

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 167
Week 48
05.12.05
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 26.11.05 until 02.12.05 (both dates inclusive) and covers the revolutions 381, 382 and 383.

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 GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9); an OMC Flat Field attitude (RA 07:05:36.00; DEC -75:11:60.0) and the Galactic Plane. The activities consisted of raster dithering, staring and GPS observations. In addition, OMC Flat Field and Dark Current calibrations were performed.

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 was completed with the eclipse passages on 26/11/2005, 29/11/2005 and 02/12/2005. The eclipse passages were nominal from an AOCS point of view. After the end of the season the ACC/FDE/FCE Eclipse Timers were stopped.

No slews were lost from the Timeline during this period.

The fuel consumption over the period between 11/11/2005 and 02/12/2005 was 0.1269 kg. The remaining propellant is in the order of 157.9281 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.

28/11/2005: In preparation for eclipse #7 and 8 of the current eclipse season, the MRU timer threshold was set to 0.

29/11/2005: Eclipse #7 of the current eclipse season took place, total eclipse duration was 00:49:52, of which the Umbra duration was 00:45:58.

The battery Depth of Discharge was 2.50Ah, recharge time was 2h 48m. Both figures were in line with expectation, the behaviour of the EPS was in all respects nominal.

1/12/2005: At 08.36.17 the Payload Power Distribution Unit (PPDU) unexpectedly switched off one Latching Current Limiter (LCL, TM P2120) powering the Pulse Shape Discriminator (PSD) of the Spectrometer Instrument (SPI). The sudden removal of power to the PSD interrupted the data link between this unit and the SPI Data Processing Electronics (DPE), generating a stream of on-event messages. The DPE Instrument Application Software (IASW), recognizing the failure, reacted autonomously commanding the whole instrument and its subassemblies into Stand-by mode, where the high voltage power supplies are turned off; additionally the IASW disabled its own autonomous reconfiguration capability, to avoid exiting stand-by due to other events.

This caused a temporary interruption of the science data collection (about ~1hr) from the only SPI instrument. For more details of the failure and subsequent recovery see SPI detailed section.

2/12/2005: Eclipse #8 (final eclipse) of the current eclipse season took place, total eclipse duration was 00:31:17, of which the Umbra duration was 00:24:09.

The battery Depth of Discharge was 5.6Ah, recharge time was 2h 29m. Both figures were in line with expectations, the behaviour of the EPS was in all respects nominal.

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.

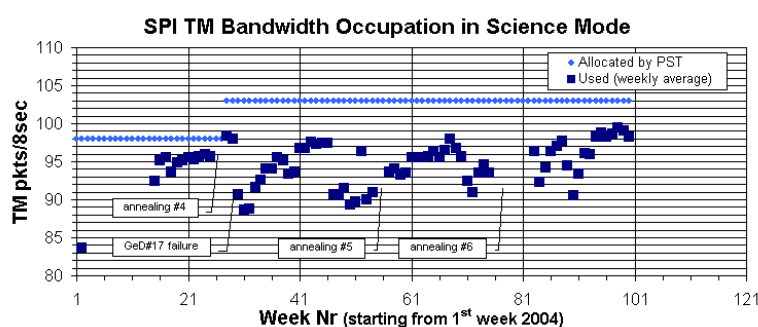
On 1st Dec at 08:36:15z a fault in the PPDU caused the switch off of the LCL power supply line to the SPI Pulse Shape Discriminator (PSD). That caused the SPI IASW to react and drive automatically the whole instrument into Stand-by mode (i.e. the safe mode of the instrument). The anomaly was only temporary, likely due to an SEU affecting the LCL electronics; the instrument operations were recovered within one hour.

On 28th Nov at 18:30z, the new SPI Instrument Application Software (IASW) version 432 was successfully installed on-board. The new version is correcting some anomaly that is only reproducible on-board and therefore a few in-flight tests followed to validate the fix. Initial test results are all positive but long-term behaviour of the software has to be evaluated before drawing final conclusions.

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 98.1 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.

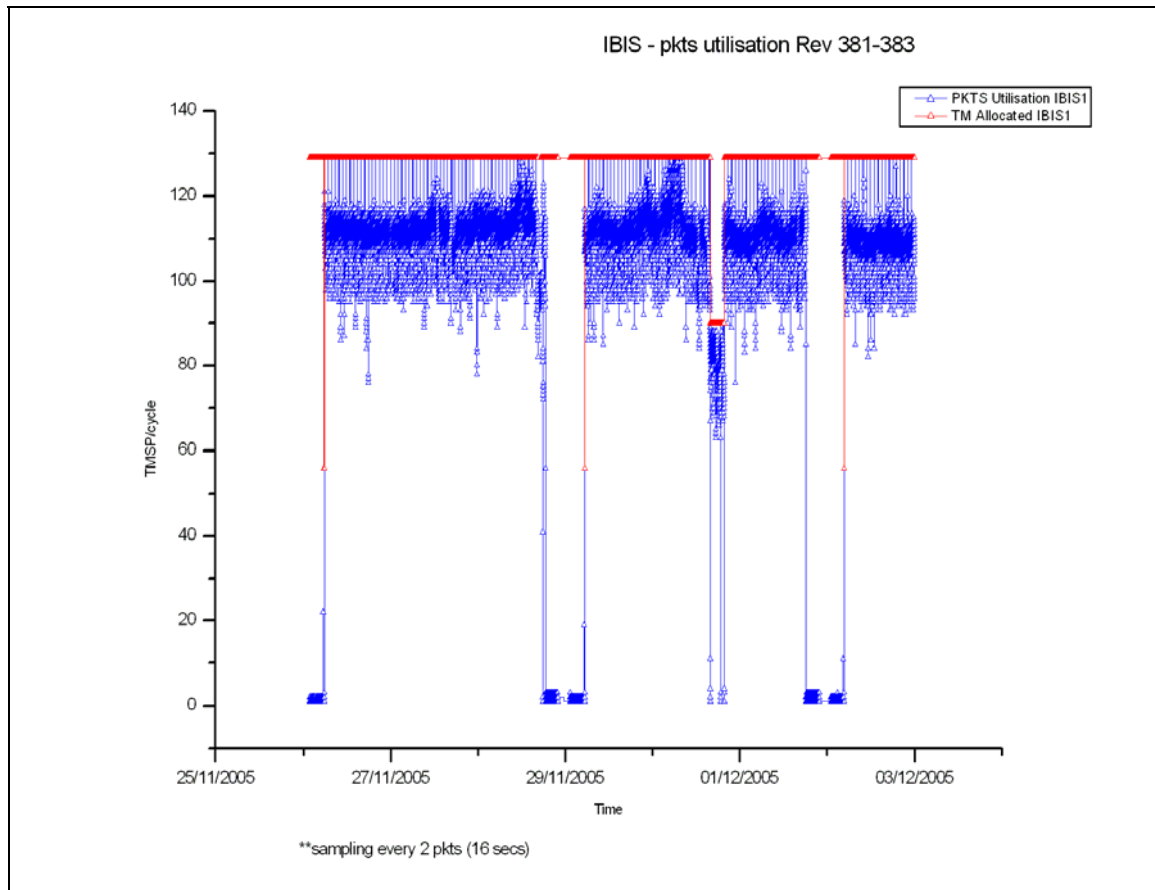
3.2.2 IBIS

The Overall status of the unit is Nominal.

The Eclipse season finished this week with the eclipse passages on 29/11/2005 and 02/12/2005. The eclipse passages were nominal from the unit point of view.

During the reporting period, the PST allocation to IBIS was 129 TMPS/cycle. However on 30/11/2005 between 15:59:38Z and 19:50:42Z it was 90 TMPS/cycle due to an OMC FFC. The IBIS mean bandwidth utilisation during the observation period was 110.42 TMPS/cycle, down 1.17 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.

On 2005-11-26 at 02:19:56Z a timeout error on the JEM-X1 LSL occurred when the JEM-X1 DFEE was switched off by the PPDU ECL (S → E) sequence. This problem was rectified by itself when the DFEE was switched on again after eclipse.

On 2005-11-28, due to problems with the NCTRS, the ED KESAFE02 was uplinked manually about 10 minutes later than planned in the Timeline before radiation belt entry of revolution 381.

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, 131 of the 131 planned science pointings for OMC were executed nominally, none were lost.

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

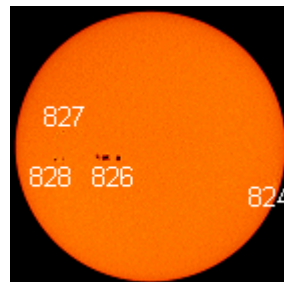
3.2.5 IREM

The overall status of the unit is nominal.

The Eclipse season ended this week with the eclipse passages on 29/11/2005 and 02/12/2005. 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, the sun was quiet. On the 30th of November sunspot 826 appeared. Since then, it has been posing threat of solar flares and some activity has been reported in x-ray emissions. (Picture: sun on 02/12/2005).



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 was excellent this week, no pointings were lost. The overall performance was nearly 100%.

4.1 Mission Operations Centre

The performance of the MOC was quite good this week, there were lots of problems with the nctrs-a this week (nctrs-b provided a good back-up), but by good fortune no slews or pointings were lost. There were other minor issues with discs filling up, and strange imcs error messages, but these had no impact. The overall performance was nearly 100%.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were a few instances of bad frames and TM drops, but these had no impact on the mission. The overall performance though was nearly 100%.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's up to revolution 390 are now available in ISOC. Planning up to revolution 389 has been performed and the corresponding files sent to MOC and ISDC. The AOCS calibration for revolution 385 was finally implemented and agreed with all parties. A SPI annealing has been requested for early January 2006. Final approval is pending availability of an accepted procedure. TSF for revolutions 383 and 384 were received.

2. Observation status

ECS's for revolutions 372 and 374 were received. The corresponding OCS's were sent to ISDC. No extra time was credited.

3. ISOC science data archive

The automatic transfer and ingestion of archive data from ISDC has now been extended to the observation groups. This is a very complex operation and some problems are inevitable. Science window data up to revolution 369 are now ingested in ISDA. All data for the 2nd ISGRI catalogue are now available from the University of Southampton.

4. ISOC system

Version 11.3 that was installed last week has been used without major problems.

5. AO 4 preparation

The documentation updates for the AO 4 is now a major activity in ISOC. In two weeks time the documents will be sent to instrument PI's and ISWT for review. Before this they will be subject of an internal review. The INTEGRAL User Group (IUG) had recommended the introduction of so-called key projects. One such project has been already suggested for AO 4. The frame-work to handle these special proposals has been agreed this week. More work is necessary including interface discussions with ISDC.

5. Problems

The long standing problem of differences in the constraint checking between ISOC and MOC / Flight Dynamics can now be considered as closed although a final agreement is still pending on how to transfer eclipse files from MOC to ISOC. No new problem has arisen.

4.3.2 ISDC

Status of ISDC observation processing on 05/12/2005:

- 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 330, at 01:53, Network could not connect the TC link on nctrs-a, at 02:00, the problem was avoided by cross-configuring nctrs-b to imca, later at 10:02, the nctrs was swapped back to the prime unit, there was no impact.
- At 05:30, the following Event Log message was received: "TCOserver, imca, Error, Log, Time correlator not valid." There was no impact.
- At 21:15, the idda & iddb icons on the global MMI were yellow, with alternately the TMDSmainRT & TMDSmainPB tasks using 24% of the cpu, there was no impact.
- At 23:02, the nctrs-a icon on the Global MMI was red. The Network nctrs display computer had crashed. At 23:08, the TC was closed and reopened, there was no impact.
- On DoY 331, at 00:14, the Event Log message: "TPKT, imca, Error, System, No TM flow on VC-0 ONT. TCOserver. Time correlator changed to inaccurate" was raised, then at 00:17, the message: "BEHVLimC, imca, Warning, Software limit checker is not receiving TM". At 00:23, the messages: "TMDSmain, idda, VC7PB disconnected", followed by: "TMDSmain, idda, VC7PB disconnected" were seen. The Autostack was also showing no TM, and then no TC. At 00:24, Network stopped and started the nctrs-a. At 00:29, the TM returned, and at 00:36, the TC was back. It was reported that the last message seen on the nctrs-a before it froze was "AOSIAM-logsize control already running". There was no impact.
- At 15:27, bad frames were received for 2 seconds, there was no impact.
- At 22:36, there was a 22 second drop in VC0 & VC7 TM from Redu, which only seemed to affect nctrs-a., there was no impact.
- On DoY 332, at 02:53, there was an imca warning message: "CPD on host imca is not receiving packets". At 03:12, the CPD_TM task on imca died. At 03:13, the SPPG, PIF, Verifier & Limit checker tasks were restarted on the imca, then at 03:18, the TC chain: Multiplexer, Verifier, Releaser, OBQM, IPF, PIF, NCDVAdmin & OMCH tasks were restarted. At 03:22, the CPD_TM, and Autostack tasks were restarted. The problem seemed to be similar to that experienced on DoY 307 at 10:14, where the PIF server didn't come up after a restart. There was no impact!!
- From 16:15 to 16:18, the TM from Redu dropped, there was no impact.
- At 16:37, during the handover from Redu to DSS-24, Network reported difficulties installing the TC link, the nctrs-a was restarted, then at 16:46, the

unit was rebooted, with the links recovered at 17:16. The impact was several EDs had to be manually uplinked, but no science data was lost.

- On DoY 333, at 01:20 (before AOS), Network report they cannot connect VC0 & VC7 TM links via nctrs-a. The unit was rebooted at 01:22, in the meantime nctrs-b took over. At 02:10, after the reboot, Network report they are still unable to insert VC0 & VC7 TM links from Redu. The problem was not cleared until 12:50, after intervention from nctrs support, there was no impact.
- At 06:03, there was an error sending data to the ISDS, at 06:10, the data was flowing again without further intervention. There was no impact.
- At 10:09, the Event Log message: idda: CPDisTM: "CPDclientHandler cannot send msg to client – client probably stopped live reception" was received, there was no impact.
- At 14:24, the nctrs-a icon was red for a few seconds on the Global MMI, there was no impact.
- At 16:35, the idda icon was yellow on the Global MMI, and indicated the problem was with the Archive file size, there was no impact.
- At 19:05, the iddb icon was red for a few seconds on the Global MMI, there was no impact.
- On DoY 334, at 02:47, the iddb icon on the global MMI went blue. Later at 07:50, the global MMI display was restarted, and the icon went green, there was no impact.
- At 19:50, a few commands were unverified or failed release due to the CPD on imca not receiving TM for 2 seconds. The limit checker task also noticed the TM drop. There was no impact.
- On DoY 335, at 14:07, the Event Log message: "idda: MADDS-B/Aux not extracting THF files" was seen, there was no impact.
- At 17:25, the icons for idda & iddb were both showing yellow on the global MMI, with HFA disk space indicated as being low, there was no impact.
- On DoY 336, at 07:26, 42 bad frames were received from Redu. Network report Reed-Solomon alarms. There was no impact.
- At 19:50, the TM-Desktop task died on sun122 during loading of a display file, there was no impact.
- At 22:06, the Event Log message: "Error TCOserver Time Correlator..." was seen, there was no impact.

The following anomaly reports were entered into the ARTS system.

AR id	Date Created	Subject	Segment	Status
INT-2815	30/11/2005	IMU_HEALTH_CHK erroneously included in PSF for rev 383	FDS	Pending
INT_SC-133	01/12/2005	PPDU LCL LINE UNEXPECTED SWITCH OFF AFFECTS SPI OPS	Spacecraft	Open
INT_SC-134	05/12/2005	IBIS: HEPI time-out	Payload	Open
INT-2816	05/12/2005	No TM-Flow on command stack	IMCS	Pending

7 Future Milestones

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

The upgrade of the IMCS has been delayed for incorporation of an urgent fix which has become available from infrastructure, new release date will probably be early January depending 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 381

In revolution 381 a raster dithering observation of GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9) was performed throughout the available observation time (~60 hours).

Throughout this observation 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.

Revolution 382

The observations in revolution 382 began with a raster dithering observation of GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9) lasting ~34 hours, followed by a staring observation at an OMC Flat Field attitude (RA 07:05:36.00; DEC -75:11:60.0) lasting ~3.5 hours, during which OMC Flat Field and Dark Current calibrations were performed. The raster dithering observation of GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9) was then resumed and performed for the remaining ~21.5 hours of observation time.

Throughout these observations SPI, IBIS and JEM-X1 were in their nominal science modes and the JEM-X2 DFEE remained off. During the OMC Flat Field observation OMC was in FFCalibration followed by DCCalibration mode and the TM allocation was IBIS 90; SPI 73; JEM-X1 8; JEM-X2 1; OMC 63. For the other observations OMC was in Science Normal mode and the TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

Revolution 383

The observations in revolution 383 consisted of a raster dithering observation of GRO J0852-4642 (RA 08:51:38.31; DEC -46:41:50.9) lasting ~49 hours, followed by a GPS, performed for the remaining ~8 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

2005-11-10T22:56:40.000Z	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.
 2005-11-26T04:08:55.000Z 158.0312 F Automatic TM processing.
 2005-11-29T03:52:46.000Z 158.0046 F Automatic TM processing.
 2005-12-02T03:16:22.000Z 157.9281 F Automatic TM processing.

This report was generated Fri Dec 2 08:00:37 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 AOCS SUMMARY OPERATIONS REPORT, 26/11/2005 – 02/12/2005

AOCS operations were executed from the Automatic Timeline.

During this period, 27 Open Loop Slews, 111 Closed Loop Slews and 3 Momentum Bias were executed (TL + manual recovery). No slews were lost from the Timeline during this period.

The AOCS eclipse operations were nominal. For the winter eclipse season passages on 26/11, 29/11 and 02/12, 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 during the winter eclipse season are provided below:

AOCS Eclipse Times															Winter 2005
Date	LOS	AOS	ACC Eclipse Imminent	Eclipse Start						Eclipse End					Eclipse Duration
				ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbra	Umbra	FSS Sun In	Penumbra	FDE/FCE	ACC	
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
2005-11-26	22:18:00	01:45:00	01:19:41	02:01:43	02:12:38	02:13:22	02:19:21	02:20:25	02:20:43	03:15:36	03:15:50	03:17:24	03:23:14	03:27:08	0:58:03
2005-11-29	22:05:00	01:28:00	01:11:00	01:53:09	02:04:12	02:04:56	02:10:40	02:11:57	02:08:49	02:33:00	00:00:00	03:00:34	03:06:44	03:10:25	0:49:54
2005-12-02	22:02:00	01:09:00	01:05:49	01:47:49	01:58:35	01:59:19	02:05:29	02:07:49	02:08:51	02:33:02	02:33:35	02:36:48	02:42:47	02:46:30	0:31:19

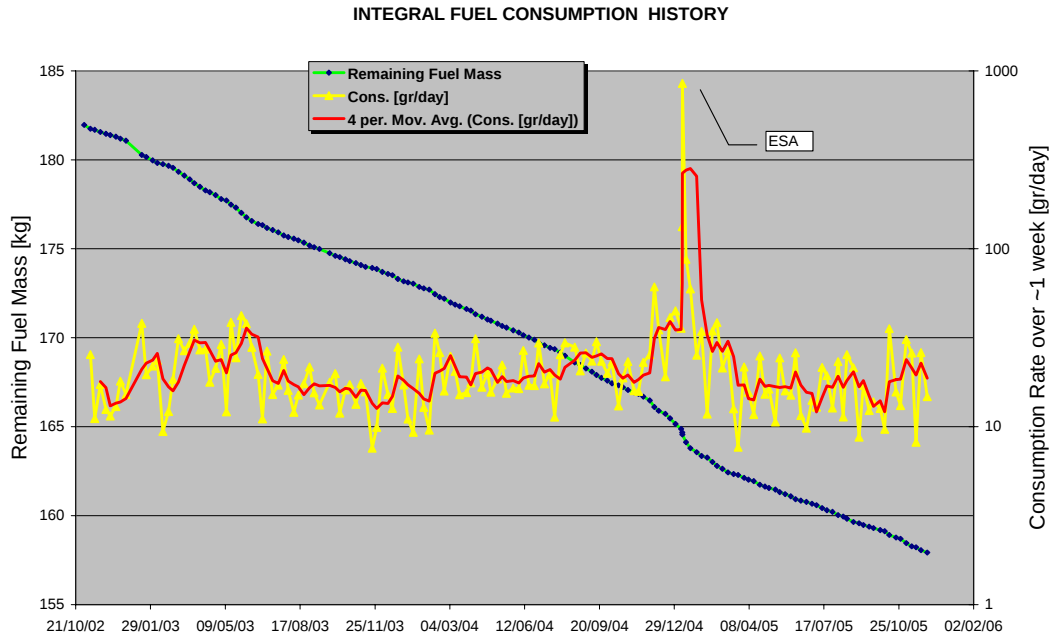
IMU Usage during Eclipse Season						Winter 2005	
IMU On	IMU Off	From Health Check		From Auto Calibration	On Time	Accumulated On Time	
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]			
2005-11-02 21:06:21	2005-11-03 03:25:57	0.2272	0.2300	NA	6:19:36	6:19:36	
2005-11-10 21:47:48	2005-11-11 04:12:08	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	
2005-11-25 19:35:59	2005-11-26 03:29:23	0.2056	0.2247	NA	7:53:24	51:43:30	
2005-11-28 18:50:23	2005-11-29 03:12:33	0.1859	0.3077	0.3254	8:22:10	60:05:40	
2005-12-01 19:02:03	2005-12-02 02:48:49	0.2065	0.1990	0.1889	7:46:46	67:52:26	

Orbit Control

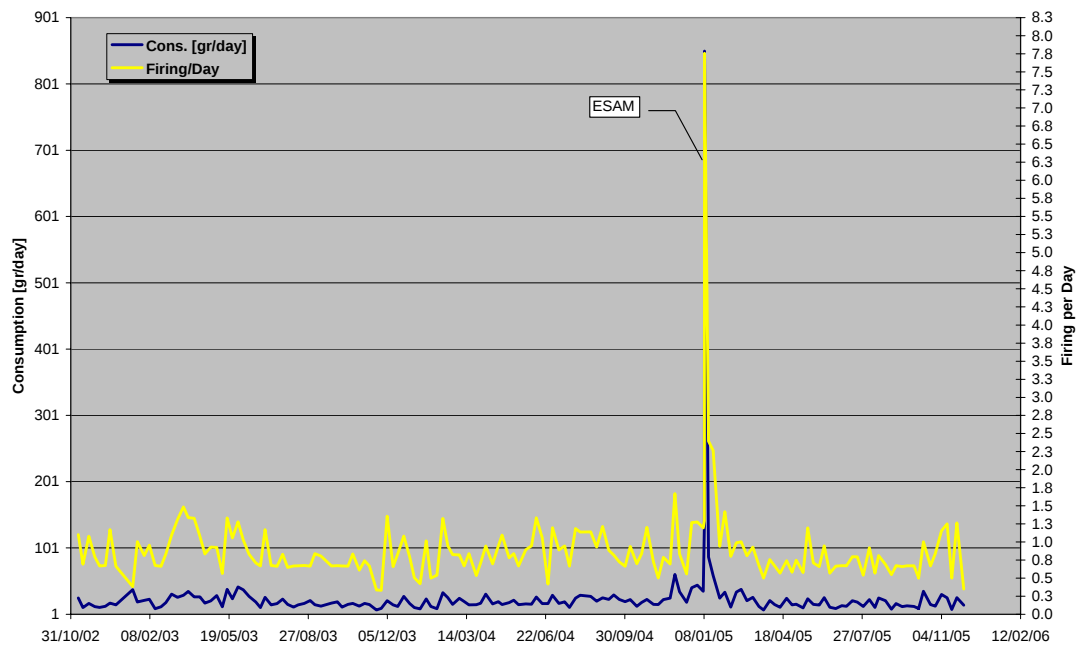
N.A., provided on monthly basis.

Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 02/12/2005 is reported in the plot below.

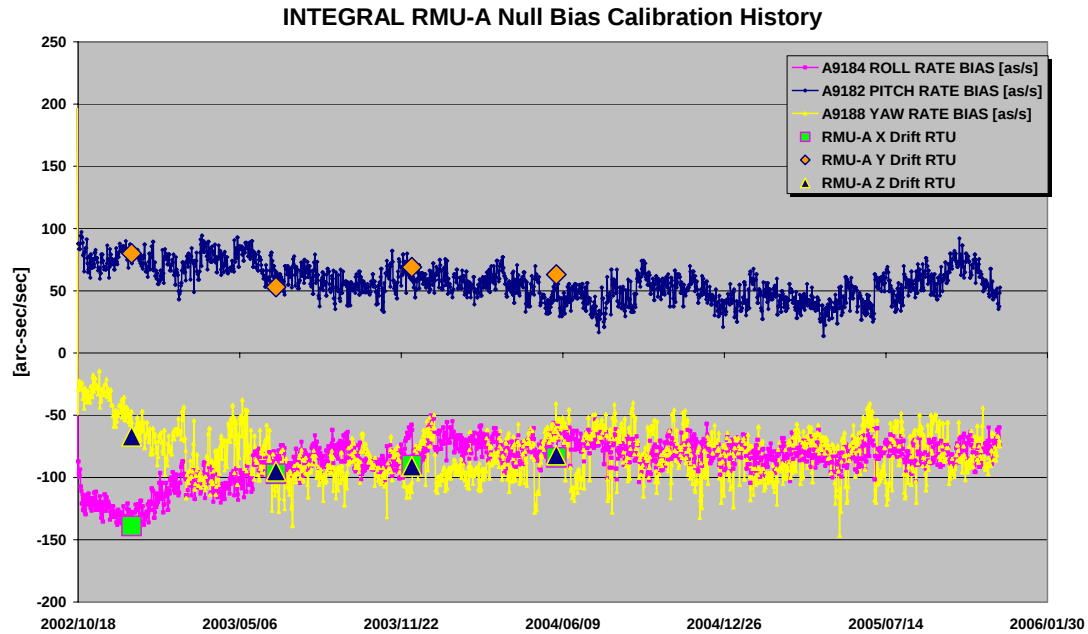


The fuel consumption (grams\day) over the period between 01/11/2002 and 02/12/2005 is reported in the plot below.

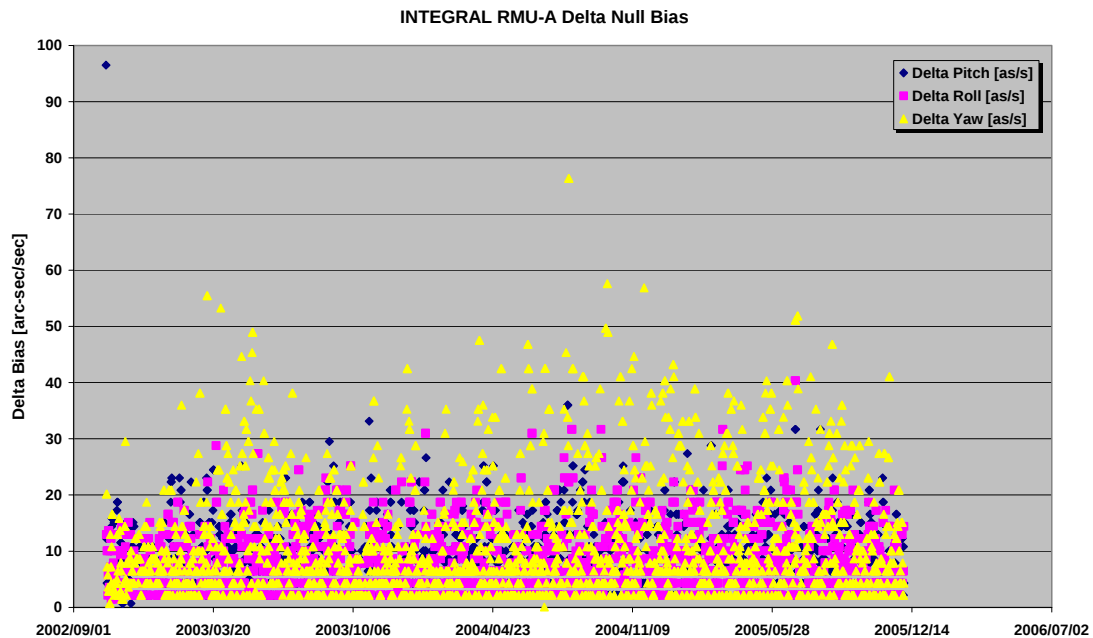


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 02/12/2005 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 02/12/2005 is reported in the plot below.



26/11/05 (Day of Year 330, Revolution 380-381)

Nothing to report.

27/11/05 (Day of Year 331, Revolution 381)

STR 1750 processor fault: at 16:43:52z a STR 1750 processor faults occurred during the execution of the PID 03810034. The sequence of the events was:

16:42:03z TRIM End
16:43:04z Mapping start
16:43:52z Mapping End prematurely (aborted)
16:43:52z IMU1 ON
16:43:52z New automatic mapping commanded by the ACC and new guide star was acquired by STR
16:53:52z IMU1 OFF

The fault, which occurred after the end of the close loop slews, resulted in the abortion of the on-going commanded mapping (duration shortened), IMU switch ON, and start of a new mapping. The guide star at the moment of the fault was

Mi 7.5 at CCD location [-14850, 14926] ID 7689-759

The guide star picked after the new mapping was:

Mi 7.8 at CCD location [1419, -6307] ID 7688-657

Likely a bright objects (GSC 7689-2617 in the Vela constellation, Mi 2.21), in the STR FoV, located at ~14 arcmins, in the same CCD detectors column of the used guide star, caused the fault and the abortion of the mapping.

The next slew (CSL) for PID 03810036 was manually updated and executed from the Timeline. No slews were missed, a manual recovery was attempted in order to reach the OTF for the remaining part of the pointing 35. The OTF was reached at 17:09z.

The operational impact of the fault was the OTF not reached for all the duration of PID 03810035.

28/10/05 (Day of Year 332, Revolution 381)

Nothing to report.

29/11/05 (Day of Year 333, Revolution 381-382)

Nothing to report.

30/11/05 (Day of Year 334, Revolution 382)

Nothing to report.

01/11/05 (Day of Year 335, Revolution 382)

Nothing to report.

02/11/05 (Day of Year 336, Revolution 382-383)

Reconfiguration of the AOCS after the eclipse season: With the end of the eclipse season the ACC, FDE and FCE Eclipse Timers were stopped. The manual operation started at 10:02z and the following steps were performed:

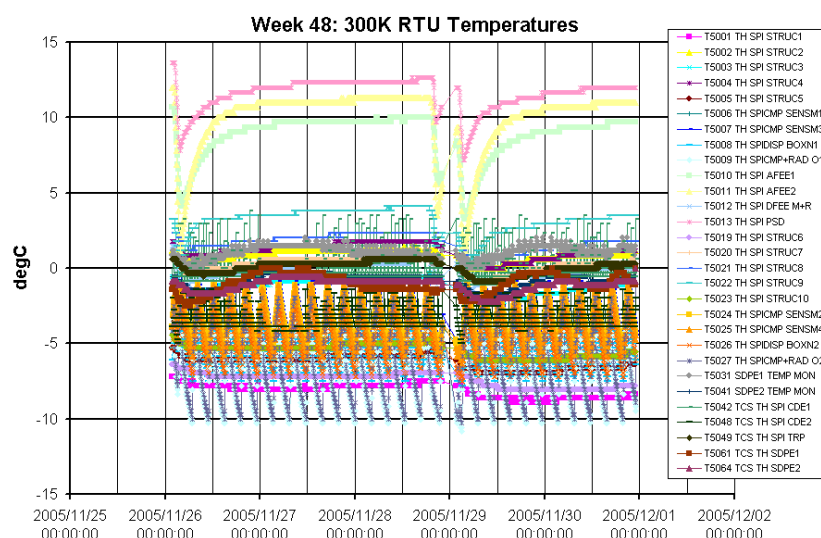
- freezing the FDE Eclipse Timer in the sunlight state (by loading zero and starting the Timer);
- freezing the FCE Eclipse Timer in the sunlight state (by loading zero and starting the Timer);
- stopping the ACC Eclipse Timer task.

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.

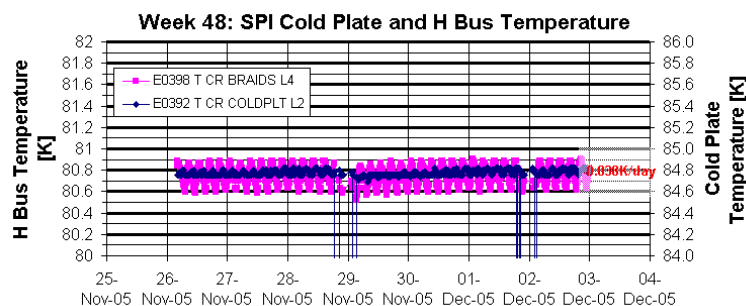
The variation of the DFEE, PSD, AFEE and ACS temperatures (still inside limits) are due to eclipse passages and the installation of the new IASW.



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.

A new IASW release, IASW v.432, was successfully installed on-board on 28th Nov at 18:30z, at radiation belts entry. The new version is intended to correct two major software anomalies:

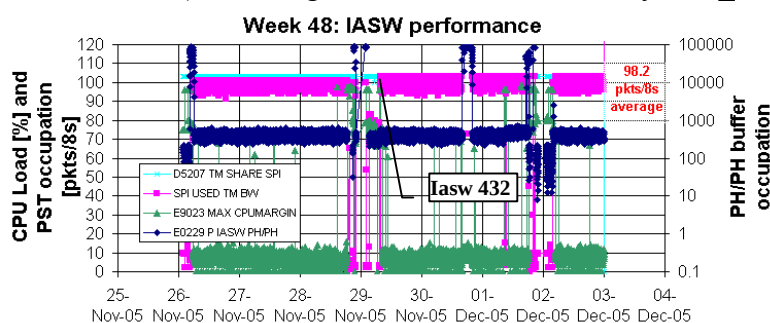
- INT_SC-115 Missed ACS HVPS Switch Off at Belts Entry
- INT-SC-107 Telemetry Leakage Anomaly

These anomalies were not reproducible on-ground, hence two exhaustive in-flight test sessions were conducted: one immediately after the installation and one a revolution later, always inside the belts, in order not to impact science operations. The results were all positive, indicating that the anomalies were solved. However the long-term behaviour of the software is still to be assessed before drawing final conclusions.

The new IASW also provides:

- A new TM parameter (E9099) to directly measure the number of TM packets transmitted by the DPE through the OBDH bus for downlink
- The instrumentation of the IASW HSL manager task to monitor its performances in relation to anomaly INT-SC-107. This is a temporary change that will be removed from the next IASW release.

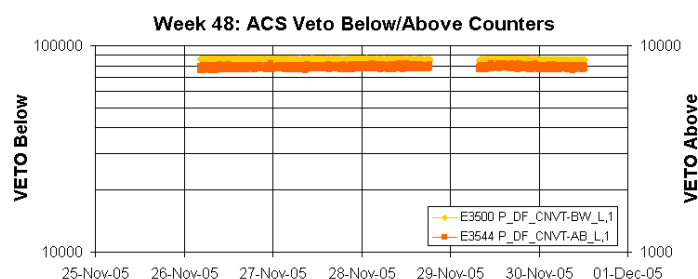
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period: It can be noted that since the installation of IASW432, the bandwidth occupation peak is slightly increased (from 101 to 103), showing the resolution of anomaly INT_SC-107.



ACS:

The performance of the ACS is nominal.

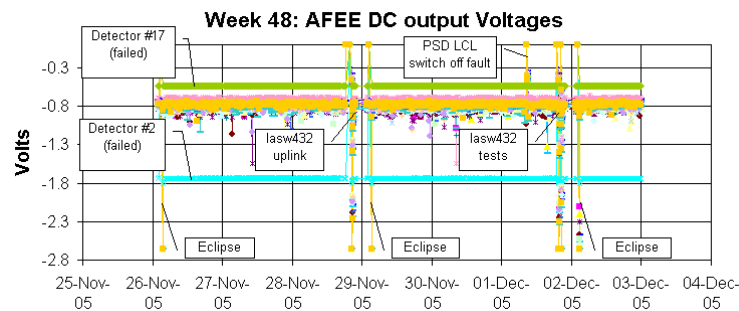
The following plot shows the ACS overall count rate evolution during the reporting period.



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

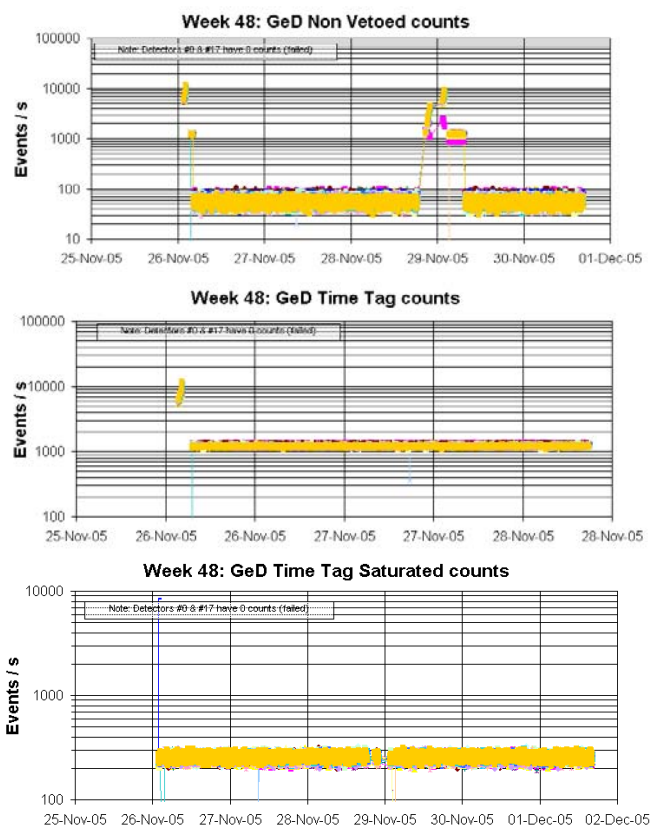
The following plot shows the dc voltage offset of the detector channels during the reporting period.



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).

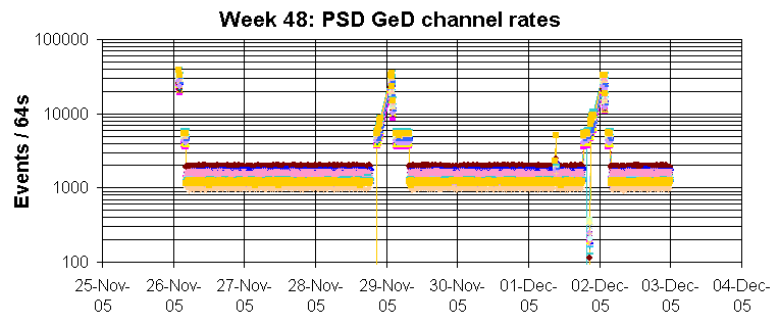


PSD:

The performance of the unit is nominal

On 1st Dec at 08:36:15z a fault in the PPDU caused the switch off of the LCL line to the SPI Pulse Shape Discriminator (PSD). The switch off was likely due to a SEU affecting the PPDU LCL electronics. The temporary fault just caused a sudden loss of power but no damage to the unit; the instrument operations were recovered within one hour.

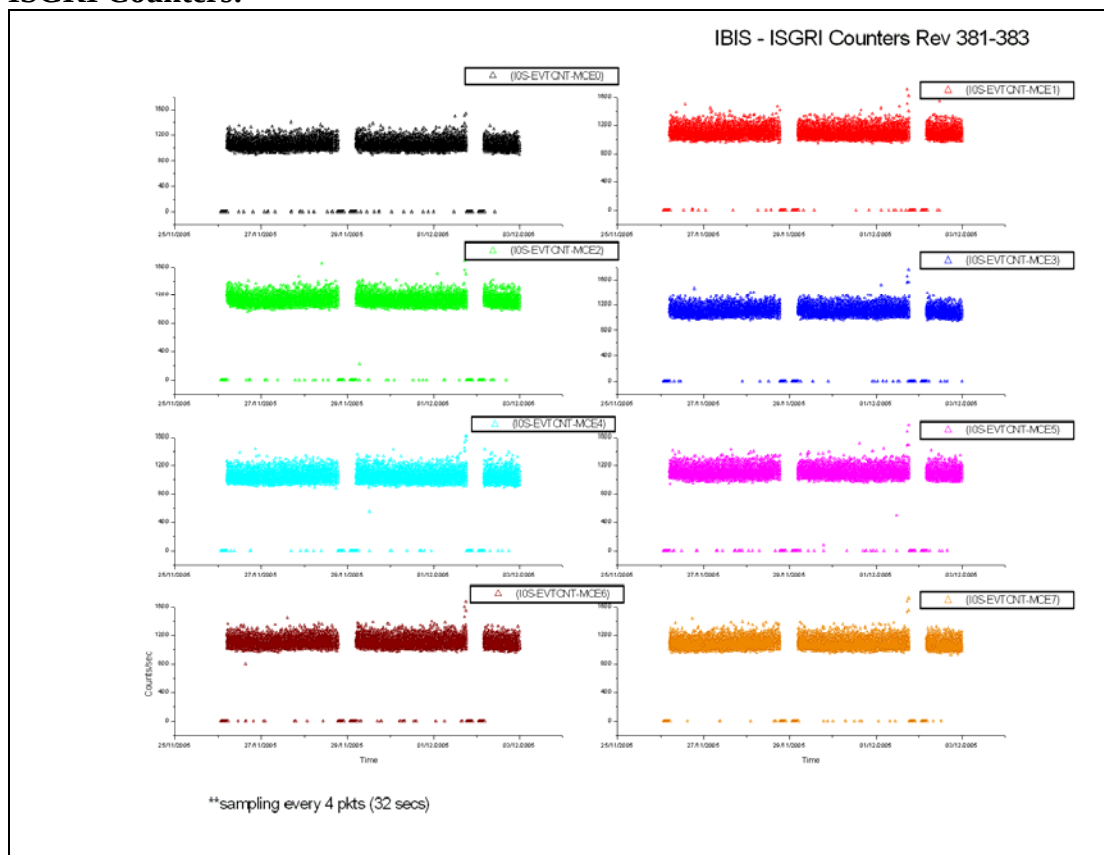
The following plots show the PSD channel rates during the reporting period



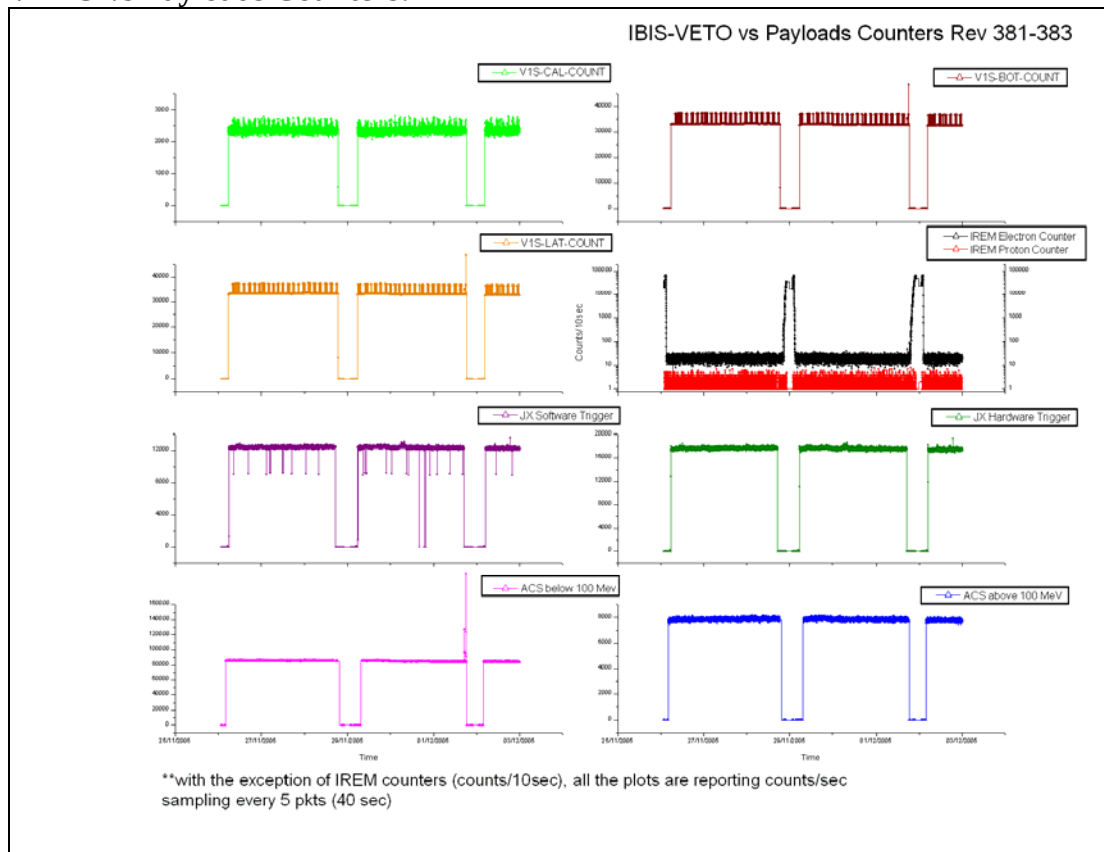
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

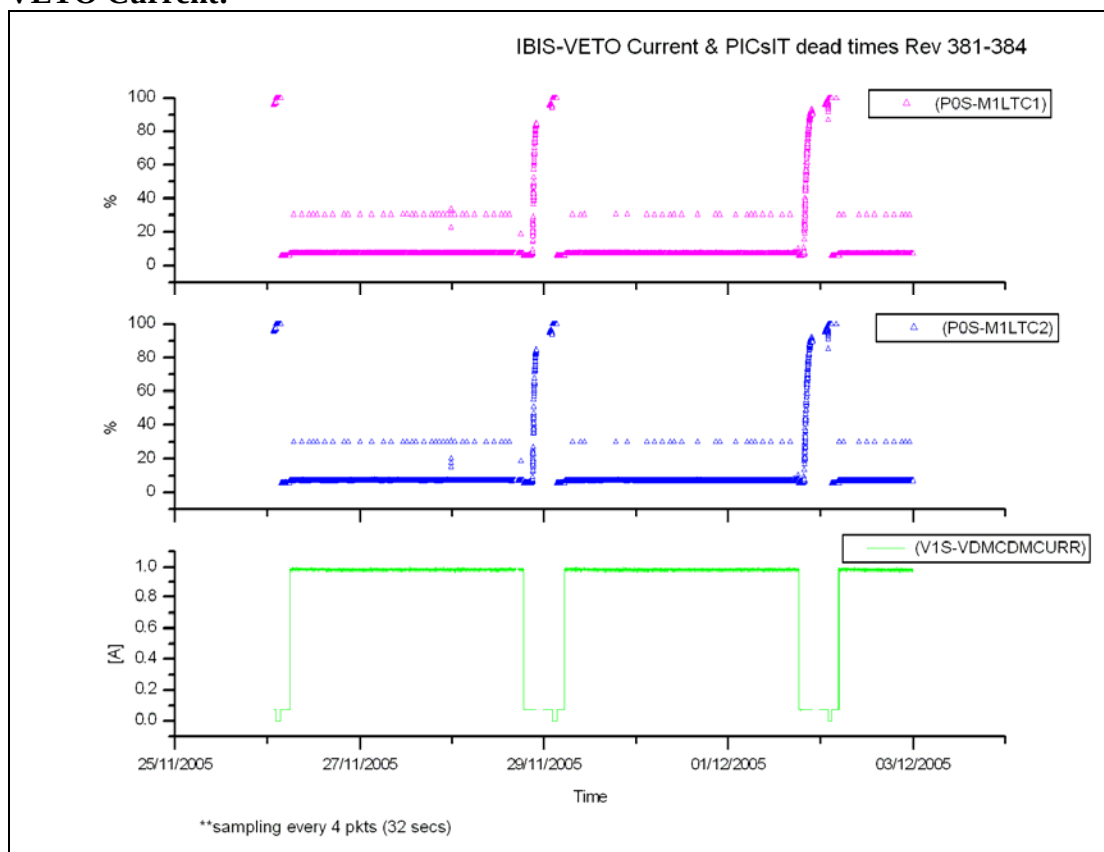


VETO vs Payloads Counters:

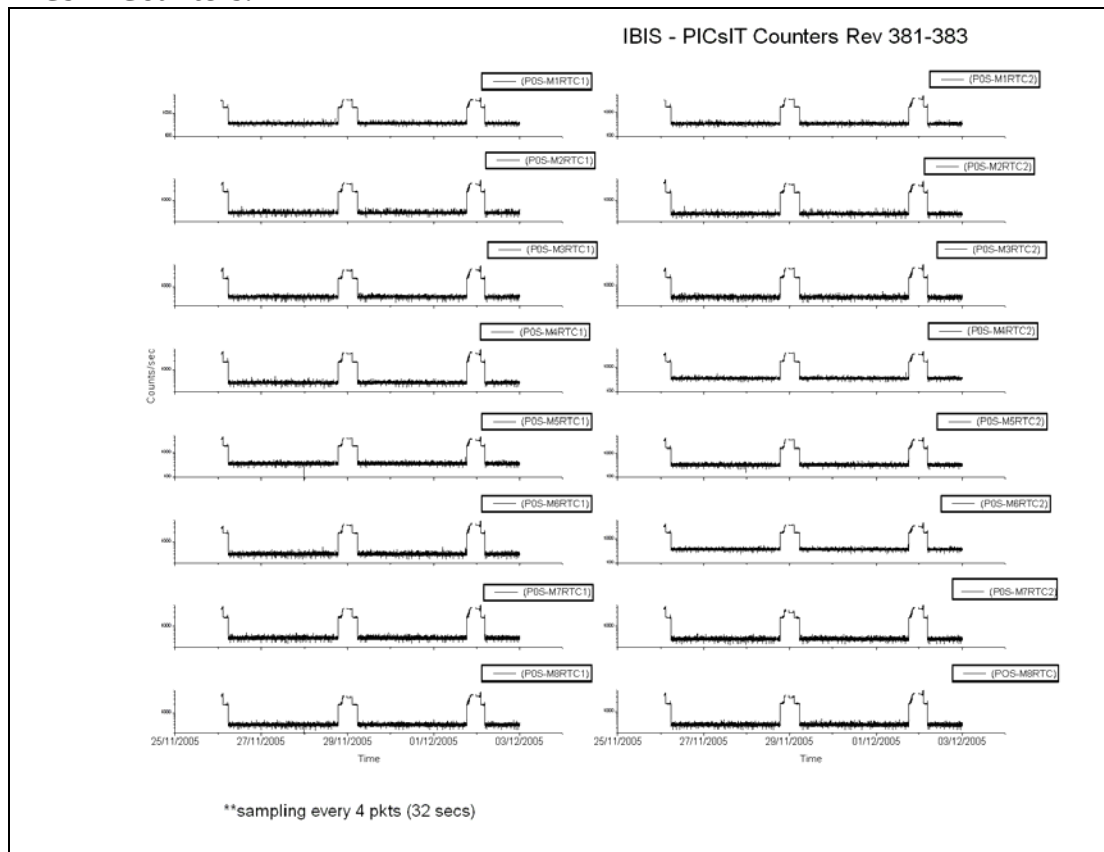


The week was characterised by low radiation.

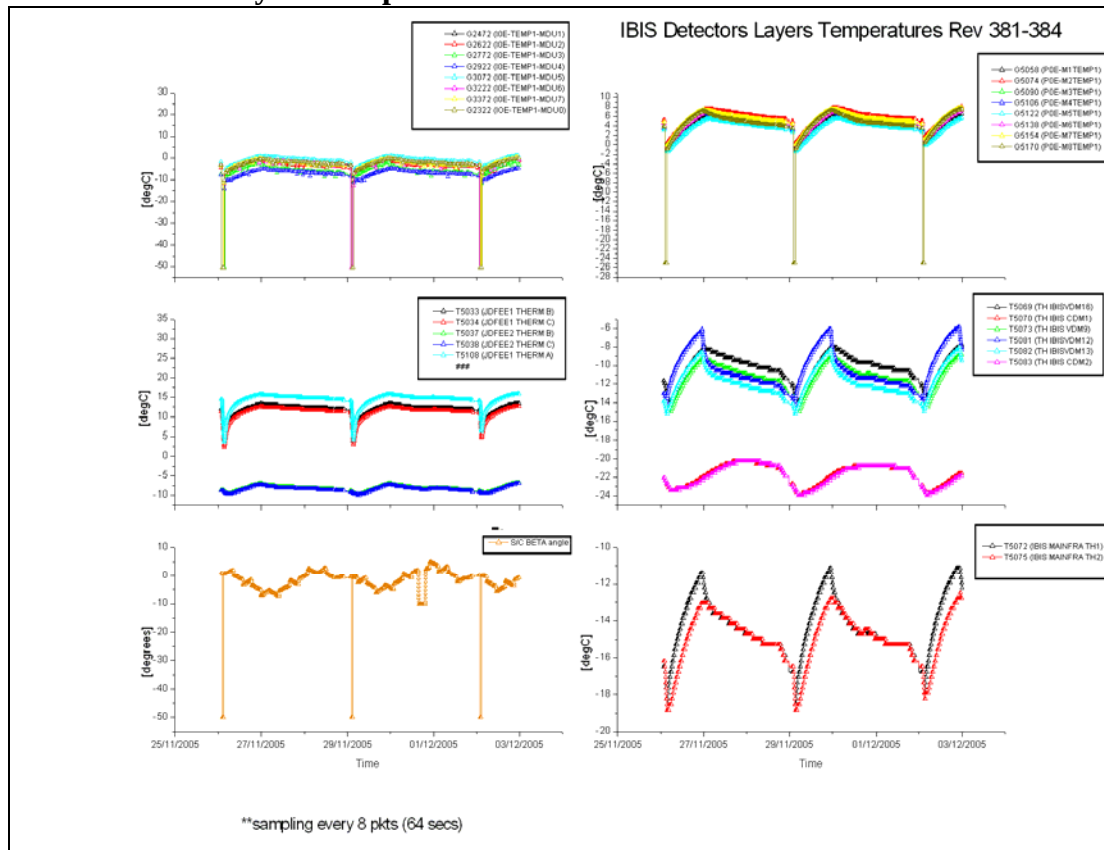
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2005.330 (26/11/2005)

On DoY 329, at 18:46Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit high. It went back inside limits on DoY 330 at 05:42Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

At 02:16Z 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 17:04Z, TM parameter G6061 (V1S-CAL-COUNT) went OOL low-low and back. No action was taken.

DoY 2005.331 (27/11/2005)

At 23:47Z, TM parameters G5088 (P0S_M2F2ERRF), G5104 (P0S_M3F2ERRF), G5148 (P0S_M6F1ERRF), G5152 (P0S_M6F2ERRF) and G5168 (P0S_M7F2ERRF) failed SCC and back. According to P-FIF-1, no action was taken.

DoY 2005.332 (28/11/2005)

At 18:38Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit high. It went back inside limits on DoY 333 at 05:25Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

As usually parameters from families G5002 (P0S_MiRTC1) and G5003 (P0S_MiRTC2) were toggling OOL High during the Belt passage. According to P-CNT-1, no action was taken.

DoY 2005.333 (29/11/2005)

At 05:05Z TM parameter G2070 (I0E_OVFWPXADD_M5) failed SCC and back. According to I-OVF-1, no action was taken.

At 16:44Z TM parameter G6061 (V1S-CAL-COUNT) went OOL low-low with the value 2180 (low limit = 2200) and back immediately. According to V-CAL-1, no action was taken.

DoY 2005.335 (01/12/2005)

At 18:12Z TM parameters G6062 (V1S-BOT-COUNT) and G6063 (V1S-LAT-COUNT) went OOL high and back due to the radiation environment. According to V-BOT-1 and V-LAT-1, no action was taken.

At 18:21Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit high. It went back inside limits on DoY 336 at 04:46Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

As usually parameters from families G5002 (POS_MiRTC1) and G5003 (POS_MiRTC2) were toggling OOL High during the Belt passage. According to P-CNT-1, no action was taken.

DoY 2005.336 (02/12/2005)

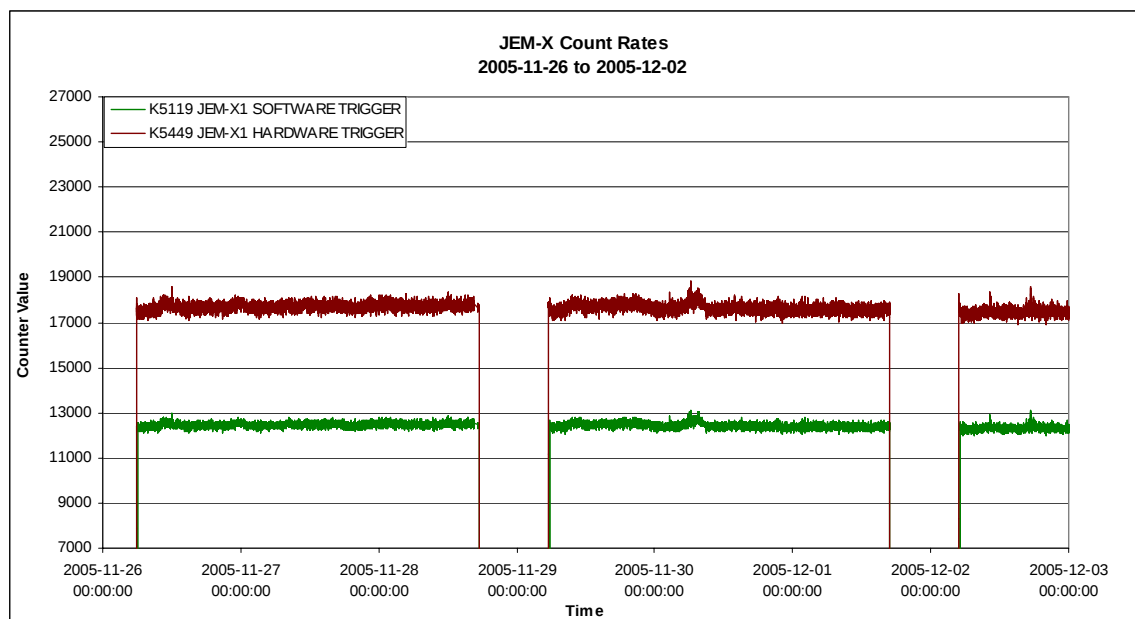
At 06:40Z TM parameter G6061 (VIS-CAL-COUNT) went OOL low-low with the value 2172 (low limit = 2200) and back immediately. According to V-CAL-1, no action was taken.

At 22:01Z TM parameter G2056 (IOE_OVFWPXADD_M4) failed SCC and back. According to I-OVF-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.

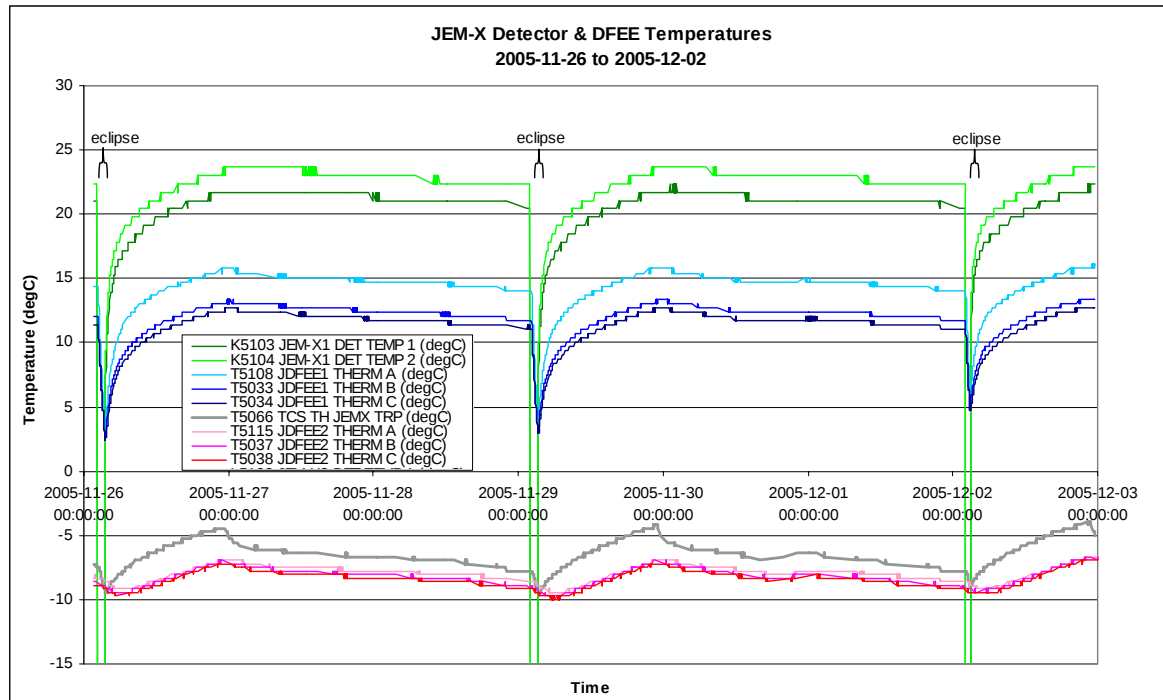


8.3.4.2 JEM-X Temperatures

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

2005-11-26 (DOY 330, Rev 380-381)

At 02:19:56Z the following OEM was issued:

169	EVENT	JEM-X1 LSL PROBLEM 9	
FIX6			9
K9079		MESS CLASS	0
K9080		MESS ID	169
K5412		WORD OF COMMAND	18193
K5413		WORD OF ANSWER	30583

>> Indicating a Timeout error on the Low Speed Line for the request from the DPE to the DFEE for the HK Block. This corresponds to the time when the DFEE was switched off by the PPDU ECL (S → E) sequence. Once the JEM-X1 DFEE was switched on again by the ED KECLEX01 in the Timeline, the following OEM was received at 03:34:51Z:

254	EVENT	ERROR OFF	
FIX6			0
K9079		MESS CLASS	0
K9080		MESS ID	254
K5408		ERROR OFF	LSL
FIX16			0

>> Indicating that the error on the Low Speed Line had been recovered. Therefore no action was taken.

2005-11-27 (DOY 331, Rev 381)

Nothing to report

2005-11-28 (DOY 332, Rev 381)

Due to problems with NCTRSA resulting in a loss of TM/TC, the ED KESAFE02 scheduled in the Timeline at 17:13:44Z (to put JEM-X1 in Safe mode before radiation belt entry of revolution 381) was missed. Once the NCTRS was recovered and TM/TC links re-established, this ED was uplinked manually at 17:22:47Z.

2005-11-29 (DOY 333, Rev 381-382) to 2005-12-02 (DOY 336, Rev 382-383)

Nothing to report

8.3.5 OMC Operations

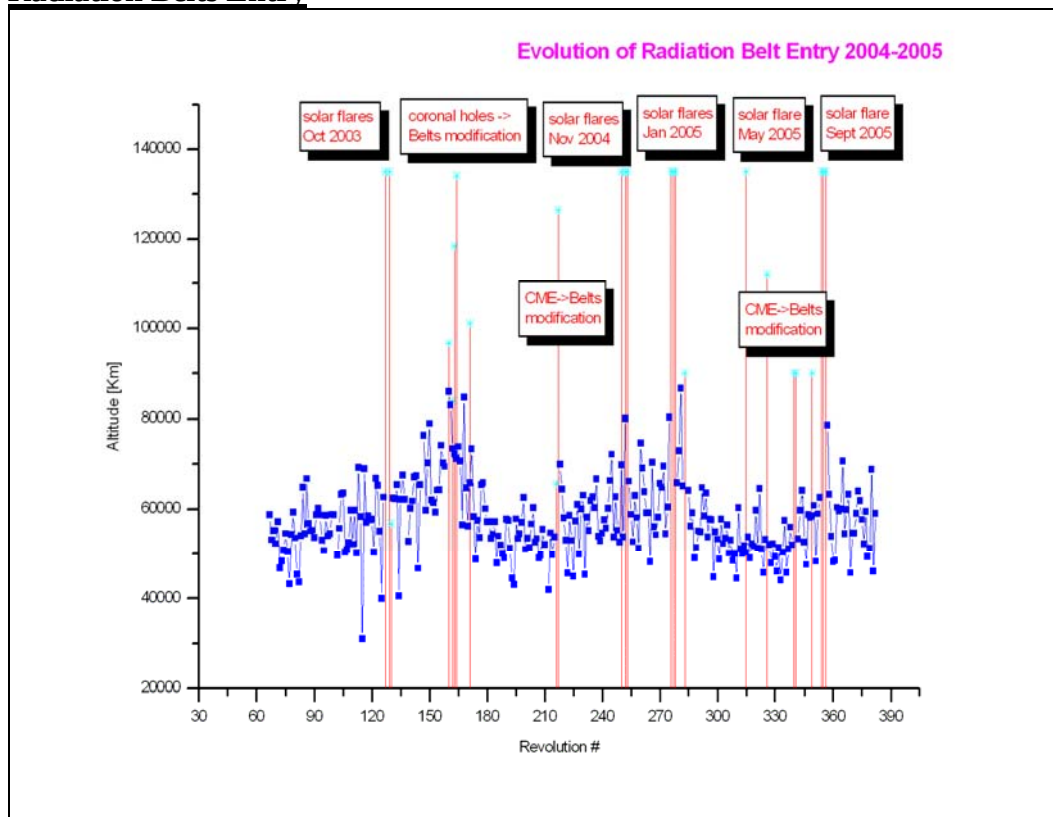
2005-11-26 (DOY 330, Rev 381) to 2005-12-02 (DOY 336, Rev 383)

Nothing to report

On DoY 332 at 18:38:11 and DoY 335 at 18:21:47 OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

Nothing to report.

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Observed Entry/Exit Altitude [Km]	Electron CUT-OFF Predicted Entry/Exit	Predicted Entry/Exit Altitude [Km]
381	RAD_EXIT R 2005-11-26T04:12:52Z	2005-11-26 03:15:46	31312	2005-11-26 03:19:49	31558
381	RAD_ENTR R 2005-11-28T18:38:05Z	2005-11-28 20:22:43	46147	2005-11-28 19:50:28	50949
382	RAD_EXIT R 2005-11-29T03:56:55Z	2005-11-29 03:00:19	31306	2005-11-29 03:10:28	32355
382	RAD_ENTR R 2005-12-01T18:21:39Z	2005-12-01 18:29:15	59030	2005-12-01 19:30:28	51866
383	RAD_EXIT R 2005-12-02T03:40:18Z	2005-12-02 02:24:11	28143	2005-12-02 02:50:28	31310

Reference

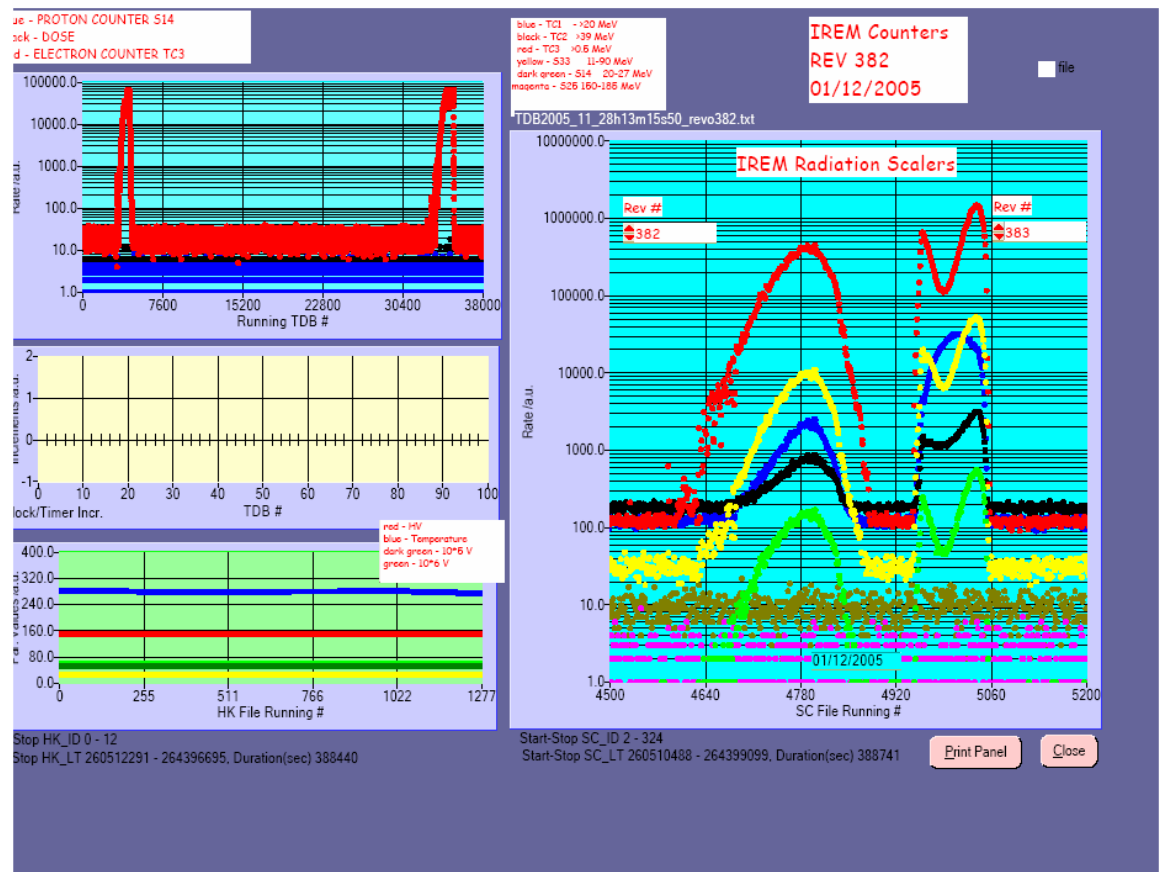
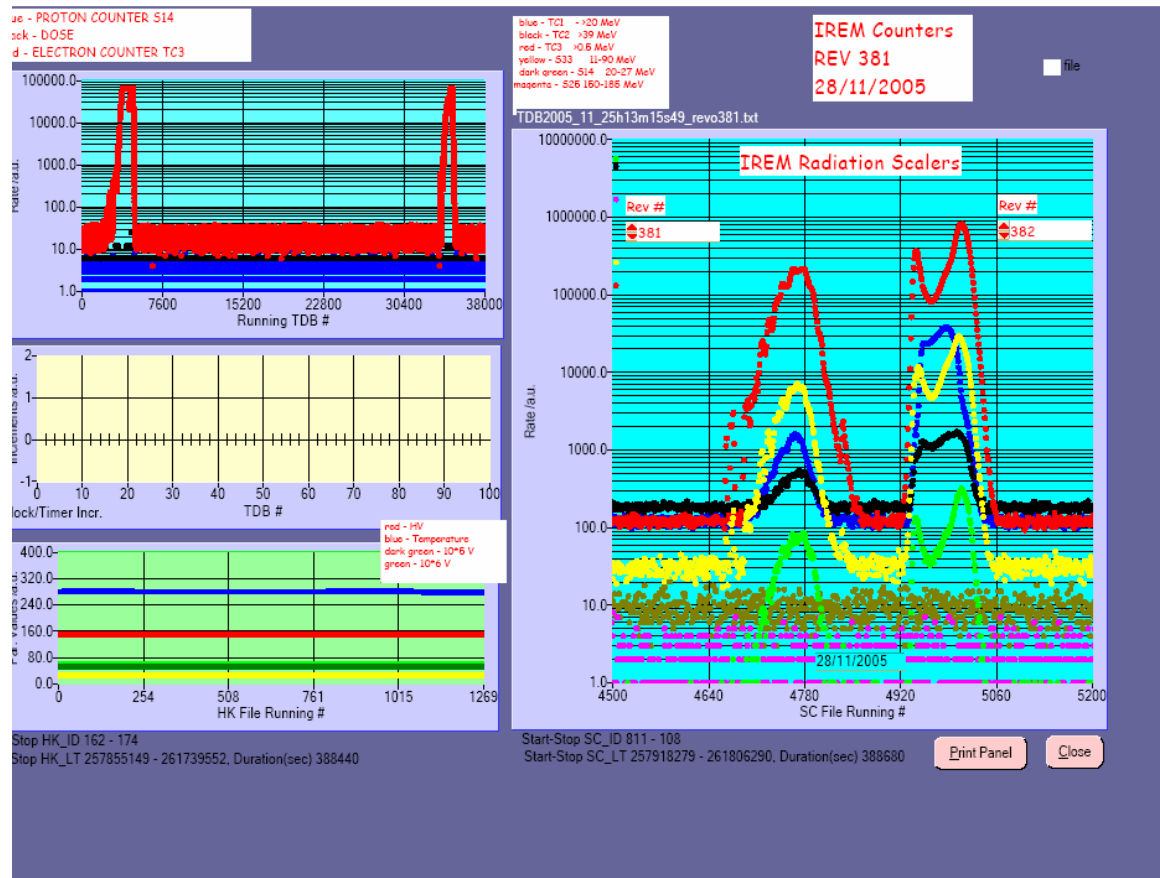
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

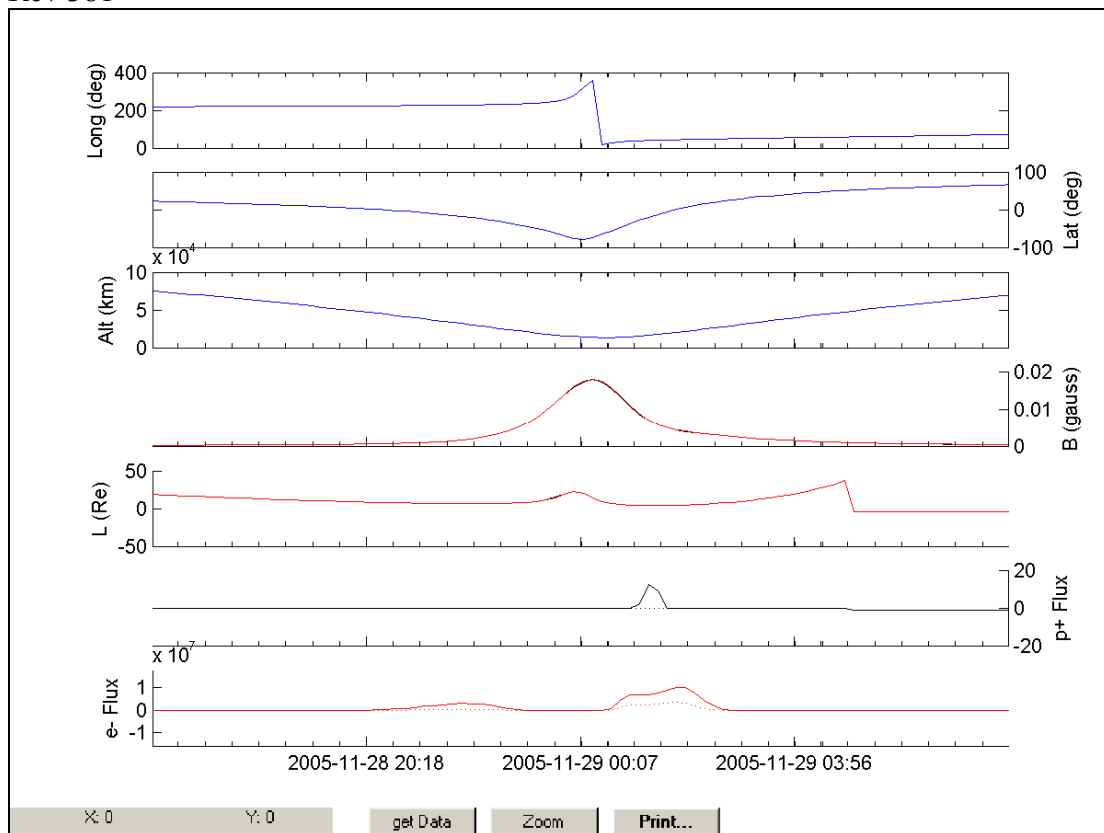
Radiation Spike

IREM radiation counters:

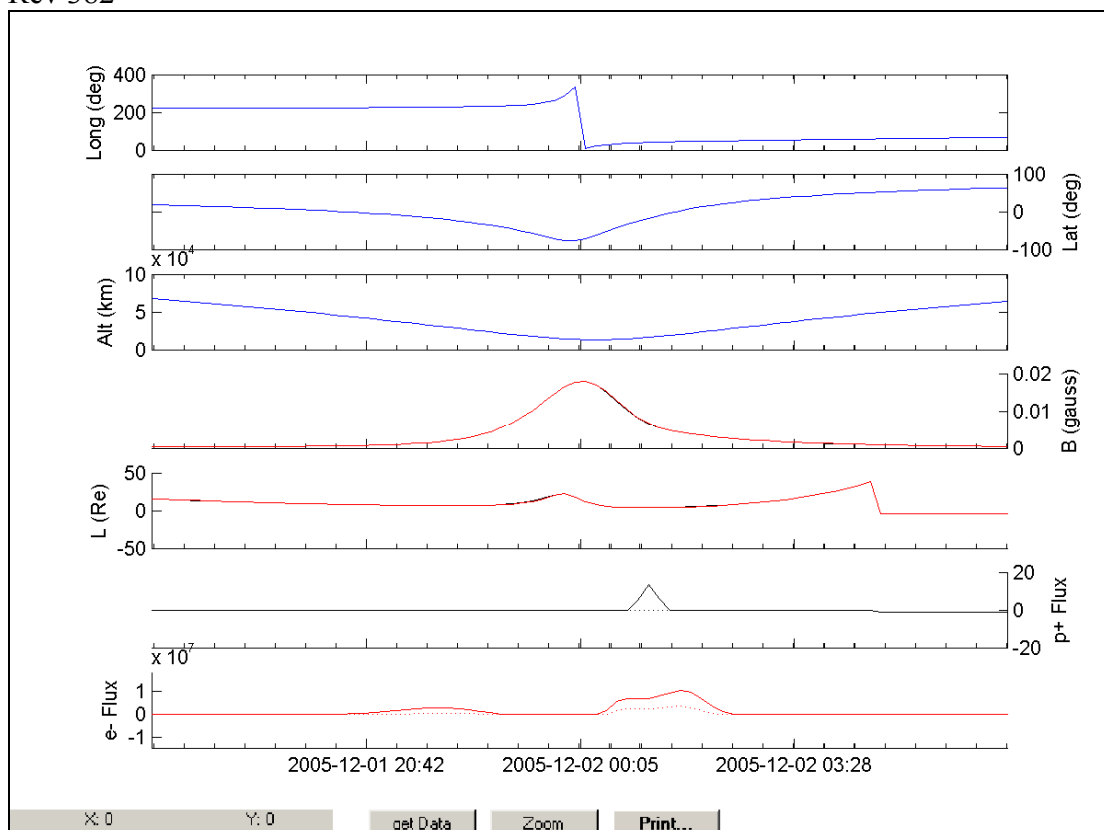


IREM Predicted Radiation Belt Passages:

Rev 381



Rev 382



SEC-GOES Observed Particles Fluxes:

