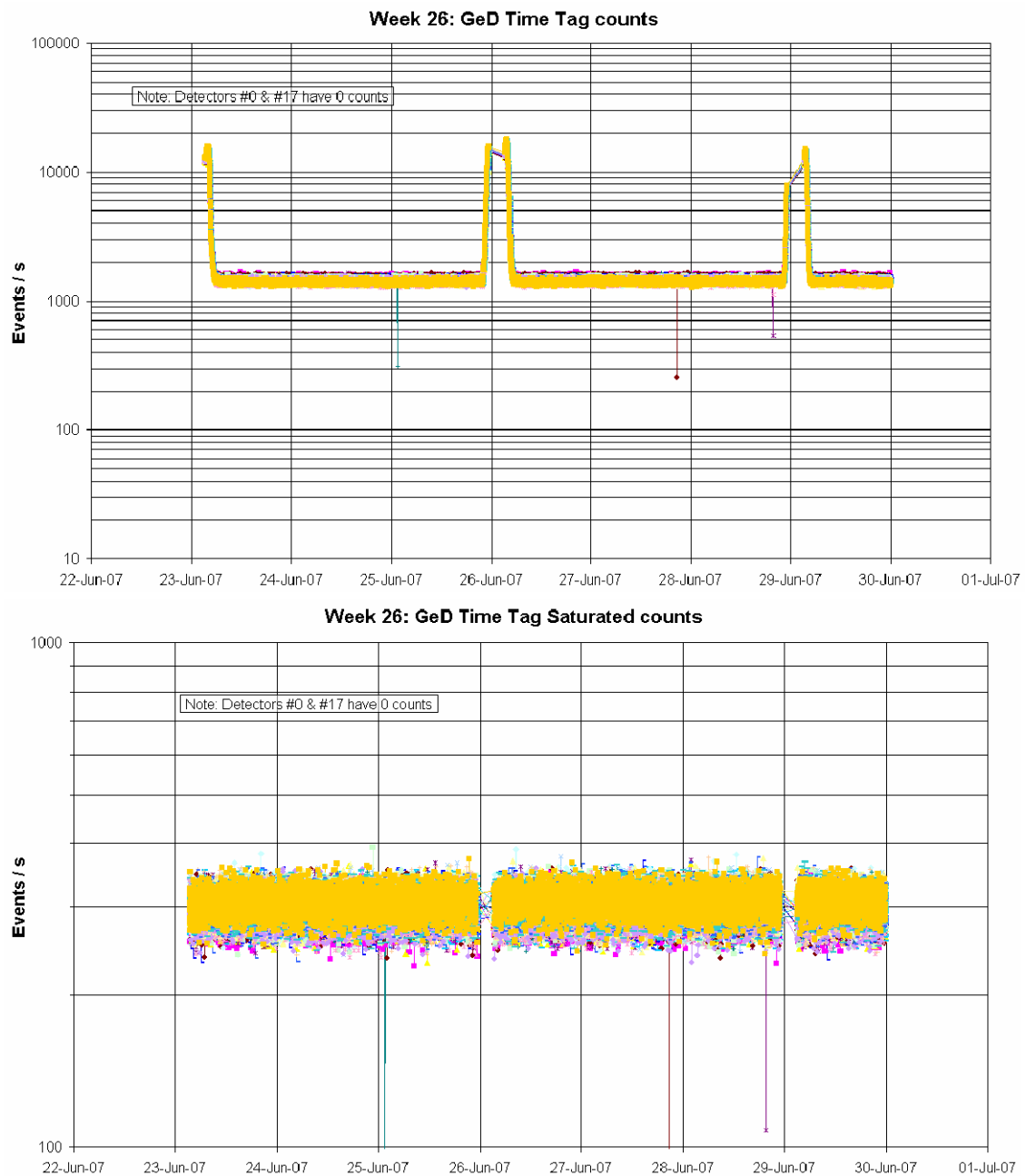
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

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.

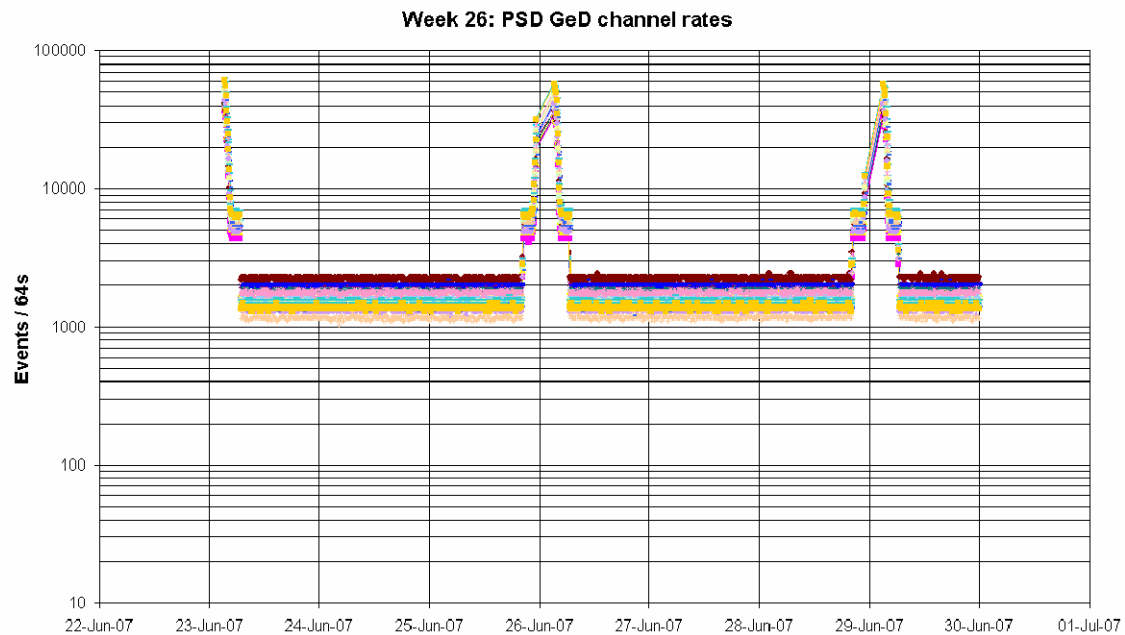


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





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



On 03/03/2007 (E

Event Log:

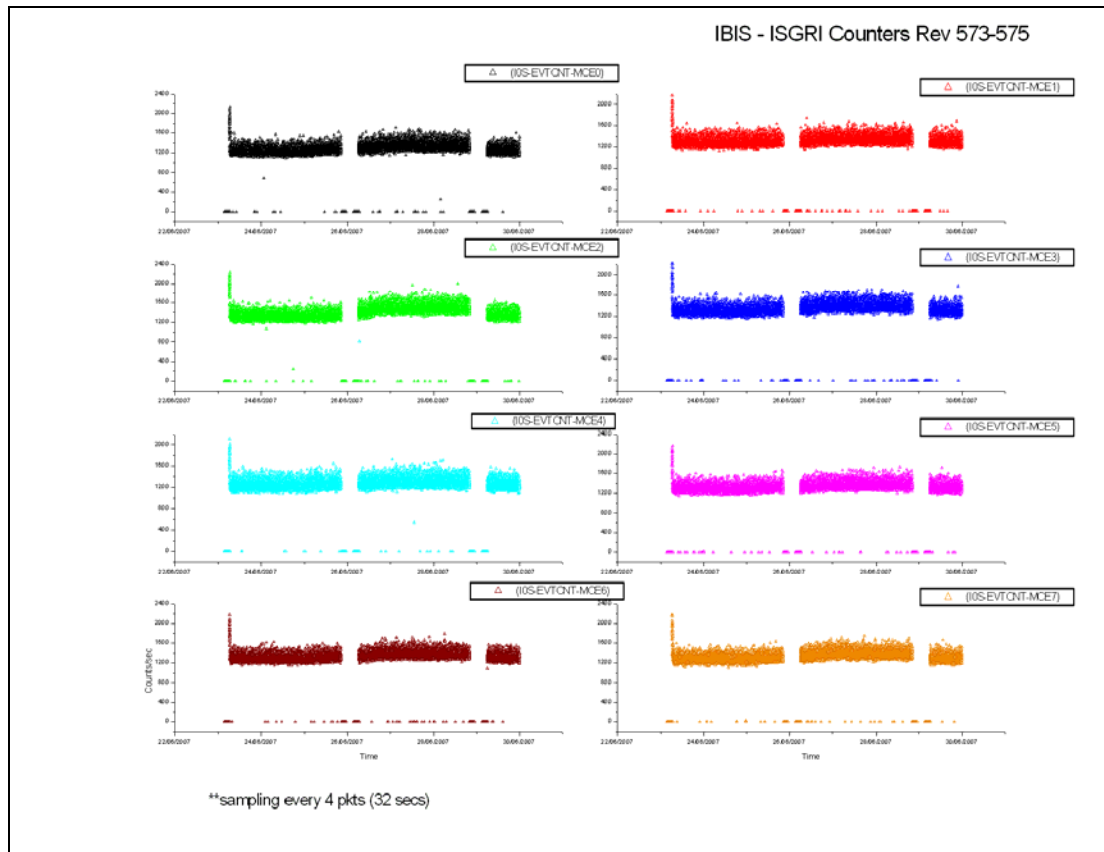
The following non-nominal events occurred on SPI during the reporting period:

- On 2007-06-28 at 20:10:01Z, just before radiation belt entry of revolution 574, the ACS parameters E0500-E0592 R AS HV-OO for the ACS HV status all went OOL (value = ON). As radiation belt entry had not yet occurred (and SPI was still in COMMANDE state), this OOL was falsely triggered, probably due to miscalculation of the derived parameter for belts entry GD0028D by the IMCS. They returned within limits (value = OFF) when the next packet was received at 20:13:21Z, after radiation belt entry.
- On 2007-06-29 at 13:56:44Z the TM parameter E3186 S AS TEMP L22 went OOL (value = PARAM > SPEC). It returned within limits when the next packet was received at 14:07:24Z and therefore no action was taken.

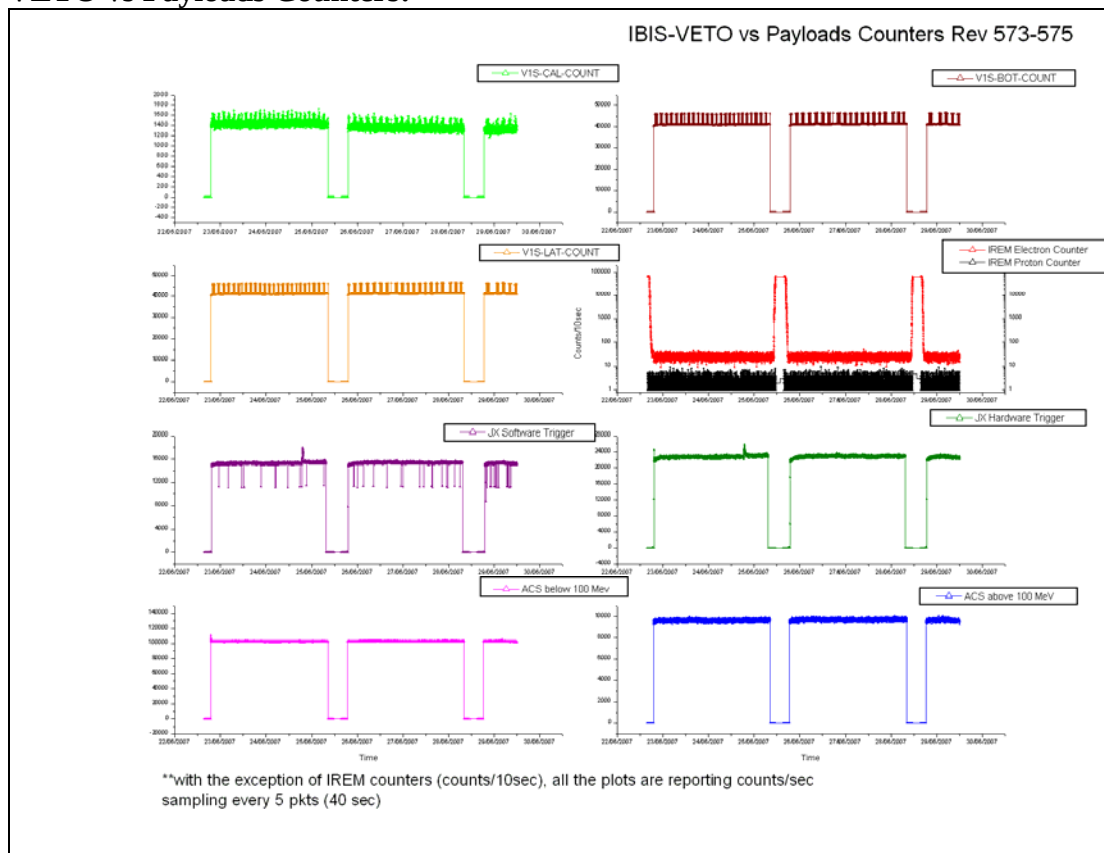
7.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

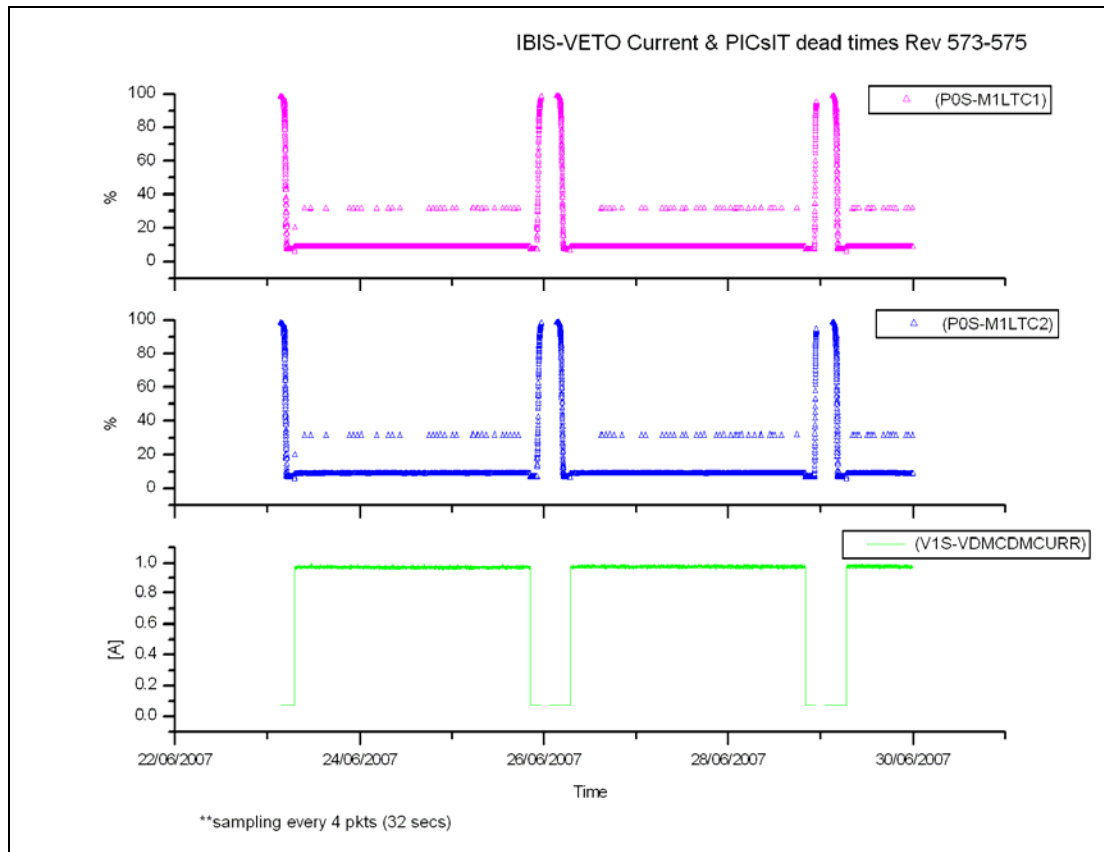


VETO vs Payloads Counters:

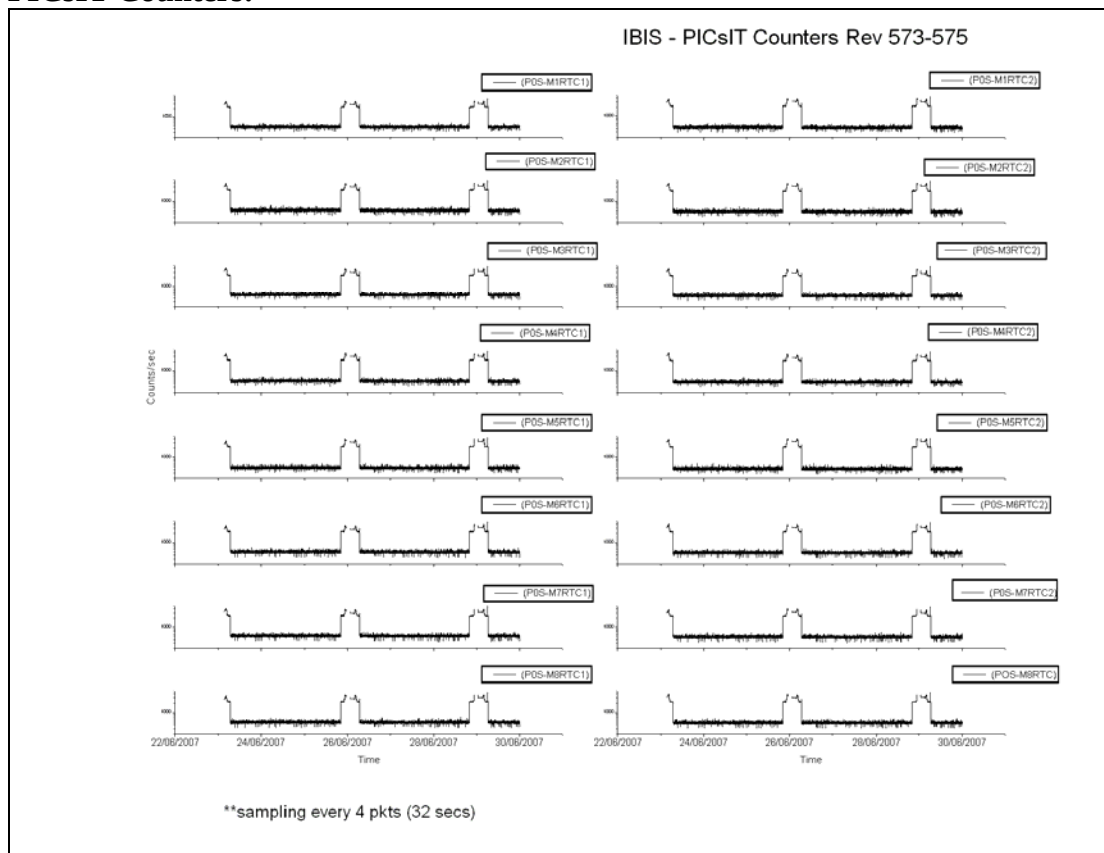


The week was characterised by low radiation as reported by the payload.

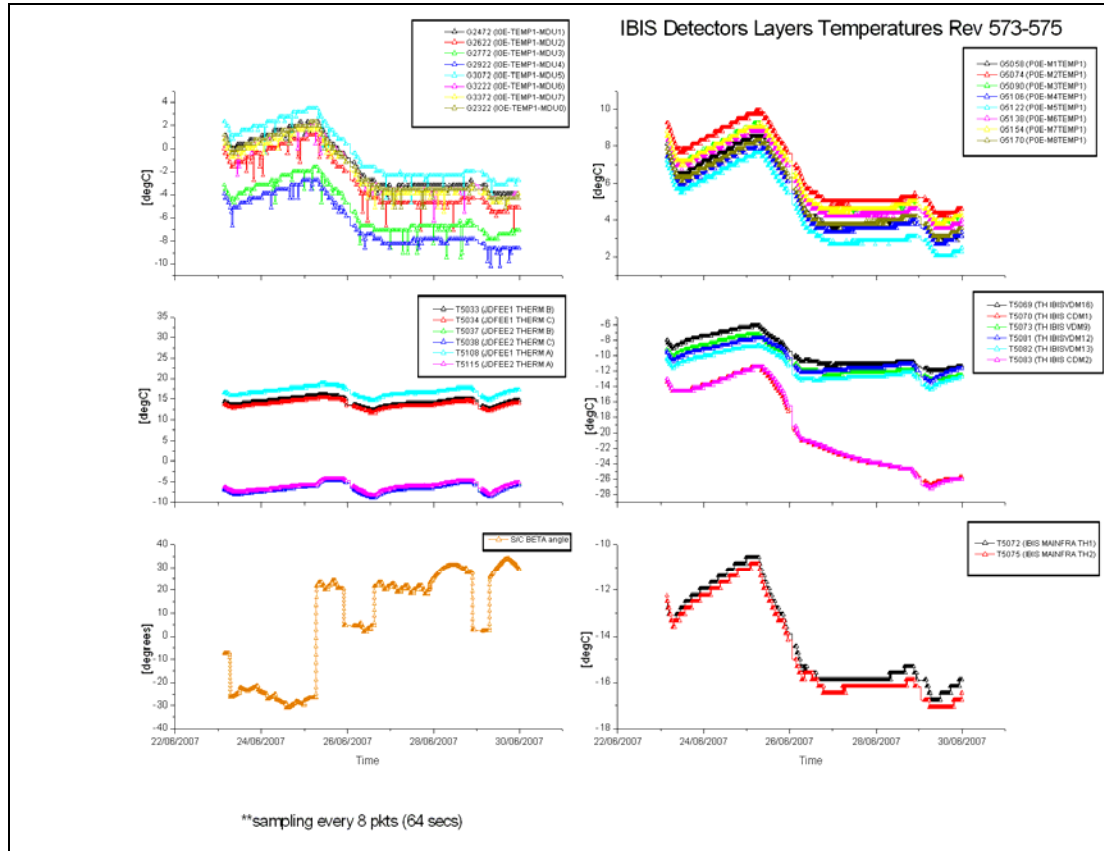
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report:

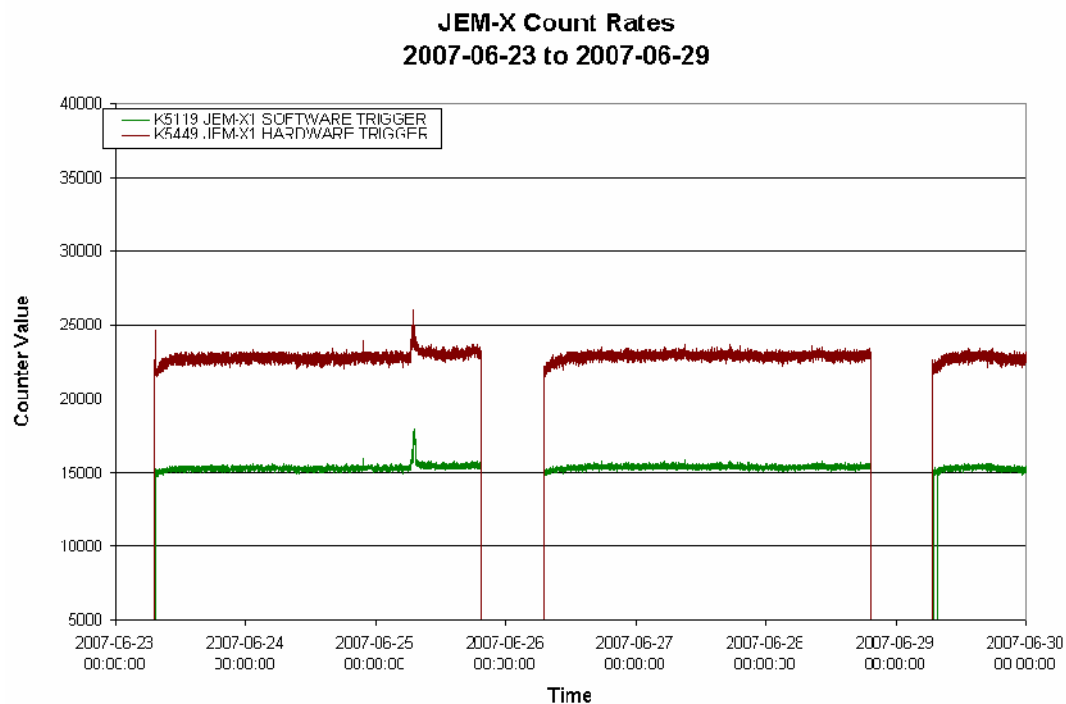
The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), families G5002 (P0S-Mi_RTC1) and G5003 (P0S-Mi_RTC2), families G2014 (I0E-OVFWPXADD-Mi) were reported at Radiation Belts passage.

7.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

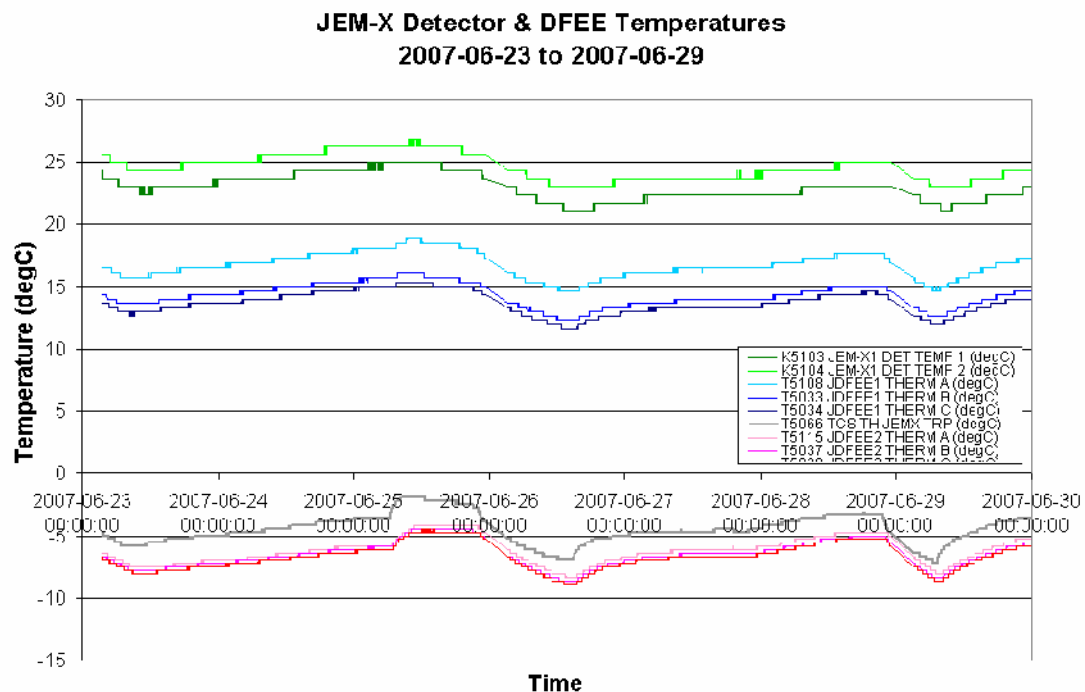
JEM-X count rates over the reporting period are displayed in the following graph¹.

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.



² Data sampled (1 frame in 8)

8.3.4.3 JEM-X Daily Report

2007-06-23 (DOY 174, Rev 572-573) to 2007-06-29 (DOY 180, Rev 574-575)

JEM-X1 operations executed nominally.

7.3.5 OMC Operations

2007-06-23 (DOY 174, Rev 573) to 2007-06-24 (DOY 175, Rev 573)

Nothing to report

2007-06-25 (DOY 176, Rev 573)

At 14:30:50, TC M1329 Imaging-BX (CONFIGURE OMC FOR IMAGE PROCESING- WINDOWS FOR TRIGGER SUB-MODE) was sent from ISDC. This command was rejected, as OMC was in Stand-by mode at the time. The following OEM was received.

```
2007.176.06.38.33.893 2007.176.06.38.43.375 1792 RealTime 131 TC REJECT
REJECTED TC1 0 65535 PR N
E E
```

There was no impact.

2007-06-26 (DOY 177, Rev 574)

Nothing to report

2007-06-27 (DOY 178, Rev 574)

On DoY 178, at 14:02, a drop in TM from DSS-27 led to the loss of a Reaction Wheel Bias. This was executed manually, and an attitude recovery performed. The Timeline was rejoined at 15:47. The impact was the loss of pointing 05740034. It was at this time the following commands were rejected:

```
2007.178.14.28.19.398 2007.178.14.28.26.559 1792 RealTime 131 TC REJECT
REJECTED TC1 0 65535 PR N
E E
2007.178.14.28.13.148 2007.178.14.28.18.511 1792 RealTime 131 TC REJECT
REJECTED TC1 0 65535 PR N
E E
```

These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing

At 14:30:50, TC M1329 Imaging-BX (CONFIGURE OMC FOR IMAGE PROCESING- WINDOWS FOR TRIGGER SUB-MODE) was sent from ISDC. This command was successfully received, and switched the unit to Trigger mode. The following OEM was received.

```
2007.178.14.30.50.398 2007.178.14.30.58.696 1792 RealTime 235 EVENT
TRIGGER 0 65535 PR N
E E
```

At 15:25:47 & 15:33:48, two further such commands were received, however OMC was in Stand-by mode both times, and the command was rejected.

```
2007.178.15.25.46.900 2007.178.15.25.53.621 1792 RealTime 131 TC REJECT
REJECTED TC1 0 65535 PR N
E E
```

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```
2007.178.15.33.48.276 2007.178.15.33.55.299 1792 RealTime 131 TC REJECT
REJECTED TC1 0 0 65535 PR N
E E
```

There was no impact.

2007-06-28 (DOY 179, Rev 574)

At 12:00, a FD problem caused the manoeuvre update to fail. A recovery was performed, and the Timeline rejoined at 12:16. The impact was the loss of pointing 05740065. It was at this time the following commands were rejected:

```
2007.179.12.07.02.953 2007.179.12.07.05.813 1792 RealTime 131 TC REJECT
REJECTED TC1 0 0 65535 PR N
E E
```

```
2007.179.12.07.08.953 2007.179.12.07.13.964 1792 RealTime 131 TC REJECT
REJECTED TC1 0 0 65535 PR N
E E
```

These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing.

At 13:00, the problem persisted, causing the interruption of the Timeline again. It was then identified as the job scheduler having crashed. Another recovery was performed, and the Timeline rejoined at 14:11. The impact was the loss of pointing 05740067. It was at this time the following commands were rejected:

```
2007.179.13.17.24.956 2007.179.13.17.29.831 1792 RealTime 131 TC REJECT
REJECTED TC1 0 0 65535 PR N
E E
```

```
2007.179.13.17.30.956 2007.179.13.17.37.784 1792 RealTime 131 TC REJECT
REJECTED TC1 0 0 65535 PR N
E E
```

These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing.

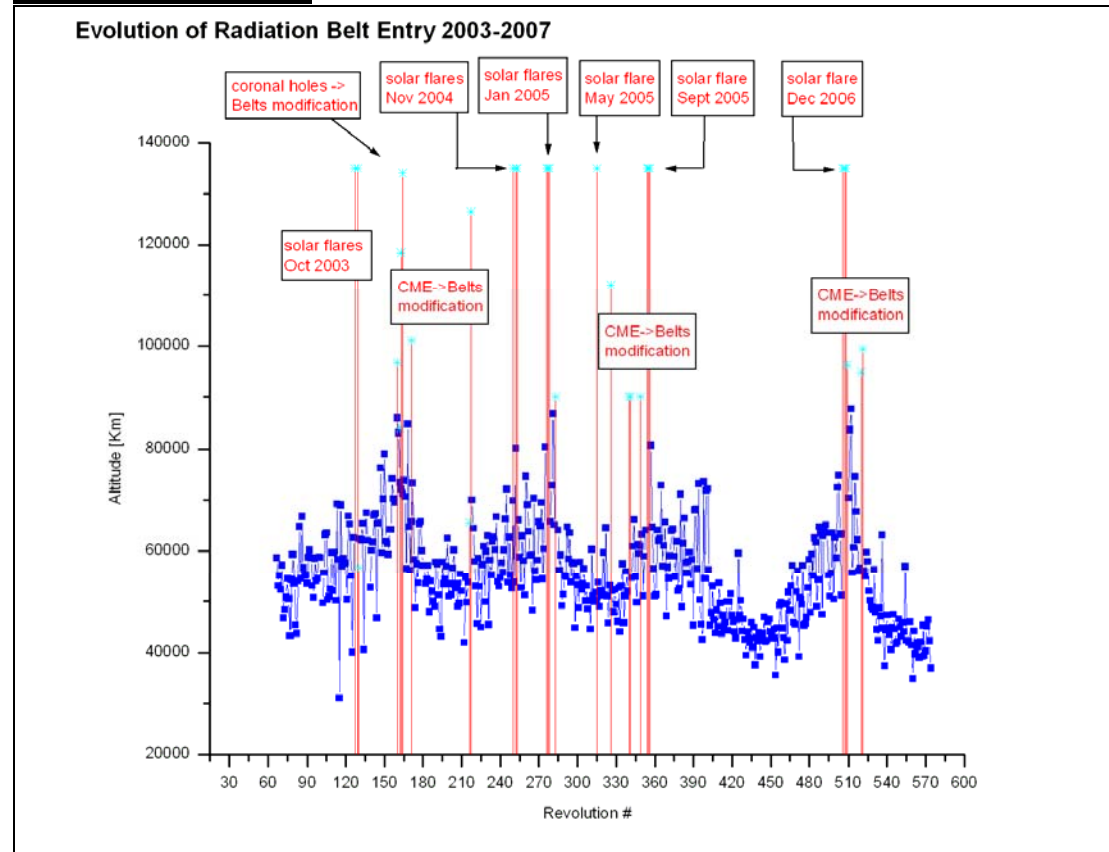
2007-06-29 (DOY 180, Rev 575)

Nothing to report

On DoY 176 at 20:24:40 and DoY 179 at 20:11:53 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

7.3.6 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]
573	RAD_EXIT R 2007-06-23T06:48:44Z	2007-06-23 05:46:07	<<51504.5	2007-06-23 05:41:27	43524
573	RAD_ENTR R 2007-06-25T20:24:32Z	2007-06-25 22:06:31	<42272.8	2007-06-25 21:44:54	44997
574	RAD_EXIT R 2007-06-26T06:36:26Z	2007-06-26 05:19:59	<<51772.8	2007-06-26 05:24:54	42652
574	RAD_ENTR R 2007-06-28T20:11:50Z	2007-06-28 22:23:03	36866.3	2007-06-28 21:34:54	45435
575	RAD_EXIT R 2007-06-29T06:22:47Z	2007-06-29 04:47:03	>>31429.7	2007-06-29 05:14:54	42304

Reference

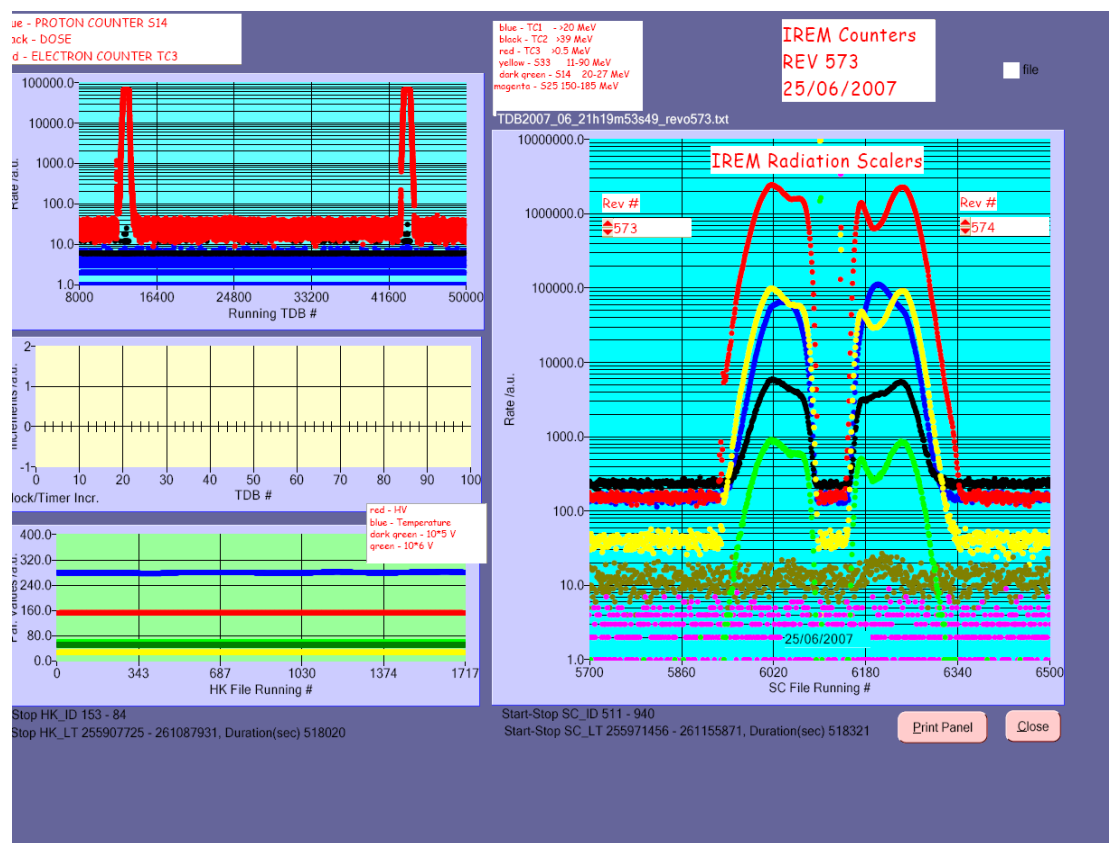
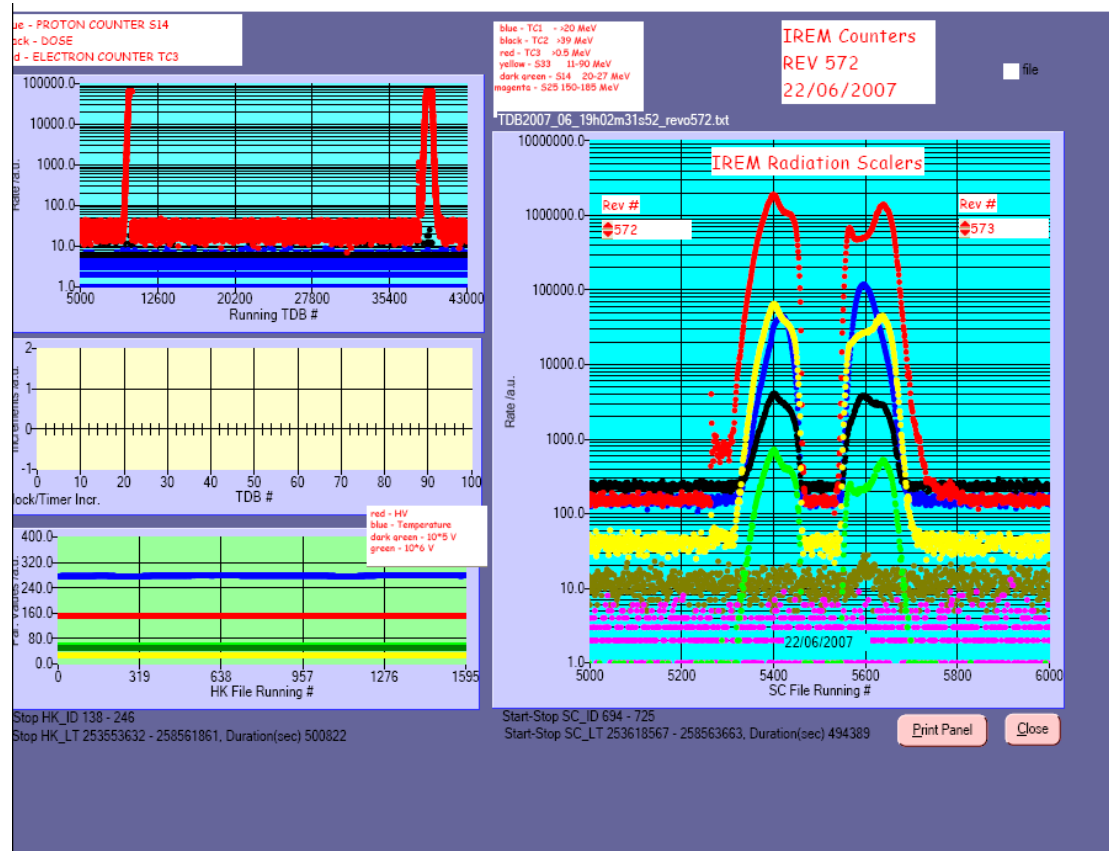
High radiation

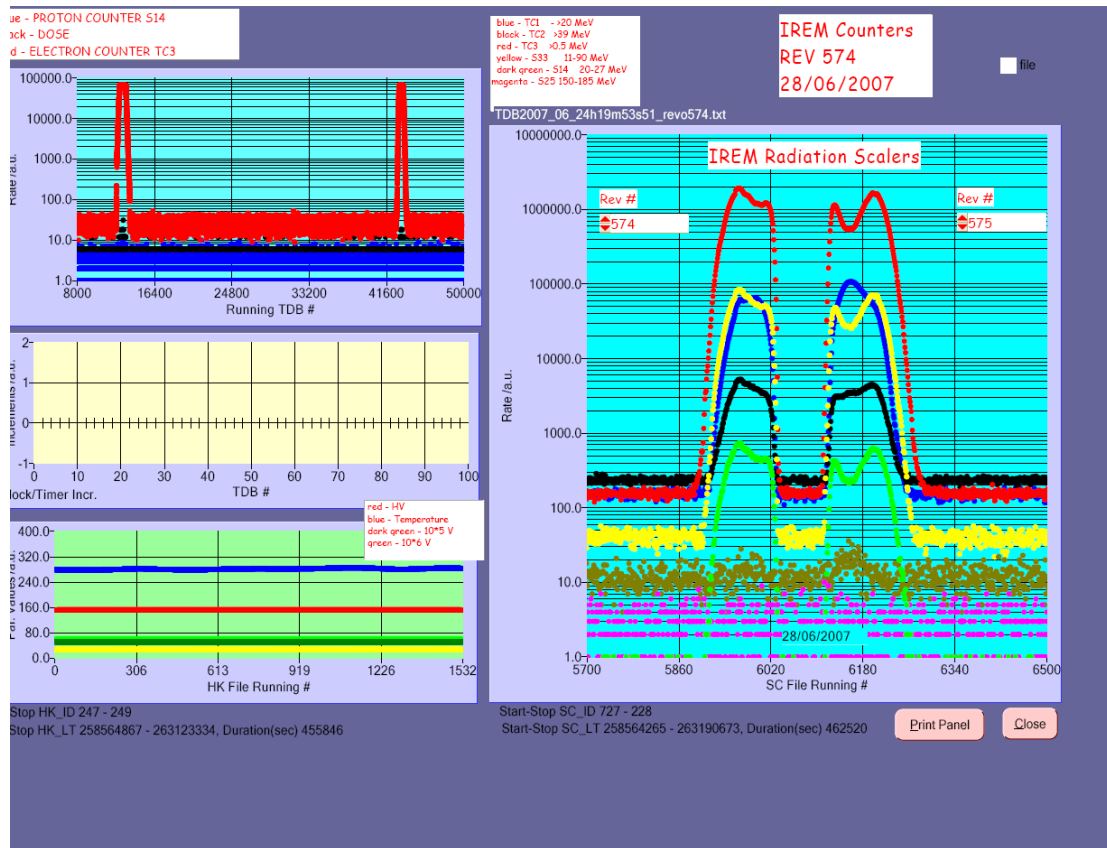
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

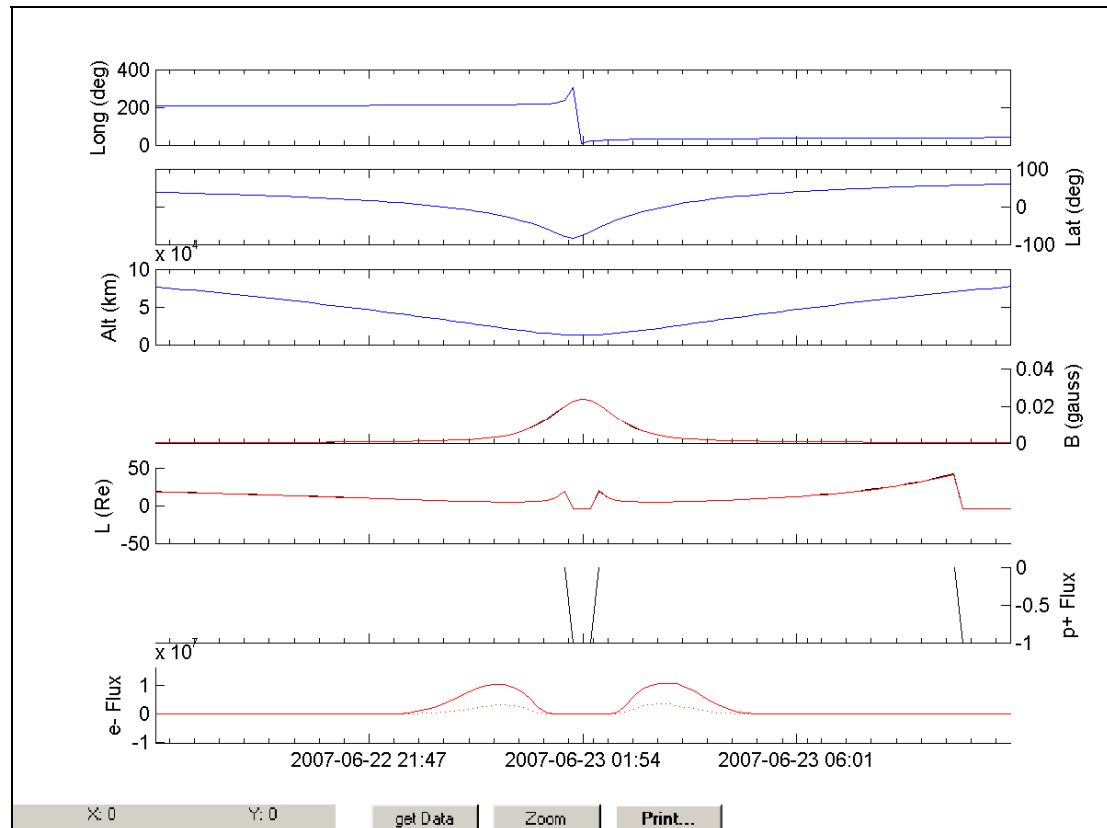
IREM radiation counters:



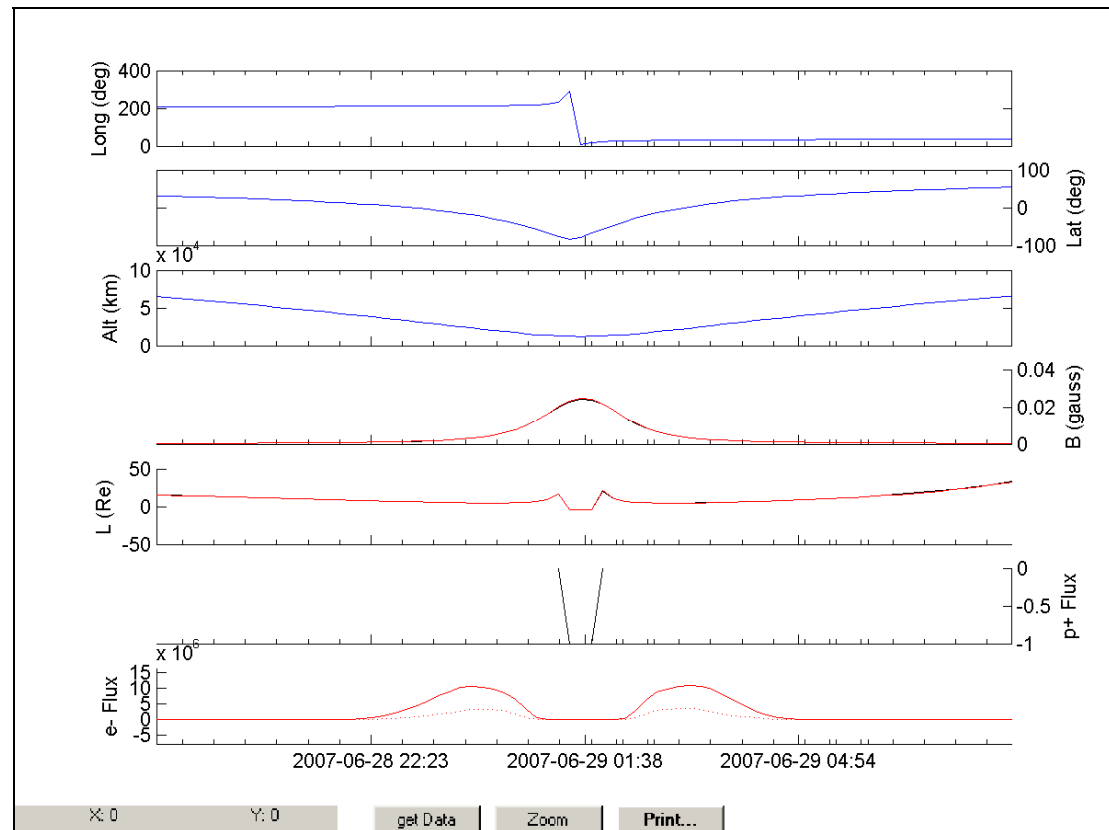


IREM Predicted Radiation Belt Passages

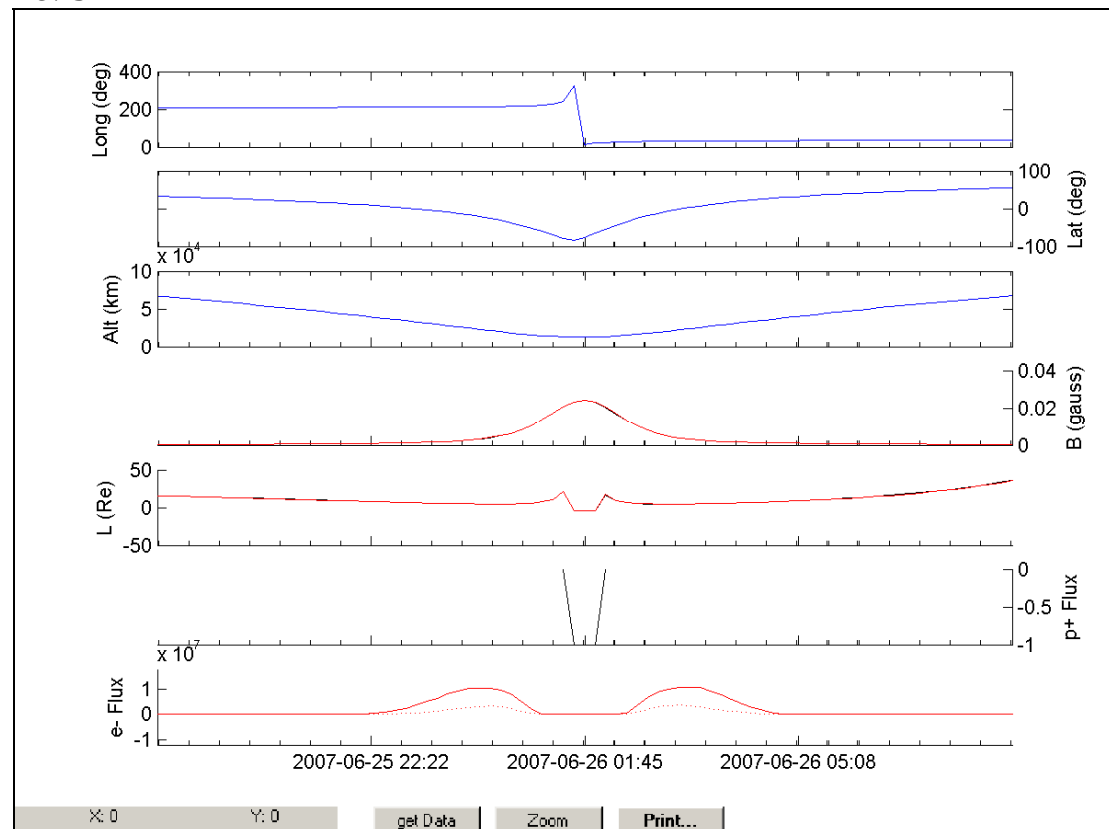
Rev 572



Rev 573



Rev 574



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

Due to a problem on the SEISOP server, no data are available this week. However, the week was very quiet and no radiation was reported.