

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 166
Week 47
28.11.05
Routine Phase

Prepared by: M. Walker (OPS-OFO)

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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 19.11.05 until 25.11.05 (both dates inclusive) and covers the revolutions 379 and 380.

2 Summary of Activities

The operations were performed according to the planning inputs from ISOC combined with some manual commanding by MOC.

The targets of these revolutions were GRS 1915+105 (RA 19:15:11.50; DEC +10:56:44.0); the Galactic Plane and GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9). The activities consisted of hexagonal and raster dithering as well as GPS observations.

Note: Some further information concerning the activities is provided in the Appendix.

3 Satellite Status

3.1 Platform

The performance of the platform was good. No new unexpected behaviour / malfunction was identified.

3.1.1 AOCS

The AOCS operations were performed from the timeline during this period.

The Eclipse season continued with the eclipse passages on 20/11/2005 and 23/11/2005. The eclipse passages were nominal from an AOCS point of view.

8 slews (3 CSL, 5 OSL) were lost from the Timeline during this period due to problem in the communications with Redu and a problem in the FDS.

The fuel consumption over the period between 11/11/2005 and 23/11/2005 was 0.1653 kg. The remaining propellant is in the order of 158.0550 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.

23/11/2005: Eclipse #5 of the current eclipse season took place, total eclipse duration was 01:00:48, of which the Umbra duration was 00:57:55.

Battery Depth of Discharge was 5.90Ah, recharge time was 3h 30m. Both figures were in line with expectations, the behaviour of the EPS was in all respects nominal.

This was the longest eclipse of the current eclipse season.

26/11/2005: Eclipse #6 of the current eclipse season took place, total eclipse duration was 00:58:03, of which the Umbra duration was 00:54:53.

Battery Depth of Discharge was 5.6Ah, recharge time was 3h 20m. Both figures were in line with expectation, the behaviour of the EPS was in all respects nominal.

26/11/2005: In preparation for eclipse #7 of the current eclipse season, the MRU timer threshold was set to 36 (2h 51m).

3.1.3 Thermal

The thermal control of the satellite is working well. The temperatures are currently all within the specified operational limits.

3.1.4 OBDH

The OBDH subsystem is working flawlessly. No on-board communications problem was identified.

3.1.5 RFS

The RF subsystem is working properly. The link margin is sufficient to ensure proper TM reception and execution of commands with the ranging channel enabled.

3.2 Payload

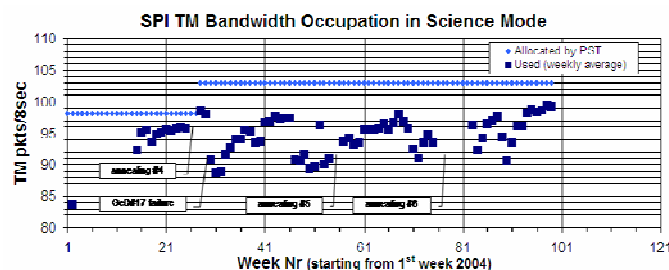
3.2.1 SPI

The overall status of the instrument is nominal.

During science operations, the instrument was kept in photon-by-photon mode, with spectra TM enabled, an assigned TM bandwidth in the science observation windows of 103 pkts/cycle and an average occupation of 99.1 pkts/cycle.

The Stirling compressors are working well, maintaining the detector cold-plate temperature within 85+/-1K.

The following plot shows the TM bandwidth occupation information.



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

3.2.2 IBIS

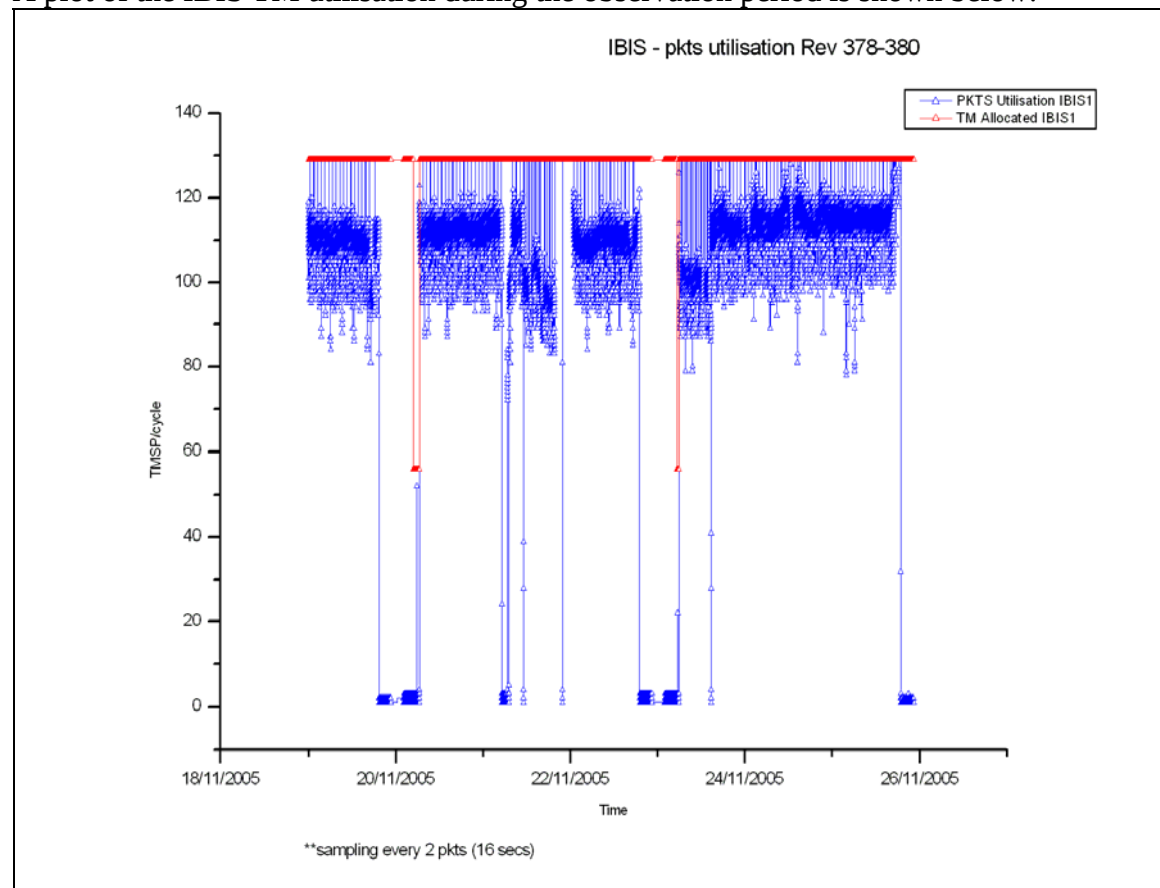
The Overall status of the unit is Nominal.

The Eclipse season continued with the eclipse passages on 20/11/2005 and 23/11/2005. The eclipse passages were nominal from the unit point of view.

On DoY 2005.325 at 05:16Z, IREM CSSW SEU #28 occurred and forced IBIS to Stand-By mode. The recovery procedures FCP_IBIS1_0803 and GESTAN02 were applied and IBIS was back into scientific mode at 07:14Z.

During the reporting period, the PST allocation to IBIS was 129 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 111.59 TMPS/cycle, up 0.09 on last week.

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



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

3.2.3 JEM-X

The status of both JEM-X units is nominal.

JEM-X operations were performed by the automatic Timeline.

JEM-X1 was operated in Data Taking mode during science observations with a TM allocation of 8 packets/cycle and JEM-X2 was dormant (DFEE OFF) with a TM allocation of 1 packet/cycle.

The TM parameter K5136 BUFFER LOSS went Out of Limits High briefly on several occasions on 2005-11-21 and 2005-11-25.

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, 133 of the 139 planned science pointings for OMC were executed nominally, 1 was cut short, and 5 were lost.

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

3.2.5 IREM

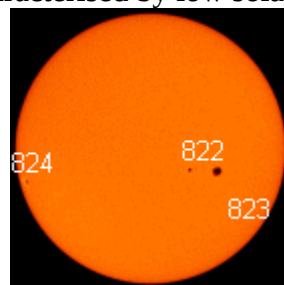
The overall status of the unit is nominal.

On DoY 2005.325 (21/11/2005) at 05:16Z the 28th IREM SEU occurred. The unit was completely recovered and re-enabled in Timeline at 11:59Z.

The Eclipse season continued with the eclipse passages on 20/11/2005 and 23/11/2005. The eclipse passages were nominal from the unit point of view.

Solar Activity

The observation period was characterised by low solar activity.



During most of the observation period, big sunspot 822 posed a threat of M-class solar flares. However no high activity was reported.

Other sunspots were quiet and did not pose any threat of solar flare.

Reference: www.spaceweather.com

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

4 Ground Facilities

The performance of the Operational ground facilities not so good this week, 7 pointings were lost. The overall performance was just below the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was below average this week, an FDS problem caused the loss of 6 pointings, though only 3 of these were science pointings. There were other minor issues with discs filling up, and strange imcs error messages, but these had no impact. The overall performance was below the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week One slew, and OMC commands for another were lost to communications difficulty with Redu, there were also other occasions when packets from Redu were dropped, without impact. There were also difficulties with the link ISDC, here there was no impact. The overall performance though was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

No PSF's were received this week. No planning activities were performed this week in ISOC. This is due to not yet available pointing inputs from MOC related to the AOCS calibration in revolution 385. In January it is planned to perform a series of earth observations with INTEGRAL. A scenario for how to perform these observations has been jointly worked by MOC and ISOC. There is still a lot of work to be done but the frame work is now established.

TSF for revolutions 380 to 382 were received. Revolutions 380 and 381 were regenerated due to changed ODB at MOC.

2. Observation status

No ECS's received this week.

3. ISOC science data archive

The automatic transfer and ingestion of archive data from ISDC is working well. However recently there has been some problems requiring some manual intervention before ingestion in ISDA. It is believed this problem will be mostly resolved when the new release of the ingest software from ISDC will be installed in ESAC as well. The main development for the 2nd ISGRI catalogue enclosure has started.

4. ISOC system

Version 11.3 was installed as planned this week. This version includes enhancements to the import of IODB from MOC, improved reporting in e.g. schedule summaries and introduction of better flexibility when selecting observations for scheduling.

5. AO 4 preparation

The new helpdesk system to replace the outdated JITTERBUG system has been installed and a first series of trials has been done by the ISOC users of the system.

Tuning of the system based on feedback from the users is in progress. Implementation of the modifications to the ISOC core system has started as planned. Documentation updates is now progressing well.

5. Problems

The long standing problem of differences in the constraint checking between ISOC and MOC / Flight Dynamics has turned out to be two problems. One is caused by different support files used in ISOC and MOC. These files were not defined by MOC as being needed to be separately updated in the ISOC system. Documentation update will be initiated by MOC and new procedure will be established in ISOC. The second problem is still under investigation but a possible cause is found but requires final confirmation.

4.3.2 ISDC

Status of ISDC observation processing on 28/11/2005:

- Latest Standard Analysis completed: observation 03201090042 (Galactic Bulge, Revolution 369) on 28/11/2005
- Latest products archived: observation 03200860001 (SS433, Revolution 366-369) on 28/11/2005
- Latest observation products sent to the observer: observation 02297000020 (galactic disk l<0, Revolution 347) on 03/10/2005

5 Special Events

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 325, at 16:08, the TC AD service with Redu terminated at the same time as a TM drop. The drop coincided with the start of retrievals from Vilspa, and only seemed to affect the imcs, as the nctrs remained green. The links were eventually re-established at 16:28, after the links were recycled, and the command link set to RDTCE1_IP. The impact was the loss of pointing 03790039.
- At 19:47, the TC A5264 (PP Filter Flag) failed release, the situation resolved itself autonomously, see AOCS section for details.
- At 20:06, a FDS problem caused the update for slew 03790044 to fail, which in turn caused the loss of the slew. The AOCS sub-system was disabled and not recovered until 00:50, the impact was the loss of pointings 03790044 to 03790049.
- On DoY 326, from 10:43 to 10:52, the TM from Redu dropped after a hit on the line, there was no impact.
- At 11:52, there were repeated messages indicating errors sending data to the ISDS. At 12:04, after the IFRD task was rebooted, the messages stopped. At 12:54, messages indicating MADDs-ISDS Disconnected/Reconnected started to appear, these were cleared at 13:10, after the IFRD & ISDS tasks were

restarted. At 14:46, a single such message was seen. There was no impact on the mission in any of the above.

- On DoY 327, at 07:04, 15 bad TM frames were received from Redu, there was no impact.
- At 17:20, Network report they received an alert that the directory /lhome/imca was 90% full, with 1.96GB of space left.
- On DoY 328, at 00:00, there was a brief drop in the VC0 & VC7 TM links with Redu, the impact was the loss of the OMC commands for pointing 03800024.
- At 20:39, error messages: “Error sending data to ISDS”, followed by “Link MADDS-ISDS disconnected/connected” started to appear every few seconds. At 20:45, CCC rebooted the IFRD task, and at 20:50 the message “Link ISDS-IFRD connected” was seen, and the other messages stopped. There was no impact.
- On DoY 329, at 00:20, the NCTRS-A icon on the Global MMI was red, with the message “NCTRS-A has disconnected” being displayed. The MCCM MMI was restarted, clearing the problem, there was no impact.
- At 00:4, the NCTRS-A icon again showed red on the Global MMI. A minute later GFCC reported their MMIs had disappeared. There was no impact.
- From 16:21 to 16:22, there was no VC0 TM flow from Redu, this seemed to be triggered when Network tried to establish a VC7 link with DSS-27. From 16:40 to 16:41, the same thing happened when Network tried to bring in a Dataflow link from DSS-16. There was no impact.
- From 19:09 to 21:00, a test was carried out using DSS-27 to confirm that ISDC could process data from this station. The test appeared to be successful, with analysis is on-going.
- At 22:28 and 22:32 the following error messages were seen: “OBQDdisp, sun122, ERROR, SYSTEM Exception raised during request to CMD OBQM disconnectObqdisplay” and “CMDHmplx, imca, ERROR, SOFTWARE, CORBA resolve, Caught Corba: system exception”. The stacks were then closed, and it was observed that the OBQM task was showing red in the imca task launcher. The task was restarted. At this time the revolution was over, and there was no impact.

The following anomaly report was entered into the ARTS system.

AR id	Date Created	Subject	Segment	Status
INT-2812	23/11/2005	INCTRA not logging TC events	NCTRS	Pending
INT-2813	24/11/2005	FDS failed automatic update task	FDS	Pending
INT_SC-132	25/11/2005	IREM Anomaly: Reset of IREM_CSCI S/W #28, 21/11/2005	Payload	Open
INT-2814	29/11/2005	GFCC cannot connect TM links VC-0/7 on INCTRA	NCTRS	Pending

7 Future Milestones

Preparation is on-going for the earth observation, currently planned to take place in January.

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The upgrade of the IMCS has been delayed for incorporation of an urgent fix which has become available from infrastructure, new release date depends upon the time taken to integrate and test this patch.

Testing of DSS-27 is still on-going.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 379

The observations in revolution 379 began with a hexagonal dithering observation of GRS 1915+105 (RA 19:15:11.50; DEC +10:56:44.0) lasting ~29 hours, followed by a GPS observation performed for ~8.5 hours. A raster dithering observation of GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9) was then performed for the remaining ~20.5 hours of observation time.

Revolution 380

The observations in revolution 380 consisted of a GPS observation lasting ~8.5 hours followed by a raster dithering observation of GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9), performed for the remaining ~51 hours of observation time.

Throughout these observations all instruments were in their nominal science modes, except JEM-X2 for which the DFEE was off, and the TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2005-11-09T14:33:48.000Z	158.3520	F	Automatic TM processing.
2005-11-10T15:32:47.000Z	158.3331	F	Automatic TM processing.
2005-11-10T20:32:07.000Z	158.2907	F	Automatic TM processing.
2005-11-10T22:56:40.000Z	158.2769	F	Automatic TM processing.
2005-11-11T04:50:24.000Z	158.2693	F	Automatic TM processing.
2005-11-12T14:00:36.000Z	158.2590	F	Automatic TM processing.
2005-11-14T04:49:04.000Z	158.2469	F	Automatic TM processing.
2005-11-17T04:43:28.000Z	158.2203	F	Automatic TM processing.
2005-11-20T04:34:40.000Z	158.1916	F	Automatic TM processing.
2005-11-21T13:21:47.000Z	158.1757	F	Automatic TM processing.
2005-11-21T19:51:00.000Z	158.1502	F	Automatic TM processing.
2005-11-21T21:50:52.000Z	158.1194	F	Automatic TM processing.
2005-11-22T00:22:36.000Z	158.0923	F	Automatic TM processing.
2005-11-23T04:21:11.000Z	158.0773	F	Automatic TM processing.
2005-11-23T12:48:48.000Z	158.0550	F	Automatic TM processing.

This report was generated Fri Nov 25 08:00:31 GMT 2005

8.3 Detailed Satellite Information

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

8.3.1 APCS SUMMARY OPERATIONS REPORT, 19/11/2005 – 25/11/2005

APCS operations were executed from the Automatic Timeline.

During this period, 50 Open Loop Slews, 95 Closed Loop Slews and 7 Momentum Bias were executed (TL + manual recovery). 8 slews (3 CSL, 5 OSL) were not executed from the Timeline during this period due to problem in the communications with Redu and a problem in the FDS.

This is equivalent to a 5.3 % of the total number of slews planned (150).

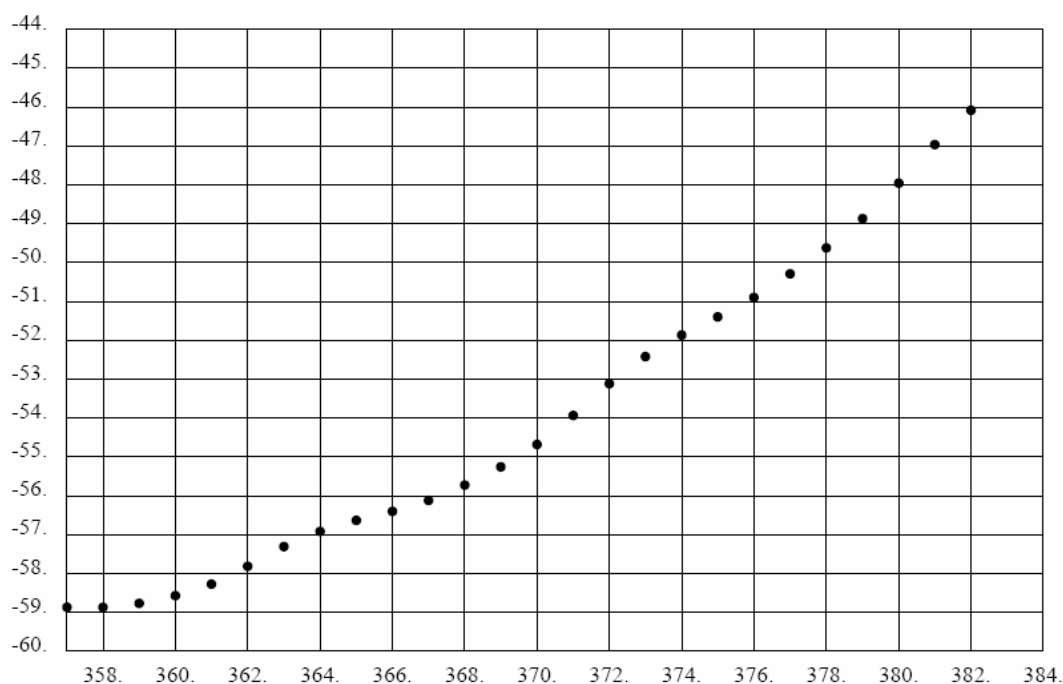
The AOCS eclipse operations were nominal. For the winter eclipse season passages on 20/11 and 23/11, the Eclipse Timers and the Time-Tagged sequence to re-enable the IMU Auto Switch-Off function of the ACC were loaded from the Timeline and the pre-eclipse IMU health checks were performed at the planned times. Some information regarding the eclipse times and IMU usage up to this stage of the eclipse season are provided below:

AOCS Eclipse Times														Winter 2005	
Date	LOS	AOS	ACC Eclipse Imminent	ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbr	Umbr	FSS Sun In	Penumbra	FDE/FCE	ACC	Eclipse Duration
2005-11-02	23:56:00	03:44:00	01:42:13	02:24:16	02:32:58	02:33:40	02:41:53	no	00:00:00	00:00:00	no	03:13:57	03:17:52	03:23:42	0:32:04
2005-11-11	23:28:00	03:02:00	02:26:27	03:08:27	03:17:22	03:18:06	03:26:07	03:27:39	03:28:02	03:57:52	03:58:17	04:00:08	04:03:46	04:09:50	0:34:01
2005-11-14	23:17:00	02:47:00	02:11:51	02:53:53	03:02:34	03:03:18	03:11:31	03:12:40	03:12:56	03:56:35	03:56:52	03:58:22	04:02:10	04:08:06	0:46:51
2005-11-17	23:03:00	02:32:00	01:57:27	02:39:29	02:48:10	02:48:54	02:57:07	02:58:16	02:58:23	03:50:19	03:50:39	03:51:58	03:55:50	04:01:42	0:54:51
2005-11-20	22:51:00	02:16:00	01:43:04	02:25:10	02:33:55	02:34:39	02:42:44	02:43:51	02:43:56	03:40:36	03:40:56	03:42:12	03:45:59	03:51:59	0:59:28
2005-11-23	22:34:00	02:00:00	01:30:13	02:12:22	02:21:34	02:22:18	02:29:53	02:30:59	02:31:07	03:29:02	03:29:19	03:30:41	03:35:06	03:40:32	1:00:48

IMU Usage during Eclipse Season						Winter 2005
IMU On	IMU Off	From Health Check		From Auto Calibration	On Time	Accumulated On Time
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]		
2005-11-02 21:06:21	2005-11-03 03:25:57	0.2272	0.2300	NA	6:19:36	6:19:36
2005-11-10 21:47:48	2005-11-11 04:12:08	0.1930	0.2841	0.2752	6:24:20	12:43:56
2005-11-13 20:18:18	2005-11-14 04:10:21	0.1960	0.1750	0.1657	7:52:03	20:35:59
2005-11-16 20:28:59	2005-11-17 04:03:58	0.2060	0.2319	0.2946	7:34:59	28:10:58
2005-11-19 20:13:35	2005-11-20 03:54:17	0.1932	0.1493	0.1684	7:40:42	35:51:40
2005-11-22 19:44:15	2005-11-23 03:42:41	0.2173	0.2253	0.2456	7:58:26	43:50:06

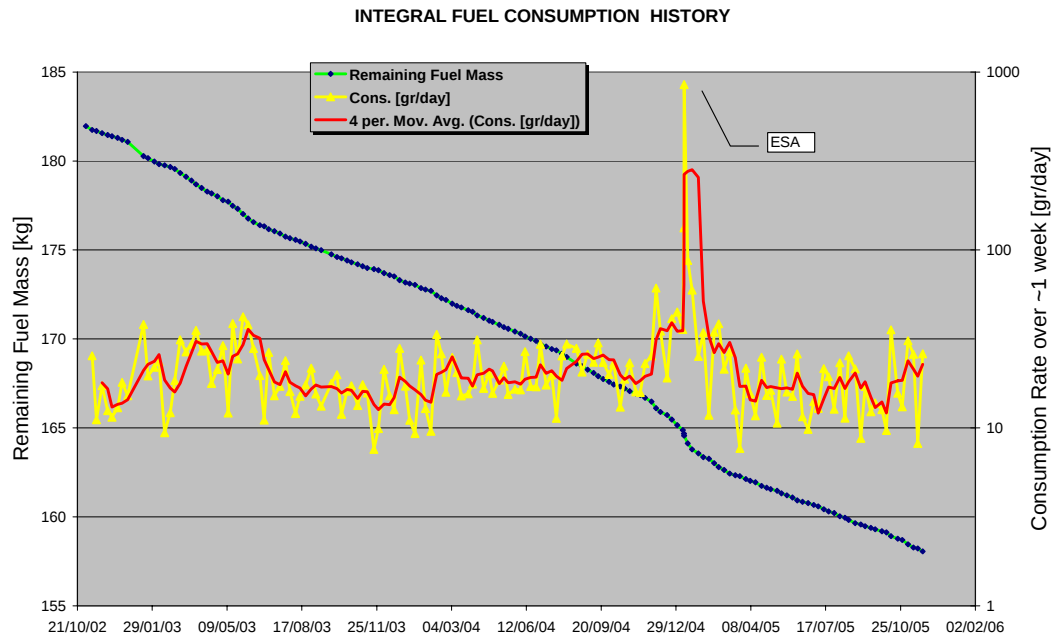
Orbit Control

APOGEE LONGITUDE OF INTEGRAL 7.9.2005 - 30.11.2005

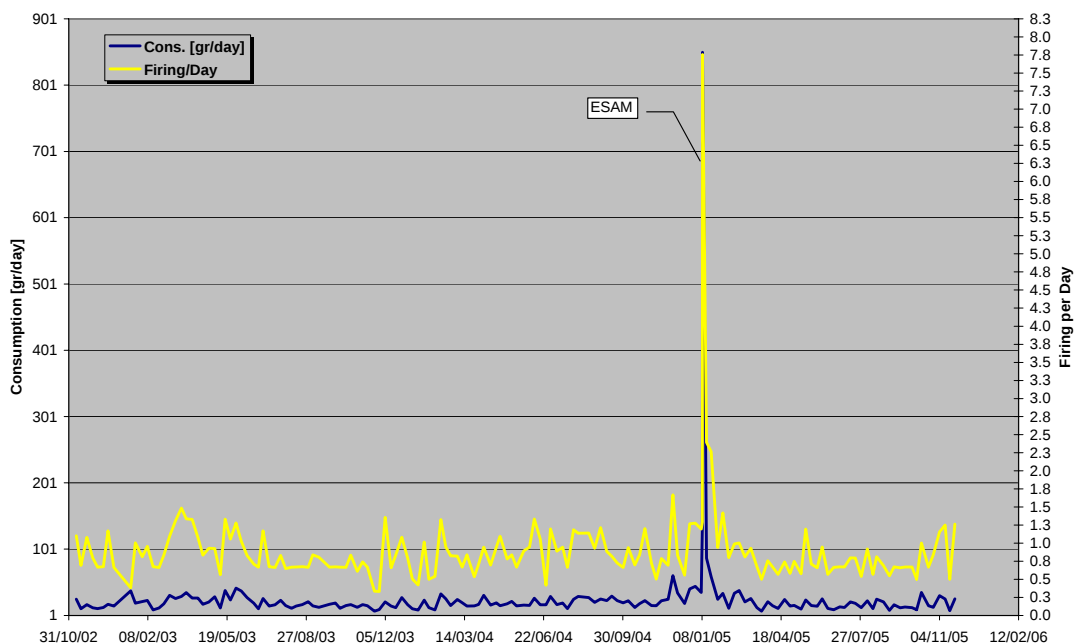


Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 23/11/2005 is reported in the plot below.

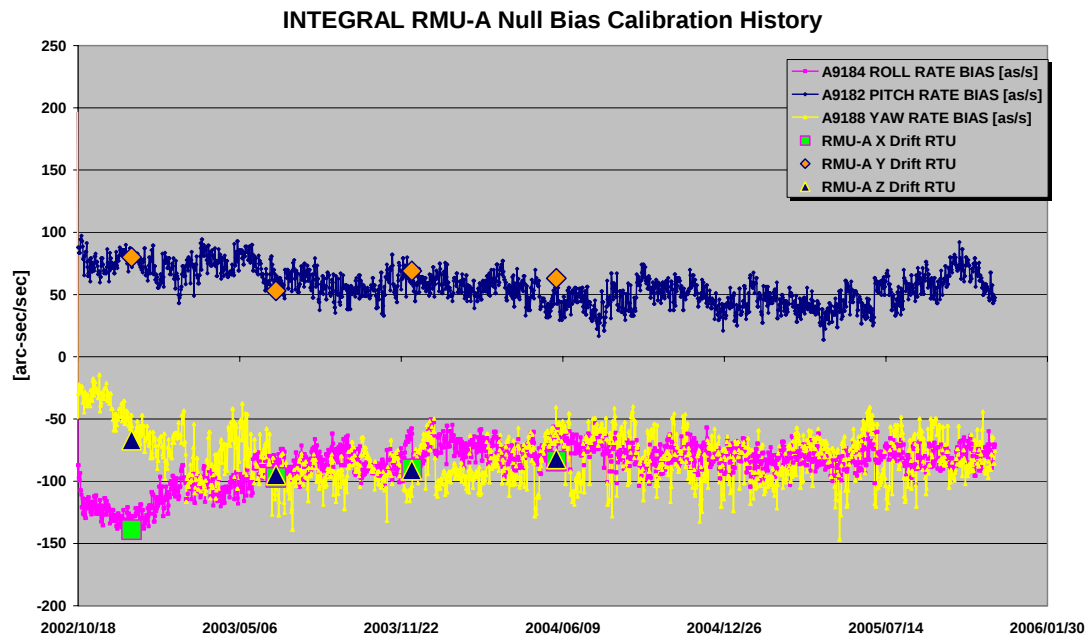


The fuel consumption (grams/day) over the period between 01/11/2002 and 23/11/2005 is reported in the plot below.

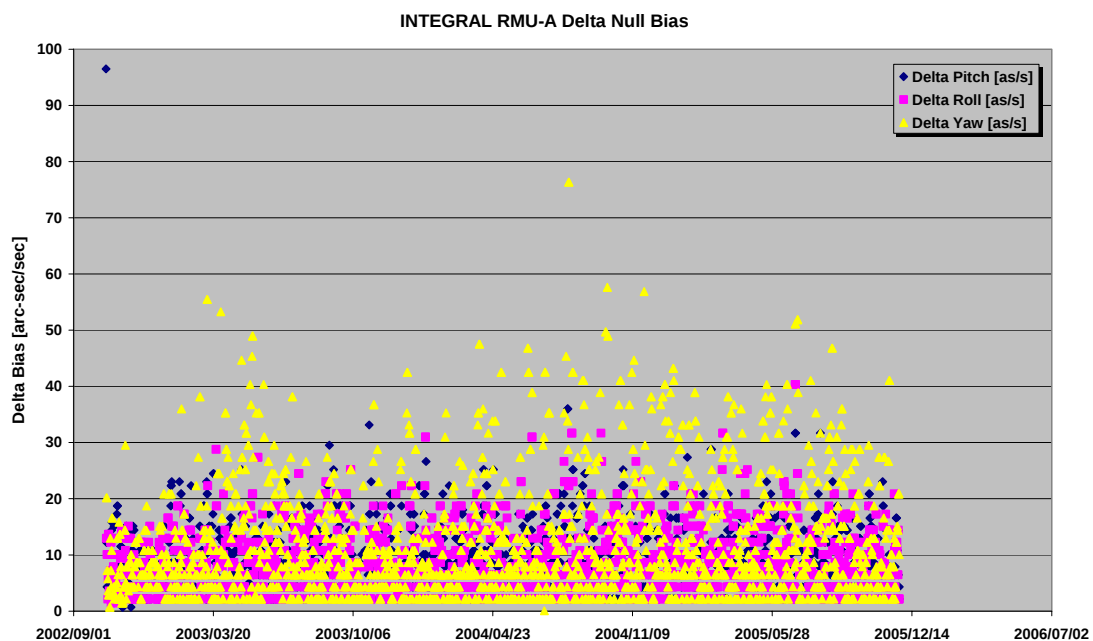


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 25/11/2005 is reported in the plot below.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 25/11/2005 is reported in the plot below.



19/11/05 (Day of Year 323, Revolution 378)

OOL in measured wheel speed RW#4, no impact on Timeline: a problem was observed at 15.45z on the measured speed of RW#4 (measured value = 3399 rpm) exceeding the warning high limit, due to a limited divergence (~100 rpm). The set AMD threshold, for RW#4, in eclipse season sunlight part is 3511 rpm, away from the value reported in TM. No action was taken, being the value in OOL for few TM cycle, but the wheels speeds evolution was careful monitored during the last part of the revolution 378.

20/11/05 (Day of Year 324, Revolution 378-379)

Nothing to report

21/10/05 (Day of Year 325, Revolution 379)

Slew missed from the Timeline: Due to a problem in the communication between Redu and the MOC (see detailed problem report in section), the slew ID 03790039 failed release.

The AOCS s/s was disabled in TL at 16:17z.

A manual recovery was attempted from attitude of PID 03790038 to the attitude of PID 03780040. The next OSL was manually updated and executed from the Timeline.

The AOCS s/s was re-enabled in TL at 17:22z.

The following slews were not executed from TL while recovering the AOCS s/s: 0379039(OSL)-40(OSL).

PP filter parameter failed SCC, no impact on Timeline: at 19:47z the PP filter status parameter changed from 'DISABLED' to 'ENABLED' autonomously, causing the failing of the SCC. This was caused by the automatic re-enabling of the PP filter after the automatic transition from TCM -> IPS mode following the execution of a RWB. The PP filter was previously disabled by the execution of ED AEPOF before slew ID 43.

No action was taken. No impact on TL.

Slews missed from the Timeline: Due to a problem occurred on FDS (update for slew fail), the slew ID 03790044 failed release.

The AOCS s/s was disabled in TL at 20:06z.

A problem was reported at 21.30z on the measured speed of RW#2 (measured value <630 rpm) exceeding the warning low limit, due to a limited divergence (~ 60 rpm) wrt the predicted value.

