

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 168
Week 49
12.12.05
Routine Phase

Prepared by: M. Walker (OPS-OFO)

LIST OF CONTENTS

1	General.....	3
2	Summary of Activities.....	3
3	Satellite Status.....	3
3.1	Platform.....	3
3.1.1	AOCS.....	3
3.1.2	Power.....	4
3.1.3	Thermal.....	4
3.1.4	OBDH.....	4
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	4
3.2.3	JEM-X.....	5
3.2.4	OMC.....	5
3.2.5	IREM.....	6
4	Ground Facilities.....	6
4.1	Mission Operations Centre.....	6
4.2	Ground Stations & Network.....	6
4.3	Science Ground Segment.....	6
4.3.1	ISOC.....	6
4.3.2	ISDC.....	7
5	Special Events.....	7
6	Anomalies.....	7
7	Future Milestones.....	8
8	Appendix.....	9
8.1	Overview of Revolutions.....	9
8.2	Consumables.....	9
8.2.1	Detailed Fuel Book-keeping.....	9
8.3	Detailed Satellite Information.....	9
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 03/12/2005 – 09/12/2005.....	10
8.3.2	SPI Operations.....	17
8.3.3	IBIS Operations.....	19
8.3.4	JEM-X Operations.....	24
8.3.5	OMC Operations.....	26
8.3.6	IREM Operations.....	27

DISTRIBUTION LIST

Addressees	Copy	Addressees	Copy
D/OPS		ESA HQ	
G. Winters D/OPS	1	D. Southwood D/SCI	1
W. Frank OPS-O	1		
A. Smith OPS-OF	1	ESTEC	
J. F. Kaufeler OPS-G	1	J. Louet SCI-P	1
N. Bobrinsky OPS-ON	1	A. Gimenez-Canete SCI-S	1
		ESTEC / PG	
M. Schmidt	1	G. Sarri	1
R. Southworth	1		
F. Di Marco	1		
F. Cordero	1		
M. Walker	1		
P. Lippi	1	ESTEC/RSSD	
R. Lemme	1	M. Kessler SCI-SD	1
S. Fahmy	1	C. Winkler	1
SPACONs	1	A. Parmar	1
O. Bergogne	1	L. Hansson	1
I. Bayliss	1	E. Kuulkers	1
G. Di Girolamo	1		
F. Dreger	1		
G. Gienger	1	ESTEC/SCI-A	
S. Pallaschke	1	Nicola Rando	1
W. Hell	1		
K.J. Schulz	1	ISDC	
M.A. Larsen	1	T. Courvoisier	1
K. Capelle	1	R. Walter	1
M. Butkovic	1	N. Mowlavi	1
D. Heinzer	1	ISDC Shift Team	1
Shift - Coord	1		
Scheduling Office	1	ALENIA	
T. Beck	1	M. Montagna	1
J. Wardill	1	F. Ravera	1
M. Unal	1		
P. Maldari	1	PI / Instrument Teams	
		J. P. Roques – SPI	1
Redu		G. La Rosa – IBIS	1
B. Demellenne	1	P. Ubertini – IBIS	1
		S. Brandt – JEM X	1
Vilspa		E. De Miguel - OMC	1
P. Kretschmar	1	W. Hajdas – IREM	1
		JPL / Goldstone	
		D. Holmes	1
		J. Valencia	1

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 03.12.05 until 09.12.05 (both dates inclusive) and covers the revolutions 384 and 385.

2 Summary of Activities

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

The target of these revolutions was Cas A (RA 23:51:39.60; DEC +61:41:40.5). The activities consisted of a raster dithering observation as well as FSS/STR Misalignment and Inertia calibrations.

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 last eclipse passage on 2/12/2005. 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 and the AMD thresholds were set to their non-eclipse season values.

As part of the AOCS periodic calibrations, after the end of the eclipse season, the FSS/STR Misalignment calibration, the calibration of SAS Alpha and Beta Scale Factors and the RW\Inertia calibration were performed. The pointings required for the Calibrations were planned in dedicated window in the Timeline of revolution 384 (for FSS\STR) and 385 (for Inertia).

The calibration activities were executed nominally from the Automatic Timeline.

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 0.0876 kg. The remaining propellant is in the order of 157.8405 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 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

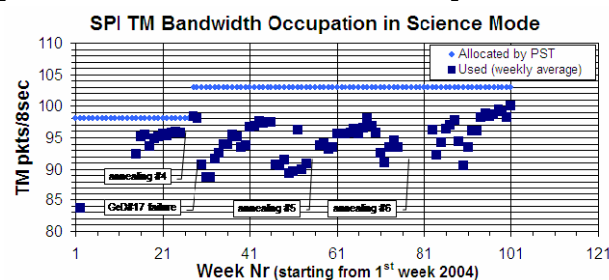
3.2.1 SPI

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 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.



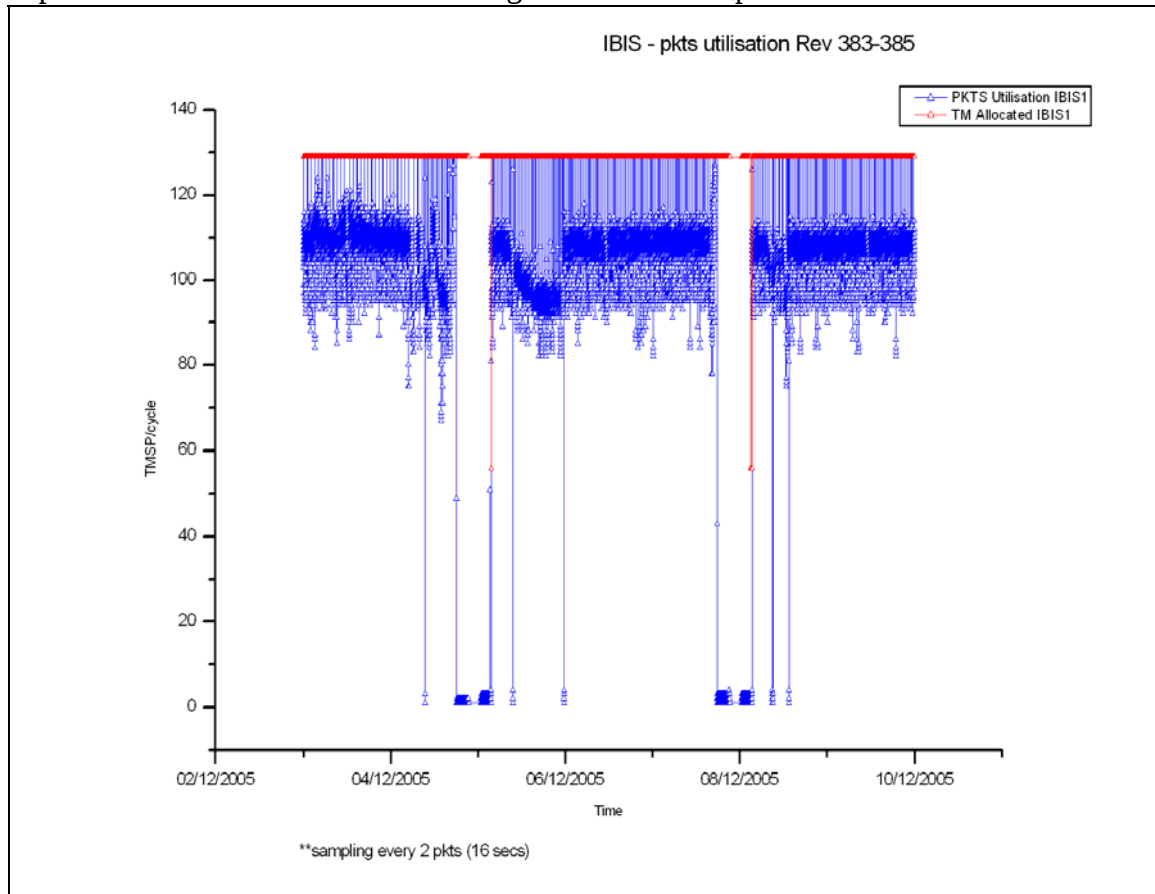
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

The Overall status of the unit is Nominal.

During the reporting period, the PST allocation to IBIS was 129 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 108.37 TMPS/cycle, down 2.05 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.

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, 235 of the 236 planned science pointings for OMC were executed nominally, one was delayed, and 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.

Solar Activity

The observation period was characterised by low solar activity.

From the 3rd to the 5th of December, sunspot 826, that appeared last week, was posing a threat of solar flares. However no X-class or M-class flare was reported. The end of the observation period was quiet.

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 well above the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was quite good this week, a pointing was delayed when the Command Verifier crashed and there are still problems with the nctrs-a but no slews or pointings were lost. There were other minor issues with strange imcs error messages, but these had no impact. The overall performance well above the 95% requirement.

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

In order to allow for low level of activities during the Christmas period it is agreed with MOC that mission planning will be established up to revolution 397 which ends 15 January 2006. PSF's for up to revolution 397 are now available in ISOC. Planning up to revolution 395 has been performed and the corresponding files sent to MOC and ISDC. In revolution 396 and 5 revolutions further is planned to perform the 7th SPI annealing if finally approved. TSF for revolutions 385 and 386 were received. No replanning has been performed and no ToO request was received.

2. Observation status

ECS's for revolutions 370, 371,373 and 375 were received. Due to short public holidays and leave the OCS processing will be done early next week.

3. ISOC science data archive

A progress meeting this week showed a slight delay in the implementation of ISDA version 2.5. A beta release is now planned for release 23 December. A meeting took place with University of Southampton (UoS) to clarify some details of the 2nd ISGRI catalogue. Interface details for future deliveries of ISGRI source catalogues was also agreed. UoS is the main interface for delivery of the ISGRI catalogue updates.

4. ISOC system

Version 11.3 has been used. A patch was introduced to allow import of PSF's with unforeseen short ground station handover windows. The topic will be discussed with MOC next week.

5. AO 4 preparation

The handling of Key Projects (KP) in the ISOC system has been discussed. In particular how the outside community will enter the KP proposals for these proposals has reached a principle agreement that will be implemented in the proposal generation tool planned for internal release shortly.

4.3.2 ISDC

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

- 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 342, at 09:01, the CMD verifier died. It was recovered 2 minutes later at 09:03, the impact was the OMC imaging commands, IBIS GESTAN02 and JEMX1 KEDATA02 were lost and had to be manually uplinked with a delay.

The following anomaly report was entered into the ARTS system.

AR id	Date Created	Subject	Segment	Status
INT-2817	12/12/2005	TM VC-0/7 drop from VILSPA	ESA Stations	Pending

7 Future Milestones

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 384

The observations in revolution 384 began with a raster dithering observation of Cas A (RA 23:51:39.60; DEC +61:41:40.5) lasting ~6 hours, followed by an FSS/STR Misalignment Calibration lasting ~13.5 hours. The raster dithering observation of Cas A (RA 23:51:39.60; DEC +61:41:40.5) was then resumed and performed for the remaining ~42 hours of observation time.

Revolution 385

The observations in revolution 385 began with a raster dithering observation of Cas A (RA 23:51:39.60; DEC +61:41:40.5) lasting ~5 hours, followed by an Inertia Calibration lasting ~4.5 hours. The raster dithering observation of Cas A (RA 23:51:39.60; DEC +61:41:40.5) was then resumed and 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

2005-11-21T19:51:00.000Z	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.
2005-12-04T08:41:56.000Z	157.9102	F	Automatic TM processing.
2005-12-04T16:30:05.000Z	157.8972	F	Automatic TM processing.
2005-12-04T21:01:57.000Z	157.8915	F	Automatic TM processing.
2005-12-05T01:33:02.000Z	157.8833	F	Automatic TM processing.
2005-12-06T11:39:54.000Z	157.8613	F	Automatic TM processing.
2005-12-07T20:51:26.000Z	157.8488	F	Automatic TM processing.
2005-12-08T01:20:22.000Z	157.8405	F	Automatic TM processing.

This report was generated Fri Dec 9 08:00:38 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, 03/12/2005 – 09/12/2005

AOCS operations were executed from the Automatic Timeline.

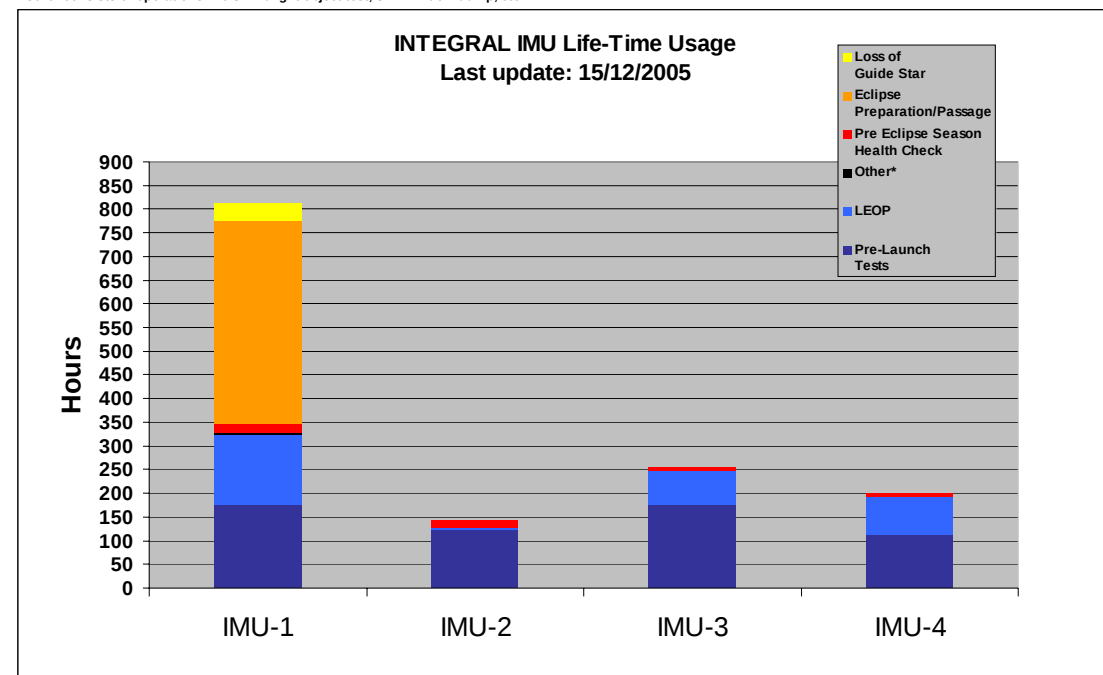
During this period, 59 Open Loop Slews, 186 Closed Loop Slews and 8 Momentum Bias were executed (TL + manual recovery).

No slews were lost from the Timeline during this period.

The AOCS eclipse operations were nominal. Some information regarding the IMU usage during the winter eclipse season is provided below:

INTEGRAL IMU Life-Time Usage									
Unit	Total [hours]	% Usage WRT 1800 hr Reserved Flight Time	Pre-Launch Tests	LEOP	Loss of Guide Star	Eclipse Preparation/Passage	Pre Eclipse Season Health Check	Other*	Last Switch-Off
IMU-1	810.948503	45.05	175.045556	147.371944	36.771003	427.145000	18.817778	5.797222	02/12/2005
IMU-2	142.330278	7.91	123.023889	3.871111	0.000000	0.000000	15.435278	0.000000	25/10/2005
IMU-3	254.725278	14.15	175.449167	70.057500	0.000000	0.000000	6.271111	2.947500	11/05/2005
IMU-4	199.760278	11.10	111.528889	80.834167	0.000000	0.000000	5.155556	2.241667	11/05/2005

* Other consists of operations like STR bright object test, STR window dump, etc.



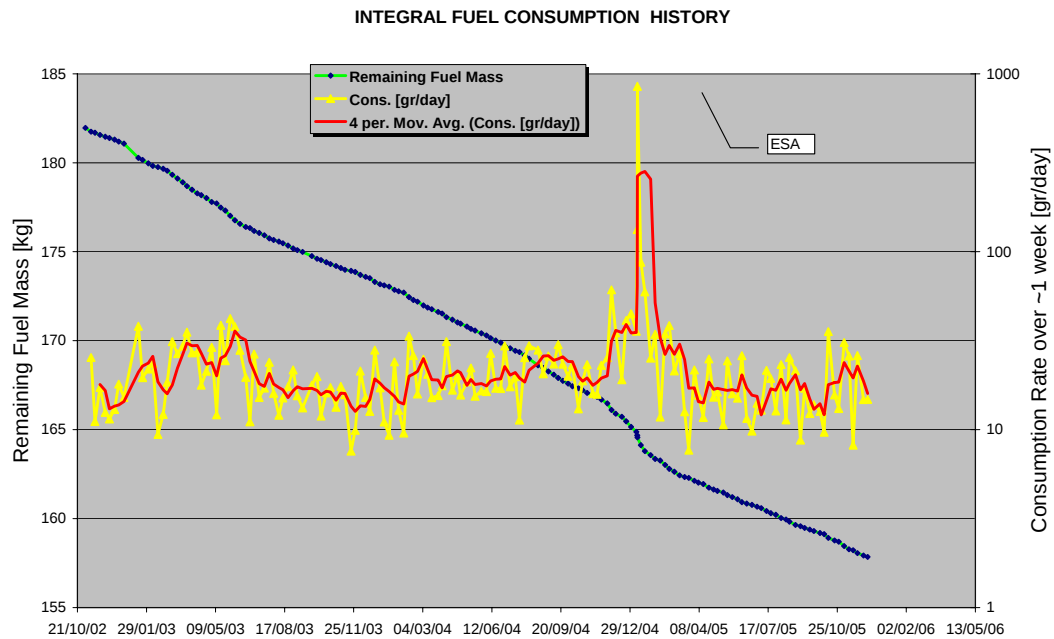
After the end of the season the ACC/FDE/FCE Eclipse Timers were stopped and the AMD thresholds were set back to their non-eclipse season values.

Orbit Control

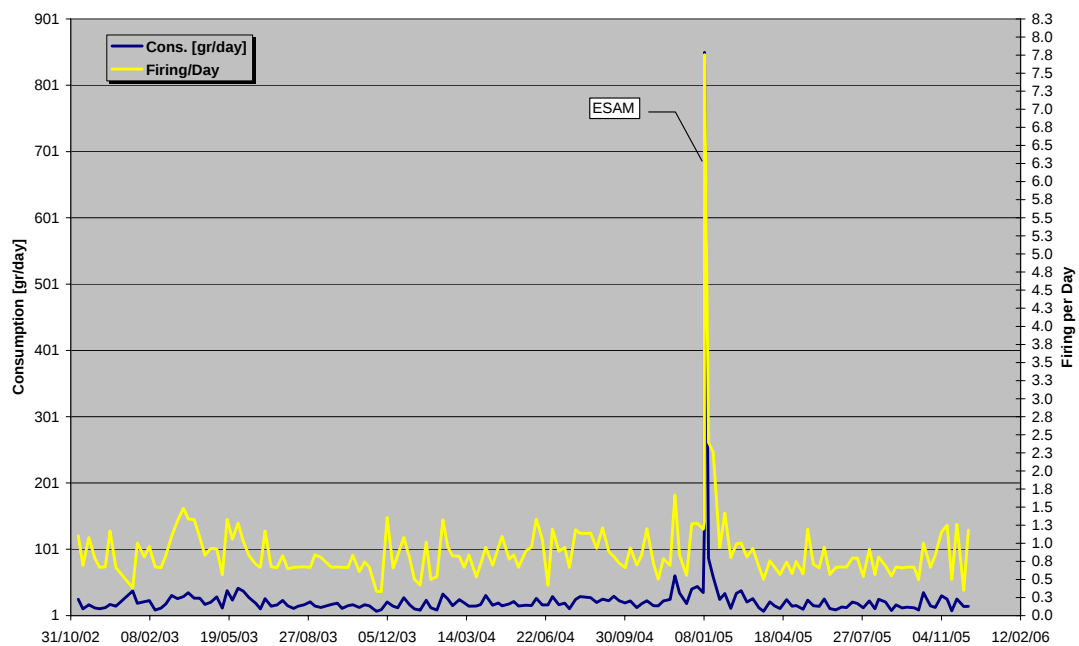
N.A, provided on monthly basis.

Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 08/12/2005 is reported in the plot below.

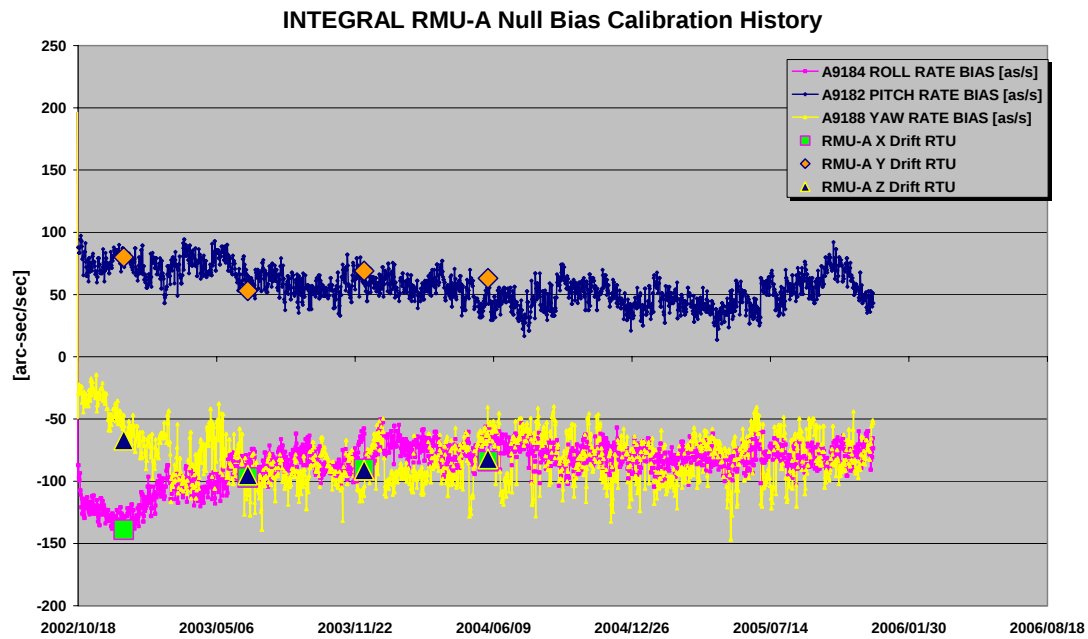


The firing\day over the period between 01/11/2002 and 08/12/2005 is reported in the plot below.

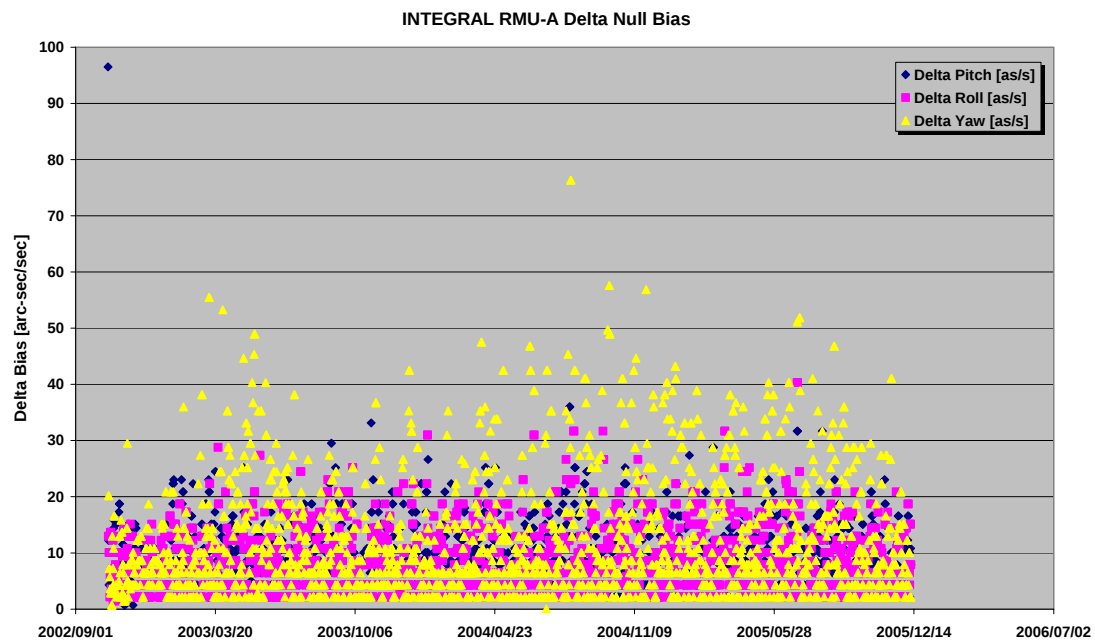


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 09/12/2005 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 09/12/2005 is reported in the plot below.



03/12/05 (Day of Year 337, Revolution 383)

Nothing to report.

04/12/05 (Day of Year 338, Revolution 383)

Reconfiguration of the AOCS after the eclipse season: With the ending of the winter eclipse season, the AMD thresholds were set back to their non-eclipse season values. The manual operation started at 21:24z and the following AMD thresholds were loaded:

Thresholds from INT-MA-AI-0001, 5.3.2.4.2.2, and INT-PR-MMB-0005 page 5-9, modified as per new AMD Threshold agreement for the eclipse season.									
01- Update of thresholds after uplink of new RW Inertias on 22/01/2004. 0155_0001_M.RWI									
Wheel Inertia:									
RW#1:	0.096000	Kgm**2							
RW#2:	0.097650	Kgm**2							
RW#3:	0.097272	Kgm**2							
RW#4:	0.097649	Kgm**2							
Sunlight Season:									
	Subset 1		Subset 2						
WSMAX	39		35.9						
WSMIN	2.2		4.8						
WSMAX	To Uplink:					In rpm:			
	X1		X2			X1	X2		
RW#1:	406.250000	rd/s	373.958333	rd/s		3879	3571		
RW#2:	399.387606	rd/s	367.641411	rd/s		3814	3511		
RW#3:	400.938401	rd/s	369.068939	rd/s		3829	3524		
RW#4:	399.388015	rd/s	367.641788	rd/s		3814	3511		
WSMIN	To Uplink:					In rpm:			
	X1		X2			X1	X2		
RW#1:	22.916667	rd/s	50.000000	rd/s		219	477		
RW#2:	22.529557	rd/s	49.155398	rd/s		215	469		
RW#3:	22.617038	rd/s	49.346265	rd/s		216	471		
RW#4:	22.529580	rd/s	49.155448	rd/s		215	469		

05/12/05 (Day of Year 339, Revolution 383-384)

Execution of the FSS/STR Misalignment Calibration: As part of the periodic AOCS calibrations, the FSS/STR Misalignment calibration and SAS calibration were performed in revolution 384. This operation was executed completely from the Timeline.

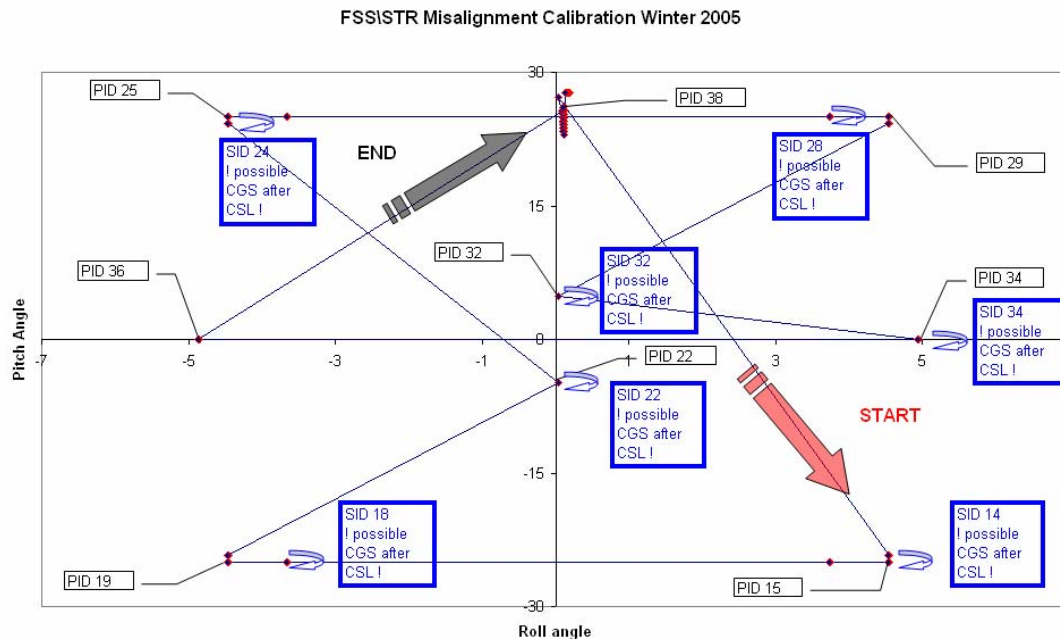
The STR\FSS misalignment calibration is scheduled after each eclipse season. The calibration is executed by performing a 4 corner x 3 points in the FSS FOV: for each point 4 SSTs activities are performed in order to acquire data for off-line evaluation.

from PID 03840013 Start of FSS/STR + SAS Calibration

to PID 03840036 End of FSS/STR + SAS Calibration

The FSS/STR calibration itself consists of 3 pointings of 0.8 degrees offset at each corner (Roll= +/- 4.5° Pitch = +/- 25°) of the FSS FoV and tracking four stars (in addition to the Guide Star) for the duration of each pointing.

A plot of the PIDs used for the calibration, reported in the FSS FOV is shown below.



Execution of the SAS Calibration: As requested already in the past by FCT, four additional pointings were inserted inside the sequence of slews for the FSS/STR calibration, to be used for the calibration of the SAS Alpha and Beta Scale Factors and update of the SAS thresholds. These included four pointings with (Alpha, Beta) equal to (0.0, +4.9), (0.0, -4.9), (+4.9, 0.0) and (-4.9, 0.0) degrees.

06/12/05 (Day of Year 340, Revolution 384)

Nothing to report.

07/12/05 (Day of Year 341, Revolution 384)

Update of the FSS coefficients after FSS\STR Misalignment Calibration: after the execution of the FSS\STR calibration the new coefficients (FSS A9-10-11; FSS B9-10-11) were evaluated on-ground and updated on board at 15:22z.

The observed variation in the FSS coefficients, wrt the previous calibration on rev 325, were limited, mainly concerning parameter FSS_A10 and FSS_B10: this translated into the STR boresight produced errors $\sim$ arcsec order.

The evaluated jump, due to the new coefficients, was for A9 $\sim$ 2.3 arcsec, and for B9 $\sim$ 7.1 arcsec.

The FSS updated coefficients as per 0384_0001_M.FSA (unit rad) are shown below:

```
AEFSA_00 S
          M F 22
2005-12-07T21:30:00Z
2005-12-07T21:30:00Z
AAAA1
FSS_A1   R -0.1191590E+01      D FSS-A transfer function parameter A1
```

FSS_A2	R 0.3635371E-04	D FSS-A transfer function parameter A2
FSS_A3	R 0.1200000E-04	D FSS-A transfer function parameter A3
FSS_A4	R 0.6135914E-02	D FSS-A transfer function parameter A4
FSS_A5	R -0.1745329E+01	D FSS-A transfer function parameter A5
FSS_A6	R 0.4100000E-04	D FSS-A transfer function parameter A6
FSS_A7	R 0.1227185E-01	D FSS-A transfer function parameter A7
FSS_A8	R 0.1518436E+01	D FSS-A transfer function parameter A8
FSS_A9	R 0.4096322E-03	D FSS-A transfer function parameter A9
FSS_A10	R 0.5331496E-02	D FSS-A transfer function parameter A10
FSS_A11	R -0.5642165E-02	D FSS-A transfer function parameter A11
FSS_B1	R -0.1191421E+01	D FSS-A transfer function parameter B1
FSS_B2	R 0.3633825E-04	D FSS-A transfer function parameter B2
FSS_B3	R 0.1170000E-03	D FSS-A transfer function parameter B3
FSS_B4	R 0.6135914E-02	D FSS-A transfer function parameter B4
FSS_B5	R 0.2076942E+01	D FSS-A transfer function parameter B5
FSS_B6	R 0.3600000E-04	D FSS-A transfer function parameter B6
FSS_B7	R 0.1227185E-01	D FSS-A transfer function parameter B7
FSS_B8	R -0.1186824E+01	D FSS-A transfer function parameter B8
FSS_B9	R -0.4403766E-03	D FSS-A transfer function parameter B9
FSS_B10	R 0.6671521E-03	D FSS-A transfer function parameter B10
FSS_B11	R 0.6737698E-03	D FSS-A transfer function parameter B11

Hereafter follows the History of the FSS Alpha (A9-10-11) and Beta (B9-10-11) coefficients since the launch (unit arcsec):

Run Time	Rev	STR FSS X	FSS_A9	FSS_A10
FSS_A11 FSS_B9		FSS_B10	FSS_B11	
2002/10/17 06:13:26	0001	B B	-84.8915860	994.2814731
1314.6779504	241.1955221	-792.7915340	253.2583531	
2002/10/17 06:13:26	0001	B A	-147.8659203	1109.3069289
915.3724221	416.2208104	390.3899050	-218.3484613	
2002/10/17 06:13:26	0001	A B	21.7121809	1021.6044798
1540.3543536	136.7246130	-819.8011812	478.7101635	
2002/10/17 06:13:26	0001	A A	-41.3633903	1136.4981023
1141.0882898	309.1626097	363.7598917	7.1161076	
2002/10/17 11:57:44	0001	A A	-10.8869311	1136.4981023
1141.0882898	-48.3742459	363.7598917	7.1161076	
2002/10/18 14:43:28	0001	A A X	-740.7515156	0.0000000
0.0000000	-62.8992210	0.0000000	0.0000000	
2002/10/22 10:26:13	0002	A A X	43.1044362	0.0000000
0.0000000	-60.6765982	0.0000000	0.0000000	
2002/10/22 10:41:00	0002	A A X	31.8405075	0.0000000
0.0000000	-58.4412611	0.0000000	0.0000000	
2002/10/22 10:46:35	0002	A A X	31.9534536	0.0000000
0.0000000	-58.8179047	0.0000000	0.0000000	
2002/10/23 12:06:48	0002	A A X	-575.7521936	0.0000000
0.0000000	-34.1473518	0.0000000	0.0000000	
2002/10/24 13:47:47	0003	A A X	-32.5119135	0.0000000
0.0000000	-73.1585486	0.0000000	0.0000000	
2002/11/05 13:37:43	0006	A A X	67.3772442	1112.4864143 -
1250.3529891	-120.1829934	435.0625162	60.2756867	
2002/11/08 12:33:15	0006	A A X	35.1912362	1149.3875188 -
1299.6735440	-106.6436234	278.5268629	185.2164330	
2002/11/08 12:54:28	0006	A A X	36.9314406	1129.9547571 -
1329.5944015	-85.0549459	346.9477086	-25.0110177	
2002/11/05 14:00:57	0006	A A	67.2067387	1131.9618229 -
1250.8956817	-120.4780133	440.9895417	60.8631778	
2003/04/04 08:12:00	0056	A	28.0672800	1123.3090000 -
1250.8956817	-120.4780133	440.9895417	60.8631778	
2003/07/23 12:17:34	0094	A A X	83.5374642	1144.9283240 -
1290.1598577	-130.3447117	-181.2657279	173.0711922	
2003/07/23 12:26:45	0094	A A X	81.4133068	1147.8046516 -
1267.0171462	-126.3265407	-58.8911287	100.5747445	
2004/01/15 08:10:37	0153	A A X	85.6545484	1106.1829781 -
1051.4112289	-107.3048338	339.9810564	60.2342427	

2004/01/15 10:28:50	0153	A	A	80.0550152	1113.7525865	-
1074.7285836	-107.3517385	342.7773785	58.3454333			
2004/01/15 12:05:43	0153	A	A	X	87.2218057	1107.2949504
1061.0560000	-107.7683725	349.3284022	64.5234373			
2004/06/30 15:52:53	0209	A	A		95.2633969	1145.6387404
1262.1608365	-128.2915442	-43.0931566	135.4295645			
2004/12/20 14:38:46	0267	A	A	X	84.3454103	1118.4758548
1190.1861634	-68.3442729	309.2098324	-74.9239762			
2005/06/13 18:24:54	0325	A	A		82.1816238	1144.1981013
1167.4243763	-97.9780532	152.8463212	138.0643852			
2005/12/07 08:41:53	0384	A	A		84.4927225	1099.6985619
1163.7823475	-90.8341826	137.6103579	138.9746936			

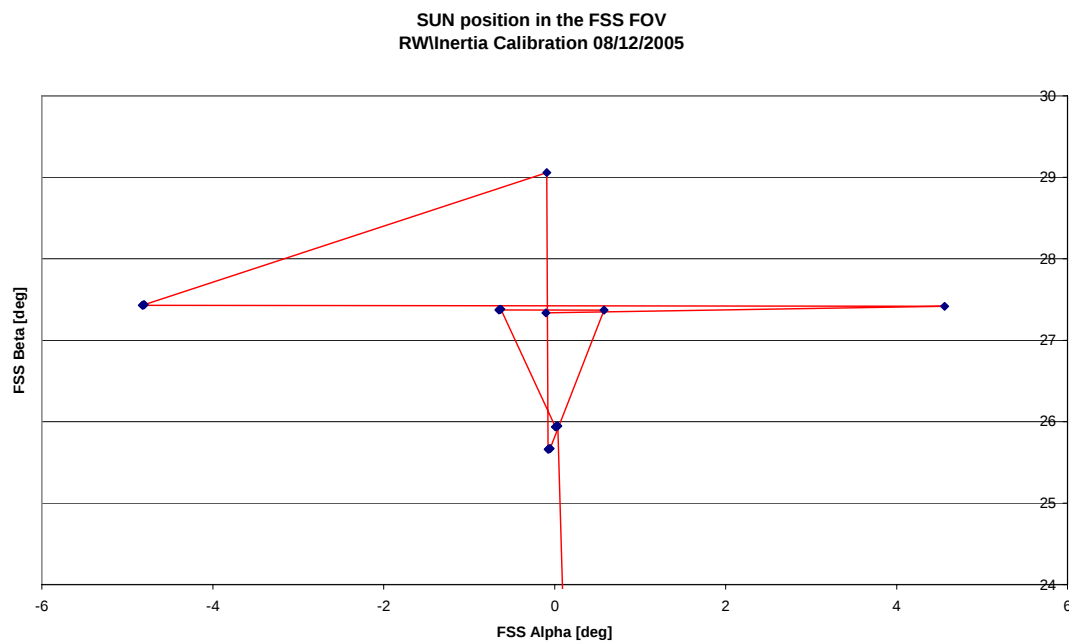
08/12/05 (Day of Year 342, Revolution 384-385)

Execution of the Reaction Wheel Inertia Calibration: A window of 8 hours was dedicated in the Timeline to the RW/Inertia periodic calibration

from PID 03850012 (Start of Periodic Inertia Calibration)

to PID 03850020 (End of Periodic Inertia Calibration)

This operation ran completely from the Timeline. The calibration was performed around a roll angle of ~ 0 degrees and a pitch angle of ~ 27 degrees. Hereafter follows the plot of the Sun position in the FSS FoV during the calibration.



09/12/05 (Day of Year 343, Revolution 385)

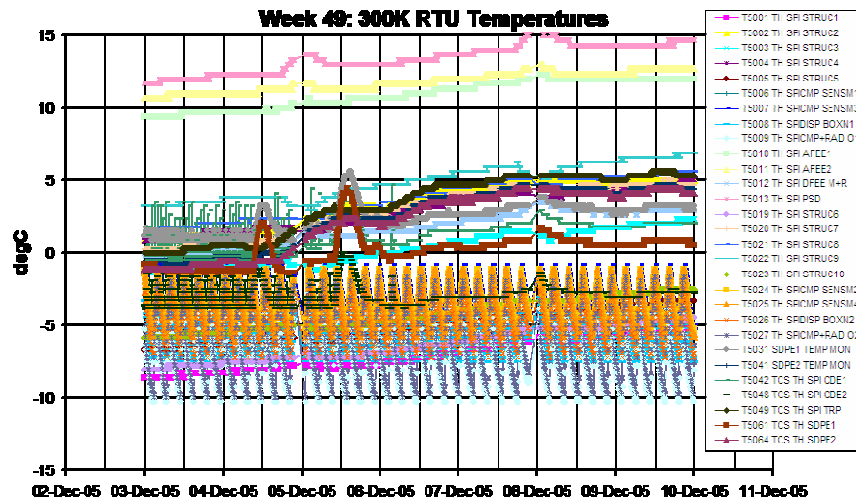
Nothing to report.

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.

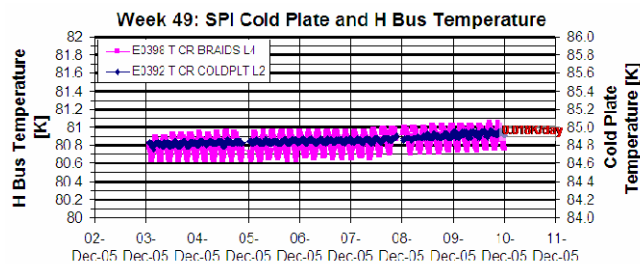
The increasing trend that is evident on some temperatures is a transitory effect of the eclipse season which is just ended.



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.

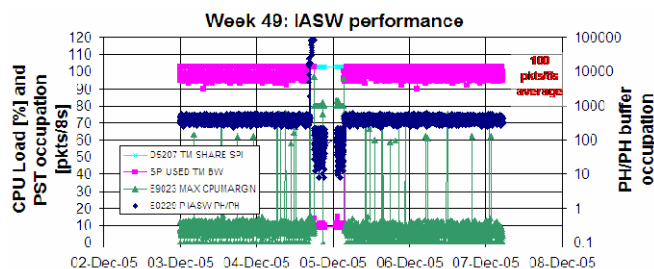


DPE & IASW

The Iasw performance is nominal.

The current Iasw version installed is 432.

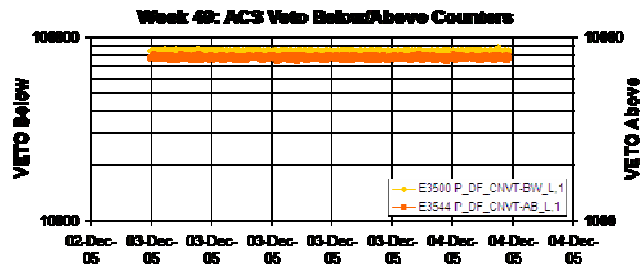
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS

The performance of the ACS is nominal.

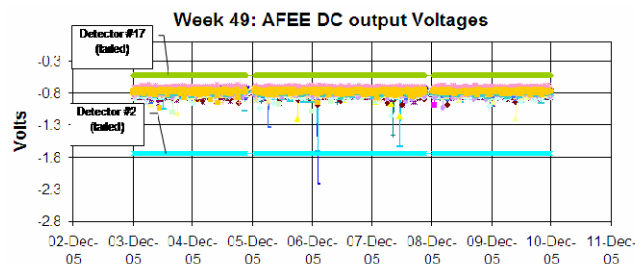
The following plot shows the ACS overall count rate evolution during the reporting period (due to problems in the data retrieval tool, some gaps could be present).



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

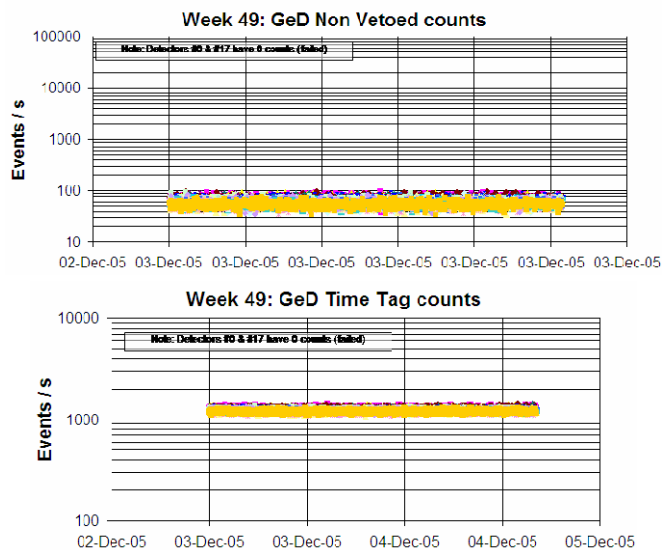
The following plot shows the dc voltage offset of the detector channels during the reporting period.

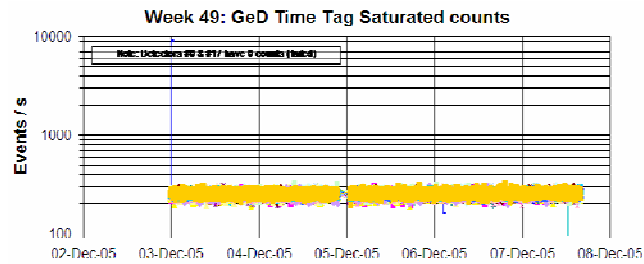


DFEE

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).

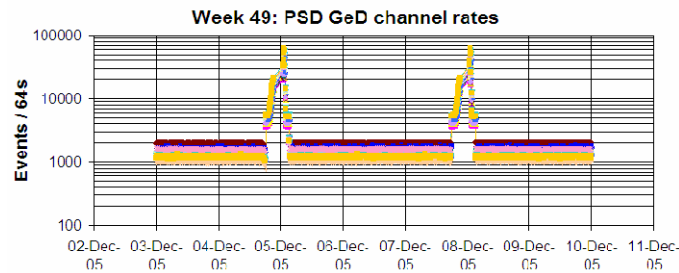




PSD

The performance of the unit is nominal

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



SPI EVENTS LOG

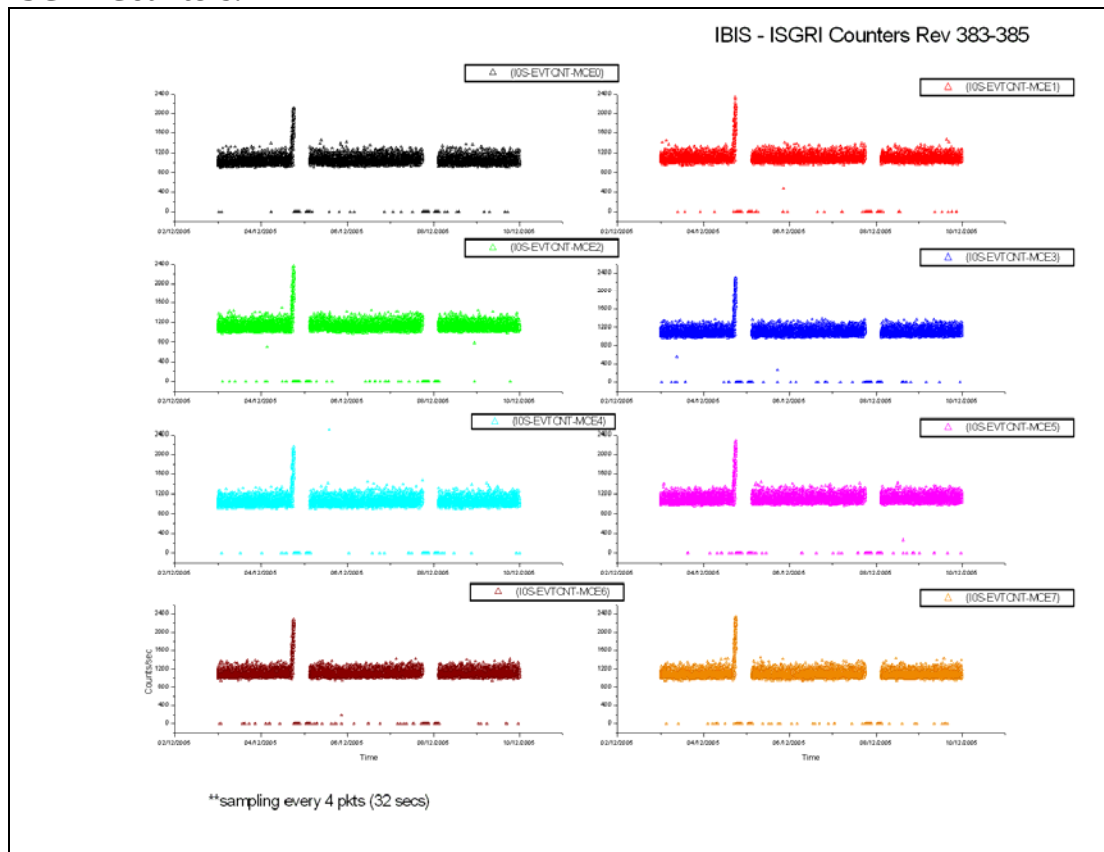
NOTE: The events log is extracted from the revolution pass summaries (courtesy of the Integral Analysts).

DOY Time	Event
336 / 06:38	TM E1296 "S AS IBS ST L" voided the fix check with the value: "ERROR".
336 06:39-06:49	TM E2363 "S AS AN-5V L13" voided the fix check with the value: "PARAM > SPEC" and back OK.
337 19:27-19:37	TM E3217 "S AS TEMP L53" voided the fix check with the value: "PARAM > SPEC" and back OK.
338 16:26-17:37	TM E3500 "P_DF_CNVT-BW_L,1" OOL Alarm High. / Some occurrences in the reported window and back into limits.
340 07:41-07:55	TM E2069 "S AS HV-ST L28" voided the Fix Check and back into limits
341 / 17:35	TM E3500 "P_DF_CNVT-BW_L,1" OOL Alarm High. Not a problem just before RB entry (17:53)
344 / 17:39	TM E3500 "P_DF_CNVT-BW_L,1" backs into limits.

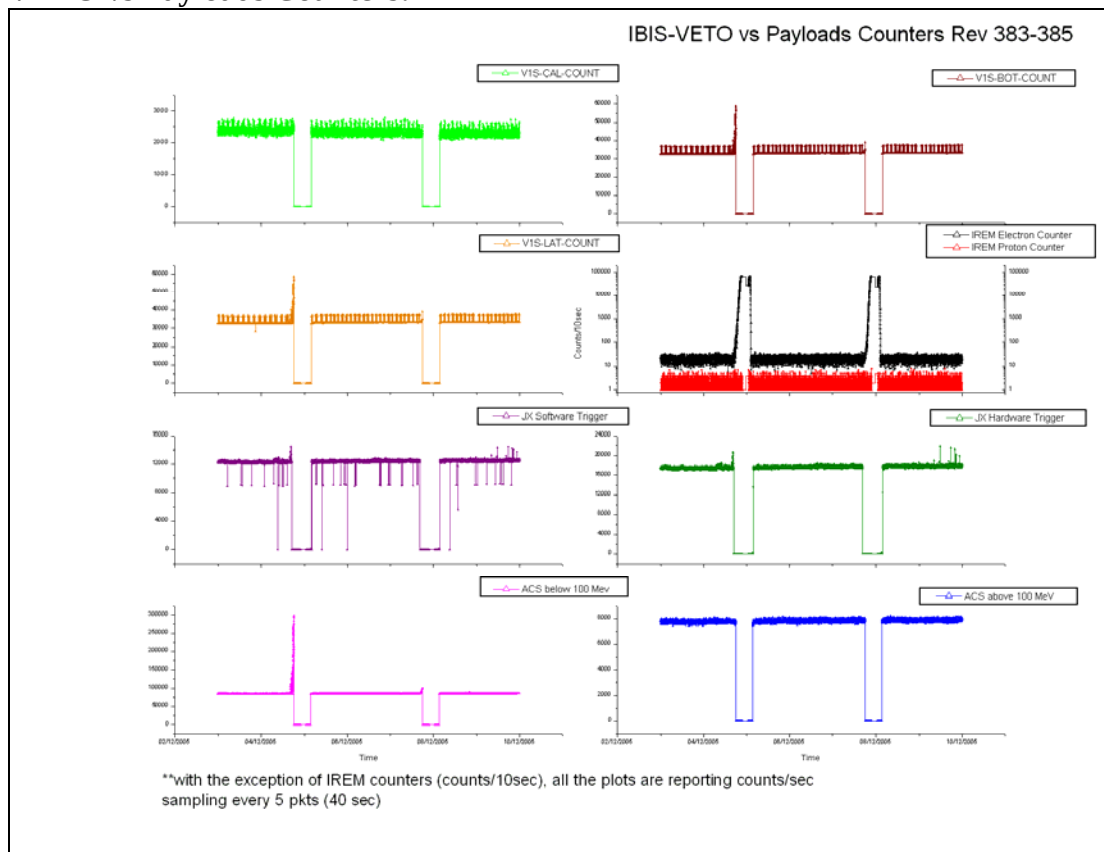
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

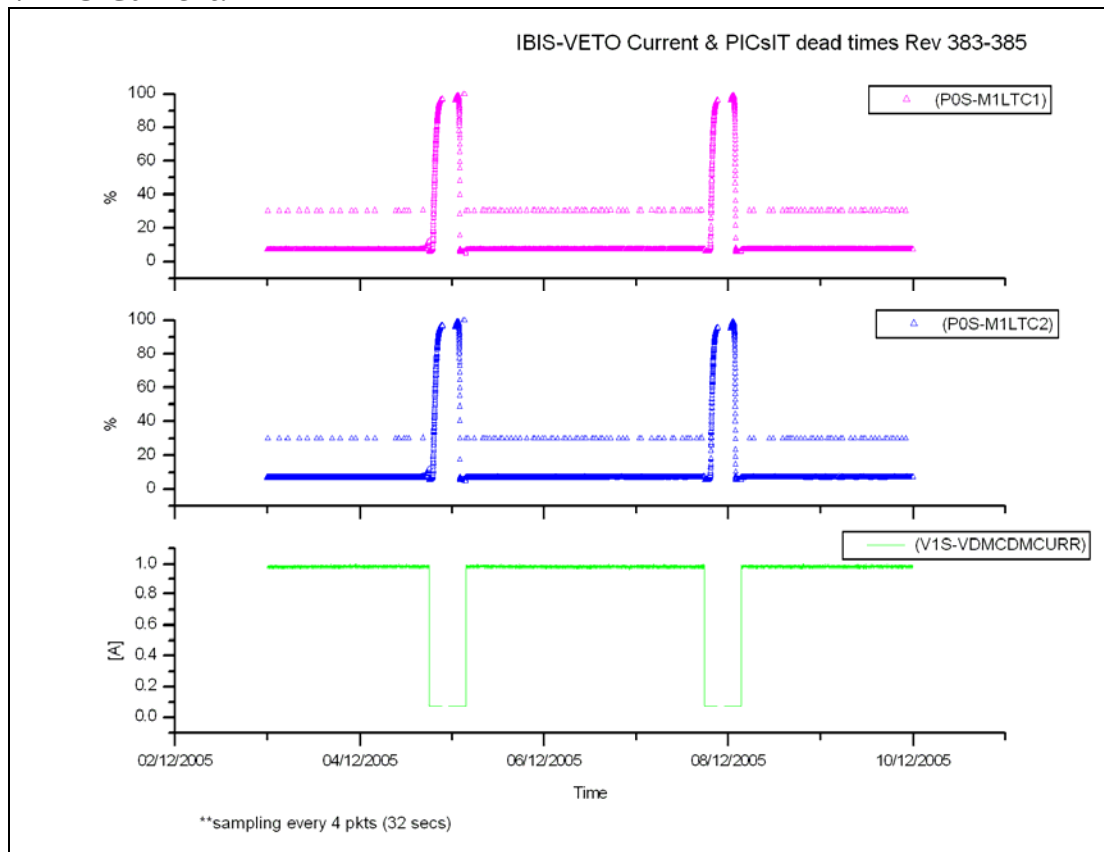


VETO vs Payloads Counters:

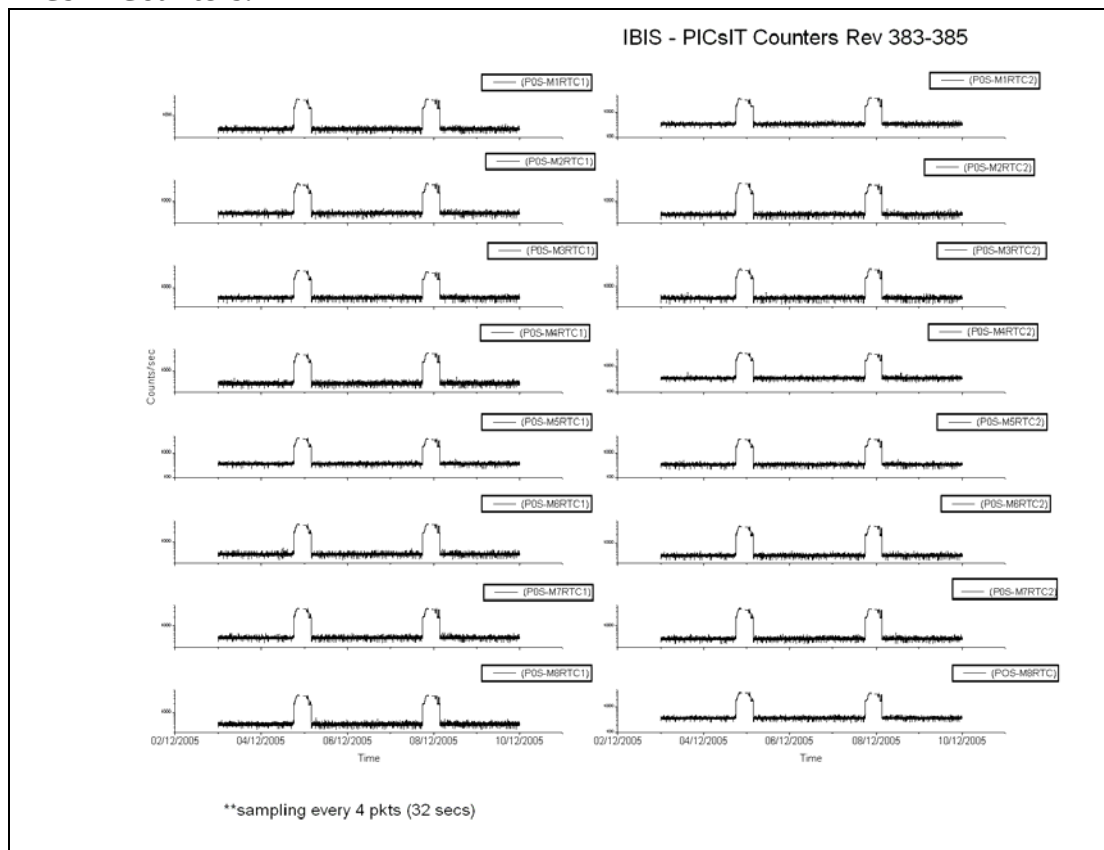


The week was characterised by low radiation.

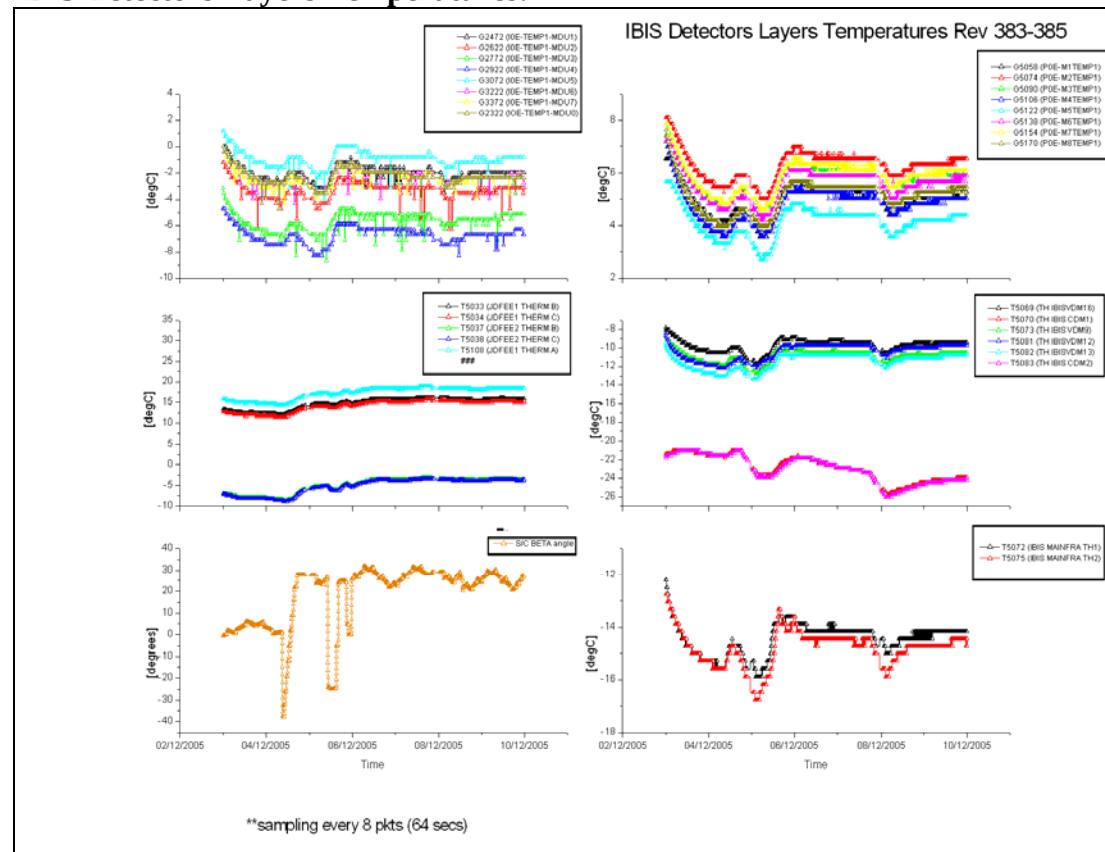
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2005.338 (04/12/2005): HEPI Time-Out (AR: INT_SC-134)

On DoY 2005.338 (04/12/2005) at 13:31:34Z, the following OEM APID 1280 ID 133 CLASS 2 was reported:

"IBIS1 IASW LSL TRANSFER FAILED (LOW LEVEL)"

together with OEM APID 1280 ID 131 CLASS 2:

"IBIS1 IASW LSL TRANSFER FAIL REPORT FOR HIGH-LEVEL MODULE RESET"

This anomaly is similar to the previous ones that flagged a Time-Out in several peripherals (ISGRI and VETO).

During the generation of the OEMs above, no ground commanding was on-going for the unit. During all the duration of the event the IASW status was Scientific Standard mode. The group of messages reported by the unit flagged an anomaly condition in the communication line between the DPE and the HEPI (the low speed link). The LSL protocol is a serial transmission and is used for Telecommand and Housekeeping communication between HEPI and DPE.

Considering what was reported in the bodies of the three OEMs resulted the following:

1) the OEM ID 133 flagged a hardware event (interrupt) on the LSL due to an over-run on the link. This was reported by parameter G1605 (REASON OF FAILURE) = LSL OVRN ERR;

2) the OEM ID 131 reported that the IASW had problem receiving data from a specific peripheral (parameter G1579 LSL TRANSFER FAIL = RECEIV DATA) upon a specific task request; the requesting task is the HK1 task (parameter G1580 TID OF CALLER = HOUSEKEEPING1); the peripheral reporting problem in sending the data was the HEPI as flagged by parameter G1581 (SUB INSTRUM ID = 0); the TC sent by the IASW to the HEPI was the command requesting to "read standard HK" (parameter G1582 CID = 118);

The anomaly lasted only one TM cycle and at this time, all data from HEPI were reported as raw value 0.

Summarizing, IBIS incurred a timing problem on the LSL that affected the communication with the peripherals. During this time, a request for HK1 was sent to HEPI without any answer due to the black-out in communication between the peripheral and the DPE. During this time no valid HK was collected from HEPI therefore, what was reported in the HK1 was simply the IASW default (i.e all 0000...). This is confirmed by the reading of TM parameters that turned to raw value 0 (all histograms OFF for example). The unit solved autonomously the internal conflict on the LSL and reported the valid HK1 for HEPI in next cycle.

DoY 2005.338 (04/12/2005)

At 16:53Z TM parameter G8080 (S1E-VS HBRA-RT) was reported OOL High and back immediately. No action was taken.

At 17:38Z TM parameters G6062 (V1S-BOT-COUNT) and G6063 (V1S-LAT-COUNT) were reported toggling OOL high until 18:07Z (radiation belt entry). This was due to the high radiation background as INTEGRAL was approaching the belts; therefore no action was taken.

At 17:43Z TM family G2027 (I0S-EVTCNT-MCEi) was toggling OOL High until 18:07Z (radiation belt entry). This was due to the high radiation background as INTEGRAL was approaching the belts; therefore no action was taken.

At 18:07Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit high. It went back inside limits on DoY 339 at 03:37Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

During Belt passages, TM parameters G5012 (P0S-M3RTC1) and G5037 (P0S-M8RTC1) were toggling OOL High. According to P-CNT-1, no action was taken.

DoY 2005.339 (05/12/2005)

At 13:06Z TM parameter G2056 (I0E_OVFWPXADD_M4) failed SCC and back. This happened again at 13:45Z. According to I-OVF-1, no action was taken.

DoY 2005.341 (07/12/2005)

At 17:53Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit high. It went back inside limits on DoY 342 at 03:24Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

During Belt passages, TM parameters G5028 (P0S-M6RTC2) and G5037 (P0S-M8RTC1) were toggling OOL High. According to P-CNT-1, no action was taken.

At 02:55Z TM parameter G2084 (I0E_OVFWPXADD_M6) failed SCC and back. According to I-OVF-1, no action was taken.

DoY 2005.342 (08/12/2005)

For the last days, TM parameter G6061 (V1S-CAL-COUNT) has been reported OOL low-low with values close to the limit 2200 several times. Consequently it has been decided to temporary decrease the low limit to 2000 while waiting for PIs approbation to change permanently the limit value in the database. **Action on PIs**

At 09:01Z, the command verifier task of IMCS died and this implied ED GESTAN02 being lost from the timeline. The sequence was manually uplinked at 09:06Z.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

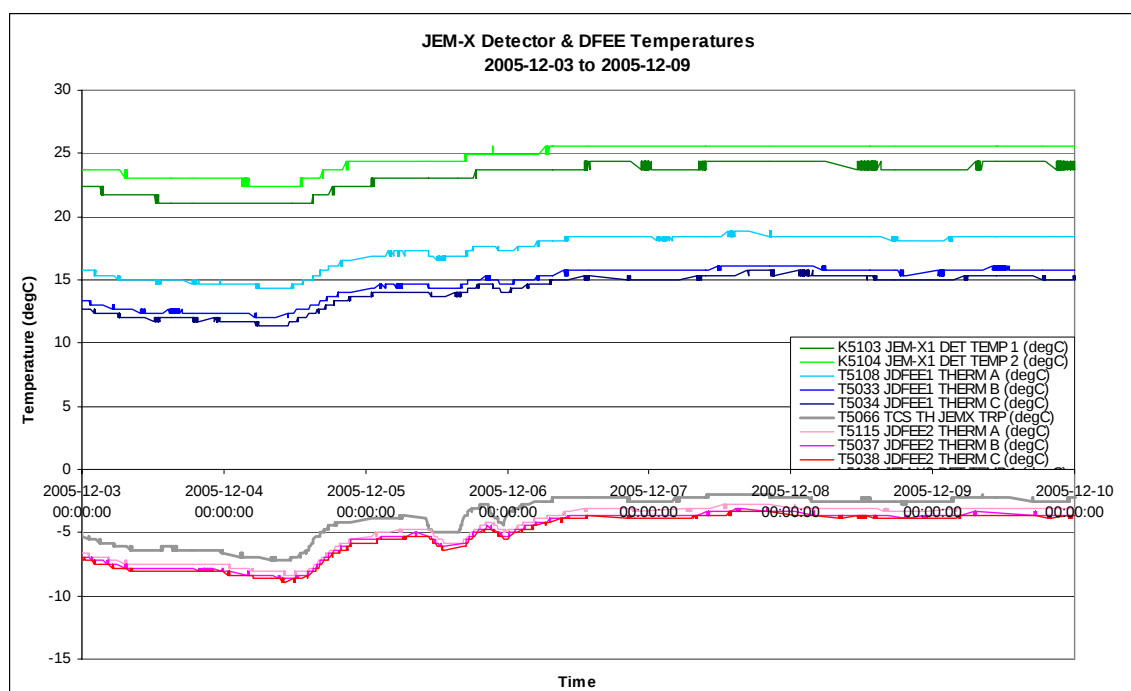
JEM-X count rates over the reporting period are displayed in the following graph¹.

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



8.3.4.2 JEM-X Temperatures

JEM-X Detector and DFEE temperatures, along with the temperature on the detector bench between the two units, over the reporting period are displayed in the following graph².



8.3.4.3 JEM-X Daily Report

2005-12-03 (DOY 337, Rev 383) to 2005-12-07 (DOY 341, Rev 384)

² Data sampled (1 frame in 8)

Doc. Title : INTEGRAL Mission Report #168
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 12/12/05

Issue : 1
Rev. : 0
Page : 26

Nothing to report

2005-12-08 (DOY 342, Rev 384-385)

Due to a problem with the command verifier task of the IMCS, starting at 09:00:50Z the TCs KU0014 and K0021 in the ED KEDATA02 were unverified at the on-board acceptance stage and TC K0011 failed release. Once the verifier was recovered and reconnected, these commands were re-uplinked manually starting at 09:07:54Z and JEM-X1 was back in Data Taking at 09:12Z.

2005-12-09 (DOY 343, Rev 385)

Nothing to report

8.3.5 OMC Operations

2005-12-03 (DOY 337, Rev 383) to 2005-12-04 (DOY 338, Rev 383)

Nothing to report

2005-12-05 (DOY 339, Rev 384)

From 10:24 to 10:50, 13 occurrences of the following OEM occurred:

2005.339.10.24.53.445	2005.339.10.25.01.401	1792	RealTime	171	EVENT	
SCI WINDOW REJECTED			0	0	65535	PR N
E E						

This coincided with the ongoing Star Tracker Calibration exercise. The reason for the rejection was that a pointing had been inserted by FD.

2005-12-07 (DOY 340, Rev 384) to 2005-12-07 (DOY 341, Rev 384)

Nothing to report

2005-12-08 (DOY 342, Rev 385)

At 09:01, after the CMD verifier died the OMC imaging commands for pointing 03850012 had to be manually uplinked. The impact was a delay of about 12 minutes in the start of this pointing.

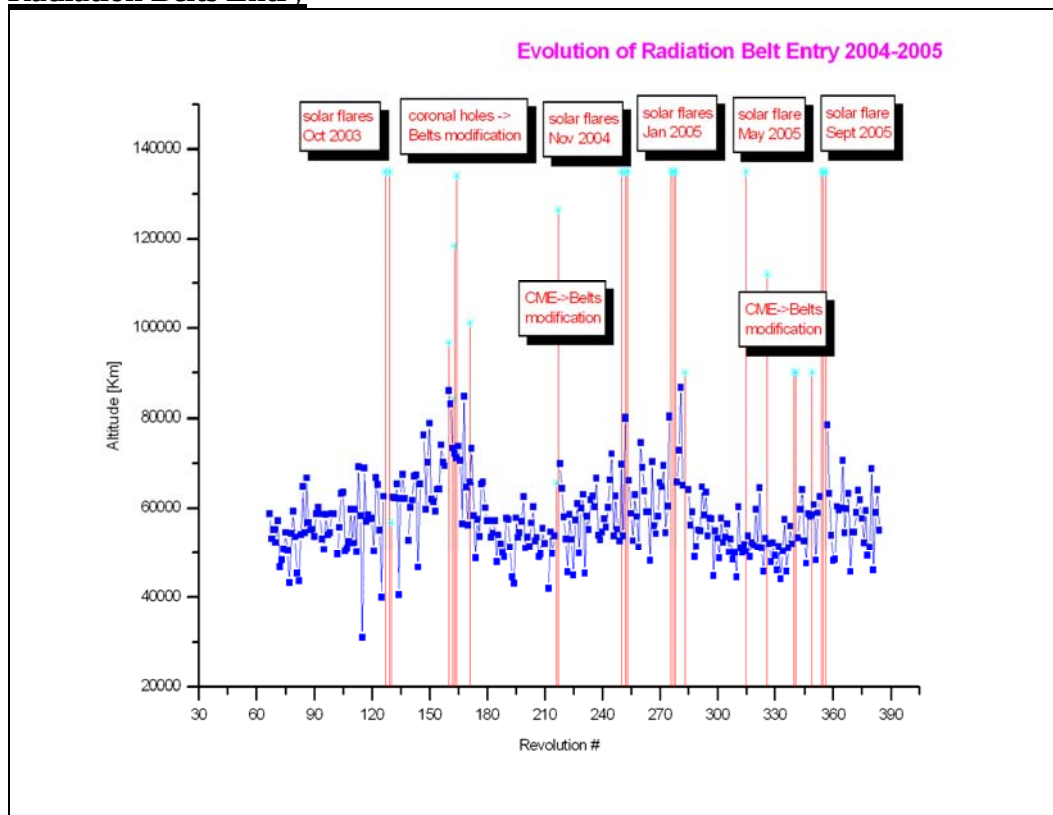
2005-12-09 (DOY 343, Rev 385)

Nothing to report

On DoY 338 at 18:07:08 and DoY 341 at 17:53:24 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]
383	RAD_ENTR R 2005-12-04T18:07:06Z	2005-12-04 17:31:39	>64065.1	2005-12-04 19:18:04	51072
384	RAD_EXIT R 2005-12-05T03:25:03Z	2005-12-05 02:24:51	>>24968.3	2005-12-05 02:28:04	30796
384	RAD_ENTR R 2005-12-07T17:53:23Z	2005-12-07 18:27:07	>55055.6	2005-12-07 19:00:37	51708
385	RAD_EXIT R 2005-12-08T03:11:03Z	2005-12-08 02:18:43	>>24963.3	2005-12-08 02:20:37	31637

Reference

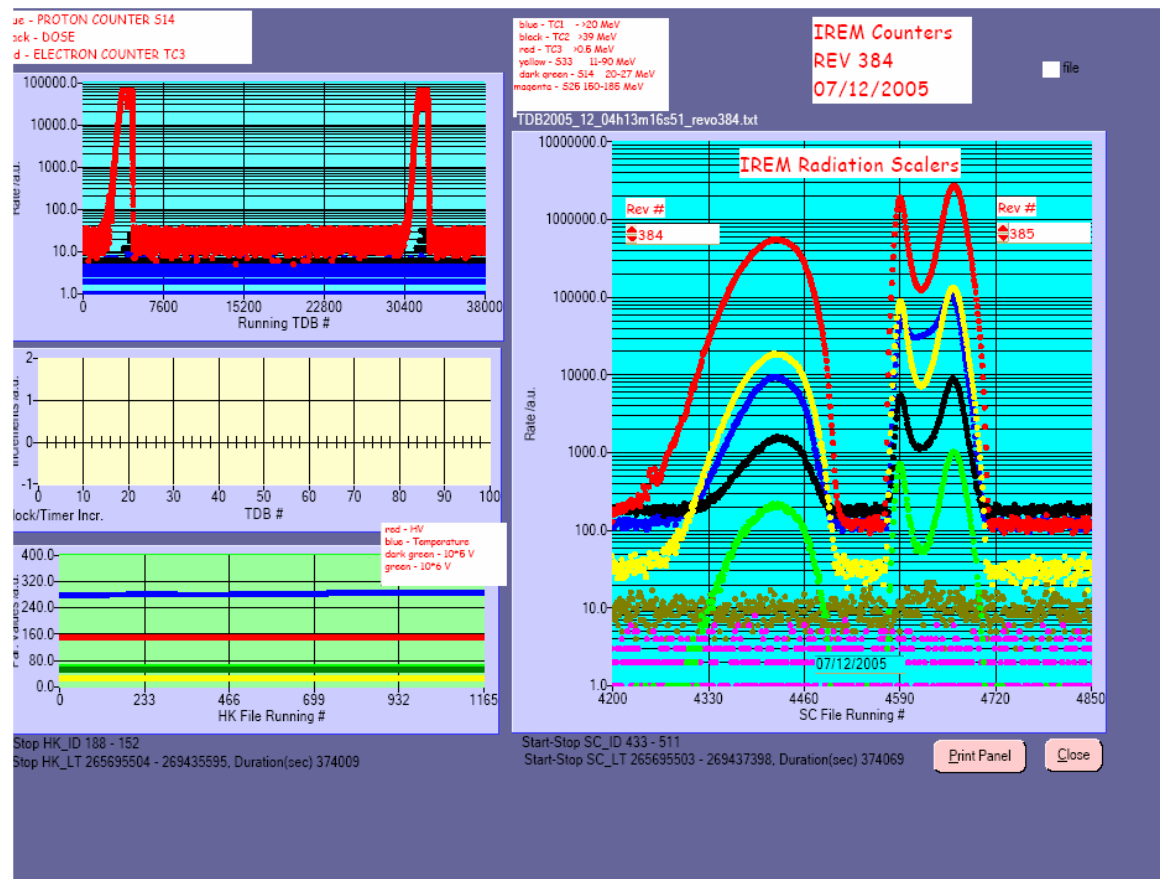
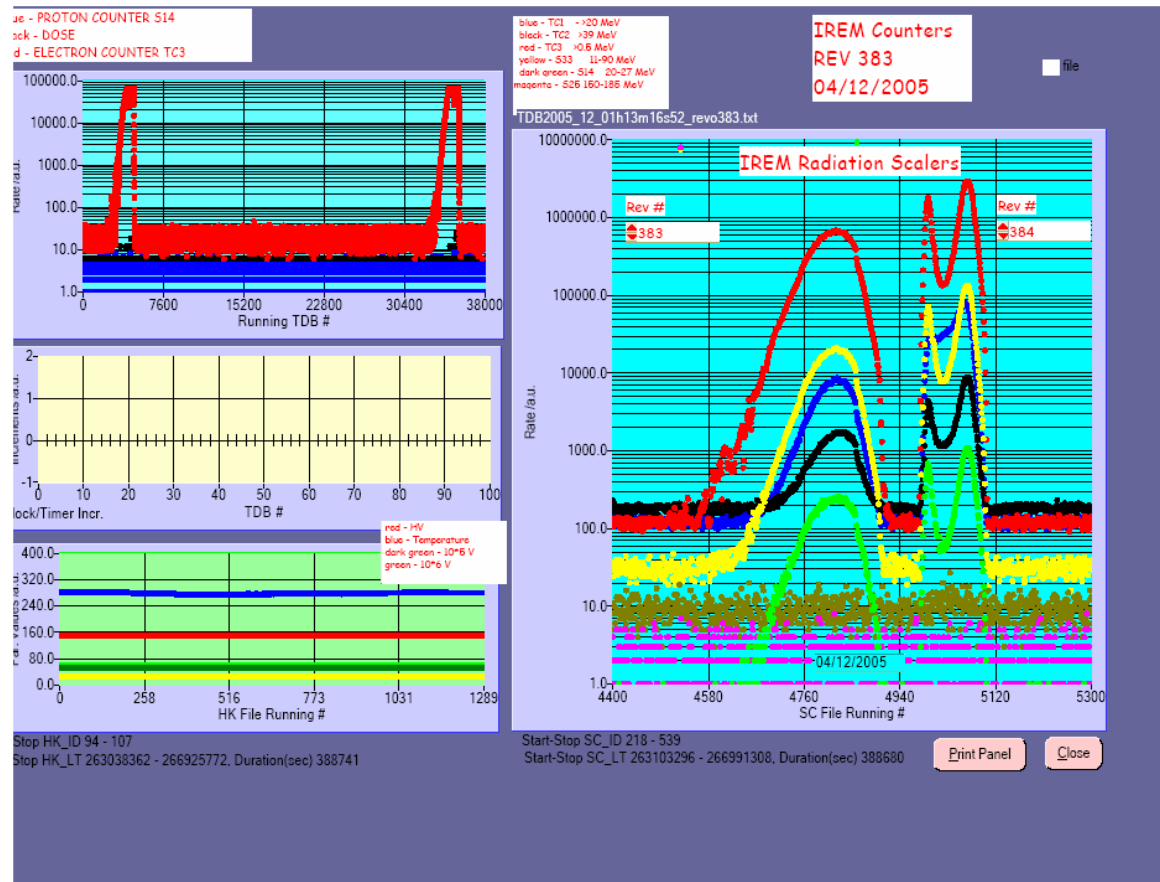
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

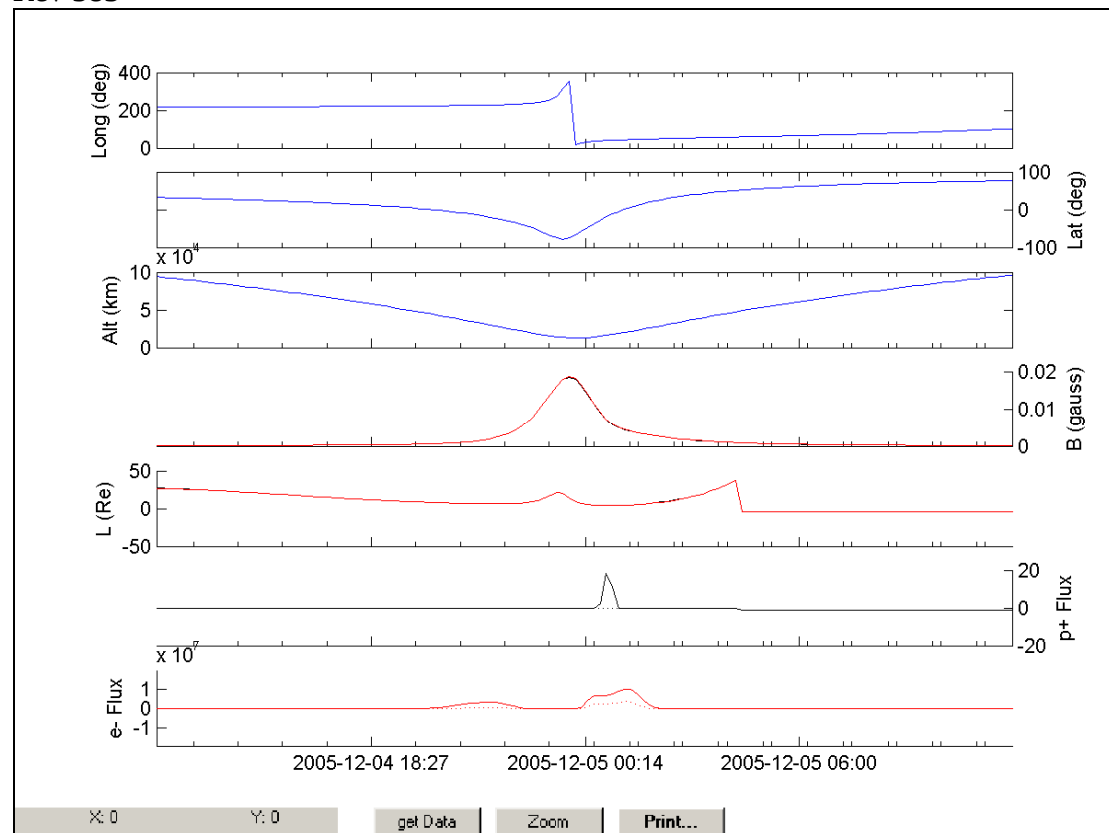
Radiation Spike

IREM radiation counters:

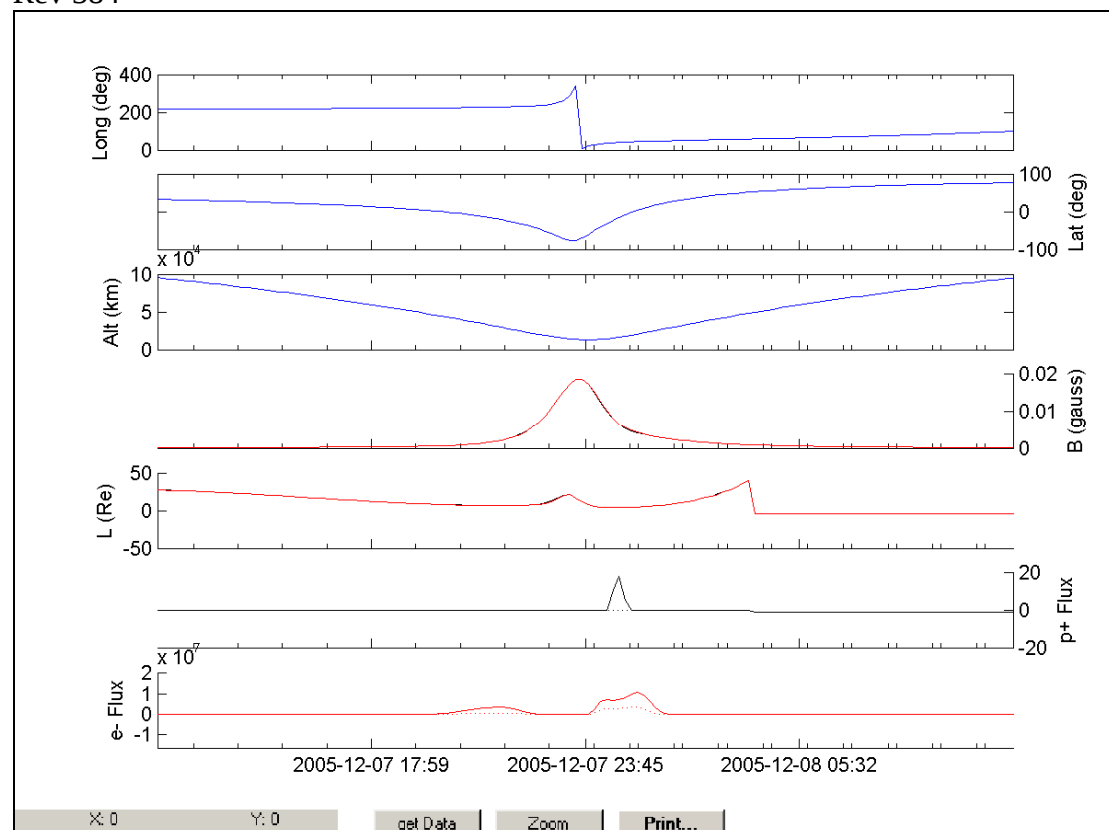


IREM Predicted Radiation Belt Passages:

Rev 383



Rev 384



SEC-GOES Observed Particles Fluxes:

