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

INTEGRAL
Mission Report

INT-MOC-SYS-RP-1001-OPS-OF

No. 251
Week 77

16.07.07

Routine Phase

Prepared by: O. Bergogne (OPS-OAI)

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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 07.07.07 until 13.07.07 (both dates inclusive) and covers the revolutions 578 and 579.

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 of the Galactic Plane Region 2 (RA 14:08:36.11, DEC -61:30:20.6), and series of Galactic Disk Latitude Scans (RA 14:57:50.40, DEC -61:13:48.0), (RA 14:51:07.20, DEC -61:38:24.0), (RA 14:13:14.40, DEC -59:13:12.0), (RA 15:09:07.20, DEC -60:28:12.0), (RA 14:09:09.60, DEC -63:34:48.0), (RA 14:55:16.80, DEC -56:53:24.0), (RA 14:14:12.00, DEC -59:11:24.0), (RA 14:39:19.20, DEC -57:55:12.0), (RA 14:39:02.40, DEC -62:18:36.0).

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.

13 slews were missed from TL during the observation period, due to several problem on Search and Track process, bright objects in STR FOV, IMCS and FDS.

The fuel consumption over the period between 06/07/2007 and 12/07/2007 was 0.1002 Kg. The remaining propellant is in the order of 145.3770 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

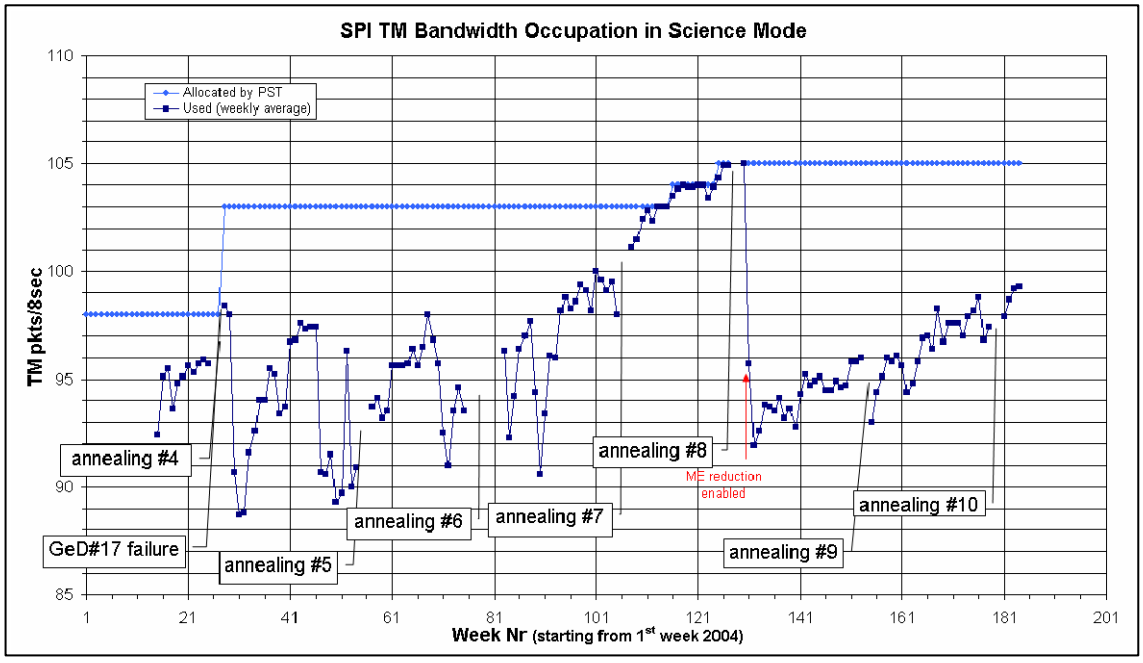
3.2.1 SPI

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 and the average telemetry occupation when the TM allocation was 105 packets/cycle was 99.3 packets/cycle.

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



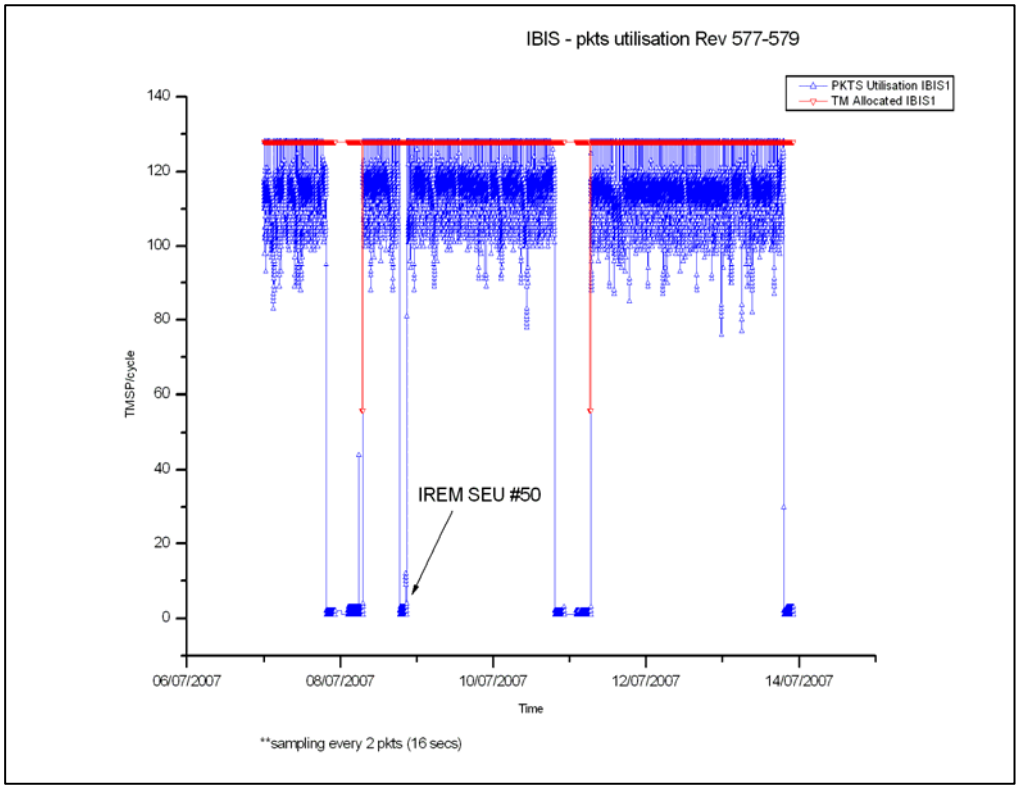
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

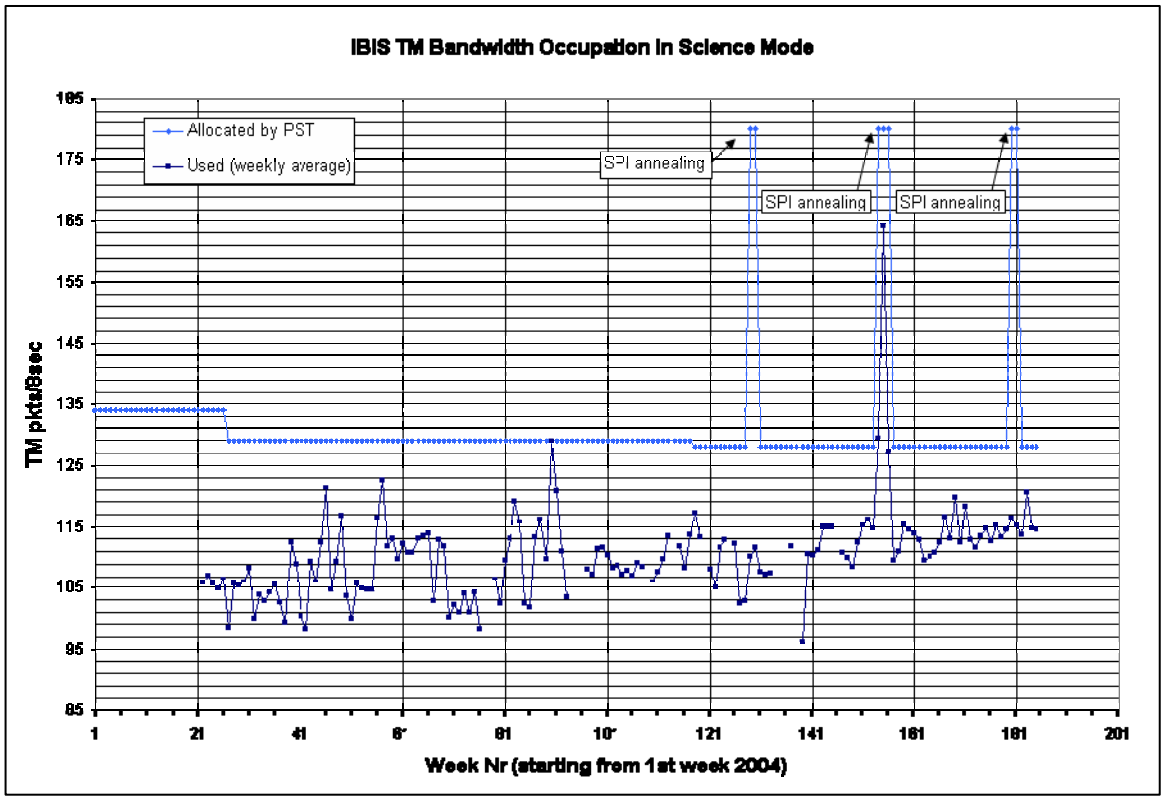
The overall status of the unit is nominal.

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 114.62 TMPS/cycle, down 0.18 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, 205 of the 218 planned science pointings for OMC were executed nominally. Five pointings (05780022 to 05780026) were lost due to an IREM SEU combined with AOCS problems; five pointings (05770079, 05770087-05770088 and 05790089-05790090) were lost due to problems in acquiring a guide star and three pointings (05780092 to 05780094) were lost due to a problem with the Flight Dynamics System.

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

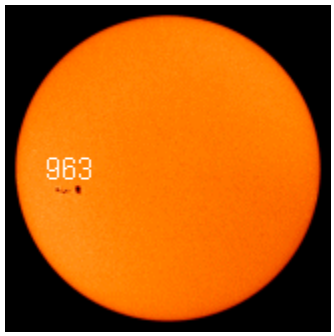
3.2.5 IREM

The overall status of the unit is nominal.

On 08/07/2007 at 18:44Z, the IREM reset #50 occurred. The unit was recovered by the operator following CRP_SYS_2570, and was back in Nominal configuration at 01:13Z.

Solar Activity
The observation period was characterised by low solar activity.

Big sunspot 963 appeared on 08/07/2007. It kept growing and posed threat of M-class solar flares on 10 and 11/07/2007 (see picture). But no solar flare was emitted and the sunspot started diminishing.



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. 3 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, this caused the loss of 3 slews. Both INCTR-A and B were upgraded this week; and the new SCOS release was installed on the B-chain. Subsequent issues with TC link caused operations to be moved to B-chain, no further impact was reported. 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 several occasions of a TM drop from Redu. 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 588. Observations were planned and approved up to 586.

A Long Term Plan for AO-5 has been set up including very time constrained observations of Her X-1 early in the AO timeline.

TSFs received up to revolution 582.

2. Observation status
ECS files have been received and processed up to revolution 571.

3. ISOC Science Data Archive
No news.

4. ISOC system
Version 15.2 will be tested early next week.

5. Problems
None.

4.3.2 ISDC

Status of ISDC observation processing on 16/07/2007:

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

- Latest products archived: observations 04200320002 (EXO 0748-676, revolution 566) and 04200770002 (NGC 4151, Revolution 561) on 30/06/2007.

- 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 2007.190 (09/07/2007) a hardware update was performed on INCTR-B which was offline during the operation. Then in order to perform similar hardware update on INCTR-A, INCTRS-B was configured as prime on the A-chain. Afterwards, from 16:00Z until Perigee passage on DoY 2007.192 (11/07/2007), INCTR-A was configured as prime on the B-chain. At beginning of revolution 579, INCTRS configuration was back to nominal (INCTR-A on primary A-chain and INCTR-B on B-chain).

- On DoY 2007.191 (10/07/2007) at 11:36Z because the FDS failed to produce the TPF update, slew #5780092 was lost. The timeline was rejoined at 12:58Z for slew #05780095, meaning that pointings #05780092 to #05780094 were lost.
- On DoY 2007.192 (11/07/2007) at 02:17Z, problems were reported with the TC link (from REDU1) on IMCS. This lead to a move of the operations to the B-chain and a complete restart of the A-chain was performed (including INCTR-A). Operations were moved back to A-chain at 03:37Z. No operational impact was reported.
- On DoY 2007.192 (11/07/2007) between 08:00Z and 14:05Z, the B-chain was down in order to install successfully the new SCOS release.

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

AR id	Date Created	Subject	Segment	Status
INT_SC-193	13/07/2007	IREM Anomaly: Reset of IREM_CSCI S/W #50, 08/07/2007	Payload	Open
INT-2936	2007-07-12	TM on Auto-Stack lost when the NCTRS configuration is changed	IMCS	Pending
INT-2937	2007-07-10	FDS: unstable TM processing	IMCS	Open

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.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 577

The observations in revolution 577 began with a series of Galactic Disk Latitude Scans (RA 14:57:50.40, DEC -61:13:48.0), for ~8.8 hours, then (RA 14:51:07.20, DEC -61:38:24.0), for ~8.8 hours, then (RA 14:13:14.40, DEC -59:13:12.0), for ~17.1 hours, then back to (RA 14:51:07.20, DEC -61:38:24.0), for a further ~8.3 hours, then back to (RA 14:57:50.40, DEC -61:13:48.0), 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 ~2.1 hours was performed, until the end of the revolution.

Revolution 578

The observations in revolution 578 began with a series of Galactic Disk Latitude Scans (RA 15:09:07.20, DEC -60:28:12.0), for ~8.8 hours, then (RA 14:09:09.60, DEC -63:34:48.0), for ~8.8 hours, then (RA 14:55:16.80, DEC -56:53:24.0), for ~17.1 hours, then back to (RA 15:09:07.20, DEC -60:28:12.0), for a further ~8.3 hours, then back to (RA 14:09:09.60, DEC -63:34:48.0), 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 ~0.7 hours was performed, until the end of the revolution.

Revolution 579

The observations in revolution 579 began with a series of Galactic Disk Latitude Scans (RA 14:14:12.00, DEC -59:11:24.0), for ~8.8 hours, then (RA 14:39:19.20, DEC -57:55:12.0), for ~8.3 hours, then (RA 14:39:02.40, DEC -62:18:36.0), for ~17.1 hours, then back to (RA 14:14:12.00, DEC -59:11:24.0), for a further ~8.3 hours, then back to (RA 14:39:19.20, DEC -57:55:12.0), for a further ~8.8 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.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

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.
2007-06-30T13:24:31.000Z	145.5236	F	Automatic TM processing.
2007-07-02T03:32:19.000Z	145.5176	F	Automatic TM processing.
2007-07-03T13:08:55.000Z	145.4912	F	Automatic TM processing.
2007-07-05T03:21:55.000Z	145.4772	F	Automatic TM processing.

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.

This report was generated Fri Jul 13 08:00:19 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, 07/07/2007 – 13/07/2007

AOCS operations were executed from the Automatic Timeline.

During this period, 77 Open Loop Slews, 158 Closed Loop Slews and 4 Momentum Biases were executed.

13 slews (10 CSL, 3 OSL) were missed from TL, during the observation period, due to problem on S/T process, bright objects causing STR 1750 fault, Command Verifier task not working on IMCS-A and FDS failing update generation.

The OTF was not reached during PID 05770082 and PID 05780022.

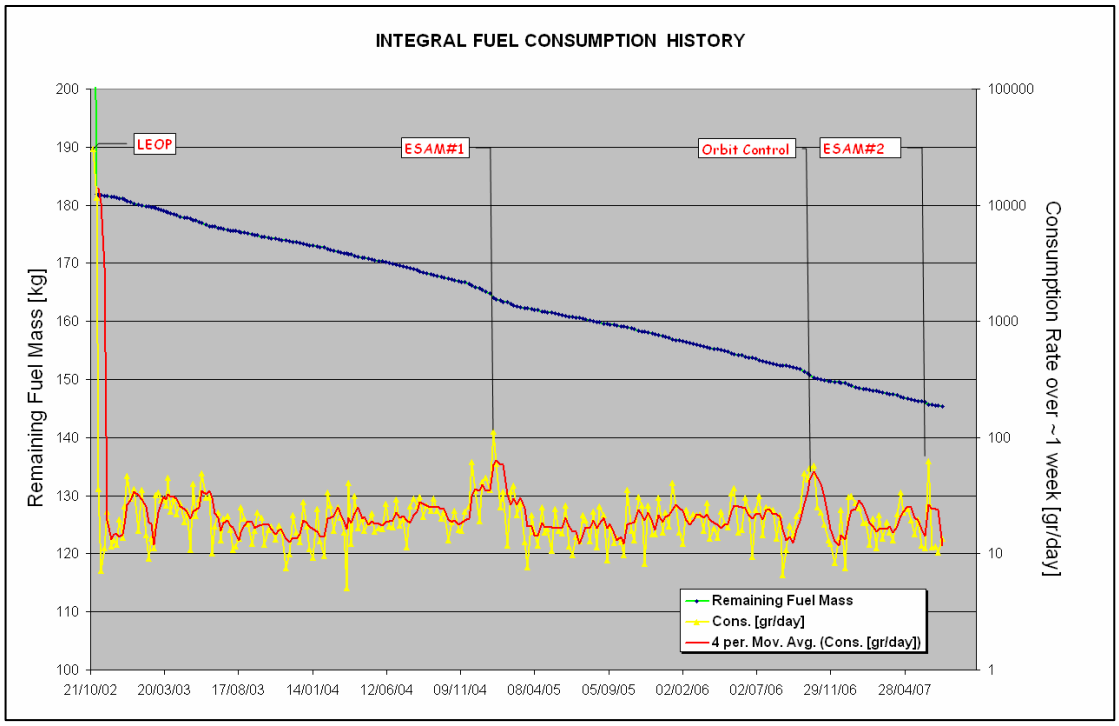
This is equivalent to ~5.3% of the total number of slews planned (243).

Orbit Control

No update.

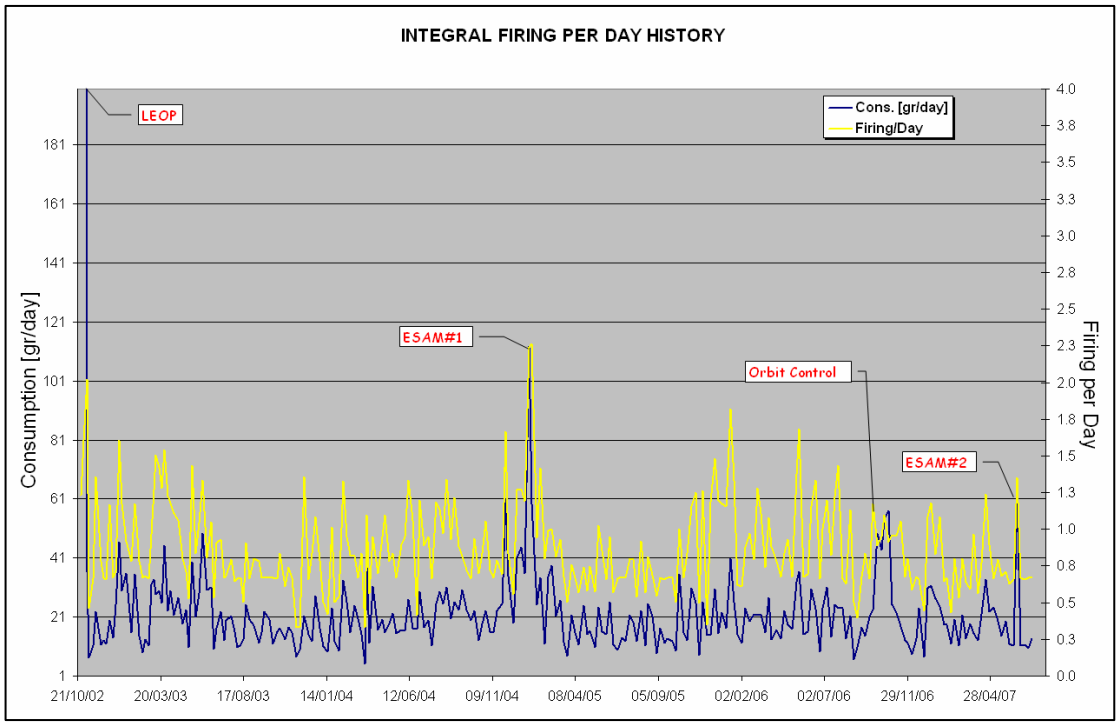
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 12/07/2007 is reported in the plot below.



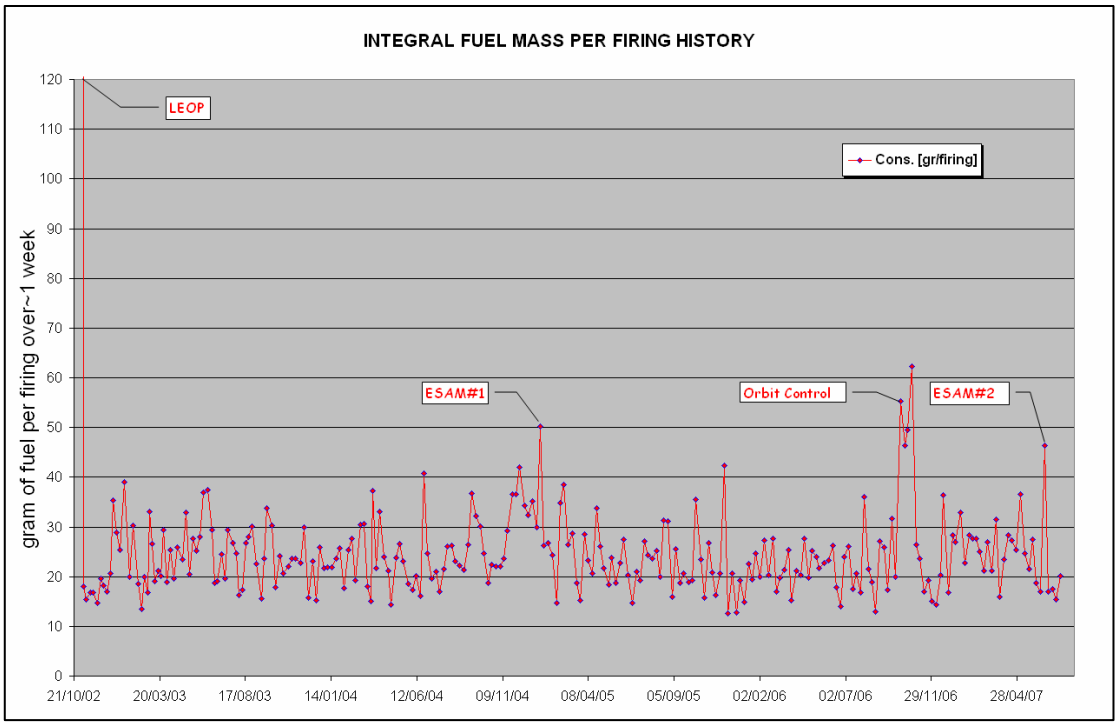
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 12/07/2007 is reported in the plot below.



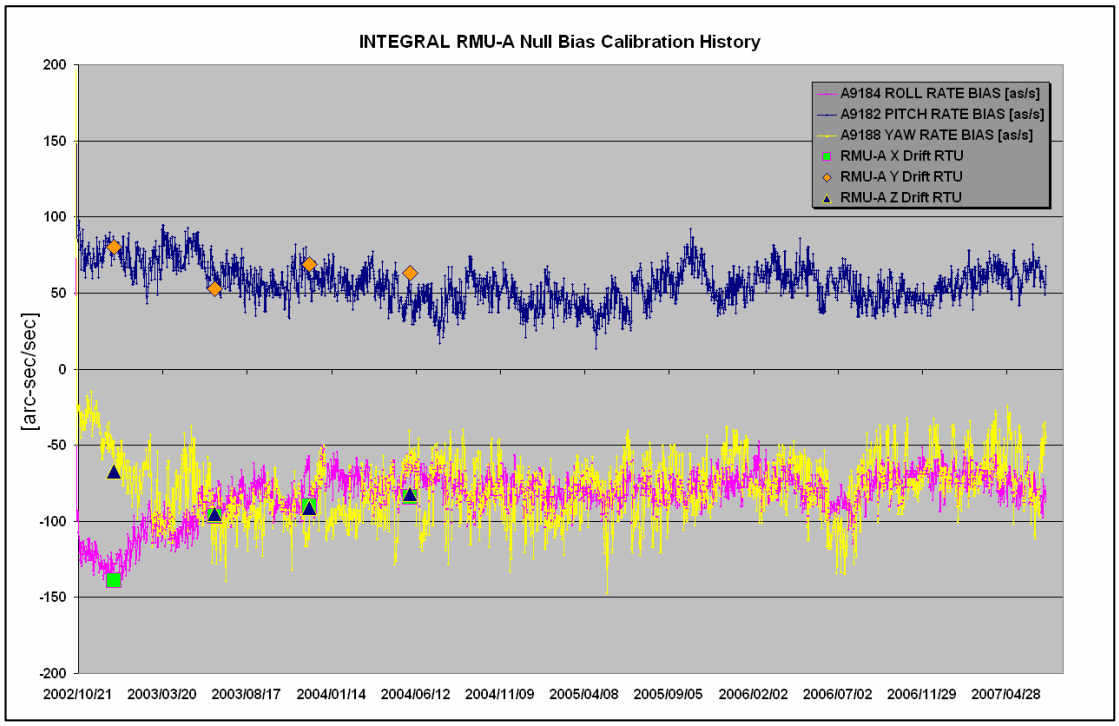
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 12/07/2007 is reported in the plot below.

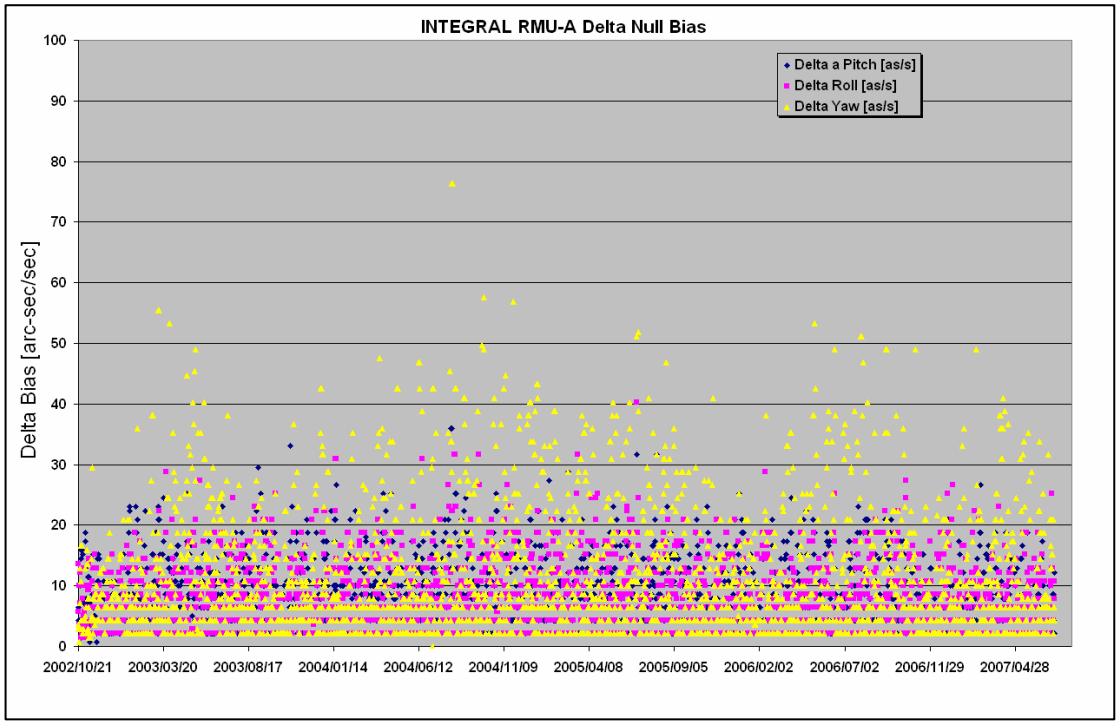


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 06/07/2007 is reported in the plot below (not updated).



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 06/07/2007 is reported in the plot below (not updated).



07/07/2007 (Day of Year 188, Revolution 577)

Search/Track process failed, start guide star failed PTV: at 04:53z, the sequence for slew ID 05770079 failed release due to static PTV. The expected slew star was not found in slot #2, during the S/T process, and the static PTV blocked the sequence execution.

The guide star selected for the S/T was ID 9034-2416 with Mi 7.8. This star was reported in the mission catalogue but not found in TM by mapping the STR FOV.

An investigation on the Hipparcos star catalogue resulted in a multiple system (ID 9034-2866, -928, -2672, -2982 with Mi >13) at min distance ~30 arcsec from the slew star. The slew star ID 9034-2416 is classified and monitored to verify its validity in the future observations.

A new mapping was manually commanded and a manual recovery performed from the attitude of PID 05770078 to the attitude of PID 05770080 by OSL.

The next slew ID 05770081 was manually updated at 05:31Z.

The following slew was missed in TL: 05770079 (CSL) -80 (OSL)

STR 1750 processor fault: at 06:48:32z a STR 1750 processor faults occurred after the execution of slew ID 05770082. The sequence of the events was:

06:46:45z Close Loop Slew End for PID 05770082
06:47:47z Mapping start
06:48:32z Mapping End prematurely (aborted) and IMU1 ON
06:48:32z New automatic mapping commanded by the ACC and new guide star acquired by the STR.

Due to the abortion of the first mapping after the CSL, the attitude reconstruction process performed by FDS failed, and the TPF update for slew ID 05770083 was not generated.

The fault, which occurred after the end of the close loop slew, resulted in the abortion of the on-going mappings (duration shortened) and start of new mapping.

The IMU was switched ON/OFF, being the problem occurred during the execution of a pointing. According to the Star Catalogue, one Bright Objects, the Alpha CENTAURUS star (ID 9007-5849, Mi 0.01) was in the STR FoV, located at ~ the same CCD detectors column of the used guide star: this caused the faults (STR 1750 fault) and the abortion of the mappings.

A new mapping was manually commanded and the next slew ID 05770083 was updated at 07:07Z.

The OTF was not reached during PID 05770082.

Search/Track process failed, start guide star failed PTV: at 09:39z, the sequence for slew ID 05770087 failed release due to static PTV. The expected slew star was not found in slot #2, during the S/T process, and the static PTV blocked the sequence execution.

The guide star selected for the S/T was the same as before, ID 9034-2416 with Mi 7.8. This star was reported in the mission catalogue and not found in the mapping of the STR FOV.

An investigation on the Hipparcos star catalogue resulted in a multiple system (ID 9034-2866, -928, -2672, -2982 with Mi >13) at min distance ~30 arcsec from the slew star. The slew star ID 9034-2416 is classified and monitored to verify its validity in the future observations.

A new mapping was manually commanded and a manual recovery performed from the attitude of PID 05770086 to the attitude of PID 05770088 by OSL.

The next slew ID 05770089 was manually updated at 10:42Z.

The following slews were missed in TL: 05770087 (CSL) -88 (OSL)

08/07/2007 (Day of Year 189, Revolution 577-578)

STR 1750 processor fault: at 18:22:46z a STR 1750 processor faults occurred after the execution of slew ID 05780022. The sequence of the events was:

18:17:55z	Open Loop Slew End for PID 05780022
18:17:55z	automatic Mapping start
18:17:58z	automatic Mapping End prematurely (aborted, STR 1750 fault) but NO IMU1 ON because event occurred < 1 min after slew end
18:17:58z	automatic Mapping start
18:18:56z	automatic Mapping end nominally and guide star acquired
18:22:43z	commanded (TL) Mapping start
18:22:46z	commanded (TL) Mapping End prematurely (aborted) and IMU1 ON
18:22:46	New automatic mapping commanded by the ACC and new guide star acquired by the STR.
18:22 – 19:17	attempted several mappings with no success, forcing the IMU1 ON\OFF each time guide star lost, due to the presence of a bright object. The reason of the mapping abortion was a bright object, located around the same CCD column of the current guide star.
19:17:21z	IMU1 OFF

Due to the abortion of the first mapping after the OSL, the attitude reconstruction process failed, and the TPF update for the next slews could not be generated.

According to the Star Catalogue, one Bright Objects, the Beta CENTAURUS star (ID 9005 – 3919, Mi 0.64) was in the STR FoV, located at ~ the same CCD detectors column of the used guide star: this likely caused the faults (STR 1750 fault) and the abortion of the mappings.

A new mapping was manually commanded and a manual recovery performed from the attitude of PID 05780022 to the attitude of PID 05780026 by OSL.

The next slew ID 05780026 was manually updated at 20:40Z.

The following slew was missed in TL: 05780023-24-25-26 (CSL).

The OTF was not reached during PID 05780022.

09/07/2007 (Day of Year 190, Revolution 578)

Nothing to report.

10/07/2007 (Day of Year 191, Revolution 578)

FDS failed slew update: at 11:36z the FDS failed the update of slew ID 05780092. FDS reported an error during the update process: received unstable TM stream from IMCS-FDS I/F. The GTPs processors were stopped and started again to cure the problem.

A manual recovery was performed at 12:58z from the attitude of PID 05780091 to the attitude of PID 05780094 and the next slew (05780095) manually updated in TL.

The following slews were missed in TL: 05780092-93-94 (CSL).

The same problem re-occurred at 15:00Z. FD suggested, in this case, to run the slew ID 05780097 without update and no impact reported. GTPs were stopped and started again.

11/07/2007 (Day of Year 192, Revolution 578-579)

FDS failed slew update: at 02:53z the FDS failed the update of slew ID 05790001. FDS reported the same error during the update process, as for DoY 191: received unstable TM stream from IMCS I/F. The GTPs processors were stopped and started again.

A manual recovery was then performed at 05:41z and the first slew of the rev (05790001) manually updated in TL.

No impact in TL.

12/07/2007 (Day of Year 193, Revolution 579)

FDS failed slew update: at 03:17z the FDS failed the update of slew ID 05790038. FDS reported an error during the update process, similar to the one raised on DoY 184: the duration of the slew was exceeding the nominal expected CSL duration.. It happened that the previous CSL took longer than 3 minutes which caused the TPF update software to read RWs speeds TM during the slew. These wheel speeds, however, were not suitable to perform the slew update and the TPF generation was aborted.

A manual recovery was performed at 03:18z and the slew 05790038 manually updated in TL.

No impact on TL.

13/07/2007 (Day of Year 194, Revolution 579)

IMCS command verifier task problem: at 06:47z the Command Verifier Task on IMCS-A crashed (lost connection from the real time TM cache), causing the last two commands for the mapping sequence , after slew ID 05790084, to fail release.

A mapping was then manually executed and the recovery of slew 05790085 started (follows next anomaly description).

FDS failed slew update: at 07:22z the FDS failed the manual update of slew ID 05790085 due to the previous problem with command verifier.

FDS reported an error during the update process: the ORATOS job scheduler failed because no mapping found, likely a clash between the automatic job and the manual recovery.

A manual recovery was performed, a second time, and the next slew (05790085) manually updated in TL.

No impact on TL.

Search/Track process failed, start guide star failed PTV: at 10:10z, the sequence for slew ID 05790089 failed release due to static PTV. The expected slew star was not found in slot #2, during the S/T process, and the static PTV blocked the sequence execution.

The guide star selected for the S/T was ID 9034-2416, same as before. This star was reported in the mission catalogue and not found in the mapping of the STR FOV. Problems to the STR caused by this star were already reported on DoY 188, in this report.

An investigation on the Hipparcos star catalogue resulted in a multiple system (ID 9034-2866, -928, -2672, -2982 with Mi >13) at min distance ~30 arcsec from the slew star. The slew star ID 9034-2416 is classified and monitored to verify its validity in the future observations, but it is likely to be removed from the catalogue of the guide star for the future observations.

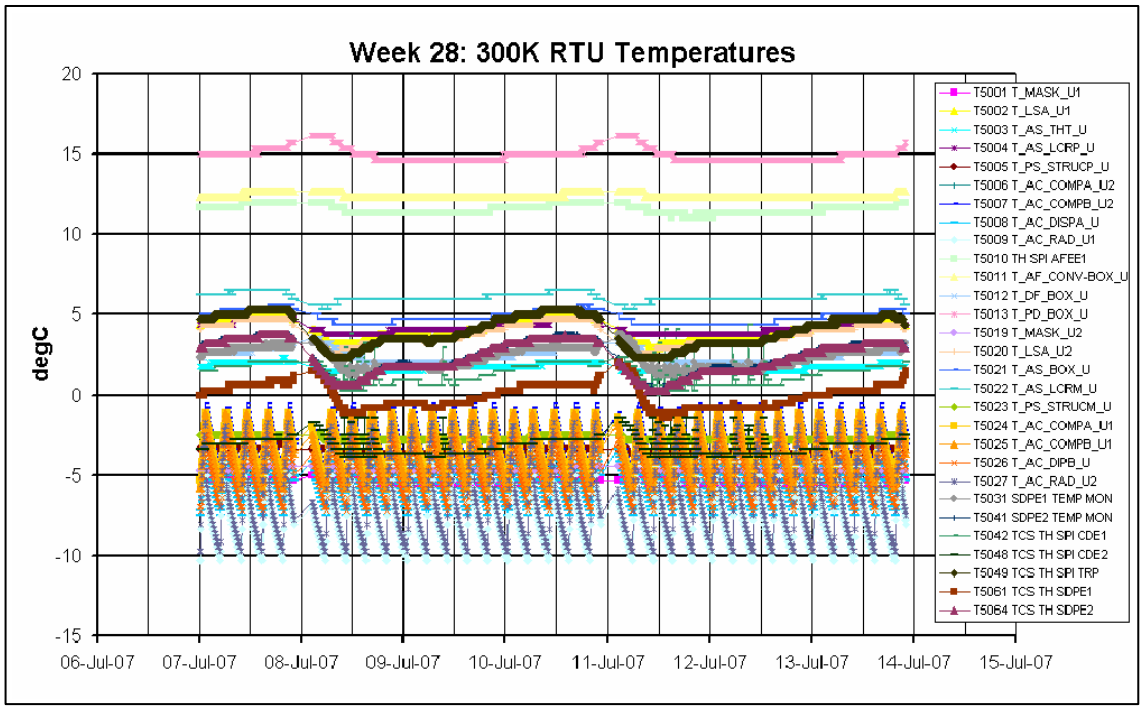
A new mapping was manually commanded and a manual recovery performed from the attitude of PID 05790088 to the attitude of PID 05790090 by OSL.

The next slew ID 05790091 was manually updated at 11:08Z.

The following slew was missed in TL: 05790089 (CSL) -90 (OSL)

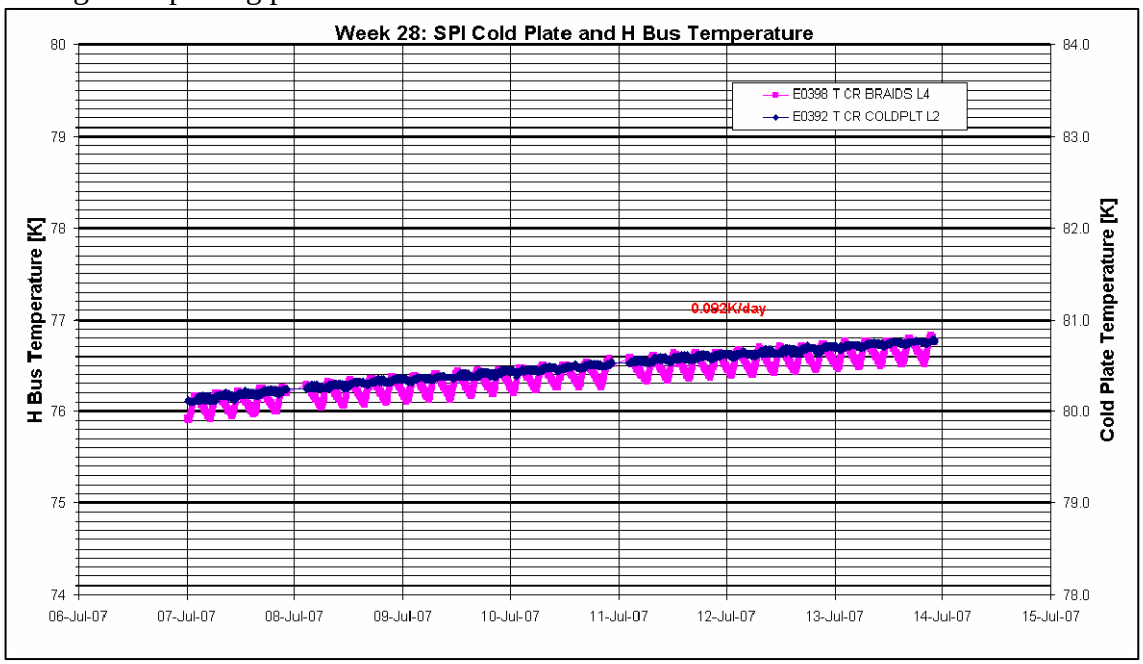
8.3.2 SPI Operations

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 0.092K/day.

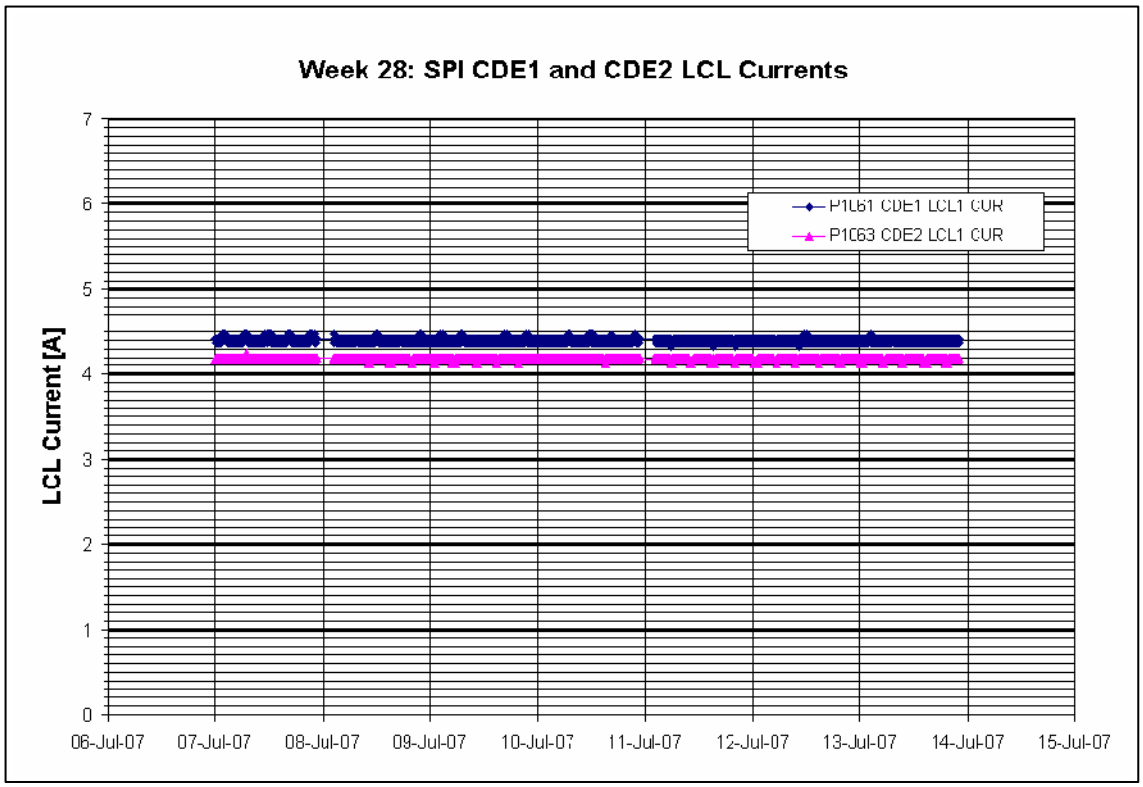
The following plot shows the evolution of the cold plate and H bus temperatures during the reporting period.



The stroke of all four compressors was set to 38 throughout the reporting period and the average CDE LCL currents were:

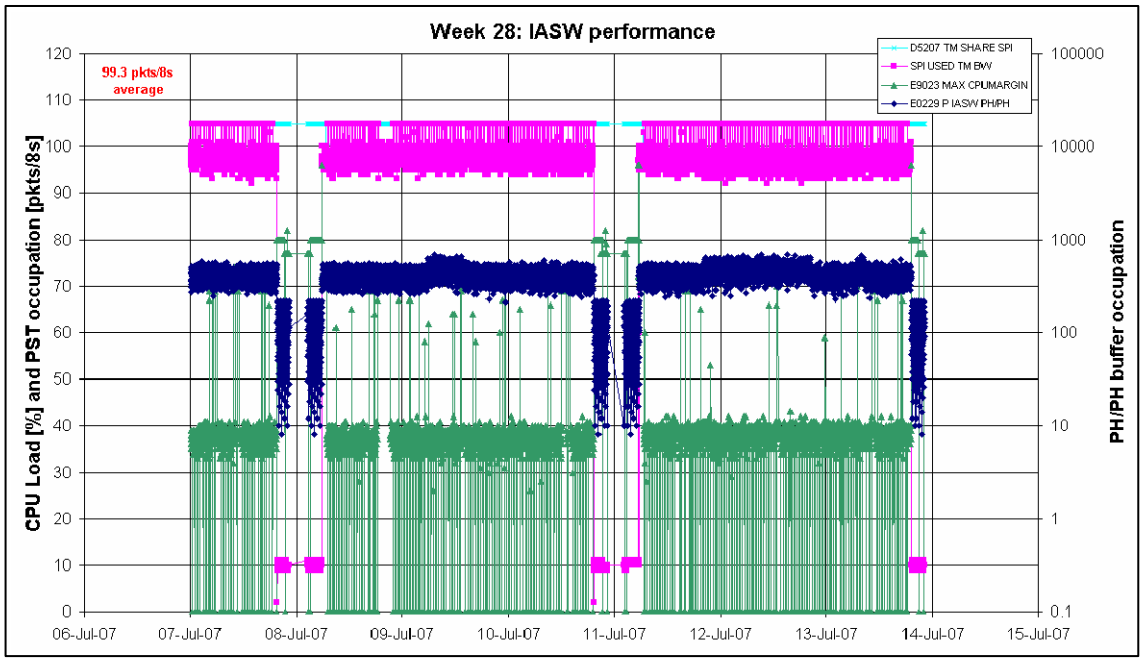
- CDE1 LCL current = 4.40A
- CDE2 LCL current = 4.18A

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



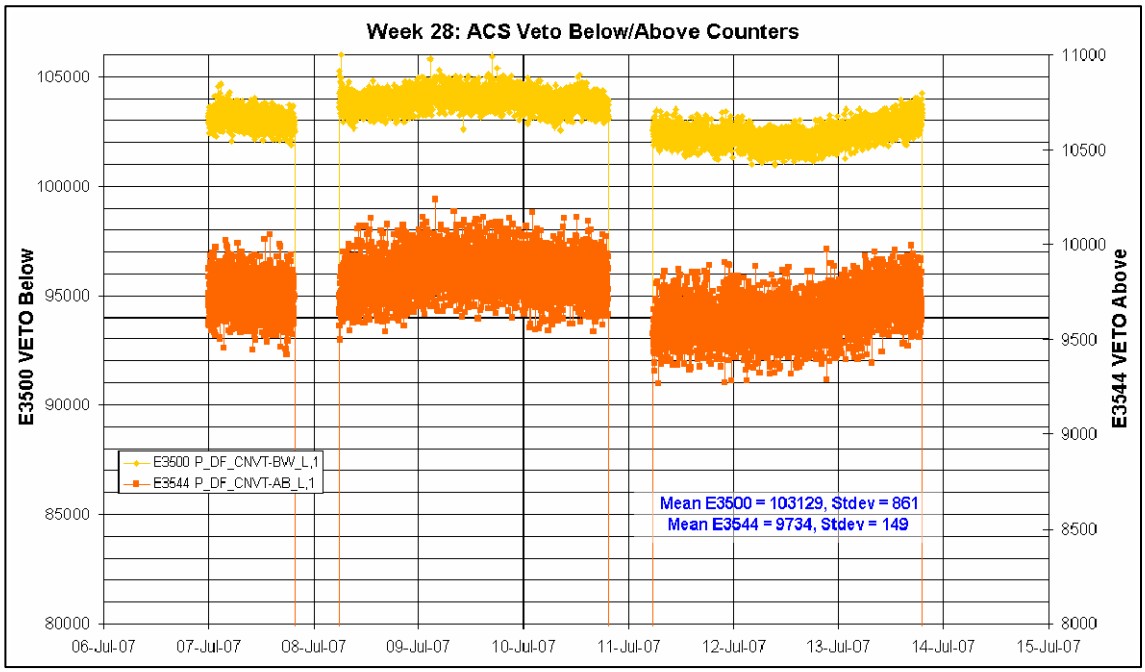
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is v433 patch #1 with the spectra scaling factor set to 9/19 SE. The average TM bandwidth occupation of SPI was 99.3 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

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



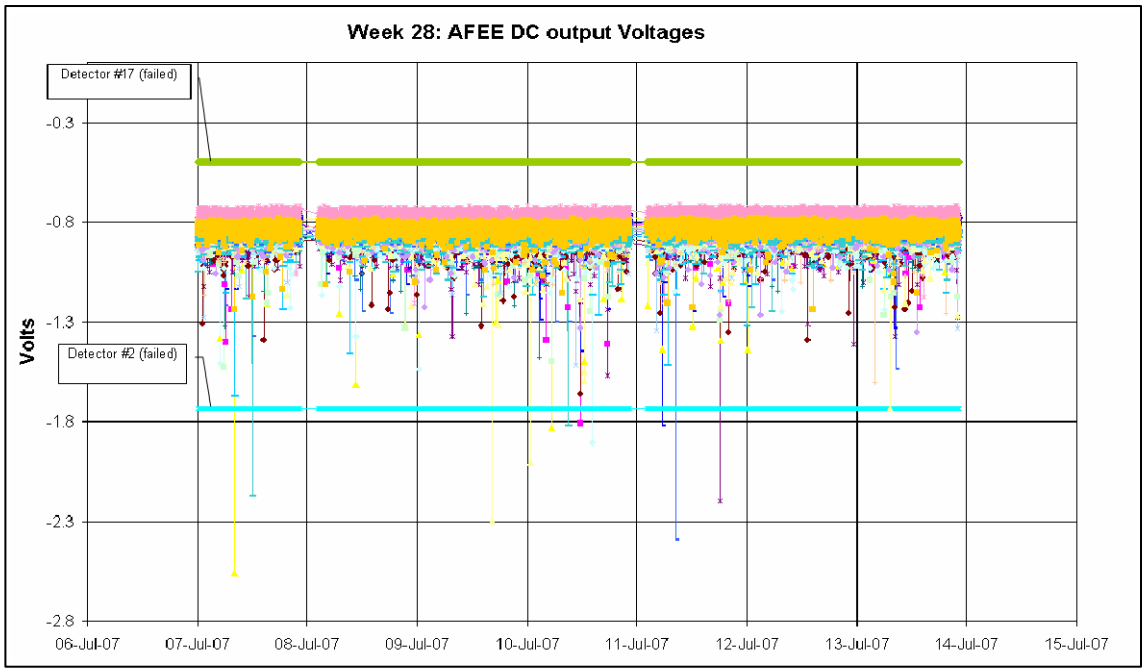
ACS: The performance of the ACS is nominal, except for FEE 81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

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

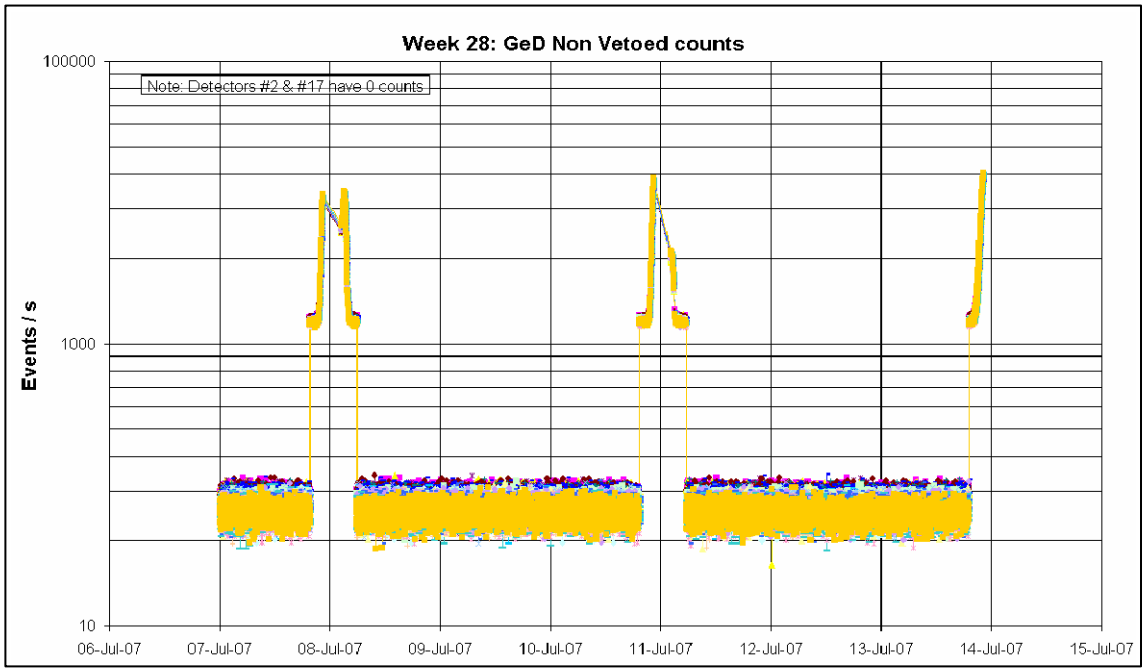


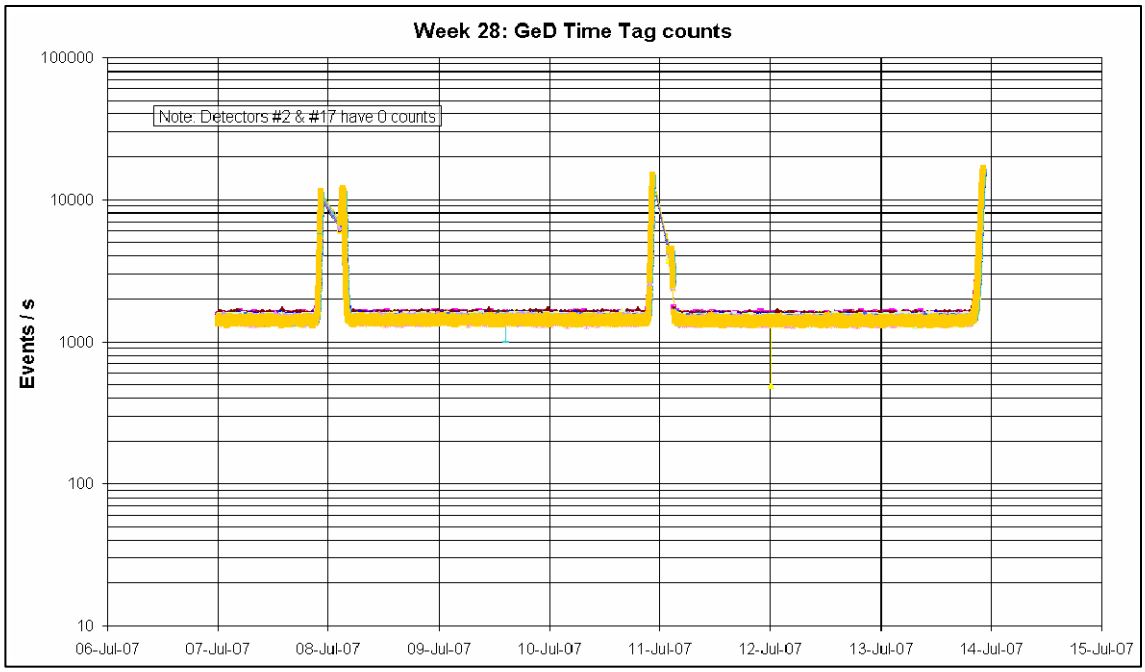
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

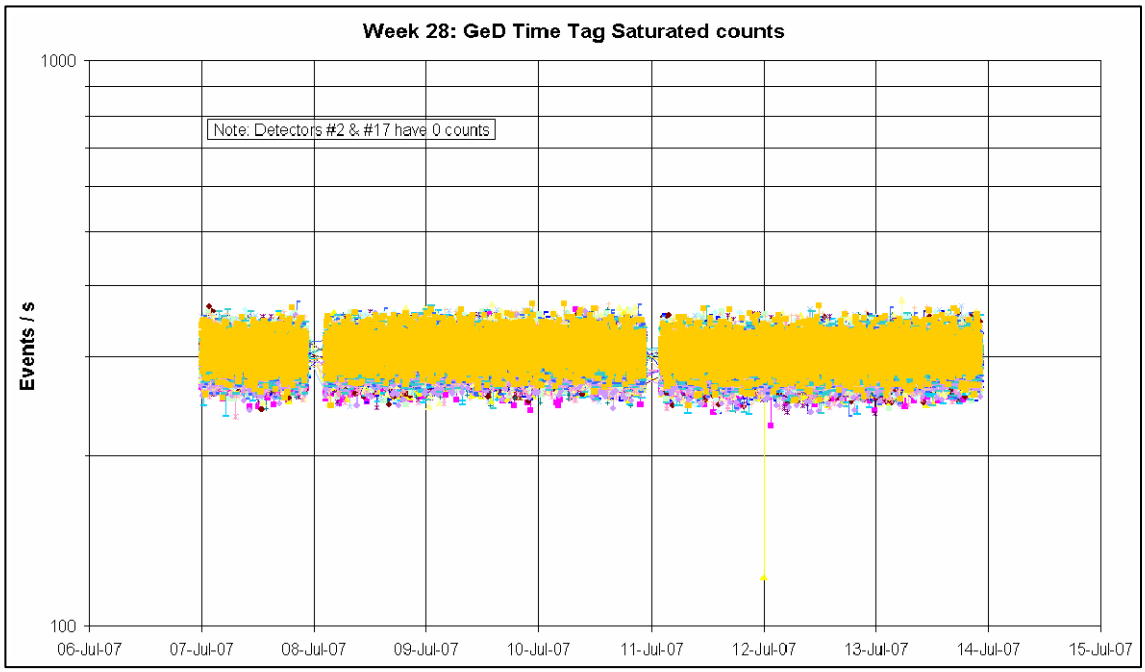
The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.



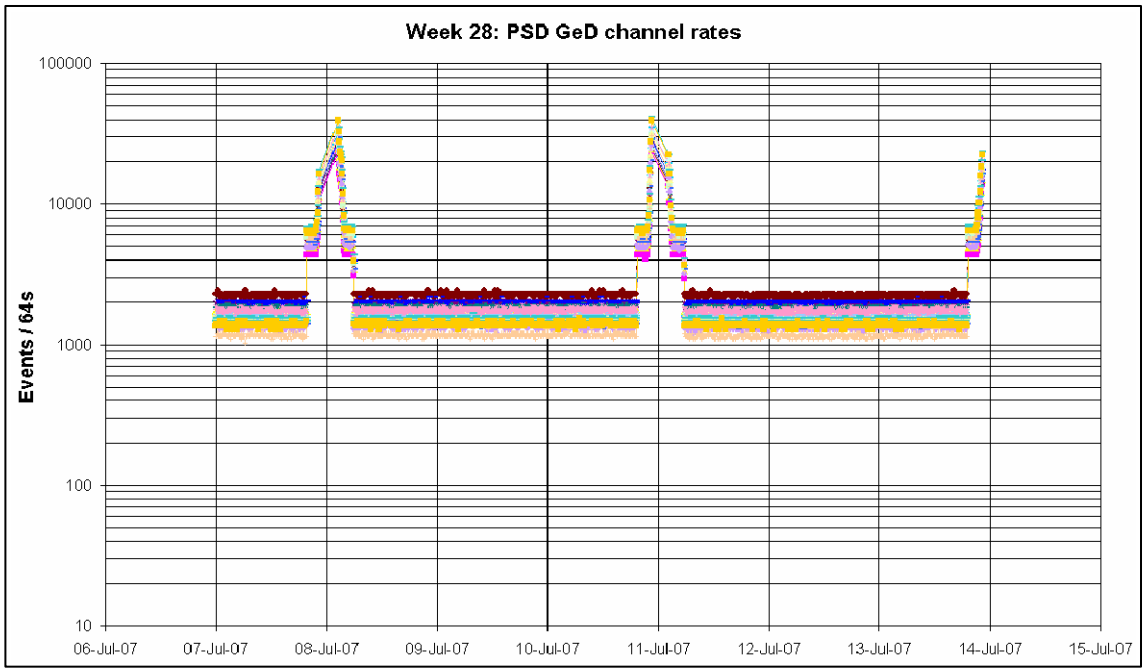
DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.







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



Event Log:

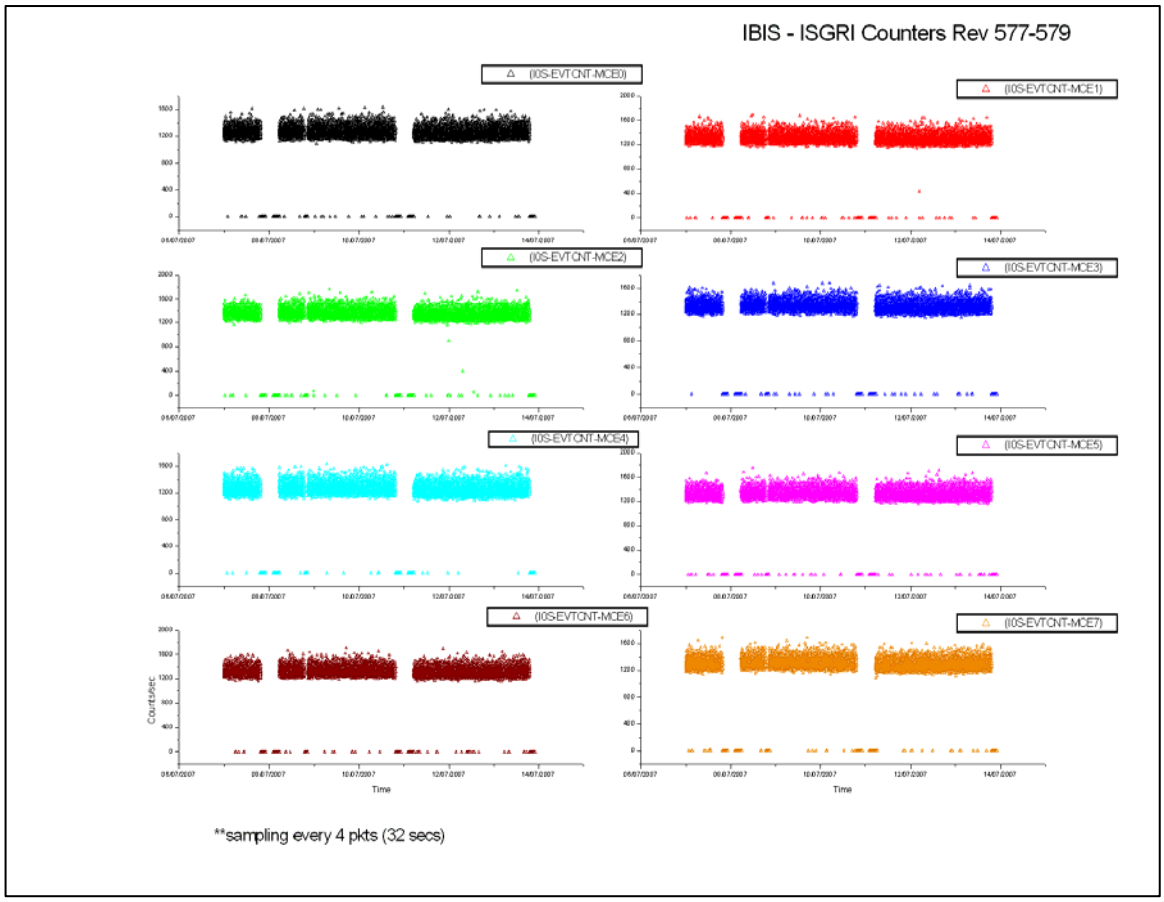
The following non-nominal events occurred on SPI during the reporting period:

- On 2007-07-07 at 19:38:02Z, just before radiation belt entry of revolution 577, 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. They returned within limits (value = OFF) when the next packet was received at 19:40:50Z, after radiation belt entry.
- On 2007-07-11 at 05:35:25Z (packet time) the ACS parameters E2101-E2116; E2150-E2179; E2250-E2279; E2350-E2379 and E3164-E3193 all went OOL value 0 raw. They are all in the periodic housekeeping packet SPID 60601.The building of this packet started 53secs before the reconfiguration of the ACS at belt exit (at 05:36:18Z) and so the ACS parameters being zero was likely due to the acquisition of these blocks being exactly at the time the ACS switch-on was occurring. They returned within limits when the next packet was received at 05:38:05Z.
- On 2007-07-13 at 05:18:43Z and again at 08:22:26Z OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED was received. This was during Pointing IDs 05790080 and 05790086. As they were single occurrences, no action was taken.

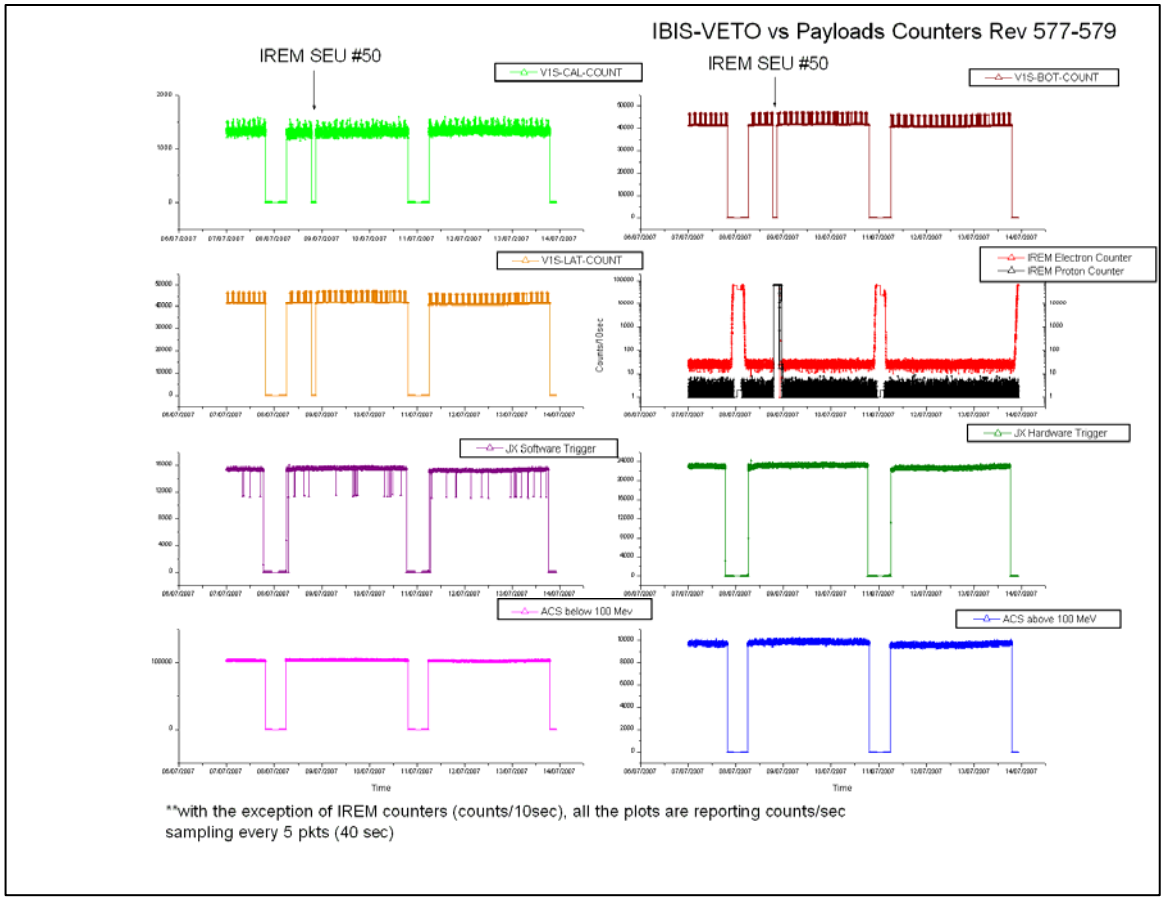
8.3.3 IBIS Operations

IBIS Event Counters Plots:

ISGRI Counters:

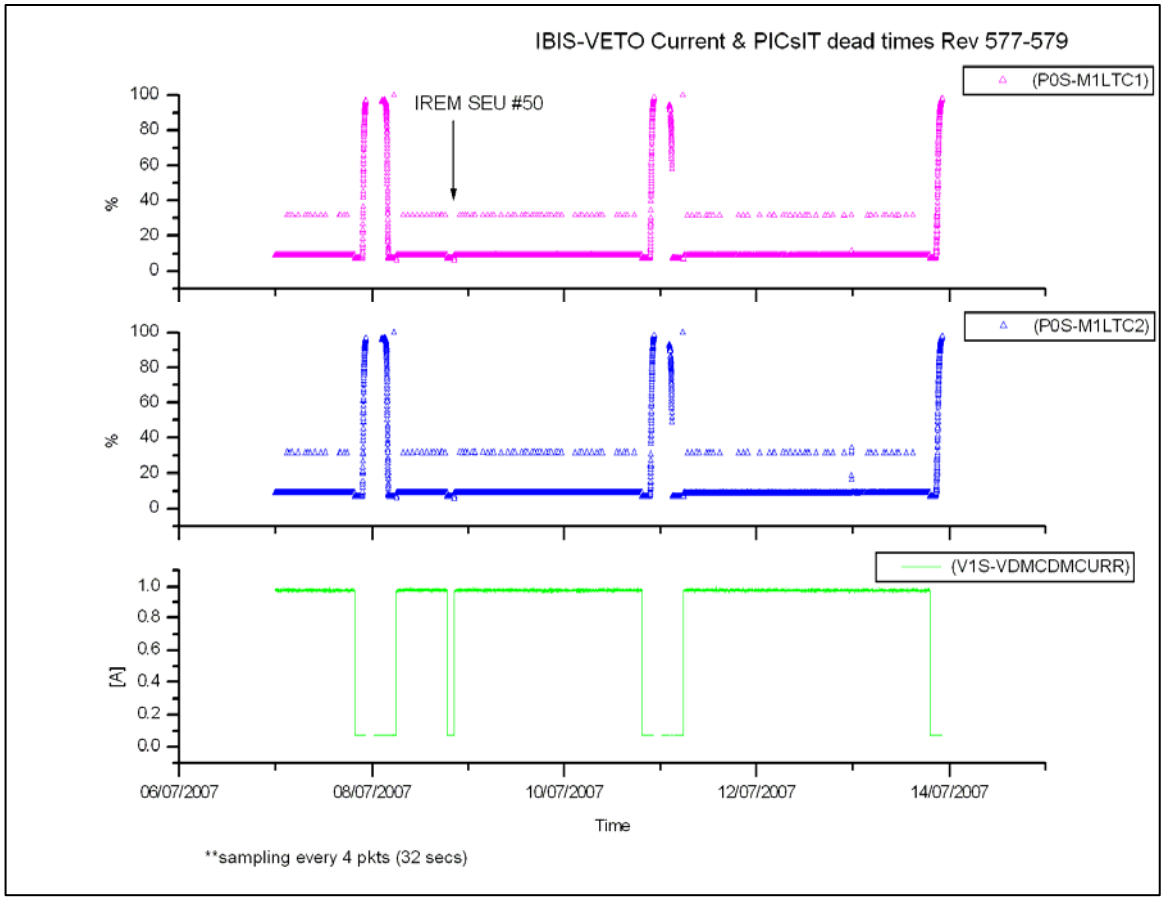


VETO vs Payloads Counters:

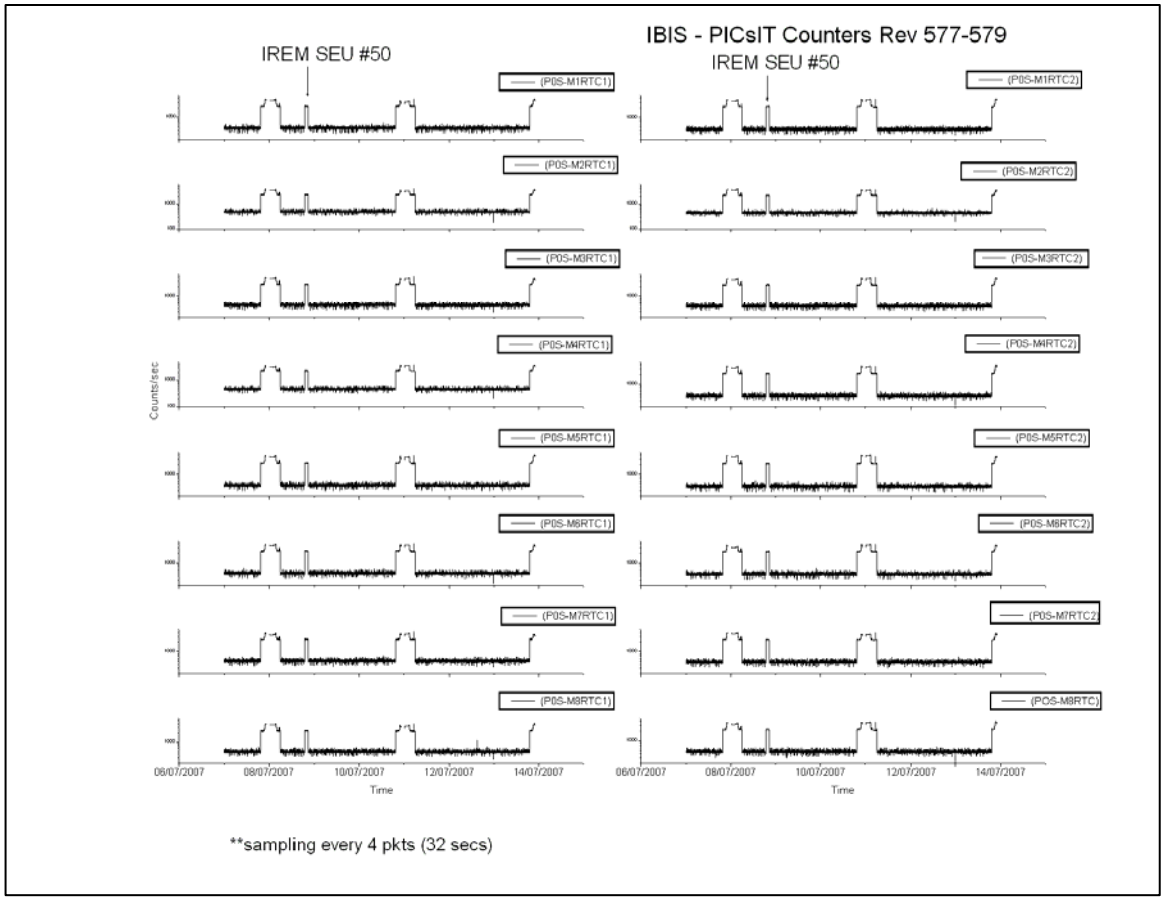


The week was characterised by low radiation as reported by the payload.

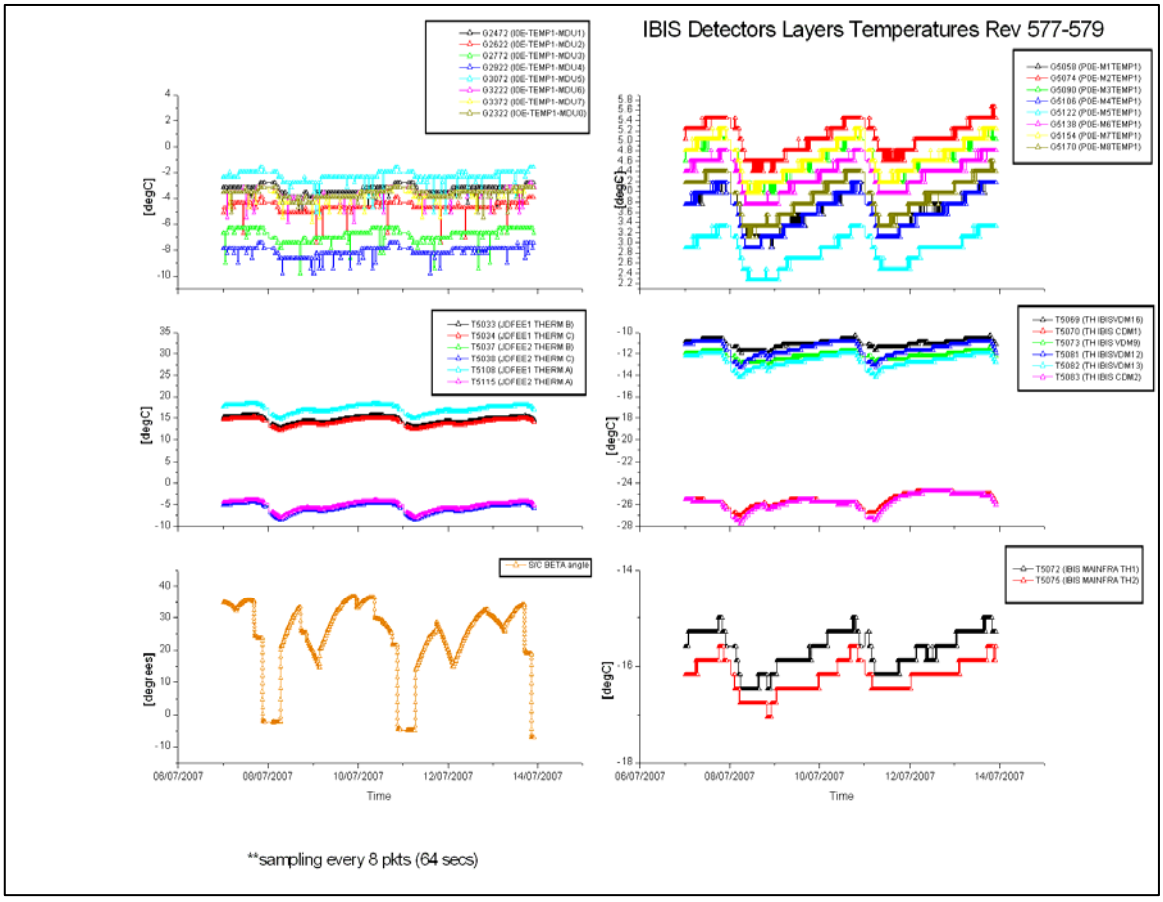
VETO Current:



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 (I0E-OVFWPXADD-Mi) were reported at Radiation Belts passage.

2007-07-07 (DOY 188, Rev 577)

IBIS operations executed nominally.

2007-07-08 (DOY 189, Rev 577-578)

Due to an IREM SEU (see anomaly report INT_SC-193), IBIS transitioned autonomously to Safe configuration at 18:44:18Z. It was recovered as follows:

- 20:26:16Z FCP_IBIS1_0803 IBIS EXIT FROM SAFE MODE
- 20:55:56Z ED GESTAN02 uplinked with the planned observation parameters and commanding to IBIS from the Timeline re-enabled.

At 20:32:07Z the TM parameter G2041 I0S-EVTCNT-MCE2 went OOL Low (value = 0). This is the number of events triggering the MCE2 per second. It returned within limits of its own accord at 20:33:59Z and no action was taken.

2007-07-09 (DOY 190, Rev 578) to 2007-07-11 (DOY 192, Rev 578-579)

IBIS operations executed nominally.

2007-07-12 (DOY 193, Rev 579)

At 23:45:40Z several parameters from the G5068 and G5072 families failed Status Consistency Check (value = TRUE). These are the PICsIT PDM Semimodule FIFO Error Flags. This occurred at the start of slew ID 05790071 and was probably caused due a large number of events following the transition of PICsIT to PPM at the start of the slew. They returned within limits of their own accord at 23:47:16Z, after the end of the slew, and therefore no action was taken.

2007-07-13 (DOY 194, Rev 579)

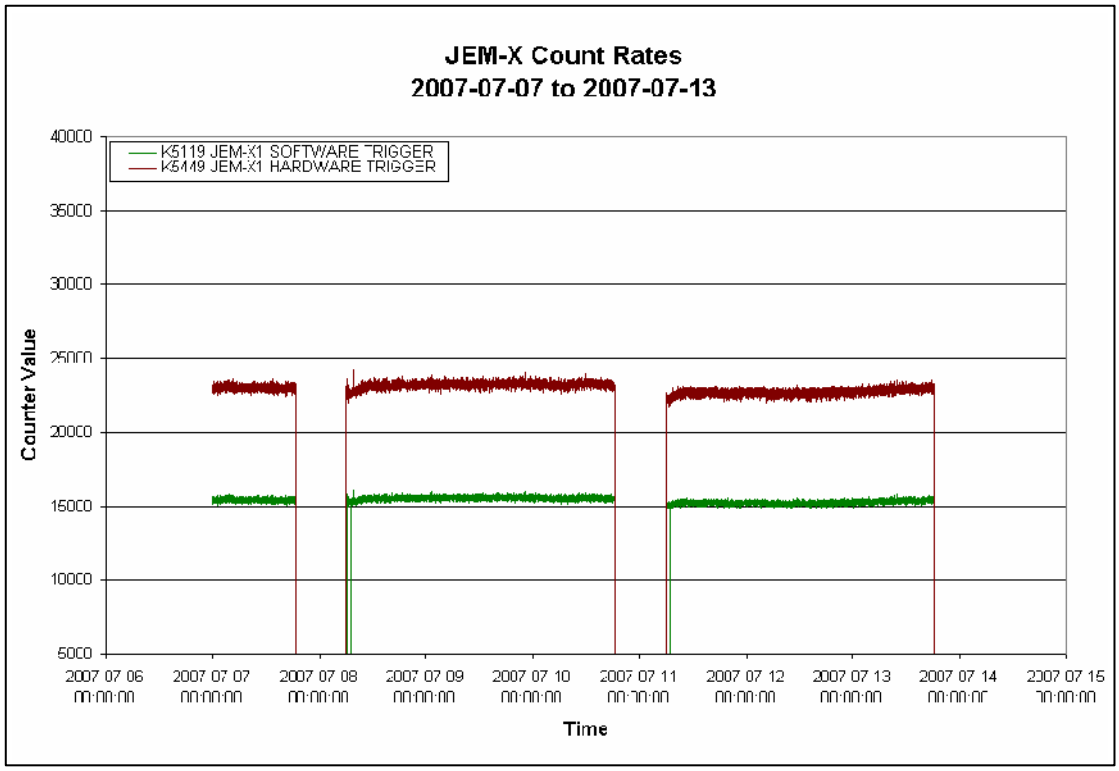
IBIS operations executed nominally.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

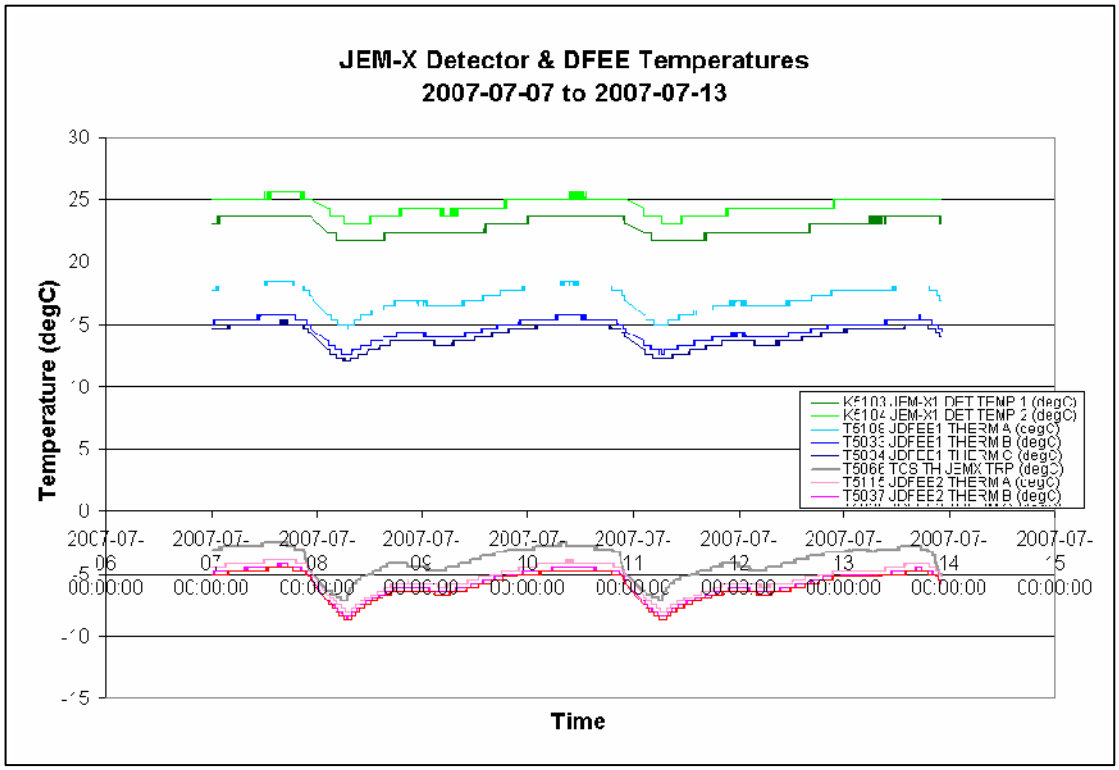
JEM-X count rates over the reporting period are displayed in the following graph[1].

[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 graph[2].



[2] Data sampled (1 frame in 8)

8.3.4.3 JEM-X Daily Report

2007-07-07 (DOY 188, Rev 577)

JEM-X1 operations executed nominally.

2007-07-08 (DOY 189, Rev 577-578)

At 18:44:15Z an IREM SW reset (see INT_SC-193) 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.

2007-07-09 (DOY 190, Rev 578) to 2007-07-13 (DOY 194, Rev 579)

JEM-X1 operations executed nominally.

8.3.5 OMC Operations

2007-07-07 (DOY 188, Rev 577)

Due to a problem acquiring the guide star for slew ID 05770079, this slew failed from the Timeline and the commands of the OMC ED MEIM-A01 scheduled at 04:56:49Z failed acceptance with OEM 131 REJECTED TC1 as OMC was still in Normal mode. The remaining OMC EDs for this pointing failed release. A manual slew from the attitude of PID 05770078 to the attitude of PID 05770080 was uplinked at 05:13Z, slightly earlier than planned in the Timeline, and the OMC Imaging EDs for this pointing were uplinked nominally from the Timeline, returning OMC to Science mode as planned for PID 05770080 at 05:32:51Z.

Another problem in acquiring the guide star occurred for PID 05770087, causing this slew to fail from the Timeline. Commanding to both AOCS and OMC from the Timeline was disabled at 09:39Z and therefore the OMC imaging EDs for this pointing were not released. Once a manual slew was performed from the attitude of PID 05770086 to the attitude of PID 05770088 and the Timeline updated for PID 05770089, AOCS and OMC commanding were re-enabled at 10:44Z. This was after the Imaging EDs scheduled for PID 05770088, at 10:31:39Z and therefore PID 05770088 was also lost for OMC.

OMC operations continued nominally from PID 05770089 onwards.

2007-07-08 (DOY 189, Rev 577-578)

Due to the inability to acquire a guide star after the Star Tracker mapping following slew ID 05780022, the OTF was not reached after this slew and OMC remained in Standby mode at the start of this pointing (scheduled at 18:17:54Z). Following this an IREM SEU occurred (see anomaly report INT_SC-193) sending OMC to Safe mode at 18:44:18Z. Commanding to OMC was disabled from the Timeline at this stage. OMC was recovered out of Safe mode by FCP_OMC_0041 at 20:08:55Z. Following the recovery of the AOCS, via a manual slew to the attitude of PID 05780026,

commanding to OMC, AOCS and OBDH from the Timeline was re-enabled at 20:40Z. OMC therefore lost pointing IDs 05780022 to 05780026.

OMC operations continued nominally from PID 05780027 onwards.

2007-07-09 (DOY 190, Rev 578)

OMC operations executed nominally.

2007-07-10 (DOY 191, Rev 578)

Due to a problem with the Flight Dynamics System, the Timeline update for slew ID 05780092 failed. Commanding to the AOCS and OMC was disabled from the Timeline and thus slew ID 05780092, along with the OMC Imaging EDs were not released. A manual slew to the attitude of PID 05780094 was performed and the AOCS was recovered (PID 05780095 updated) at 13:22Z. Following this, commanding to OMC was re-enabled and OMC operations continued nominally from PID 05780095 onwards (having lost PIDs 05780092-05780094).

2007-07-11 (DOY 192, Rev 578-579) to 2007-07-12 (DOY 193, Rev 579)

OMC operations executed nominally.

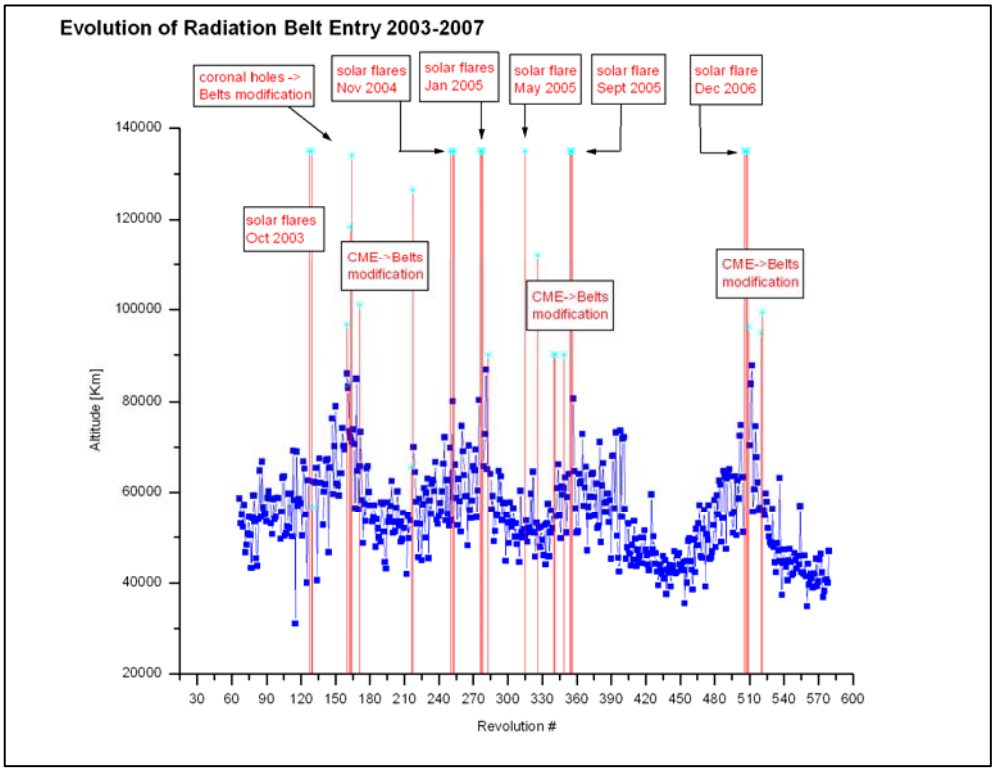
2007-07-13 (DOY 194, Rev 579)

Due to a problem acquiring the guide star for slew ID 05790089, this slew failed from the Timeline and the commands of the OMC ED MEIM-A01, scheduled at 10:13:46Z, failed acceptance with OEM 131 REJECTED TC1 as OMC was still in Normal mode. The remaining OMC EDs for this pointing failed release. A manual slew from the attitude of PID 05790088 to the attitude of PID 05790090 was uplinked at 10:49Z, with OMC going to STANDBY (OTF low) at 10:52:42Z. This was after the Imaging EDs scheduled for PID 05790090, at 10:48:55Z, and therefore the commands of the OMC ED MEIM-A01 for PID 05790090 also failed acceptance with OEM 131 REJECTED TC1 as OMC was still in Normal mode and the remaining OMC EDs for this pointing failed release.

OMC operations continued nominally from PID 05790091 onwards.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

DoY 2007.189 (08/07/2007):

At 18:44Z, a local reset of the IREM CSCI S/W (SEU #50) 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 2007.189.18.44Z at 122147.3km. 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 19:45Z 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 01:13Z on 09/06/2007.

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 20:08Z and IBIS at 20:57Z.

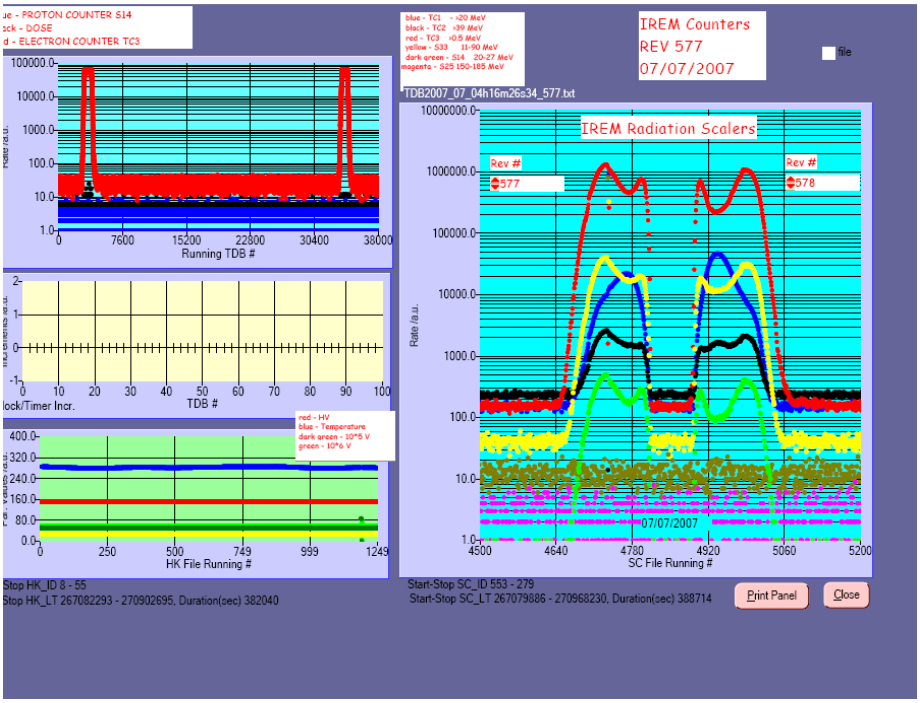
The cause of these S/W resets is still under investigation, but it is apparently due to the unit's memory device that is sensitive to radiation.

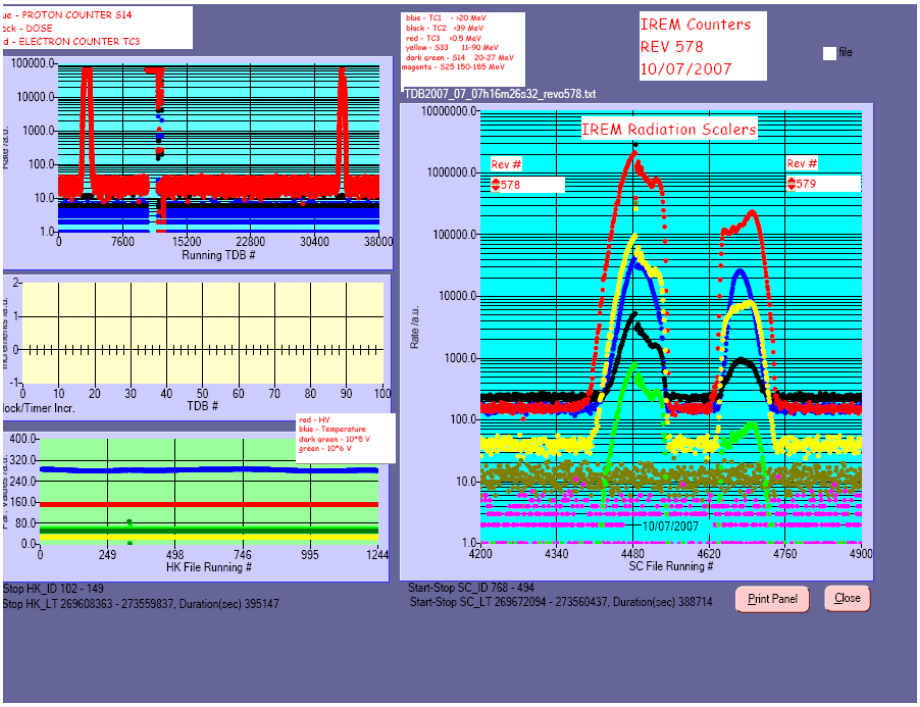
Electron Belts

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]
577	RAD_ENTR R 2007-07-07T19:38:49Z	2007-07-07 21:25:52	40708.7	2007-07-07 21:01:48	45134
578	RAD_EXIT R 2007-07-08T05:49:47Z	2007-07-08 04:19:36	>>31429.6	2007-07-08 04:41:48	42562
578	RAD_ENTR R 2007-07-10T19:25:04Z	2007-07-10 21:17:12	40045.1	2007-07-10 20:48:44	45322
579	RAD_EXIT R 2007-07-11T05:35:55Z	2007-07-11 03:14:40	31430.1	2007-07-11 04:28:44	42394
579	RAD_ENTR R 2007-07-13T19:11:51Z	2007-07-13 20:19:28	46991.7	2007-07-13 20:38:44	45484

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)

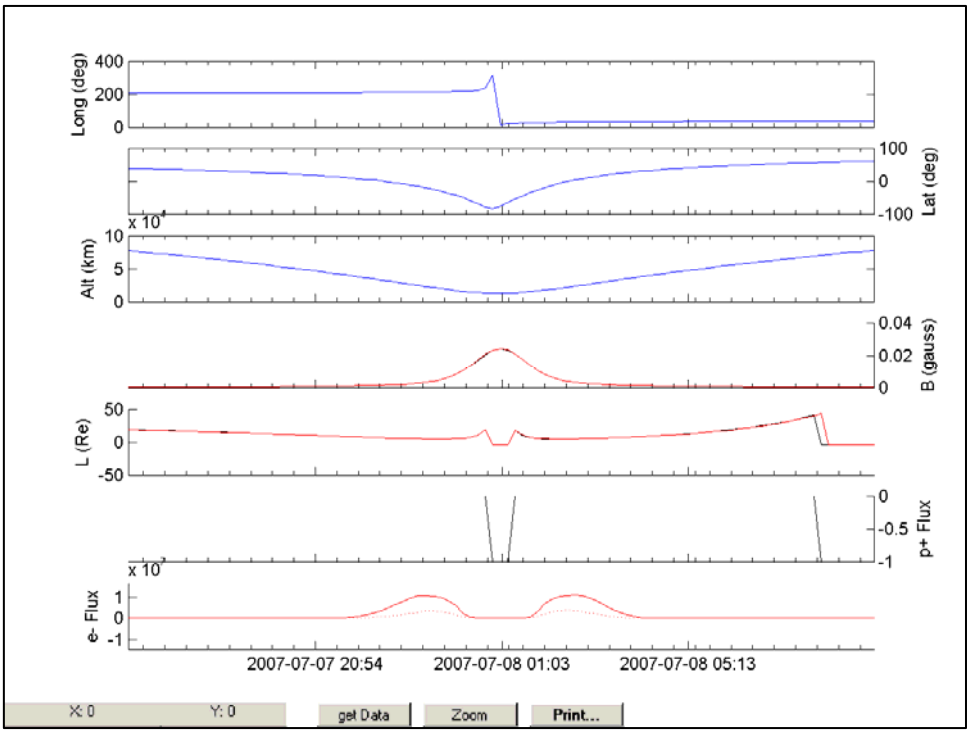
IREM radiation counters:



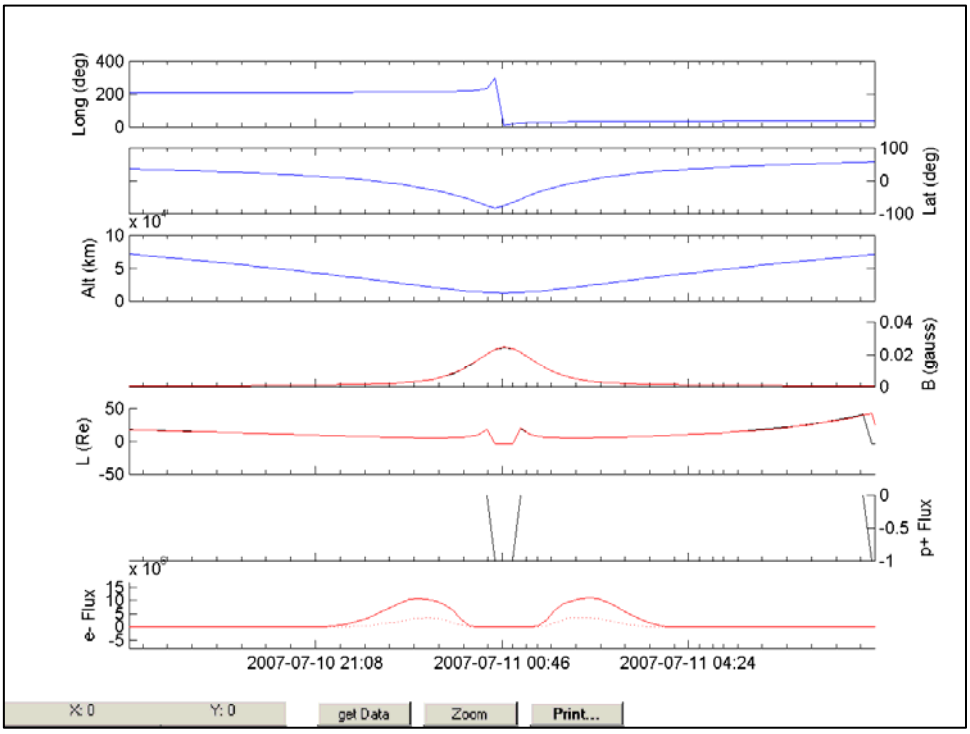


IREM Predicted Radiation Belt Passages

Rev 577



Rev 578



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 this week except on July 10th when several C-class flares were emitted (see picture below from GOES satellites).