The set AMD threshold, for RW#2, in eclipse season sunlight part is 469 rpm, away from the value reported in TM. No action was taken, being the value in OOL for few TM cycle, but the wheels speeds evolution was careful monitored during the last part of the revolution 379.

A manual recovery was performed from attitude of PID 03790043 to the attitude of PID 03790049, by several steps.

A problem was again reported at 23.40z on the measured speed of RW#4 (measured value <630 rpm) exceeding the warning low limit during the recovery process.

The set AMD threshold, for RW#4, in eclipse season sunlight part is 469 rpm, away from the value reported in TM. No action was taken but the wheels speeds evolution was careful monitored until the execution of a RWB (at 00:16z) dumping momentum from the wheels and rejoining the wheel profiles to the predicted values in timeline.

The next OSL for slew ID 50 was manually updated and executed from the Timeline. The AOCS s/s was re-enabled in TL at 00:43z.

The following slews were not executed from TL while recovering the AOCS s/s: 03790044(OSL)-45(OSL)-46(OSL)-47(CSL)-48(CSL)-49(CSL).

22/11/05 (Day of Year 326, Revolution 379)

Nothing to report.

23/11/05 (Day of Year 327, Revolution 379-380)

Nothing to report.

24/11/05 (Day of Year 328, Revolution 380)

Nothing to report.

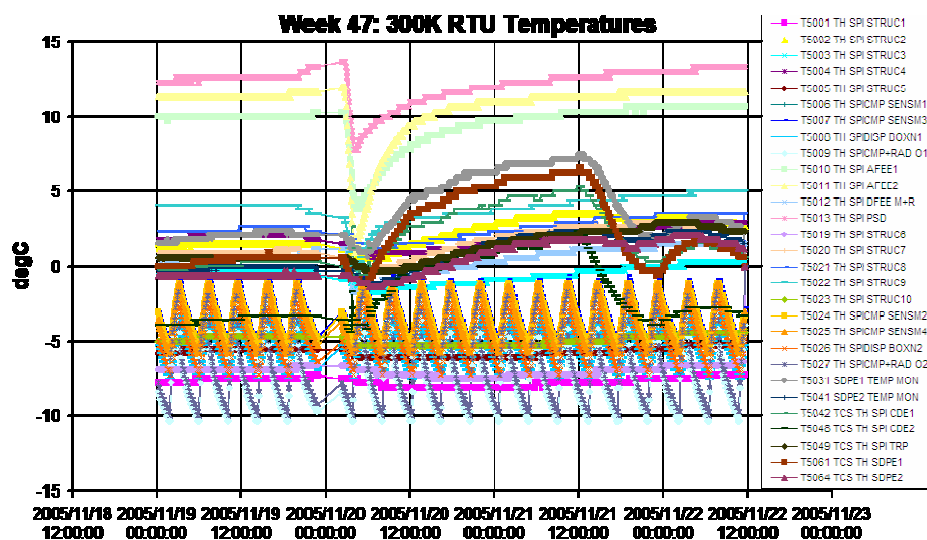
25/11/05 (Day of Year 329, Revolution 380)

Nothing to report.

8.3.2 SPI Operations

Unit Temperatures

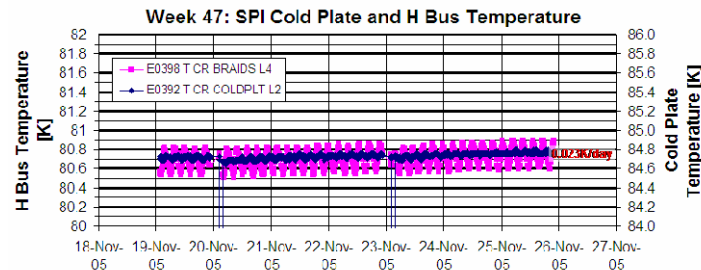
All the temperatures of the equipment are inside the operational limits. The following plot shows their evolution along the reporting period. The variation of the DFEE, PSD, AFEE and ACS temperatures (still inside limits) are due to eclipse passages.



Stirling Compressors and Cryostat

The performance of the compressors is nominal. The cold plate temperature was maintained at 85K $\pm$ 1K showing the expected positive drift.

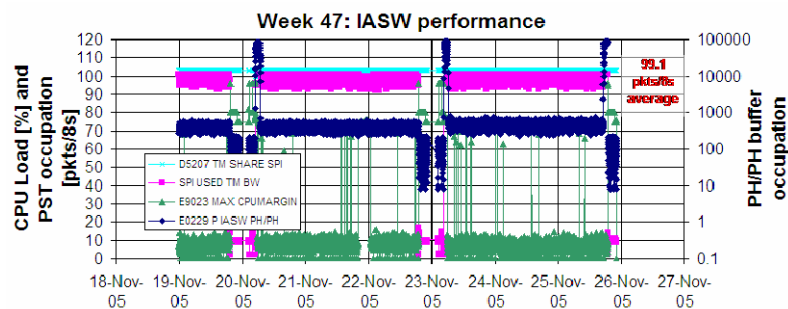
The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



DPE & IASW

The IASW performance is nominal.

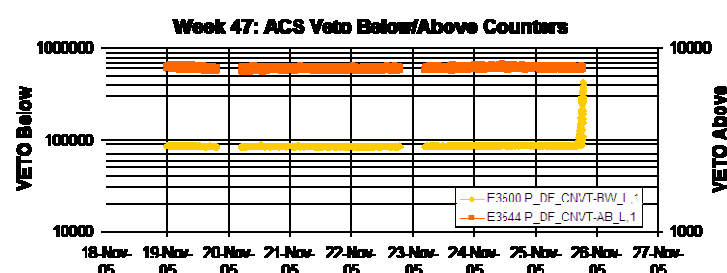
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period



ACS

The performance of the ACS is nominal.

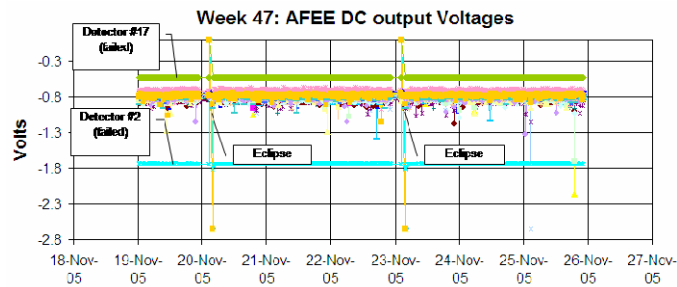
The following plot shows the ACS overall count rate evolution during the reporting period.



AFEE

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

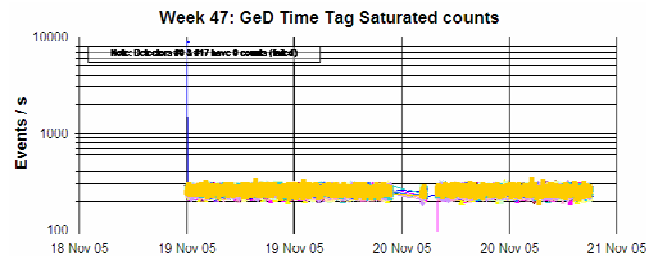
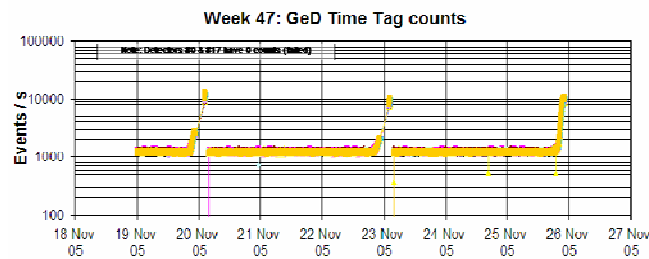
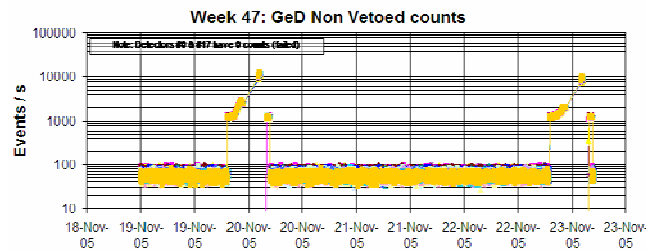
The following plot shows the dc voltage offset of the detector channels during the reporting period.



DFEE

The performance of the unit is nominal

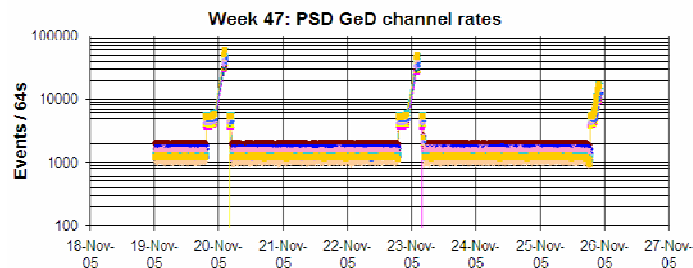
The following plots show the count rates of the detectors during the reporting period (due to problems in the data retrieval tool, some gaps could be present).



PSD

The performance of the unit is nominal

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



SPI EVENTS LOG

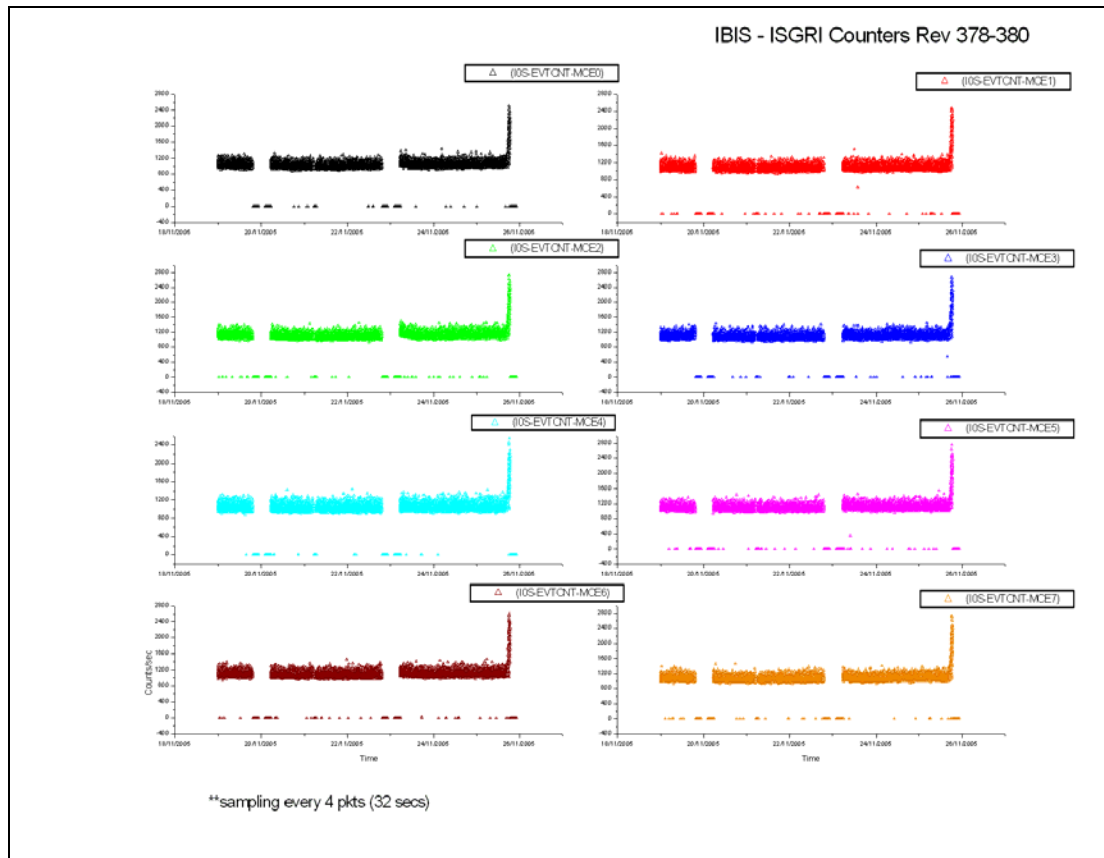
NOTE: The events log is extracted from the revolution pass summaries (courtesy of the Integral Analysts).

DOY Time	Event
327 - 03:44	EV: SPI1 LSL error "exception"
329 - 02:43	TM E0361 OOL, back in limits @ 02:55
329 - 17:25	TM E3500 OOL

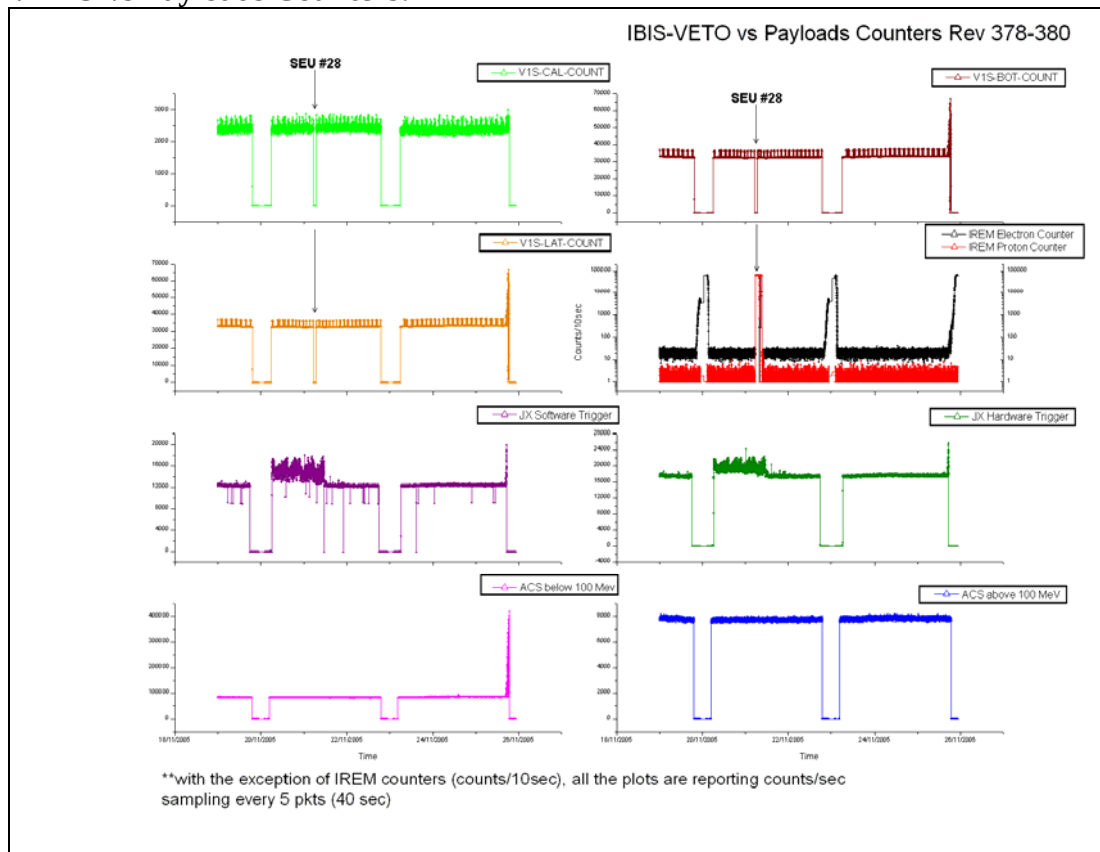
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

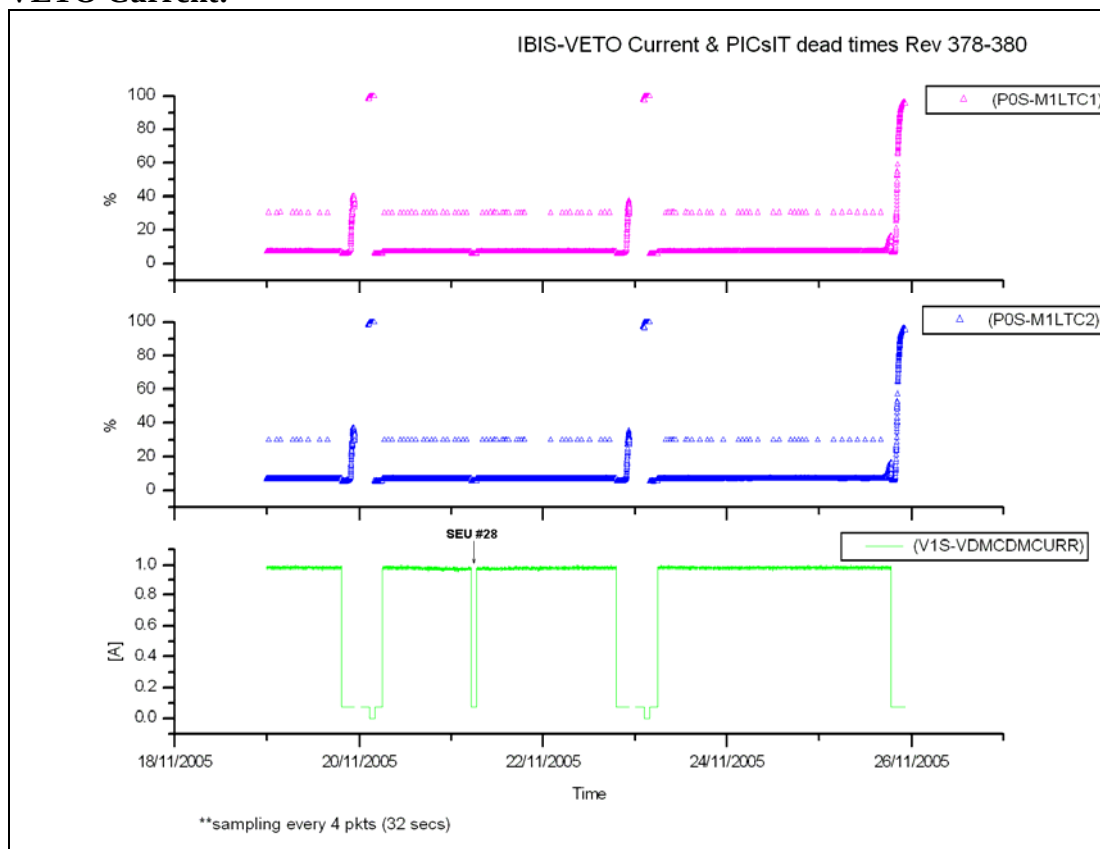


VETO vs Payloads Counters:

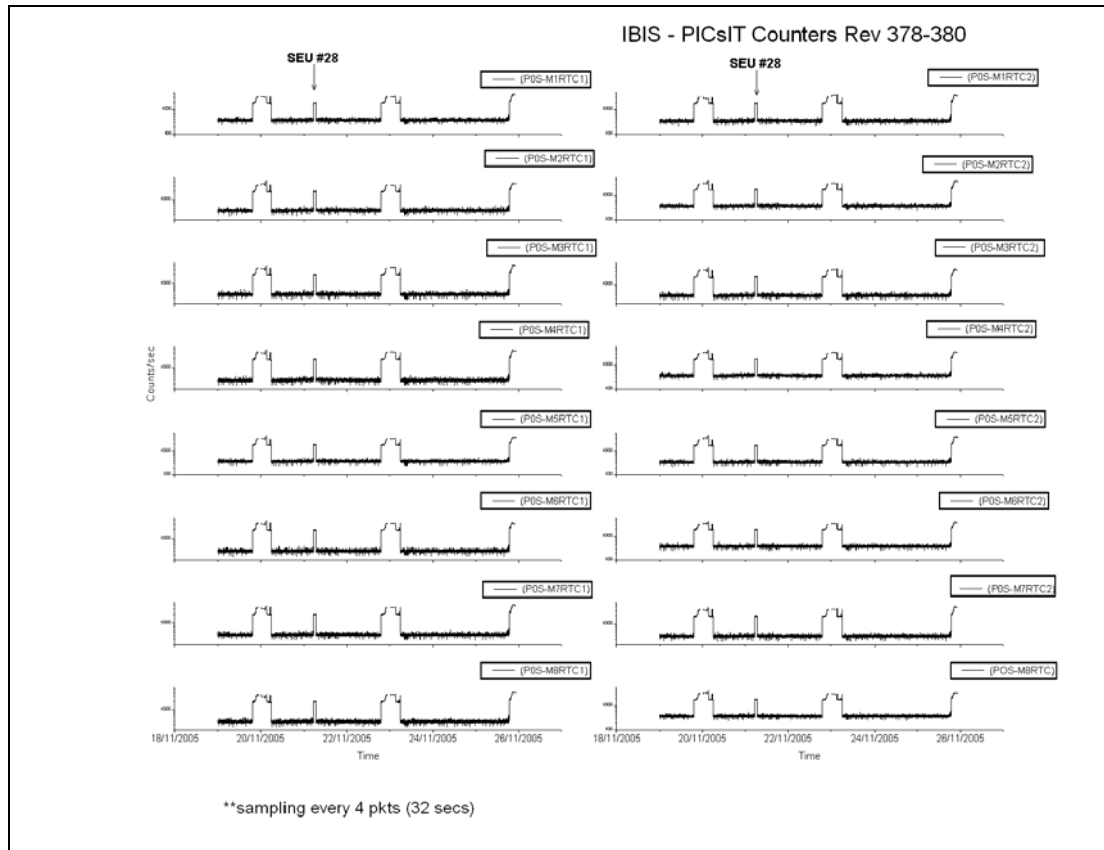


The week was characterised by low radiation.

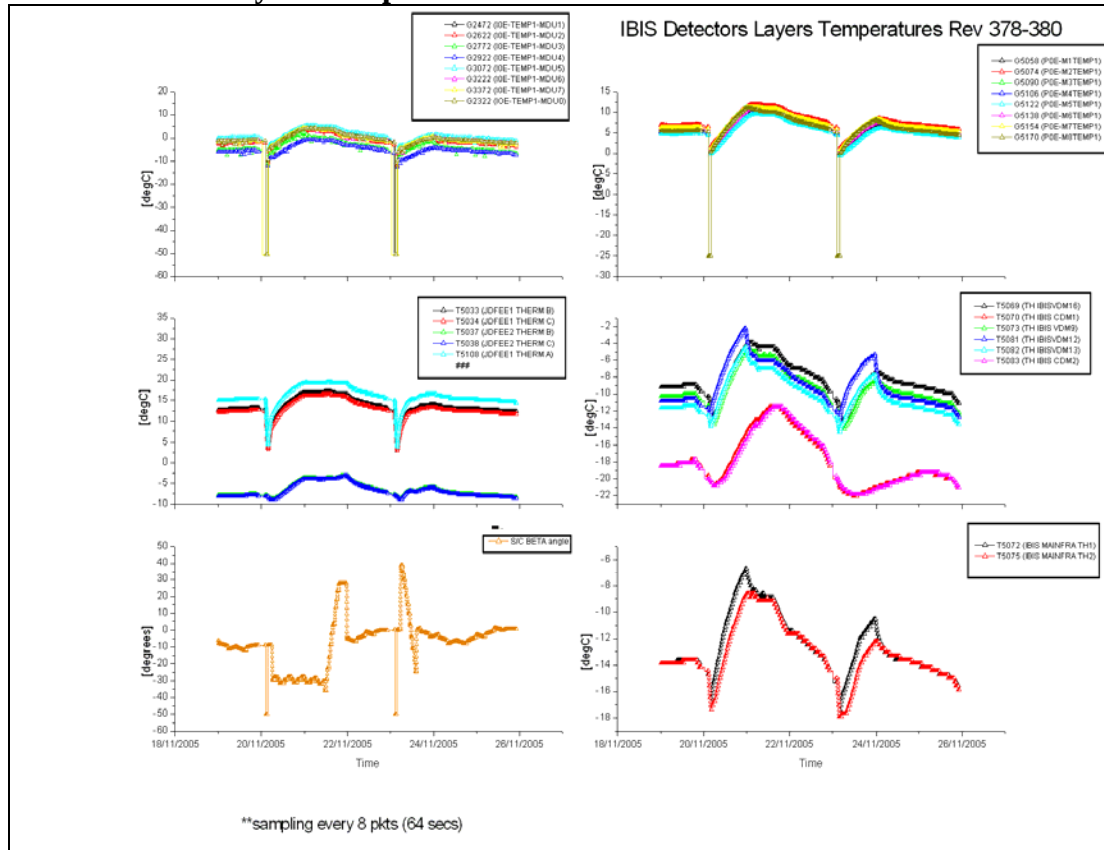
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2005.323 (19/11/2005)

At 19:25Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit high. It went back inside limits on DoY 324 at 06:06Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

DoY 2005.323 (19/11/2005)

At 02:40Z TM families G5002 (P0S_MiRTC1) and G5003 (P0S_MiRTC2) went OOL High and back. As this happened inside the radiation belts, according to P-CNT-1, no action was taken.

At 05:35Z TM parameter G2014 (I0E_OVFWPXADD_M1) failed SCC and back. According to I-OVF-1, no action was taken.

DoY 2005.325 (21/11/2005)

At 05:16Z an IREM SW failure (SEU #28) forced IBIS to Stand-by mode. Following procedure FCP_IBIS1_0803, IBIS exited this Safe configuration and went back to Scientific Standard mode at 07:14Z.

Consequently, TM parameter G8015 (S1E-A2_PMT_V) went OOL between 05:16Z and 06:41Z (when VETO was back in Nominal).

DoY 2005.326 (22/11/2005)

At 19:10Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit high. It went back inside limits on DoY 327 at 05:55Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

DoY 2005.327 (23/11/2005)

At 05:25Z TM parameter G2098 (I0E_OVFWPXADD_M7) failed SCC and back. According to I-OVF-1, no action was taken.

DoY 2005.329 (25/11/2005)

From 17:50Z to 18:46Z, TM parameters G6062 (V1S-BOT-COUNT) and G6063 (V1S-LAT-COUNT), as well as G2013 family (I0S-EVTCNT-MCEi) were toggling OOL High due to high radiations caused by a modification of the radiation belts.

At 18:46Z IBIS automatically switched to Stand-By mode in advance on the planned Radiation Belt entry (18:54Z).

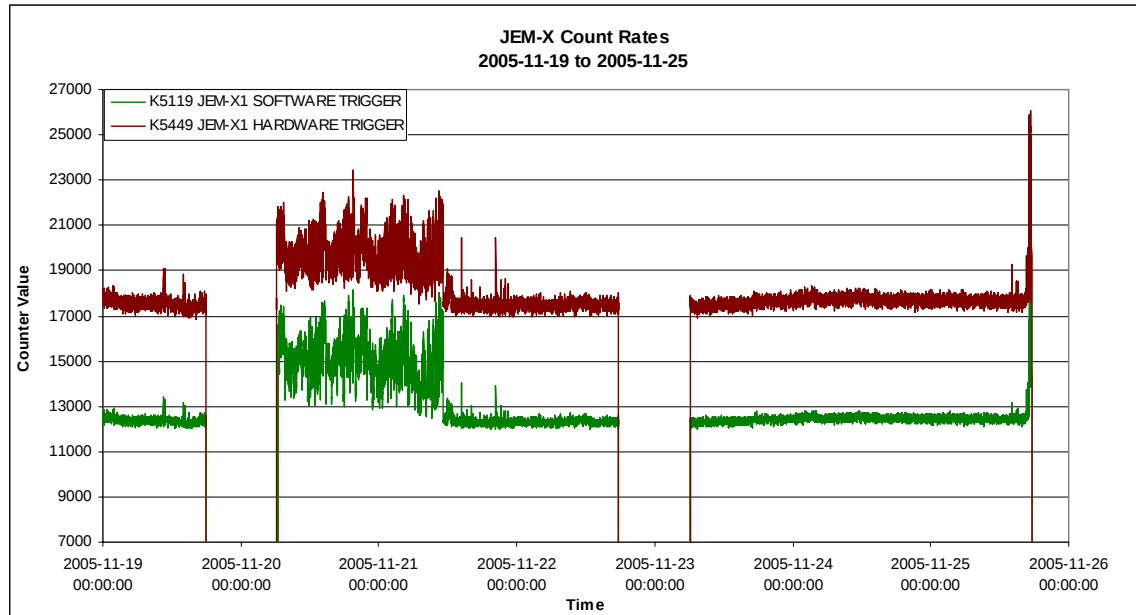
Consequently TM parameter G8015 (S1E-A2_PMT_V) went OOL high in advance as well, at 18:46Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

During the belt passage, TM families G5002 (P0S-MiRTC1) and G5003 (P0S-MiRTC2) were toggling OOL High. According to P-CNT-1 no action was taken.

8.3.4 JEM-X Operations

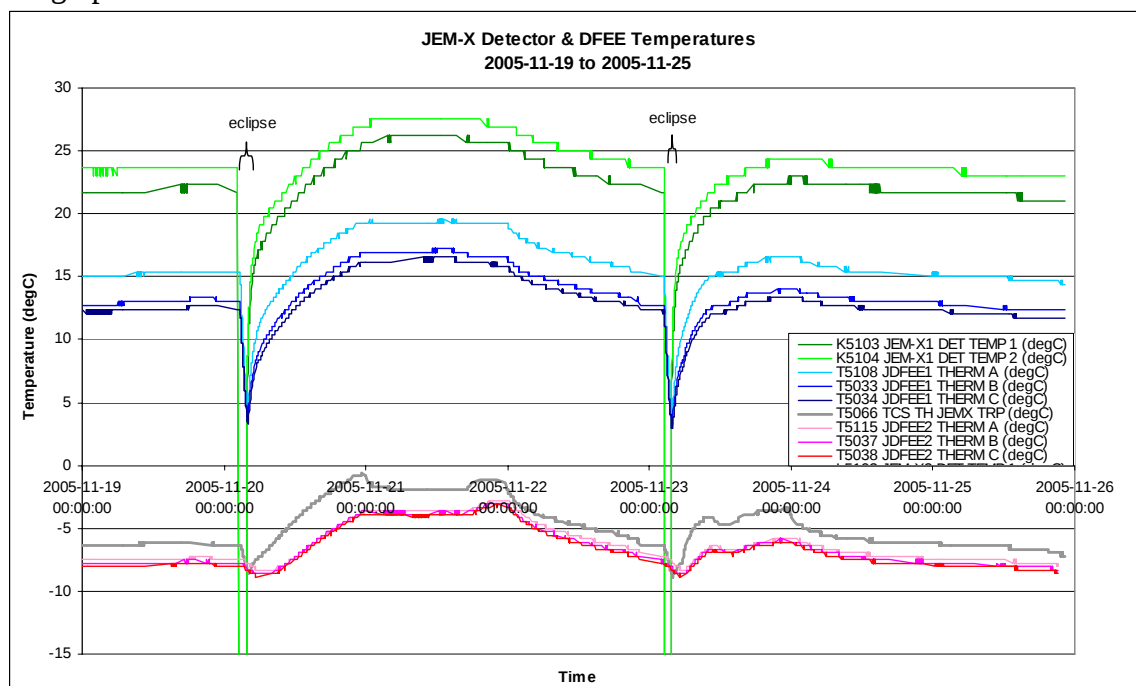
8.3.4.1 JEM-X Count Rates

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



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.



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

² Data sampled (1 frame in 8)

8.3.4.3 JEM-X Daily Report

2005-11-19 (DOY 323, Rev 378) to 2005-11-20 (DOY 324, Rev 378-379)

Nothing to report

2005-11-21 (DOY 325, Rev 379)

The TM parameter K5136 BUFFER LOSS went Out of Limits High on several occasions as follows:

- at 00:03:37Z, value = 256;
- at 15:01:53Z, value = 973;
- at 15:49:05Z, value = 1047.

On each occasion it returned within limits at the next TM cycle.

At 05:16Z an IREM CSCI S/W reset (#28) occurred and thus the TM parameters K5315-K5317 all went OOL (value = 65535) but this did not affect JEM-X1 as the JEM-X1 reactions to the IREM counters are disabled.

2005-11-22 (DOY 326, Rev 379) to 2005-11-24 (DOY 328, Rev 380)

Nothing to report

2005-11-25 (DOY 329, Rev 380)

The TM parameter K5136 BUFFER LOSS went Out of Limits High on several occasions as follows:

- at 14:06:57Z, value = 261;
- at 15:06:57Z, value = 240.

On each occasion it returned within limits at the next TM cycle.

8.3.5 OMC Operations

2005-11-19 (DOY 323, Rev 378) to 2005-11-20 (DOY 324, Rev 379)

Nothing to report

2005-11-21 (DOY 325, Rev 379)

At 05:16:50, an IREM SEU caused OMC to switch to SAFE mode, it was recovered back to stand-by at 05:45:23, the imaging commands were manually re-sent at 05:47:54. The impact was pointing 03790026 was interrupted after 560 seconds, then restarted, and subsequently terminated after a further 1166 seconds instead of the planned total of 3572 seconds.

At 16:23, due to a problem with the links, pointing 03790039 was lost.

Doc. Title : INTEGRAL Mission Report #166
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 28/11/05

Issue : 1
Rev. : 0
Page : 25

At 19:47, a FDS problem led to the loss of pointings 03790044 to 03790049. However, only OMC was only active in pointings 03790047 to 03790049.

2005-11-22 (DOY 326, Rev 379) to 2005-11-23 (DOY 327, Rev 380)

Nothing to report

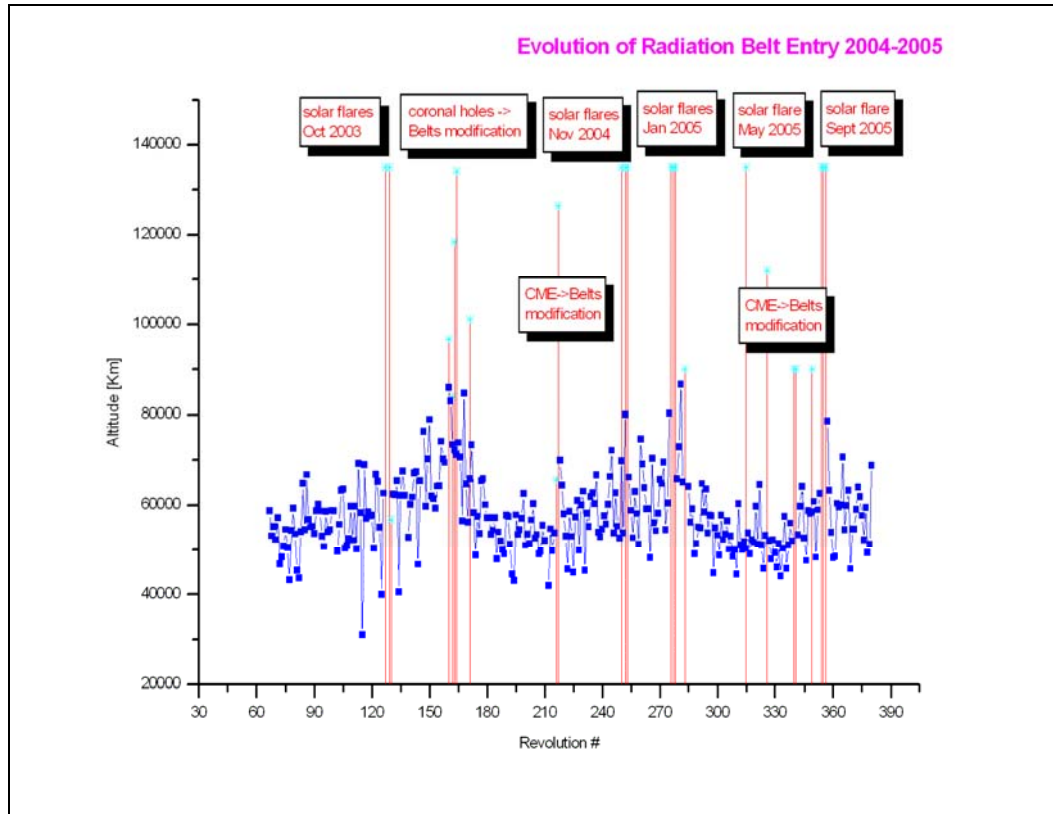
2005-11-24 (DOY 328, Rev 380)

At 00:00, there was a brief drop in the VC0 & VC7 TM links with Redu, the impact was the loss of the OMC commands for pointing 03800024.

On DoY 323 at 19:25:23, DoY 326 at 19:09:55 and DoY 329 at 18:54:27 OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

At 05:16Z a local reset of the IREM CSCI S/W (SEU #28) occurred: as previously (see anomalies on 16/12/02, 01/01/03, 03/06/03, 11/07/03, 19/07/03, 05/08/03, 24/08/03, 26/12/03, 13/05/04, 16/05/04, 09/06/04, 12/06/04, 10/09/04, 14/09/04, 28/10/04, 06/11/04, 01/12/04, 11/12/04, 30/01/05, 11/02/05, 04/03/05, 11/05/05, 17/05/05, 15/06/05, 30/07/05, 07/09/2005, 20/09/2005) the status of the unit, before the anomaly, 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 2005.325.05.16.49 at 144407.2 km when the unit 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 05:37Z using procedure CRP_SYS_2570. The first dump of the status word after the anomaly showed a value of BCC0 HEX = 48320 DEC = 1011110011000000, ie. 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. The operation was completed at 09:50Z.

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

The recovery of the payload was performed with IBIS re-enabled at 07:14Z, and OMC at 05:46Z.

The cause of this S/W reset is still under investigation, but it is apparently due to the unit's memory device that is sensitive to ionising 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]
378	RAD_ENTR R 2005-11-19T19:25:15Z	2005-11-19 20:44:10	>49325.8	2005-11-19 20:30:10	51813
379	RAD_EXIT R 2005-11-20T04:43:45Z	2005-11-20 03:31:14	>28142.8	2005-11-20 03:50:10	31411
379	RAD_ENTR R 2005-11-22T19:09:49Z	2005-11-22 20:20:58	<51221.0	2005-11-22 20:16:33	51492
380	RAD_EXIT R 2005-11-23T04:28:05Z	2005-11-23 03:15:54	>28143.6	2005-11-23 03:36:33	31824
380	RAD_ENTR R 2005-11-25T18:54:26	2005-11-25 17:42:02	<68831.9	2005-11-25 20:06:33	50831

Reference

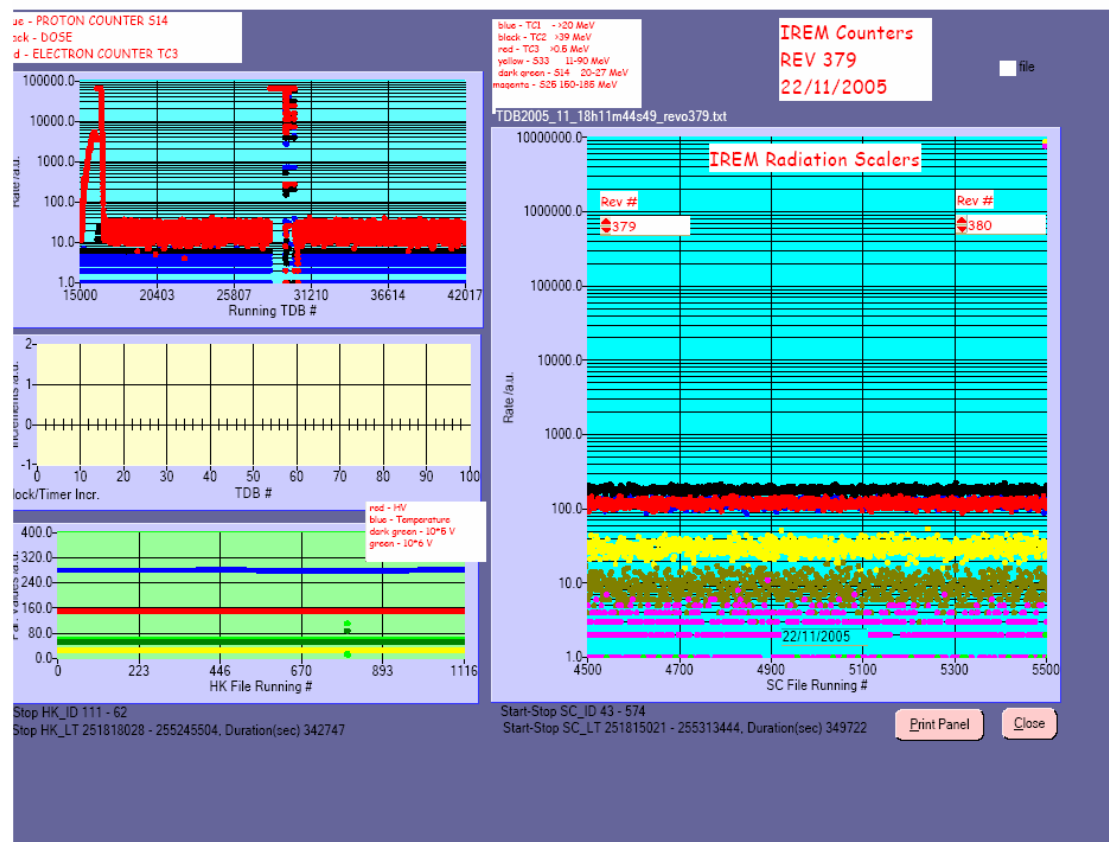
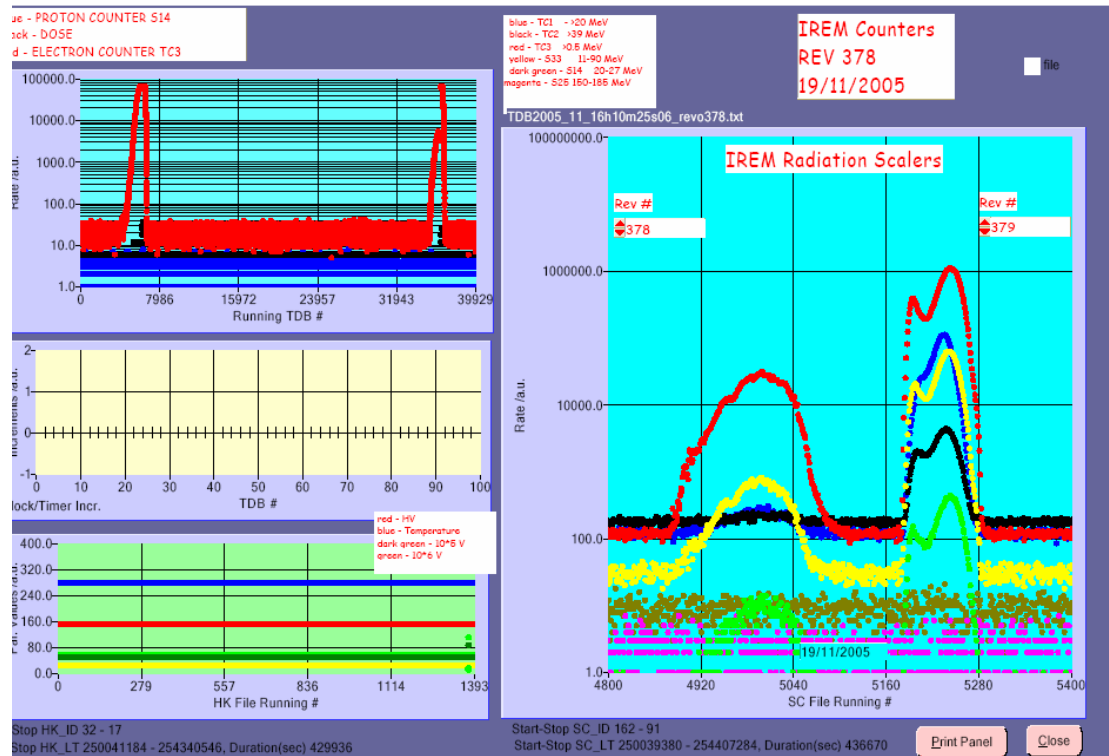
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

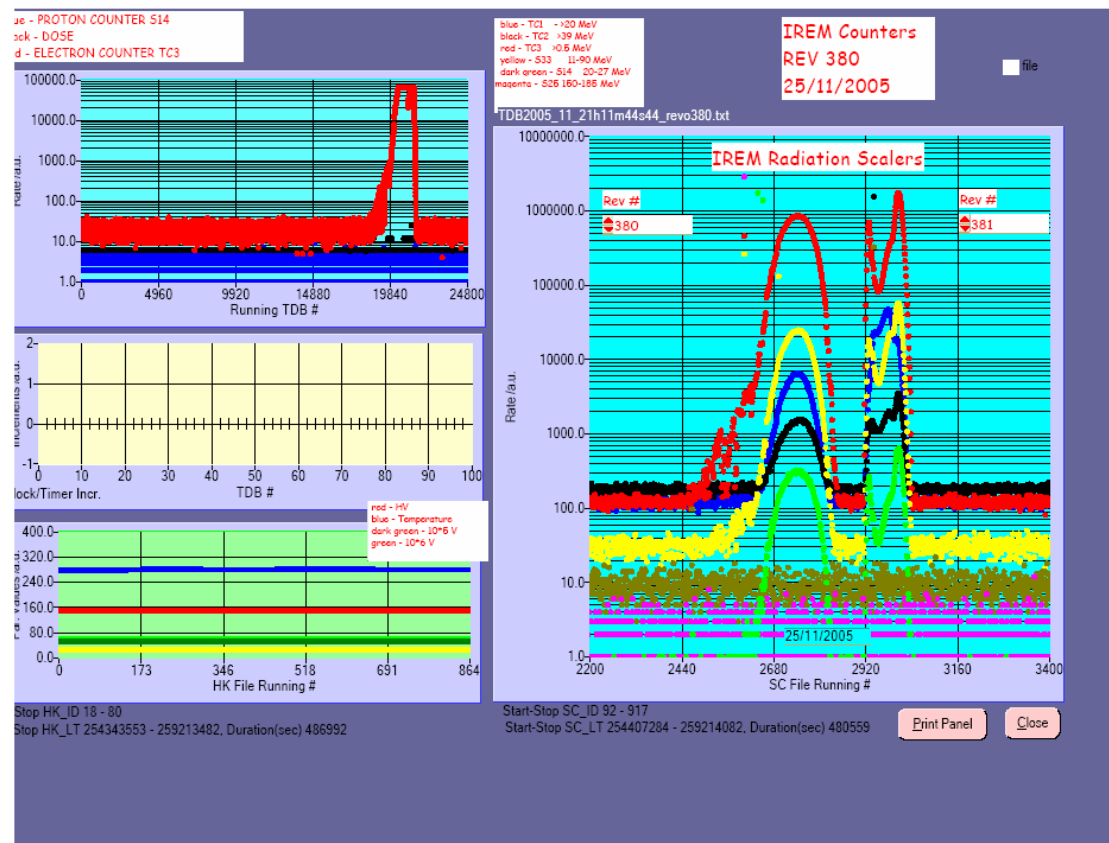
Large error vs reference (more than 30 minutes)

Radiation Spike

IREM radiation counters:

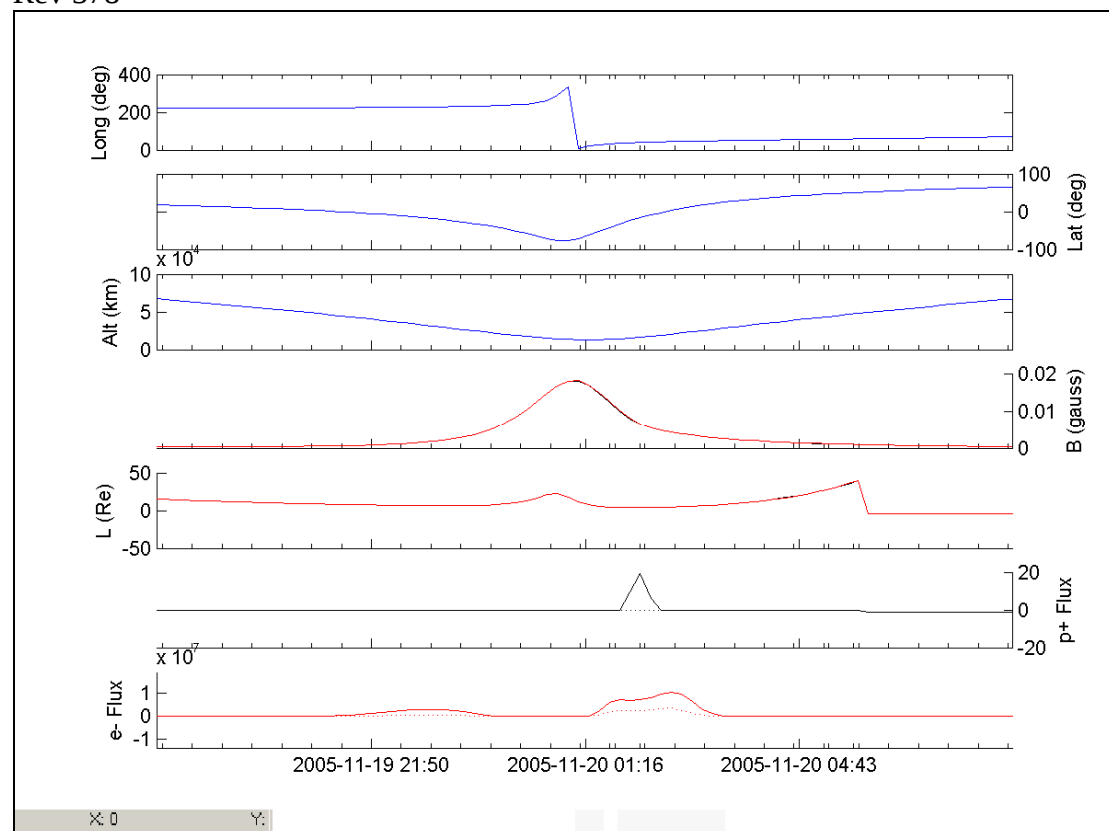


Data for belt passage from revolution 379 to 380 are missing due to a problem with the server.

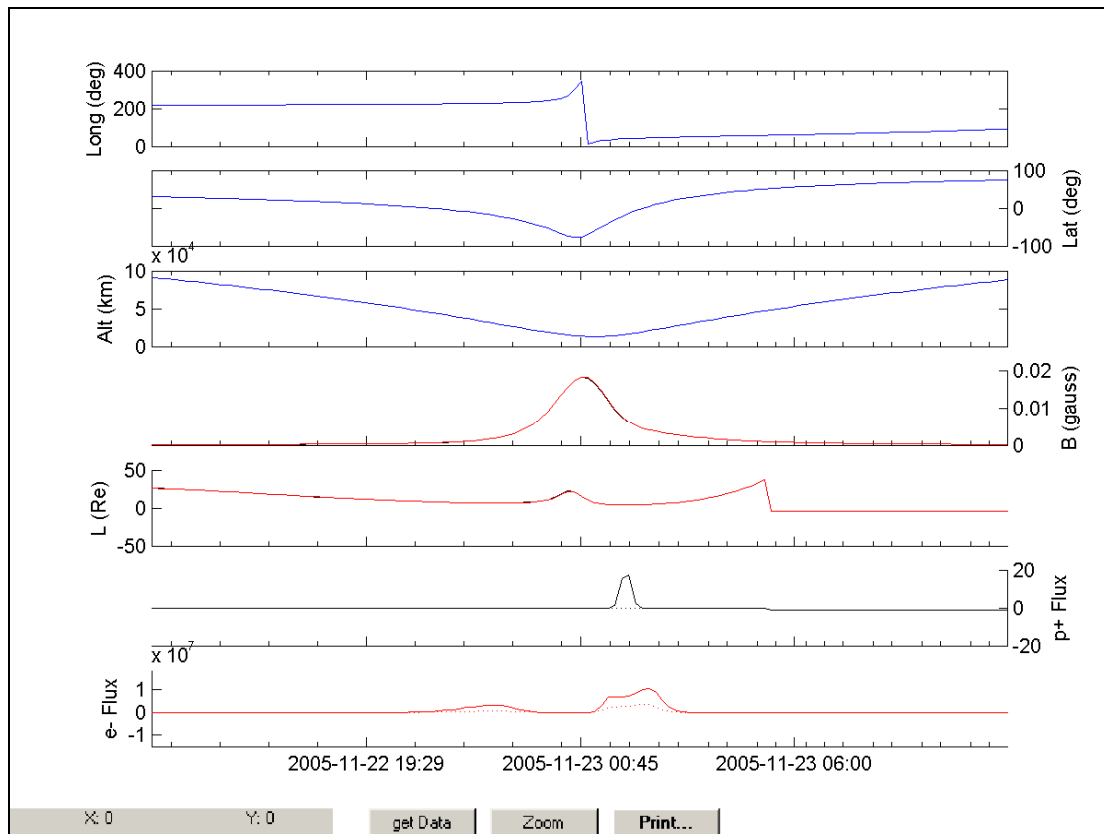


IREM Predicted Radiation Belt Passages:

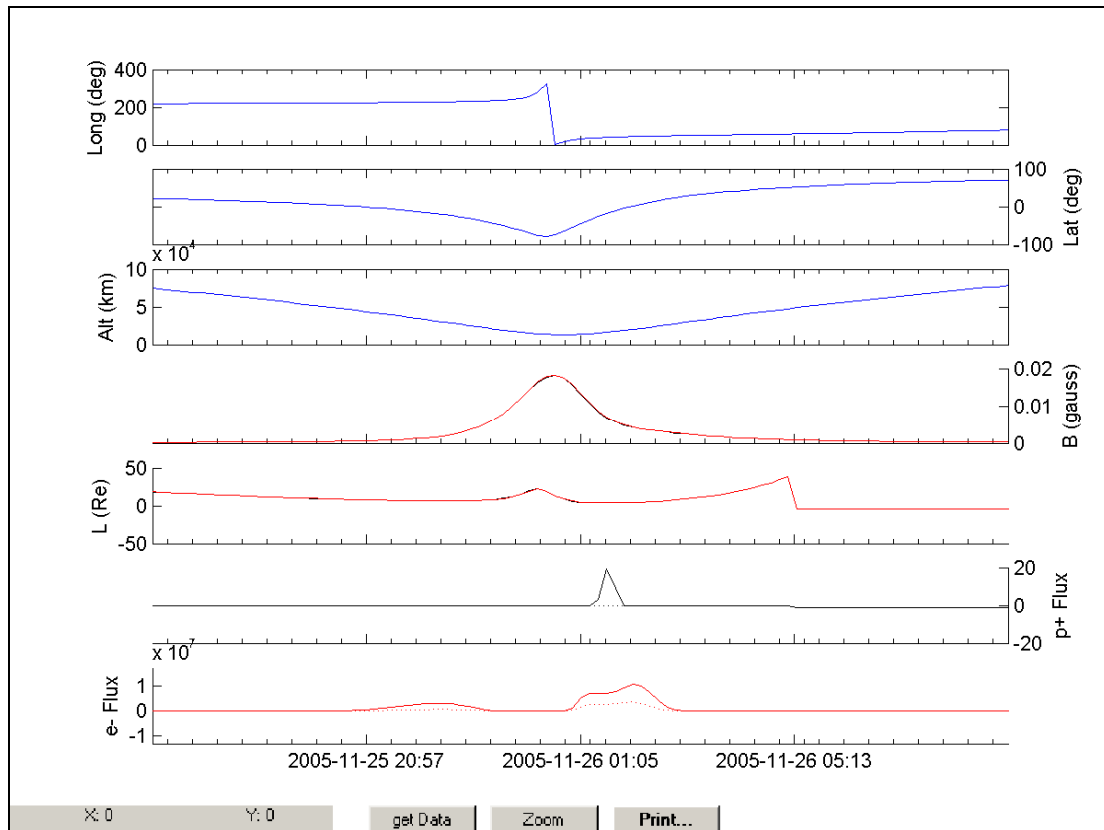
Rev 378



Rev 379



Rev 380



SEC-GOES Observed Particles Fluxes:

