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

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 253
Week 30
30.07.07
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 21.07.07 until 28.07.07 (both dates inclusive) and covers the revolutions 583 and 584.

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 series of Galactic Disk Latitude Scans (RA 13:58:33.60, DEC -59:46:48.0), (RA 14:06:24.00, DEC -59:30:00.0), and (RA 15:06:36.00, DEC -60:39:00.0), a raster dither of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6), and a raster of the Galactic Plane Region 4 (RA 21:44:04.54, DEC +53:09:58.7).

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.

Following the Thruster torque re-scaling in synch with the end of the Eclipse summer season, the AMD on-times, TIMs and Reciprocal Torques were updated during rev 584.

4 slews were missed from TL, during the observation period, due to problem on guide star, on TM link at REDU station and wrong antenna selection.

The fuel consumption over the period between 20/07/2007 and 26/07/2007 was 0.1519 Kg. The remaining propellant is in the order of 145.1445 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

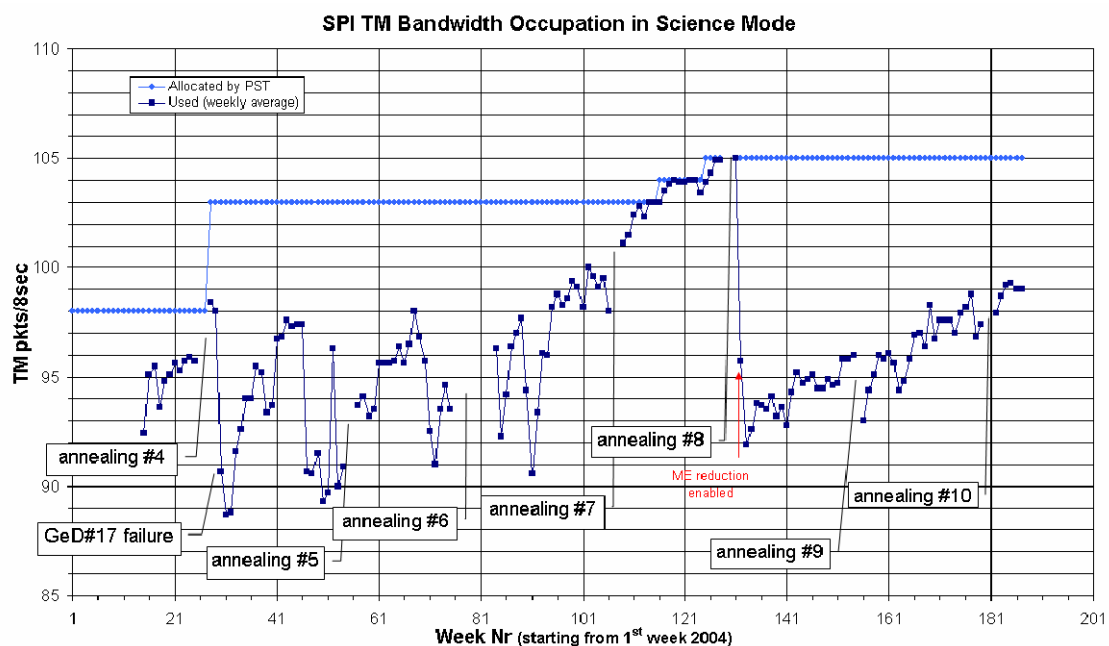
3.2.1 SPI

Following the 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. The average telemetry occupation when the TM allocation was 105 packets/cycle was 99 packets/cycle.

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



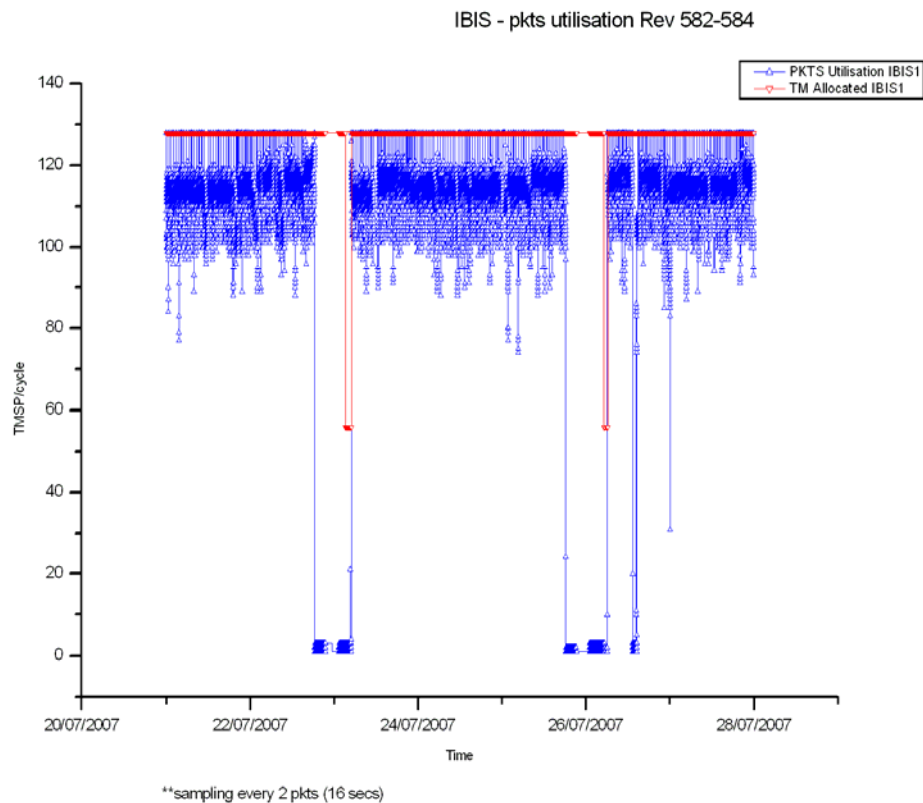
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

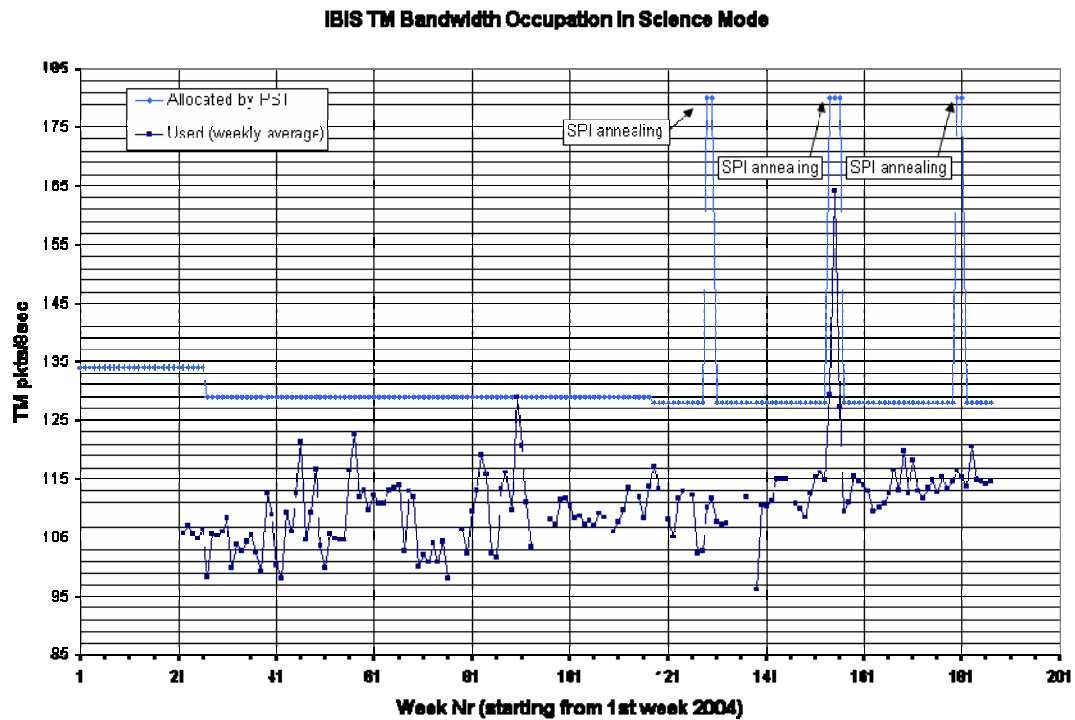
The overall status of the unit is nominal.

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 114.48 TMPS/cycle, up 0.38 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.

Note: Some more information concerning the JEM-X operations is provided in the Appendix.

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, 204 of the 208 planned science pointings for OMC were executed nominally, 1 was shortened and 3 were lost.

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

3.2.5 IREM

The overall status of the unit is nominal.

On 26/07/2007 at 13:32Z, the IREM reset #51 occurred. The unit was recovered by the operator following CRP_SYS_2570, and was back in Nominal configuration at 16:30Z.

Solar Activity

The observation period was characterised by low solar activity.

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 due to ground problems. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week.

The FDS was reported having problem in updating TPF, and a lost guide star led to the loss of a pointing. A further pointing was lost due to confusion over antenna selection. The overall performance was well over the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were however four occasions of a TM drop from Redu, one of which led to the loss of a pointing. 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 593.

Observations were planned and approved up to 593.

TSFs received up to revolution 585.

2. Observation status

ECS files have been received up to revolution 576.

3. ISOC Science Data Archive

No news.

4. ISOC system

Version 15.2 has been installed.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 30/07/2007:

- Latest Standard Analysis completed: observation 04200030002 (MCG -05-23-016, Revolution 565) on 23/07/2007.
- Latest products archived: observations 04200730023 (Gal disk lat scans, Revolution 576) and 04200030002 (MCG -05-23-016, Revolution 565) on 23/07/2007.
- Latest observation products sent to the observer: observation 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 203, At 06:48, the loss of a guide star led to the suspension of the Timeline. A recovery was performed, and the Timeline rejoined at 07:24. The impact was pointing 05820070 was shortened to 1104 from a planned 1985 seconds.
- On DoY 204 (23/07/2007) at 20:23, a 5 minute TM drop from REDU, due to unknown causes, led to the suspension of the Timeline. A recovery was performed and the Timeline rejoined at 20:56. The impact was the loss of pointing 05830027.
- On DoY 207 (26/07/2007) at 05:30, there was a TM drop due to the spacecraft being on the wrong antenna. There had been some confusion at the end of the previous revolution about which antenna to use which had led to the problem. The Timeline had to be interrupted, a manual swap performed, and an attitude recovery executed. The Timeline was rejoined at 06:39. The impact was the loss of pointing 05840002.
- On DoY 207 (26/07/2007) at 13:32:18, an IREM SEU (#51) occurred. A recovery was performed, which was completed at 17:51. The impact was the loss of OMC and IBIS data for pointing 05840016.

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

AR id	Date Created	Subject	Segment	Status
INT-2939	2007-07-17	FDS failed slew update due to constraint violation (STR earth	FDS	Open

Doc. Title : INTEGRAL Mission Report #253
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 30/07/07

Issue : 1
Rev. : 0
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AR id	Date Created	Subject	Segment	Status
		occultation)		
INT_SC-194	2007-07-30	SPI PSD channel rates malfunction	Payload	Pending
INT_SC-195	2007-07-31	IREM Anomaly: Reset of IREM_CSCI S/W #51, 26/07/2007	Payload	Open

7 Future Milestones

The following activities are foreseen in the next few weeks.

- On Board Clock wrap around due 30th July 2007 in Rev. 585.
- Lunar eclipse on 11th September 2007, at the end of revolution 599.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 583

The observations in revolution 583 began with a raster dither of the Galactic Plane Region 4 (RA 21:44:04.54, DEC +53:09:58.7), which lasted ~6.2 hours. This was followed by a Galactic Disk Latitude Scan (RA 13:58:33.60, DEC -59:46:48.0), for ~8.8 hours. A raster dither of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6) followed, lasting ~32.1 hours. Finally a return to the Galactic Disk Latitude Scan (RA 13:58:33.60, DEC -59:46:48.0), for ~8.3 hours was performed, until the end of the revolution.

Revolution 584

The observations in revolution 584 began with 2 Galactic Disk Latitude Scans (RA 14:06:24.00, DEC -59:30:00.0), for ~7.2 hours, then (RA 15:06:36.00, DEC -60:39:00.0), for ~7.7 hours. This was followed by a raster dither of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6), which lasted ~19.8 hours. This was followed by a return to the Galactic Disk Latitude Scans, first (RA 14:06:24.00, DEC -59:30:00.0), for ~9.9 hours, then (RA 15:06:36.00, DEC -60:39:00.0), for ~9.4 hours, 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.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2007-07-06T13:16:55.000Z	145.4531	F	Automatic TM processing.
2007-07-08T03:09:39.000Z	145.4370	F	Automatic TM processing.
2007-07-09T13:00:23.000Z	145.4184	F	Automatic TM processing.
2007-07-11T03:07:49.000Z	145.4060	F	Automatic TM processing.
2007-07-12T12:47:34.000Z	145.3770	F	Automatic TM processing.
2007-07-14T02:37:38.000Z	145.3630	F	Automatic TM processing.
2007-07-15T12:13:43.000Z	145.3441	F	Automatic TM processing.
2007-07-17T02:26:03.000Z	145.3345	F	Automatic TM processing.
2007-07-18T12:19:51.000Z	145.3074	F	Automatic TM processing.
2007-07-20T02:14:35.000Z	145.2964	F	Automatic TM processing.
2007-07-20T15:00:04.000Z	145.2624	F	Automatic TM processing.
2007-07-20T19:56:37.000Z	145.2135	F	Automatic TM processing.
2007-07-23T01:59:30.000Z	145.2022	F	Automatic TM processing.
2007-07-23T11:36:03.000Z	145.1565	F	Automatic TM processing.
2007-07-26T01:48:26.000Z	145.1445	F	Automatic TM processing.

This report was generated Fri Jul 27 08:00:20 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, 21/07/2007 – 27/07/2007

AOCS operations were executed from the Automatic Timeline.

During this period, 87 Open Loop Slews, 138 Closed Loop Slews and 4 Momentum Biases were executed.

4 slews (2 CSL, 2 OSL) were missed from TL, during the observation period, due to loss of guide star, problem with VC0 TM link at REDU station and wrong on-board antenna selection.

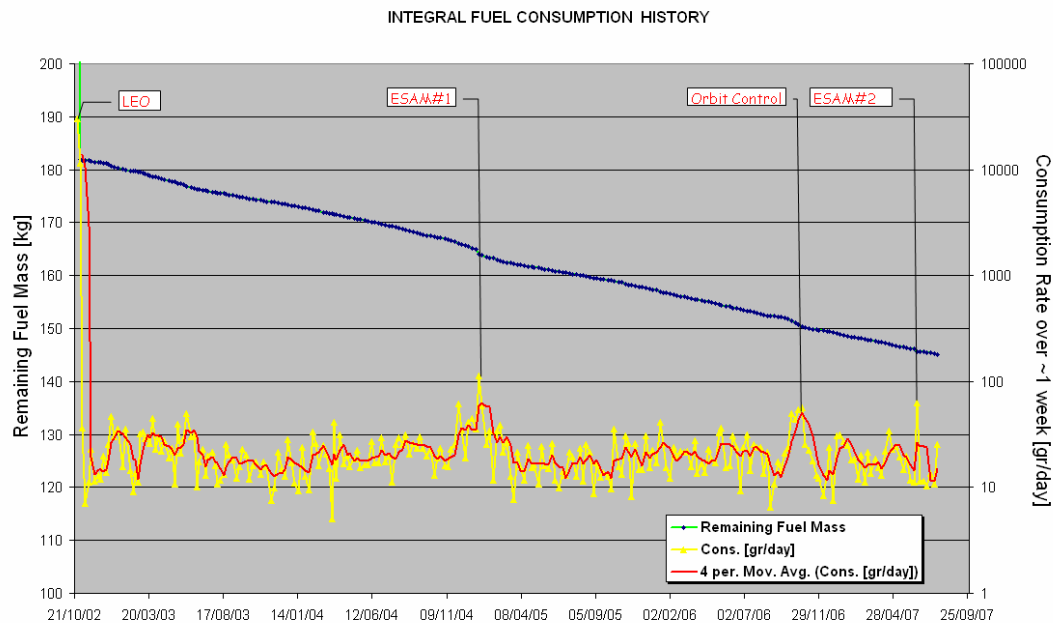
This is equivalent to $\sim 1.8\%$ of the total number of slews planned (226).

Orbit Control

No update.

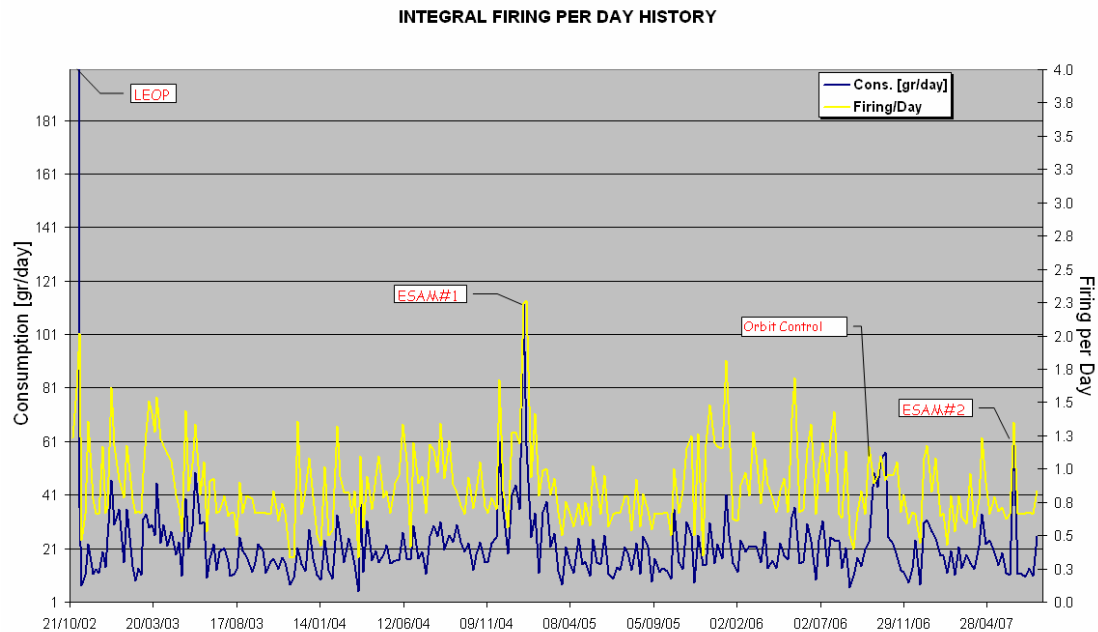
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 26/07/2007 is reported in the plot below.



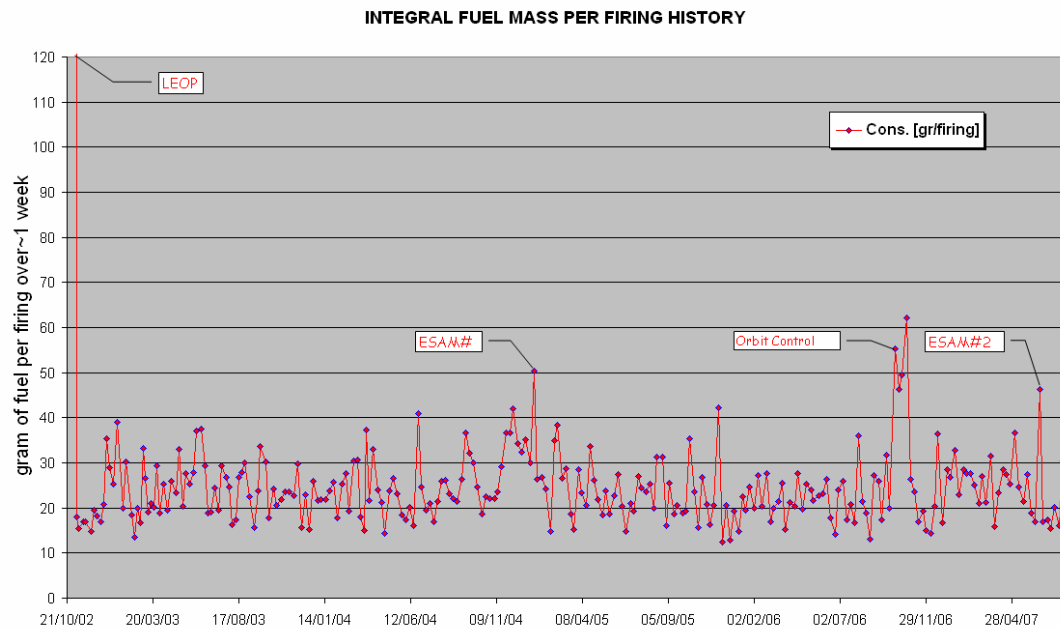
The above plot considers the ESAM fuel consumption spread over period of ~ 1 week.

The firing per day over the period between 01/11/2002 and 26/07/2007 is reported in the plot below.



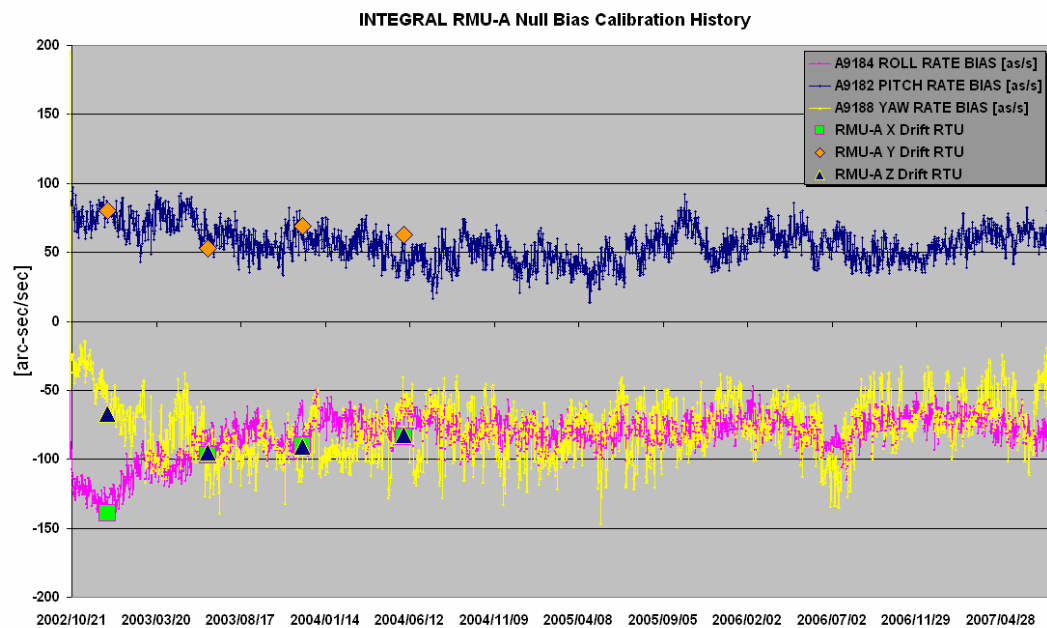
The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 26/07/2007 is reported in the plot below.

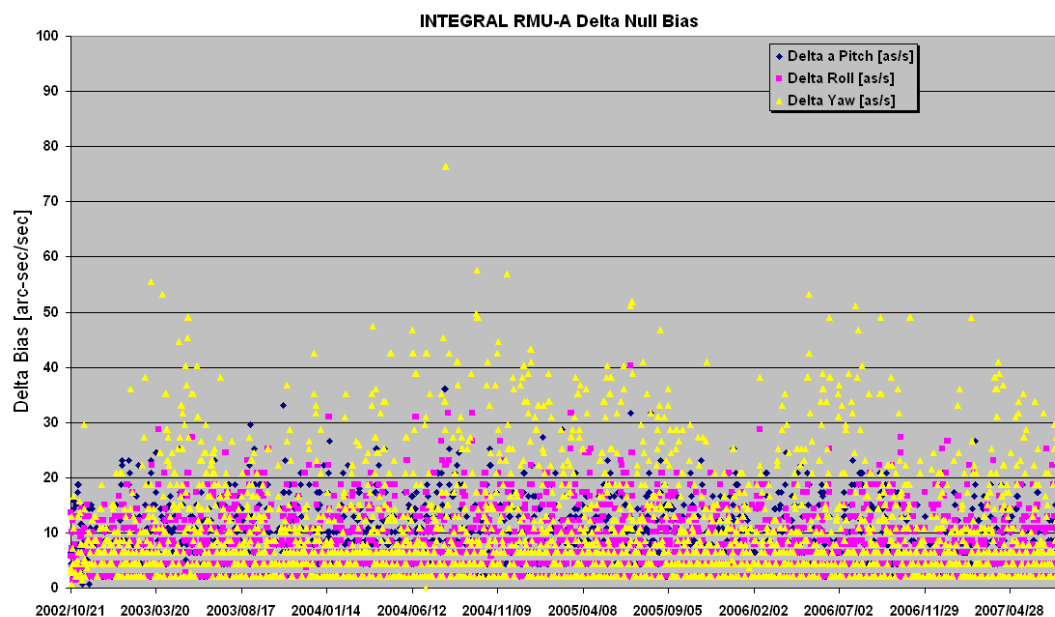


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 27/07/2007 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 27/07/2007 is reported in the plot below.



21/07/2007 (Day of Year 202, Revolution 582)

Nothing to report.

22/07/2007 (Day of Year 203, Revolution 582)

Loss of guide star: at 06:49:41z a loss of guide star occurred during the execution of PID 05820069. The guide star selected was ID 9008-4164 with Mi 8.0 at CCD location [9429, 21814].

The IMU 1 came ON almost at the end of PID # 69 and starting commanding for slew # 70. The AOCS s/s was promptly disabled and no time was available for a simple update of the next scheduled slew. The AOCS timeline execution was suspended and slew 05820070 was not released and manually recovered. The update job for the subsequent slew was not suspended. The attitude determination could not find the autonomous mapping after slew 05820070 and was aborted.

A new mapping was manually commanded and a manual recovery performed from attitude of PID 05820069 to the attitude of PID 05820070. A new mapping was manually commanded and the next slew ID 05820071 was updated at 07:24Z.

The following slew was missed in TL: 05820070 (OSL).

The OTF was not reached at the end of PID 05820069.

FDS failed slew update: at 14:22z the FDS failed the update of slew ID 05820083. FDS reported an error during the update process: the TPF update software spotted a constraint violation on the initial attitude of pointing 05820083 at 2007-07-22T14:56:39Z (STR occultation by moon). That is about one minute before starting the slew at 2007-07-22T14:57:29Z to attitude of PID 05820083. The TPF generation was aborted. The TPF could be produced by running Recover Schedule some time later.

A manual recovery was performed at 15:15z and the slew 05820083 manually updated in TL.

No impact on TL.

23/07/2007 (Day of Year 204, Revolution 582-583)

Loss of TM link at REDU station: at 20:24z the slew ID 05830027 failed release due to a problem on VC0 TM link at REDU station.

At 20:28z the TM link was established and manual recovery performed from attitude of PID 05830026 to the attitude of PID 05830027. The next slew ID 05830028 was manually updated in TL.

The following slew was missed in TL: 05830027 (CSL).

24/07/2007 (Day of Year 205, Revolution 583)

Nothing to report.

25/07/2007 (Day of Year 206, Revolution 583)

Loss of guide star: at 00:18z a loss of guide star occurred at the end of slew ID 05830065 (OEM <<slew end>> at 00:17:35z).

As foreseen by the IPS logic, the IMU 1 did not come ON because the loss of guide star occurred at the end of the slew manoeuvre, with the manoeuvre timer still running (tranquillization phase) and <1 min after the slew end message.

A new automatic mapping was commanded by the ACC and a new guide star picked.

No impact on TL. The OTF was not reached during PID 05830065.

26/07/2007 (Day of Year 207, Revolution 583-584)

Loss of RF link: at 05:30z a problem on the satellite RF link (TM & TC) occurred caused by wrong on-board antenna selection. The sequence of events was:

1. At AOS (TC at 01:18z) of revolution 584 the initial antenna automatically planned was Antenna 1, with Antenna 2 already in visibility.
2. Due to a clash, at planning level of the antenna swap to 2 and RWB, the operation could not be planned as an automatic event by TL but as manual operation.
3. In case like this the manual antenna swap shall be performed before the recommended planning time, in a convenient window. This window was identified to be just before the LOS of the previous revolution.
4. Indication on the cover sheet of the TL for revolution 583 (reported to execute a manual antenna swap, without specifying on which antenna, right before the LOS) and on the T/L of the revolution 584 itself, as MOUT: "Initial Antenna is 1", caused confusion and the manual antenna swap was not to be performed at the expected time and the following loss of TM & TC links.

The AOCS s/s was disabled in TL at 05:48z.

As first recovery, it was attempted an antenna swap on antenna 2 by commanding the RFDU SWD POSX in BD mode and having the PTV disabled, but the recovery did not work.

As second attempt, the carrier was brought down and a new carrier, having the right frequency for the RX 2, was brought up. The sweep to look the RX 2 was then executed in blind.

At 05:56 the antenna swap command was uplinked in BD mode, it succeeded and TM was re-acquired. Finally at 06:00 the RX 1 was locked.

A manual recovery was performed from attitude of PID 05840001 to the attitude of PID 05840003. The next slew ID 05840004 was manually updated in TL at 06:39z.

The following slews were missed in TL: 05840002 (OSL) - 03 (CSL).

27/07/2007 (Day of Year 208, Revolution 584)

Update Thrusters Reciprocal Torques, TIMs and AMD on-times: following the Thruster torque re-scaling in synch with the end of the Eclipse summer season, the

TIMs thresholds, AMD on-times and Thrusters reciprocals torques were updated during rev 584, at 13:36z (values by FD team).

Based on the output of the calibration-utility, the mean-force for the winter-2006 full thruster-torque-calibration was:

$$F_{cal} = 9.53837 \text{ N}$$

Based on the predicted mid rev-0584 remaining fuel mass (145.11 kg) and rev-0582 average tank temperature (25.40 deg C), the 'current' mean force is:

$$F_{now} = 9.442 \text{ N}$$

The scaling factor is thus:

$$F_{cal}/F_{now} = 9.53837/9.442 = 1.0102$$

This factor is slightly larger than the previous scale factor, due in part likely to the extra fuel used during the ESAM on 14/06/2007.

Thruster Impulse Monitors

The winter-2006 TIMs settings were:

TTIM: 432.0	(raw 27)
RTIM: 6.50000	(raw 52)
PTIM: 2.12500	(raw 17)
YTIM: 33.90625	(raw 1085)

Scaled by 1.0102 and rounded up to the nearest LSb (16s, 0.125s, 0.125s 0.03125s respectively), gives the following scaled values for uplink:

TTIM:448.0	(raw 28)
RTIM:6.62500	(raw 53)
PTIM:2.25000	(raw 18)
YTIM:34.28125	(raw 1097)

Thruster Torque Reciprocals and PWM Look up Table

AERCA_00 S

M F 4

2007-07-28T23:26:00Z

2007-07-28T23:26:00Z

A

TORQ_X_A R 0.2626993E+00 1/Nm D Reciprocal Roll Torque (A)

TORQ_Y_A R 0.8580135E-01 1/Nm D Reciprocal Pitch Torque (A)

TORQ_Z_A R 0.7141435E-01 1/Nm D Reciprocal Yaw Torque (A)

PWM_TORQ R 7 D PWM Look Up Table

AMD On-Times

AEOTA_00 S

M F 32

2007-07-28T23:26:00Z

2007-07-28T23:26:00Z

A

MON_W1T1 R 0.6612400E-01	sec D AMD decrease on-time (W1,Th1)
MON_W1T2 R 0.2264320E+00	sec D AMD decrease on-time (W1,Th2)
MON_W1T3 R 0.0000000E+00	sec D AMD decrease on-time (W1,Th3)
MON_W1T4 R 0.2940200E+00	sec D AMD decrease on-time (W1,Th4)
MON_W2T1 R 0.6100000E-01	sec D AMD decrease on-time (W2,Th1)
MON_W2T2 R 0.1395680E+00	sec D AMD decrease on-time (W2,Th2)
MON_W2T3 R 0.7686000E-01	sec D AMD decrease on-time (W2,Th3)
MON_W2T4 R 0.0000000E+00	sec D AMD decrease on-time (W2,Th4)
MON_W3T1 R 0.2971920E+00	sec D AMD decrease on-time (W3,Th1)
MON_W3T2 R 0.0000000E+00	sec D AMD decrease on-time (W3,Th2)
MON_W3T3 R 0.2303360E+00	sec D AMD decrease on-time (W3,Th3)
MON_W3T4 R 0.6905200E-01	sec D AMD decrease on-time (W3,Th4)
MON_W4T1 R 0.1334680E+00	sec D AMD decrease on-time (W4,Th1)
MON_W4T2 R 0.6075600E-01	sec D AMD decrease on-time (W4,Th2)
MON_W4T3 R 0.0000000E+00	sec D AMD decrease on-time (W4,Th3)
MON_W4T4 R 0.7051600E-01	sec D AMD decrease on-time (W4,Th4)
MOFFW1T1 R 0.2264320E+00	sec D AMD increase on-time (W1,Th1)
MOFFW1T2 R 0.8027600E-01	sec D AMD increase on-time (W1,Th2)
MOFFW1T3 R 0.3089040E+00	sec D AMD increase on-time (W1,Th3)
MOFFW1T4 R 0.0000000E+00	sec D AMD increase on-time (W1,Th4)
MOFFW2T1 R 0.7198000E-01	sec D AMD increase on-time (W2,Th1)
MOFFW2T2 R 0.0000000E+00	sec D AMD increase on-time (W2,Th2)
MOFFW2T3 R 0.6344000E-01	sec D AMD increase on-time (W2,Th3)
MOFFW2T4 R 0.1337120E+00	sec D AMD increase on-time (W2,Th4)
MOFFW3T1 R 0.0000000E+00	sec D AMD increase on-time (W3,Th1)
MOFFW3T2 R 0.3118320E+00	sec D AMD increase on-time (W3,Th2)
MOFFW3T3 R 0.8344800E-01	sec D AMD increase on-time (W3,Th3)
MOFFW3T4 R 0.2298480E+00	sec D AMD increase on-time (W3,Th4)
MOFFW4T1 R 0.0000000E+00	sec D AMD increase on-time (W4,Th1)
MOFFW4T2 R 0.7905600E-01	sec D AMD increase on-time (W4,Th2)
MOFFW4T3 R 0.1407880E+00	sec D AMD increase on-time (W4,Th3)
MOFFW4T4 R 0.6344000E-01	sec D AMD increase on-time (W4,Th4)

FDS failed slew update: at 23:33z the FDS failed the update of slew ID 05840068. FDS reported the following error: the job scheduler was down and did not kick off the update jobs. The updates for slew 05840068 and 05840069 were not kicked off from the scheduler.

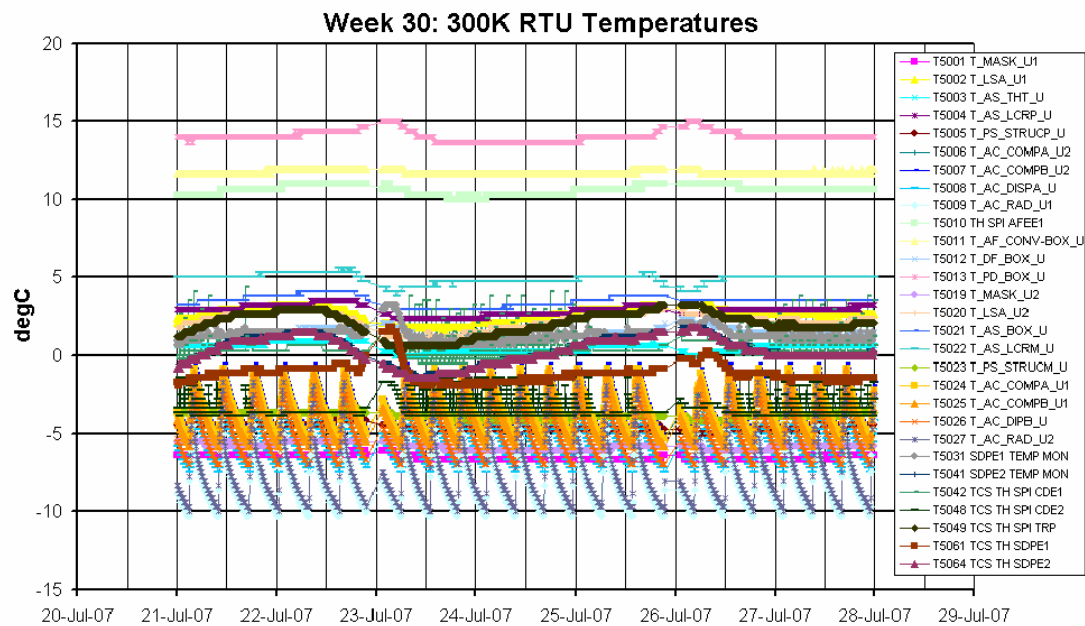
The alarm for the failing of update slew #68 was not immediately recognized and this caused the slew ID 05840069 to be uplinked by TL without update.

A manual recovery was then performed at 23:34z and the slew ID 05840069 manually updated in TL.

No impact in TL.

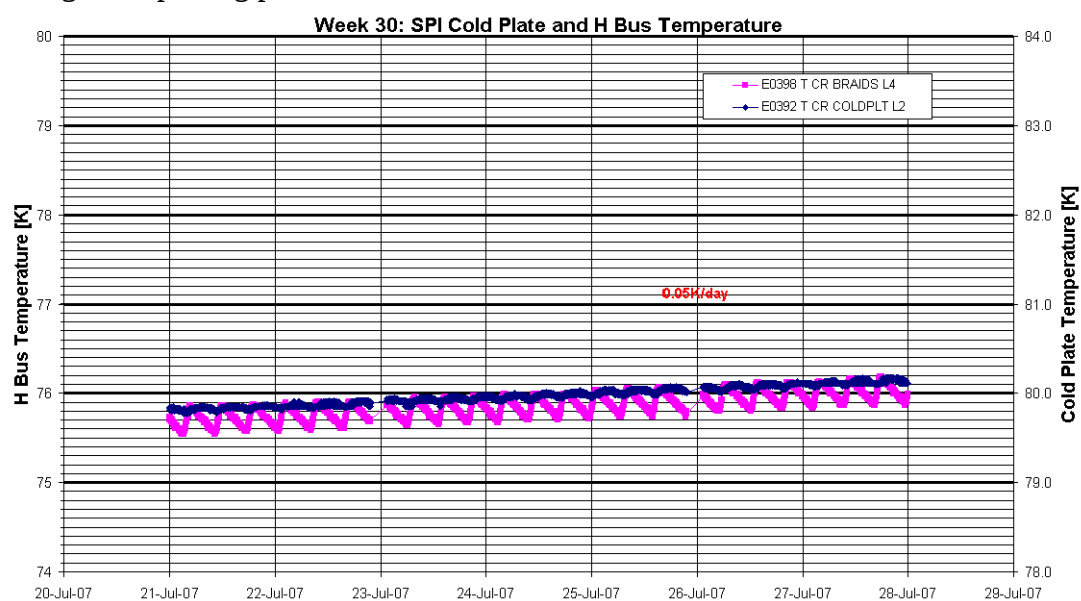
8.3.2 SPI Operations

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 with a positive drift of 0.05K/day.

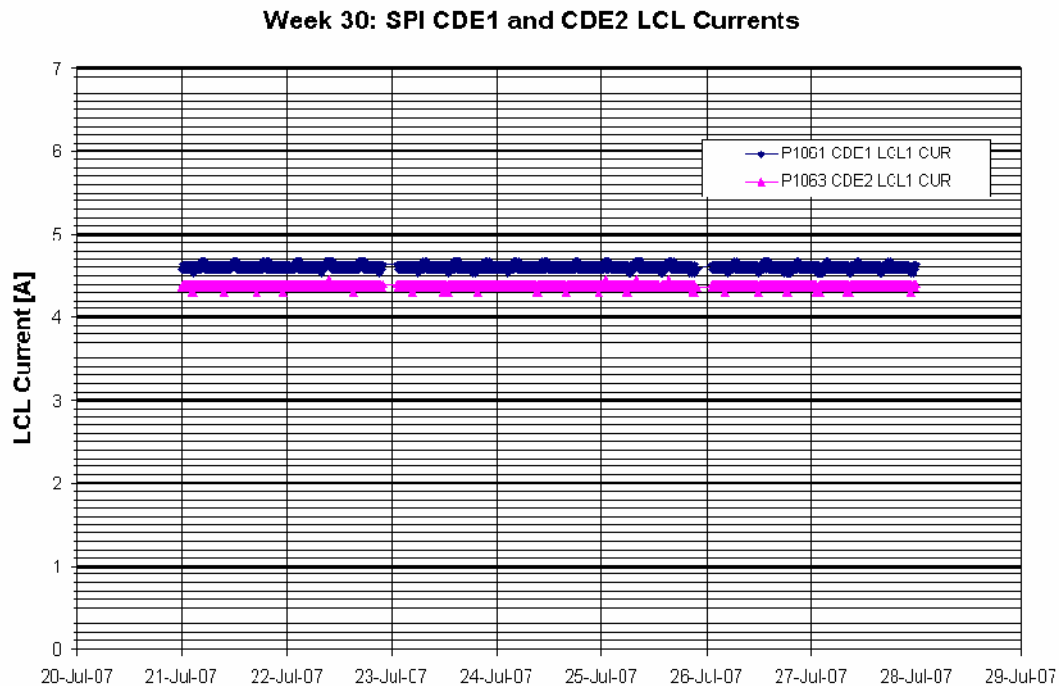
The following plot shows the evolution of the cold plate and H bus temperatures during the reporting period.



The average CDE LCL currents over the week were:

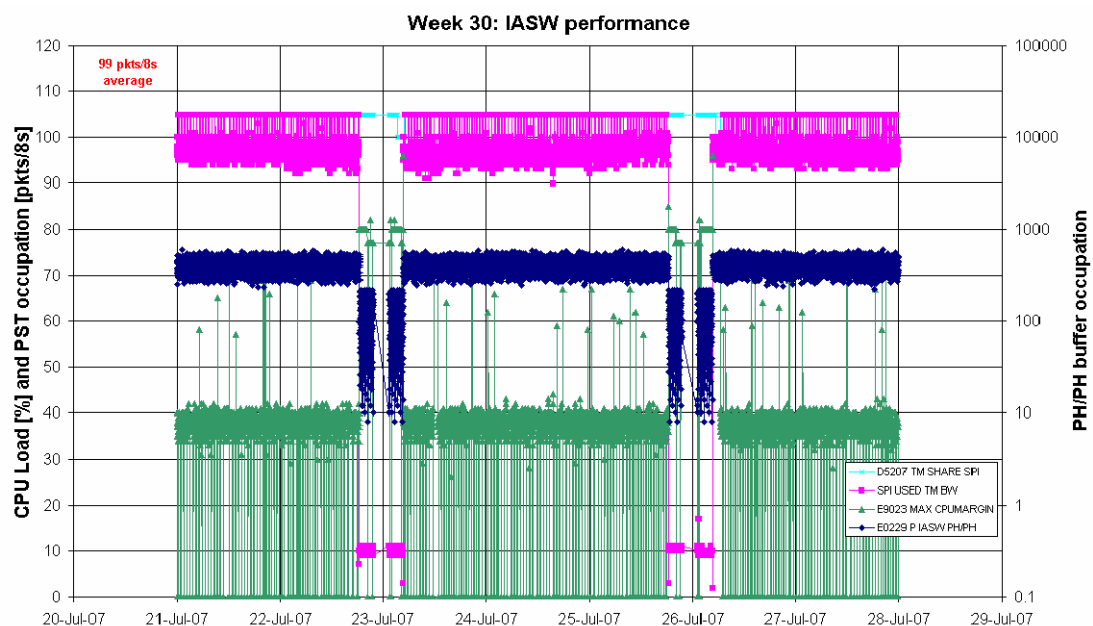
- CDE1 LCL current = 4.60A
- CDE2 LCL current = 4.38A

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



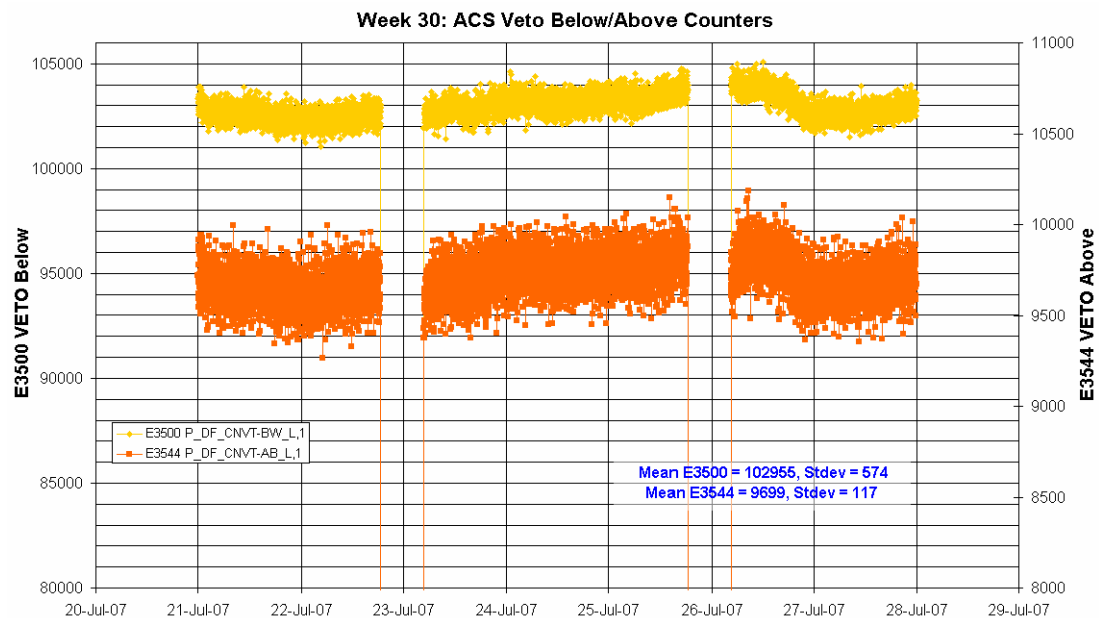
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is v433 patch #1 with the spectra scaling factor set to 9/19 SE. The average TM bandwidth occupation of SPI was 99 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

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



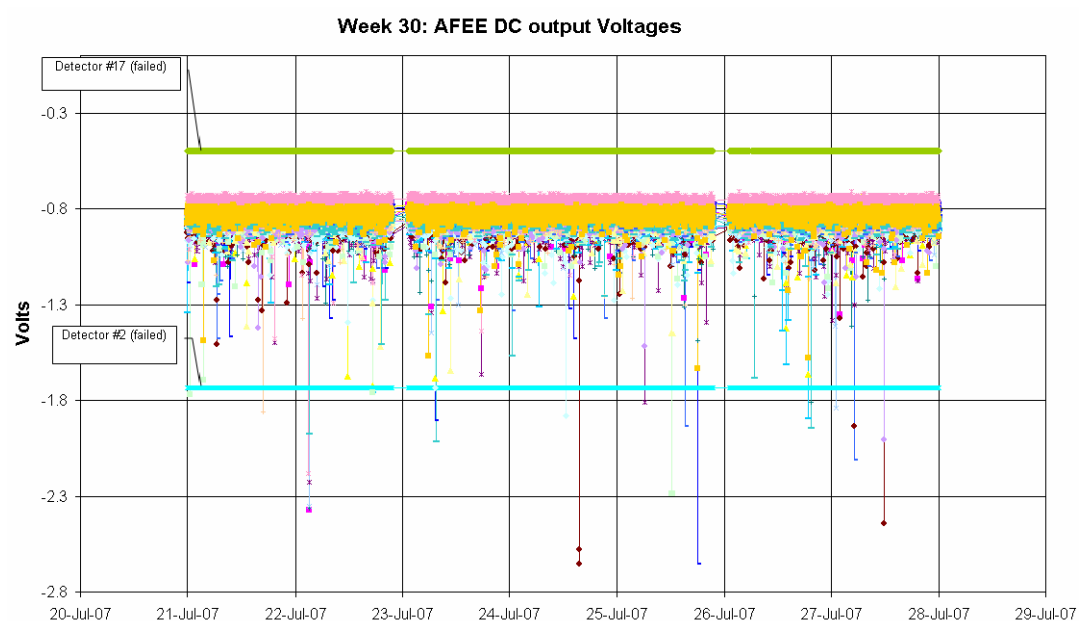
ACS: The performance of the ACS is nominal, except for FEE #81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

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

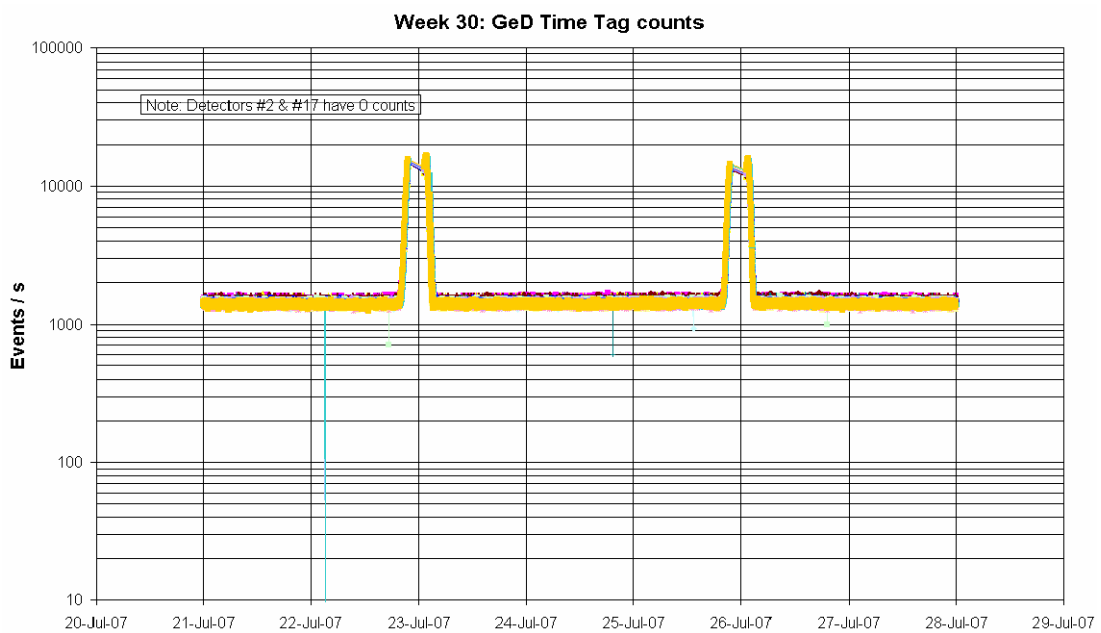
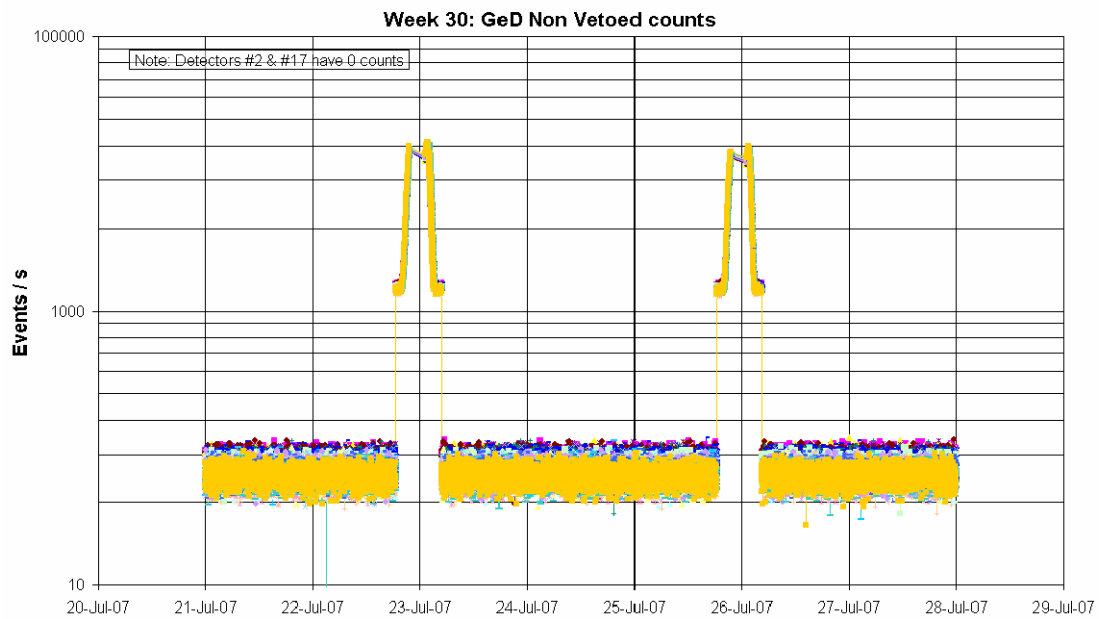


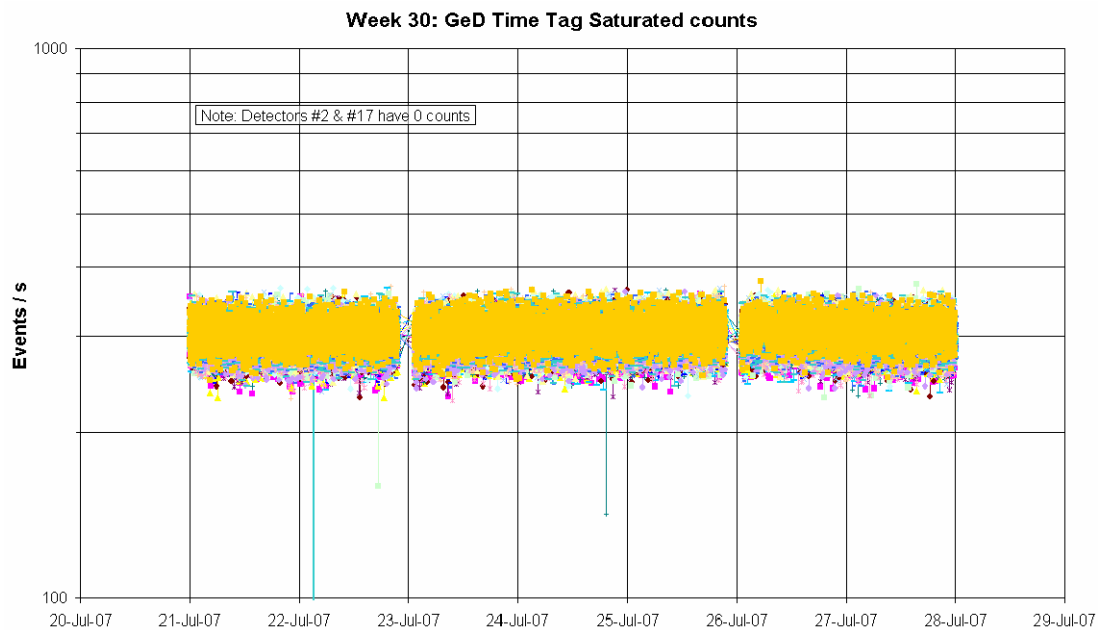
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

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.

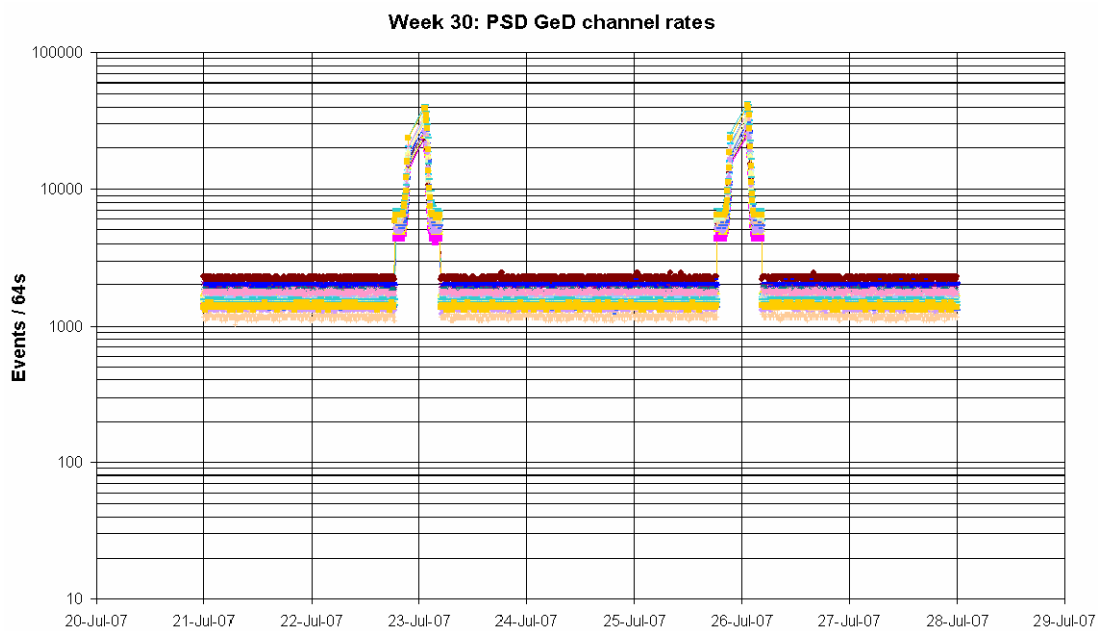


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





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



Event Log:

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

- On 2007-07-27 at 07:26:59Z OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED was received. This was during Pointing ID 05840044. As this was a single occurrence, no action was taken.
- On 2007-07-22 at 14:28:45Z TM parameter E2067 went OOL (value = PARAM > SPEC). This is the ACS FEE#28 HV status. It returned within limits when the next packet was received at 14:39:25Z and therefore no action was taken.

- On 2007-07-24 at 15:36:28Z TM parameter E3324 went OOL (value = 0). This is the AfeeTimeTag Count for GeD#4. It returned within limits of its own accord at 15:37:32Z and therefore no action was taken.
- On 2007-07-26 at 04:31:21Z, during the reconfiguration of SPI at radiation belt exit, the TM parameters E3825, E3826 and E3828- E3831 all went OOL with value = 0 raw. These are the PSD +/-5V analogue and some PSD board temperatures. They returned within limits when the next packet was received at 04:32:25Z.

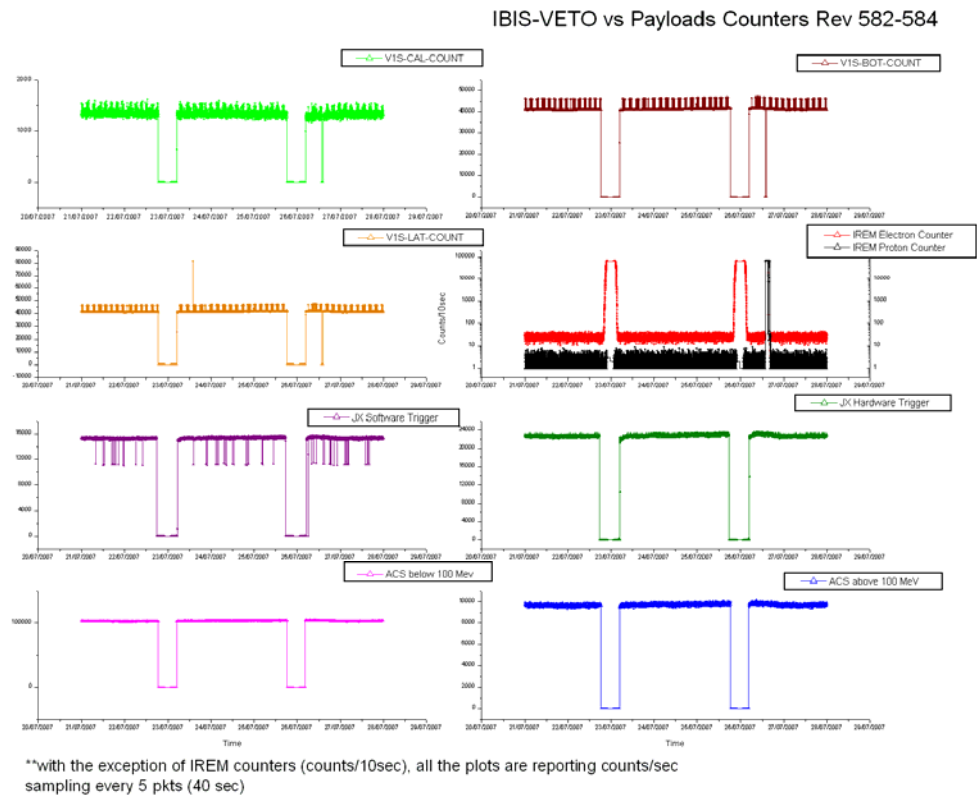
8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

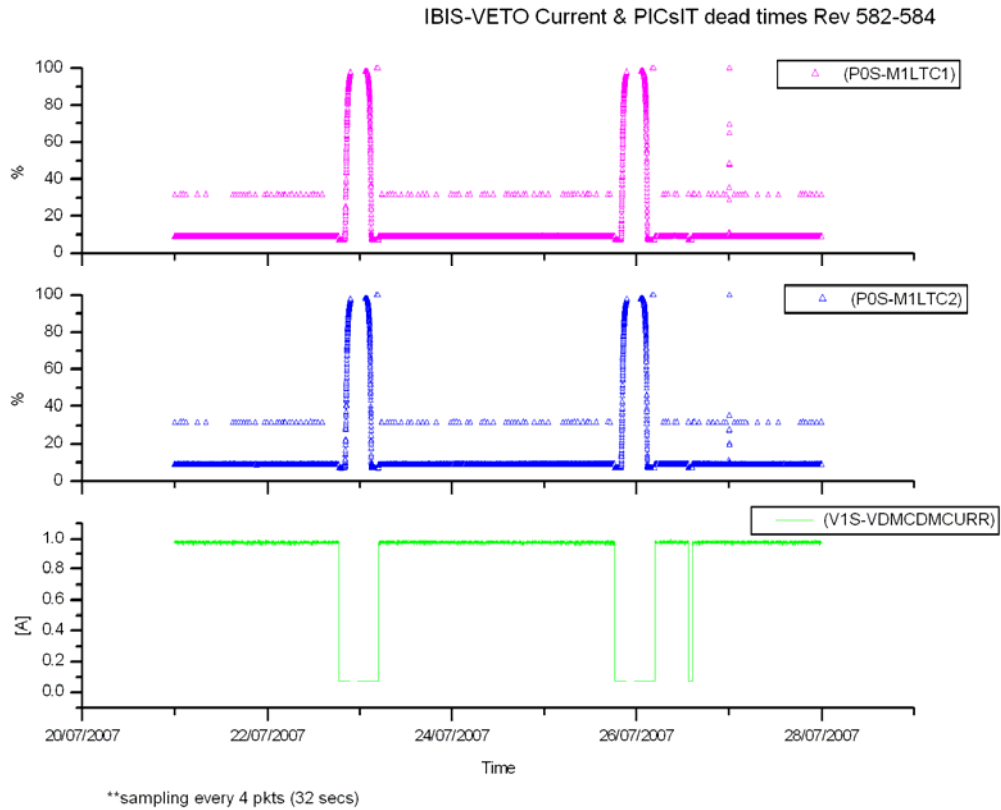


VETO vs Payloads Counters:

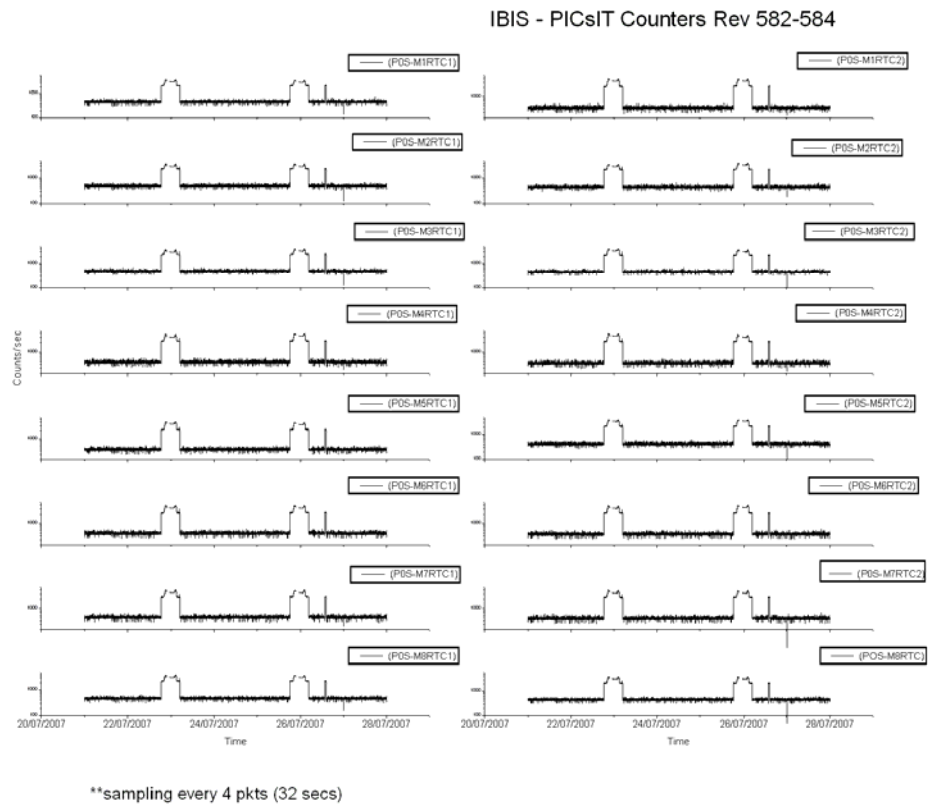


The week was characterised by low radiation as reported by the payload.

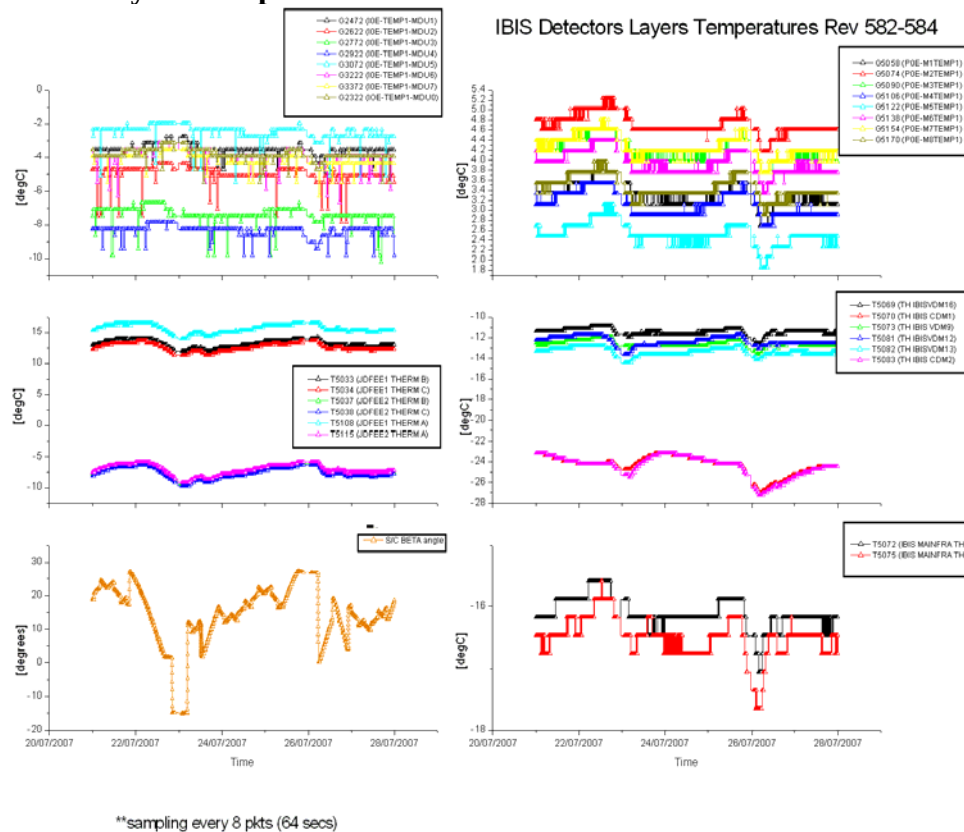
VETO Current:



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 G2000 (IOE-OVFWPXADD-Mi) were reported at Radiation Belts passage.

2007-07-21 (DOY 202, Rev 582)

IBIS operations executed nominally.

2007-07-22 (DOY 203, Rev 582-583)

At 20:20:20Z TM parameter G5079 went OOL low (value = -2.6V). This is the PDM2 +2.5V voltage. It returned within limits of its own accord at 20:20:52Z and therefore no action was taken.

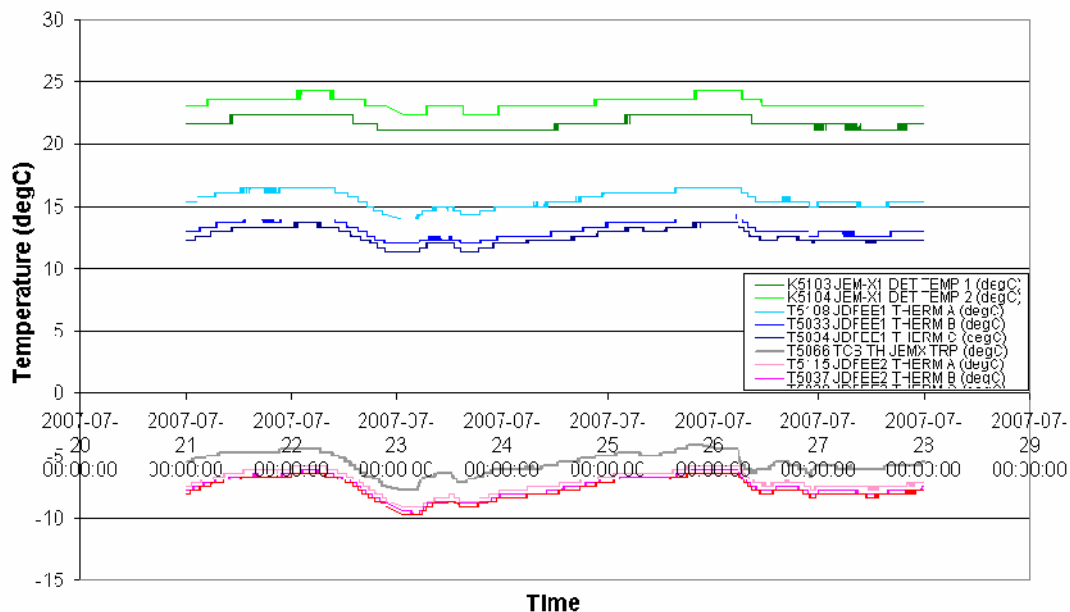
2007-07-23 (DOY 204, Rev 583) to 2007-07-25 (DOY 206, Rev 583-584)

IBIS operations executed nominally.

2007-07-26 (DOY 207, Rev 584)

Due to the wrong antenna being selected at the start of revolution 584 causing a loss of TM/TC, the GESTAN02 ED scheduled in the Timeline at 05:46:36Z failed. Following the recovery of the TM/TC links, this ED was re-uplinked at 06:11:25Z.

Week 30: JEM-X Detector & DFEE Temperatures



JEM-X Daily Report

2007-07-21 (DOY 202, Rev 582) to 2007-07-25 (DOY 206, Rev 583-584)

JEM-X1 operations executed nominally.

2007-07-26 (DOY 207, Rev 584)

Due to the wrong antenna being selected at the start of revolution 584, which caused a loss of TM/TC, the KEDATA02 ED scheduled in the Timeline at 05:46:56Z failed. Following the recovery of the TM/TC links, this ED was re-uplinked at 06:12:37Z.

At 13:32:24z an IREM SW reset (see INT_SC-195) 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.

2007-07-27 (DOY 208, Rev 584)

JEM-X1 operations executed nominally.

8.3.5 OMC Operations

2007-07-21 (DOY 202, Rev 582)

Nothing to report.

2007-07-22 (DOY 203, Rev 582)

² Data sampled (1 frame in 8)

At 06:48, an AOCS problem led to the suspension of the Timeline. A recovery was performed, and the Timeline rejoined at 07:24. The impact was pointing 05820070 was shortened to 1104 from a planned 1985 seconds.

2007-07-23 (DOY 204, Rev 583)

At 20:23, a TM drop from Redu led to the suspension of the Timeline. At 20:28, the TM returned, and a manual recovery started. At 20:56, the recovery was complete, and the Timeline restarted. The impact was the loss of pointing 05830027. It was at this time the following commands were rejected:

2007.204.20.29.30.853	2007.204.20.29.42.241	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2007.204.20.29.37.415	2007.204.20.29.47.428	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.

2007-07-24 (DOY 205, Rev 582) to 2007-07-25 (DOY 206, Rev 584)

Nothing to report.

2007-07-26 (DOY 207, Rev 584)

At 05:30, due to the spacecraft entering perigee on the wrong antenna, the TM was lost. A re-sweep was necessary on the other antenna, and a manual recovery was performed. The Timeline was rejoined at 06:19. The impact was the loss of pointing 05840002.

At 13:32:18, an IREM SEU (#51) caused OMC to switch to SAFE mode. A recovery was performed, and the unit returned to Stand-by at 14:11:56. The impact was the loss of pointing 05840016.

2007.207.13.43.08.007	2007.207.13.43.15.412	1792	RealTime	131	TC	REJECT		
REJECTED TC1			0	0	65535	PR	N	
E E								
2007.207.13.43.14.007	2007.207.13.43.23.499	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.

2007-07-27 (DOY 208, Rev 584)

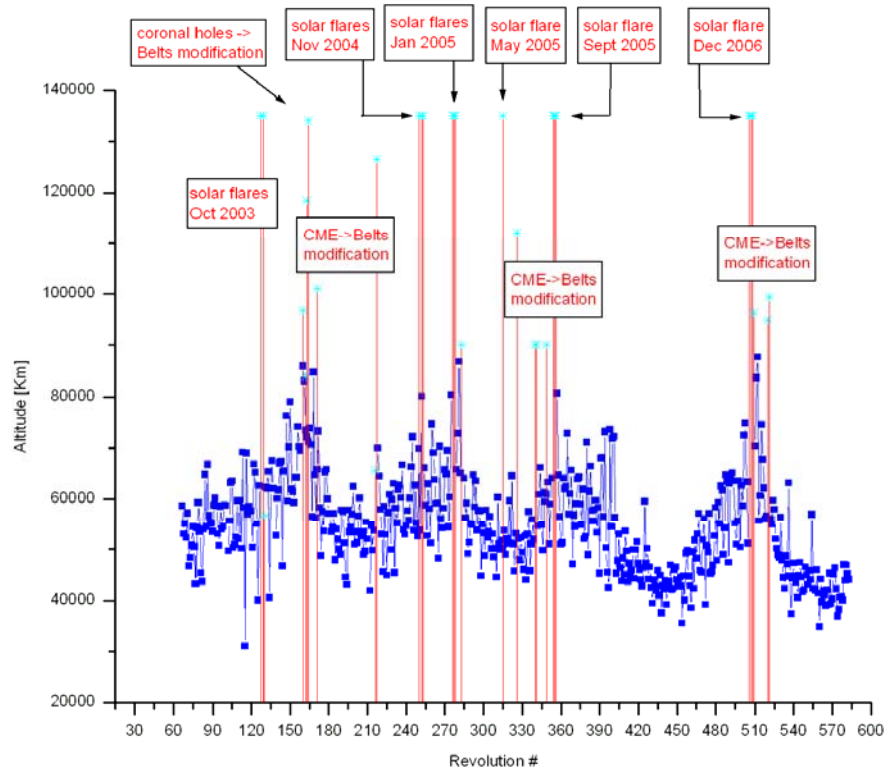
Nothing to report.

On DoY 203 at 18:33:14 and DoY 206 at 18:21:46 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

8.3.6 IREM Operations

Radiation Belts Entry

Evolution of Radiation Belt Entry 2003-2007



IREM daily report

DoY 2007.207 (26/07/2007):

At 13:32Z, a local reset of the IREM CSCI S/W (SEU #51) occurred. The status of the unit, before the local reset of the IREM CSCI S/W, 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 2007.207.13.32Z at 107068 km. 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 13:37Z using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of BCC0 HEX = 48320 DEC = 1011110011000000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation 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 16:30Z.

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. OMC was recovered at 14:05Z and IBIS at 14:42Z.

The cause of these S/W resets is apparently due to the unit's memory device that is sensitive to high energy radiation, as proved during test campaign on-ground.

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]
582	RAD_ENTR R 2007-07-22T18:33:12Z	22/07/2007 19:49:45	45219	22-Jul-2007 20:01:47	44769
583	RAD_EXIT R 2007-07-23T04:43:12Z	23/07/2007 03:18:41	41178	23-Jul-2007 03:41:47	43070
583	RAD_ENTR R 2007-07-25T18:21:43Z	25/07/2007 19:46:25	44110	25-Jul-2007 19:52:51	44492
584	RAD_EXIT R 2007-07-26T04:31:03Z	26/07/2007 03:08:33	>>29822	26-Jul-2007 03:32:51	43436

Reference

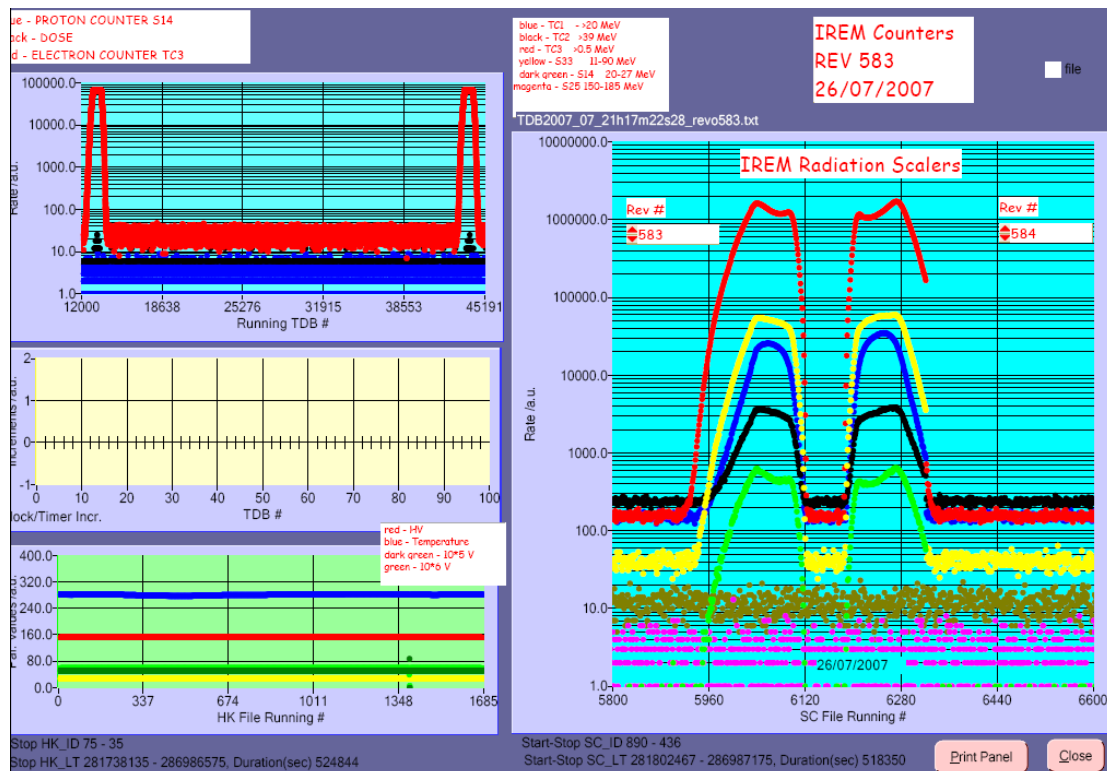
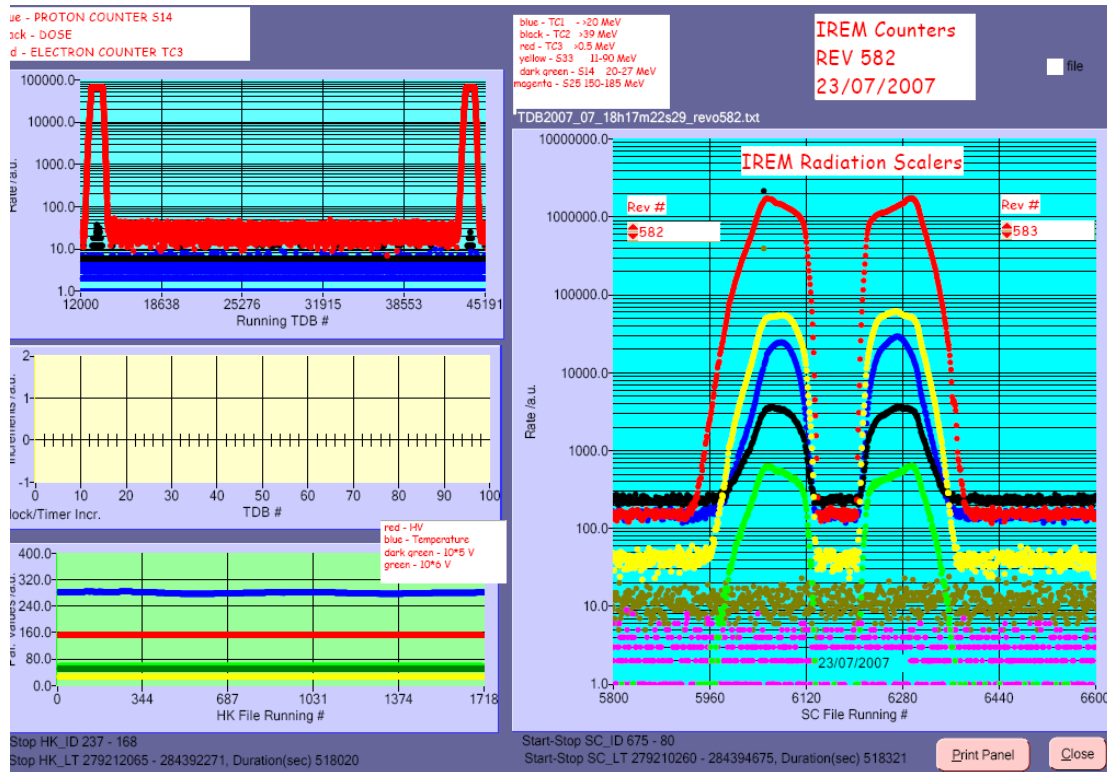
High radiation

Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

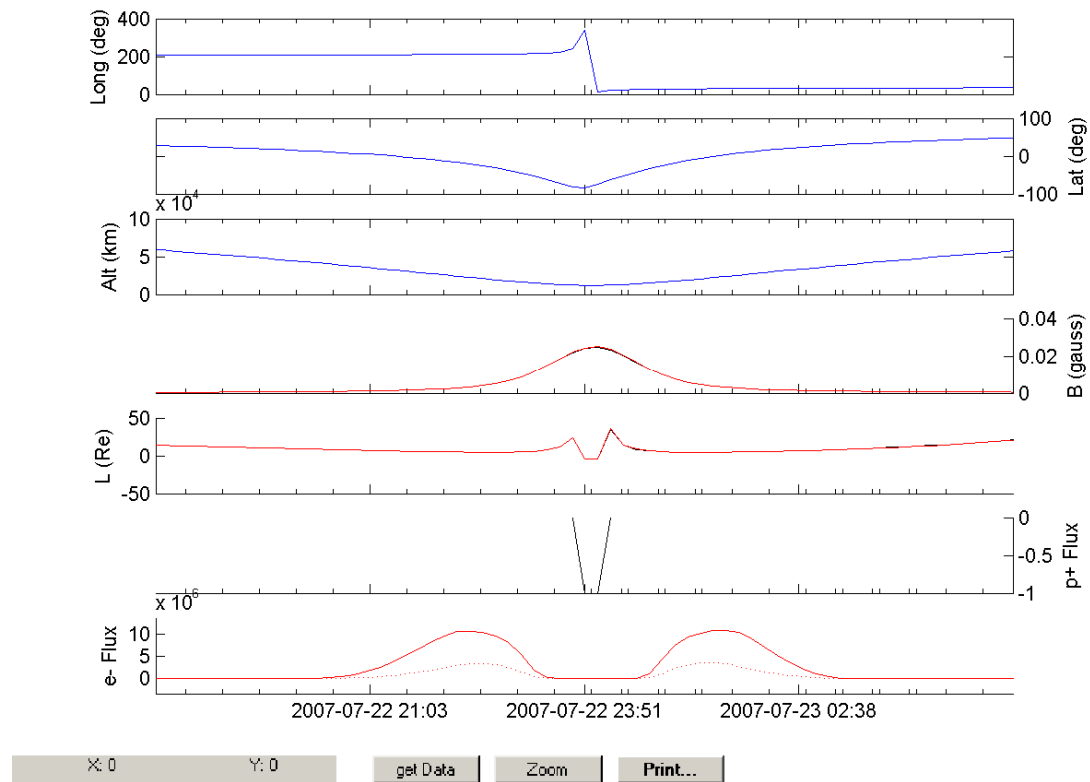
Large error vs reference (more than 30 minutes)

IREM radiation counters:

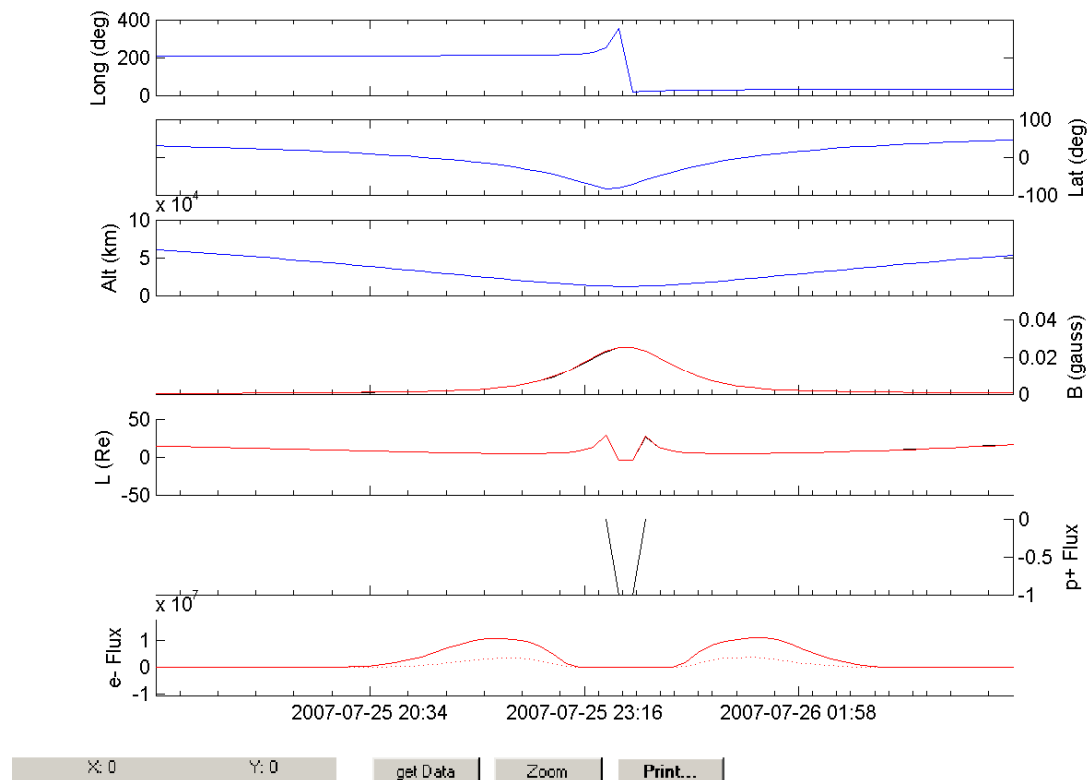


IREM Predicted Radiation Belt Passages

Rev 582



Rev 583



Doc. Title : INTEGRAL Mission Report #253
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 30/07/07

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

Due to problem with the SEIS server, no plots are available this week. However no radiation was reported.