

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 211
Week 40
09.10.06
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.....	3
3.1.3	Thermal.....	7
3.1.4	OBDH.....	7
3.1.5	RFS.....	7
3.2	Payload.....	7
3.2.1	SPI.....	7
3.2.2	IBIS.....	8
3.2.3	JEM-X.....	9
3.2.4	OMC.....	9
3.2.5	IREM.....	10
4	Ground Facilities.....	10
4.1	Mission Operations Centre.....	10
4.2	Ground Stations & Network.....	10
4.3	Science Ground Segment.....	10
4.3.1	ISOC.....	10
4.3.2	ISDC.....	11
5	Special Events.....	11
6	Anomalies.....	11
7	Future Milestones.....	12
8	Appendix.....	13
8.1	Overview of Revolutions.....	13
8.2	Consumables.....	13
8.2.1	Detailed Fuel Book-keeping.....	13
8.3	Detailed Satellite Information.....	14
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 30/09/2006 – 06/10/2006.....	14
8.3.2	SPI Operations.....	20
8.3.3	IBIS Operations.....	26
8.3.4	JEM-X Operations.....	31
8.3.5	OMC Operations.....	32
8.3.6	IREM Operations.....	34

DISTRIBUTION LIST

Addressees	Copy	Addressees	Copy
D/OPS		ESA HQ	
G. Winters D/OPS	1	D. Southwood D/SCI	1
J. F. Kaufeler OPS-G	1		
N. Bobrinsky OPS-ON	1	ESTEC	
J. Dodsworth OPS-OA	1	J. Louet SCI-P	1
		A. Gimenez-Canete SCI-S	1
M. Schmidt	1		
R. Southworth	1		
F. Di Marco	1	ESTEC / PG	
F. Cordero	1	G. Sarri	1
M. Walker	1		
P. Lippi	1		
R. Lemme	1		
S. Fahmy	1		
SPACONs	1		
O. Bergogne	1	ESTEC/RSSD	
I. Bayliss	1	M. Kessler SCI-SD	1
G. Di Girolamo	1	C. Winkler	1
F. Dreger	1	A. Parmar	1
G. Gienger	1	L. Hansson	1
S. Pallaschke	1	E. Kuulkers	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
U. Feucht	1		
Shift - Coord	1	ALENIA	
Scheduling Office	1	M. Montagna	1
T. Beck	1	F. Ravera	1
J. Wardill	1		
M. Unal	1	PI / Instrument Teams	
P. Maldari	1	J. P. Roques – SPI	1
		G. La Rosa – IBIS	1
		P. Ubertini – IBIS	1
		S. Brandt – JEM X	1
		E. De Miguel - OMC	1
		W. Hajdas – IREM	1
Redu			
B. Demellenne	1	JPL / Goldstone	
		D. Holmes	1
Vilspa		J. Valencia	1
P. Kretschmar	1	Jesse Velasco	1
		DSN - MPSETD	1
ESTEC/SCI-A			
Nicola Rando	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 30.09.06 until 06.10.06 (both dates inclusive) and covers the revolutions 484, 485 and 486.

2 Summary of Activities

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

The targets of these revolutions consisted of 2 hexagonal dithers of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), a raster dither of the Galactic Plane Region 3 (RA 19:43:54.33, DEC +23:53:25.4), 3 raster dithers each of AO-4 KP: l=+6.9 (RA 18:01:12.94, DEC -22:59:28.5) and AO-4 KP: l=-6.9 (RA 17:28:08.54, DEC -34:45:18.6), a hexagonal dither of the object 2030+375 (RA 20:32:15.30, DEC +37:38:15.0) and a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0).

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

3 Satellite Status

3.1 Platform

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

3.1.1 AOCS

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

Eight slews were missed during the observation period due to problems on FDS and REDU station.

The fuel consumption over the period between 27/09/2006 and 05/10/2006 was 0.4427 Kg. The remaining propellant is in the order of 151.3793 Kg.

Note: Some more information concerning the AOCS operations and the fuel budget is provided in the Appendix.

3.1.2 Power

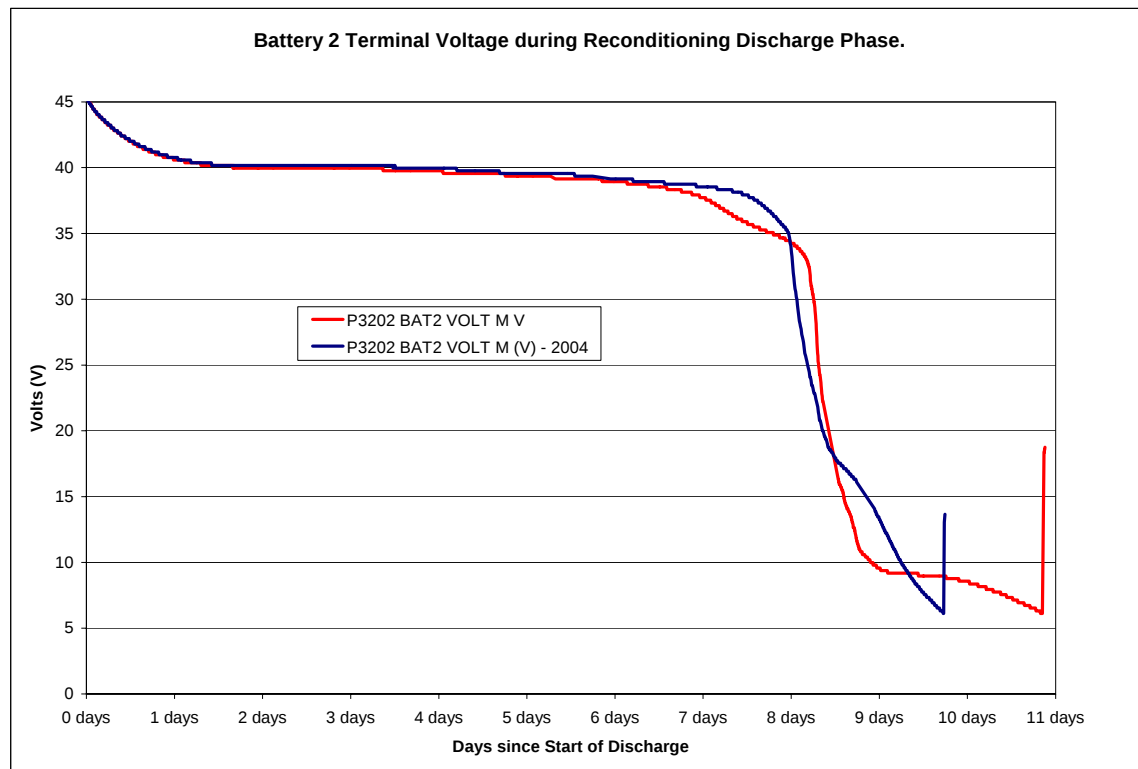
The EPS is working nominally, available power from the arrays is of the order of 2100W.

Battery 2 Reconditioning Discharge Phase.

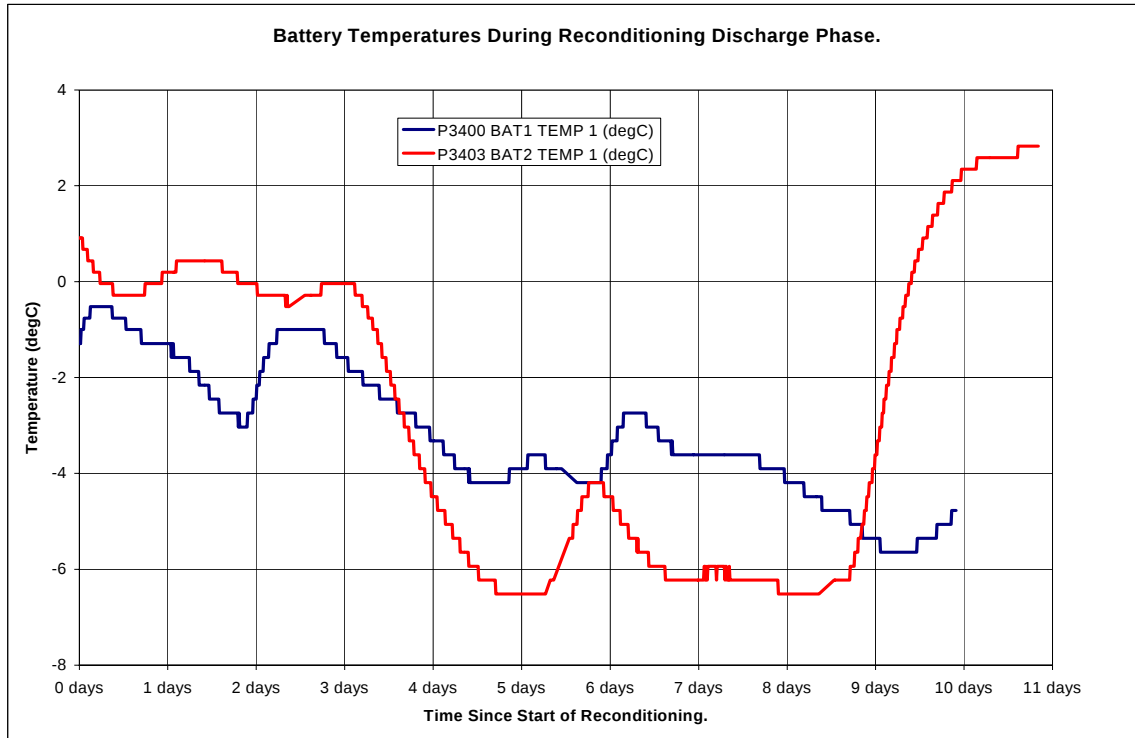
Battery 2 Reconditioning Discharge Phase terminated at 05.02z on 8/10/2006, the discharged capacity was approximately 36.6Ah, this was somewhat more than the discharged capacity of battery 1 (35.7Ah), the reason for this was that the discharge to 6V took more than 20hours longer. The following table summarises the results of the discharge phase and contains also the relevant figures from the first reconditioning in 2004.

	Start of Discharge ddd hh mm	End of Discharge ddd hh mm	Duration of Discharge	Discharged Capacity	Duration of Discharge (2004)	Discharged Capacity (2004)
Battery 1	255 07.50z	265 06.04z	9d 22h 14m	35.7Ah	9d 20h 28m	35.9Ah
Battery 2	270 08.38z	281 05.02z	10d 20h 24m	36.6Ah	9d 17h 03m	35.8Ah

The following plot compares the discharge profiles of battery 2 during the 2 reconditioning operations executed to date.



It can be seen that in terms of 'useful capacity' (above 35V) there is in fact little difference between the 2 discharge profiles. It is possible that the slow discharge from 9V to 6V this time was caused by a significant increase in battery temperature during the last 2.5 days of the discharge phase due to a large change in pitch angle. The plot below illustrates this. The temperature profile of battery 1 during the discharge phase is also included for comparison purposes.



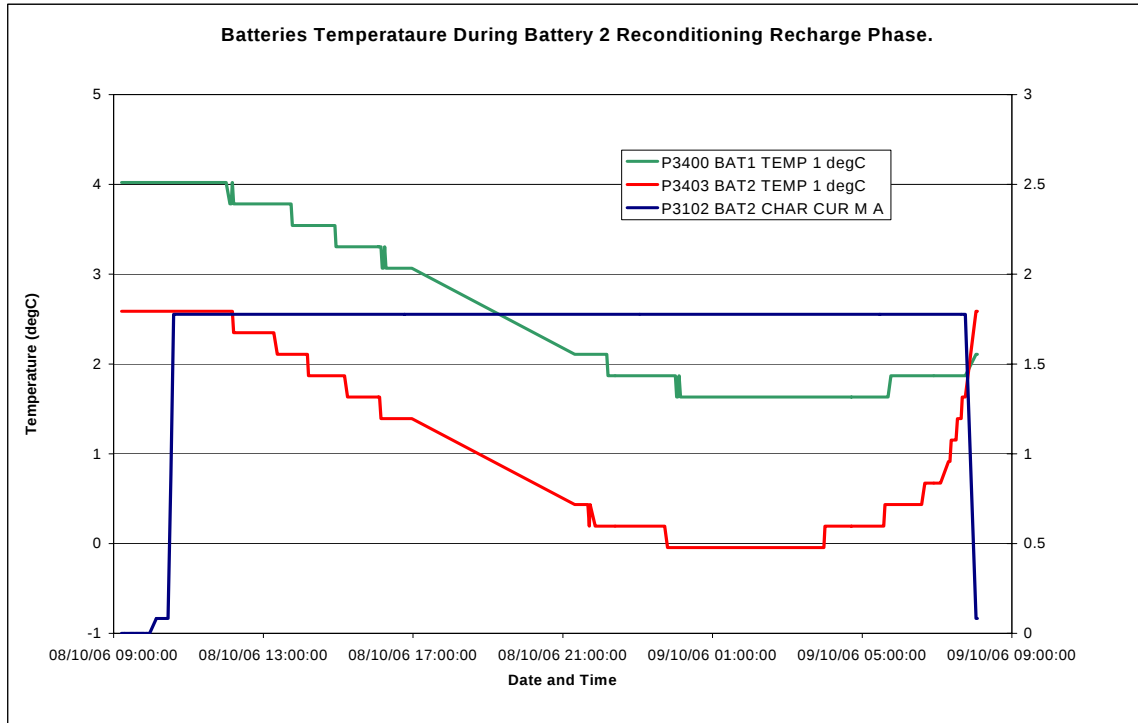
Battery 2 Reconditioning Recharge Phase.

Battery 2 Reconditioning Charge Phase started on 8/10/2006 at 10.12z (charge rate C/26), 10.15 (charge rate C/26) and terminated at 07.42z on 9/10/2006. The recharged capacity was approximately 38.6Ah, this was the same figure as battery 1 and also the same as during the last reconditioning.

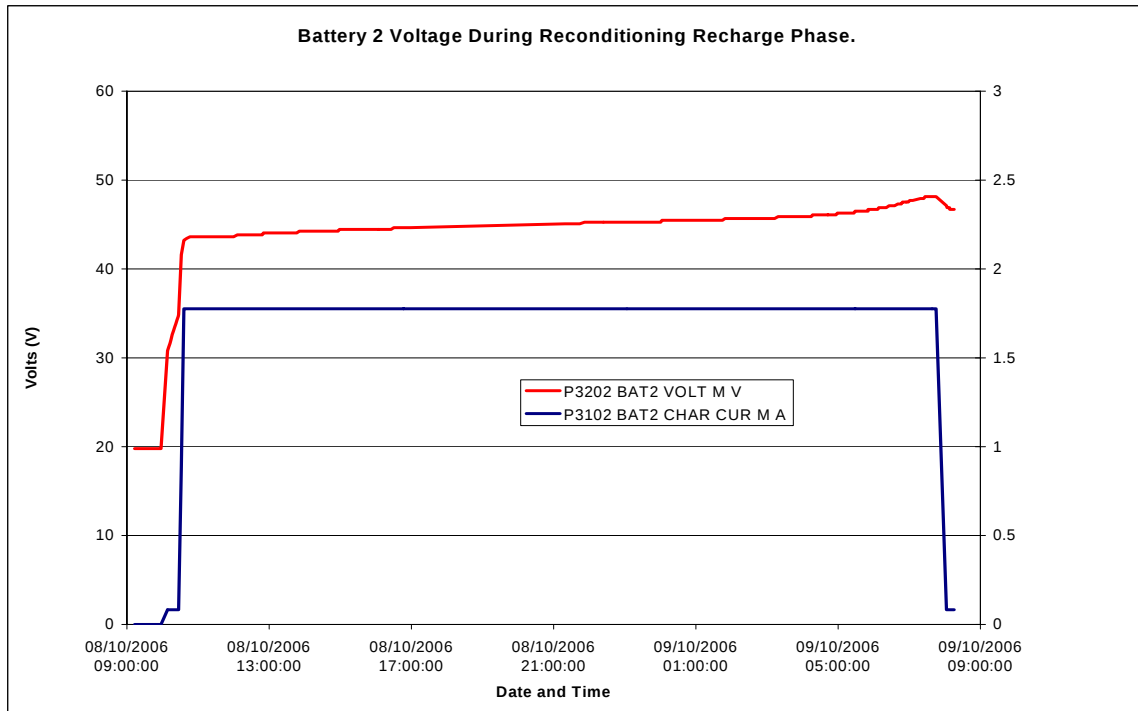
The following table summarises the results of the recharge phase and contains also the relevant figures from the first reconditioning in 2004.

	Start of Recharge ddd hh mm	End of Recharge ddd hh mm	Duration of Recharge	Recharged Capacity	Duration of Recharge (2004)	Recharged Capacity (2004)
Battery 1	265 07.35z	266 05.02z	21h 27m	38.6Ah	21h 31m	38.6Ah
Battery 2	281 10.12z	282 07.42z	21h 30m	38.6Ah	21h 31m	38.6Ah

The following plot shows battery 1 and 2 temperatures during the battery 2 recharge phase, the sharp increase in battery temperature (not echoed in battery 1) during the last phase of recharge shows that battery 2 was fully recharged.



Finally the Battery 2 terminal voltage evolution during the recharge is plotted, this also displays a nominal evolution.



3.1.3 Thermal

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

3.1.4 OBDH

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

3.1.5 RFS

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

3.2 Payload

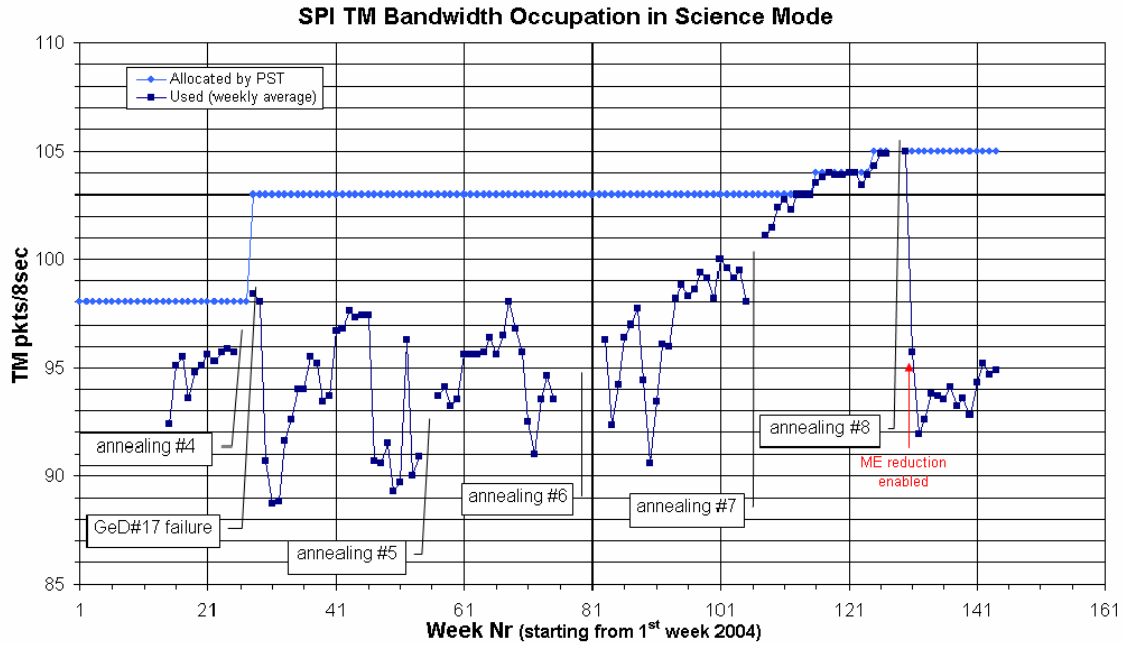
3.2.1 SPI

Following the 8th annealing, which ended on 26th June, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detectors #4 and #12 which are showing a slightly degraded energy resolution. The energy resolution of GeD#15 was recovered with this annealing. Detector #2 is failed since 06.12.2003 and detector #17 since 17.07.2004.

The Stirling compressors are working nominally, maintaining the Germanium detectors at 82 +/-1K.

During science operations, the instrument was kept in photon-by-photon mode with spectra TM enabled. The assigned TM bandwidth in the science observation windows was 105 packets/cycle and the average telemetry occupation was 94.9 packets/cycle.

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



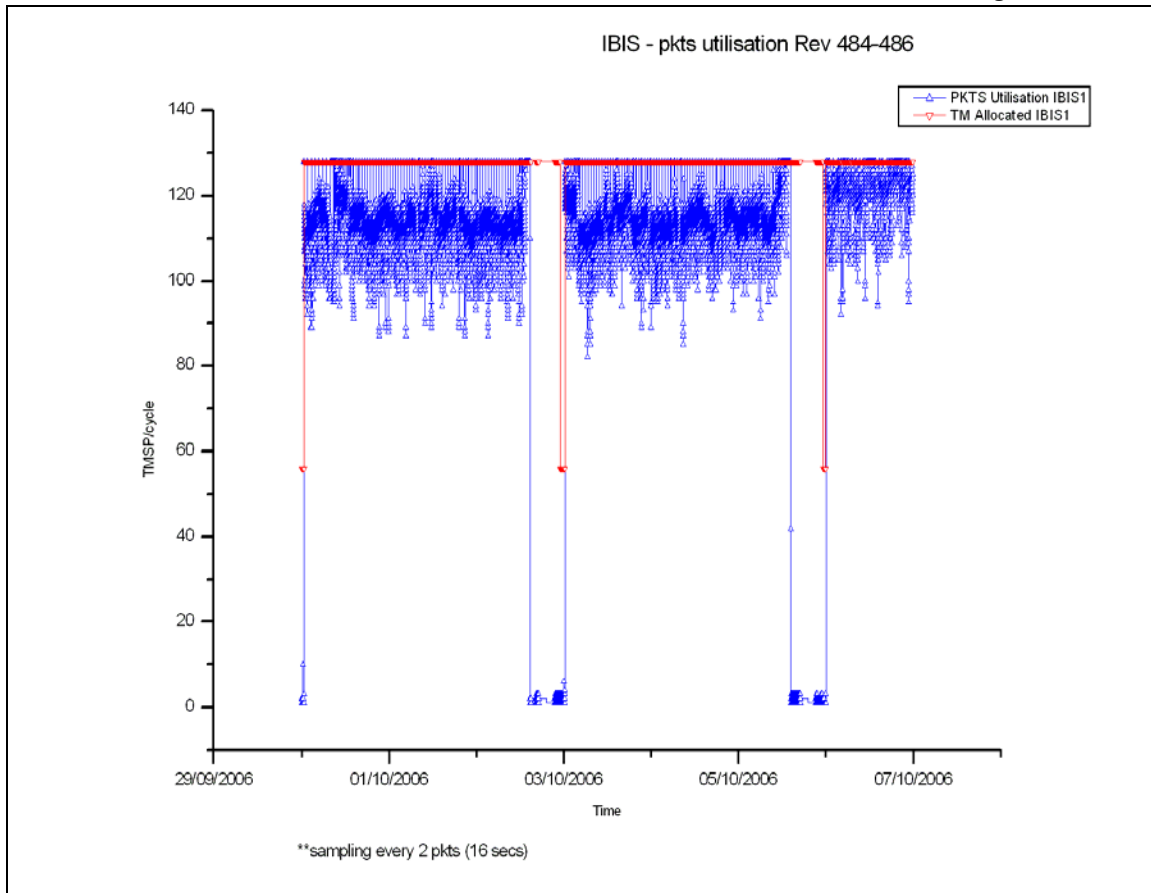
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

The overall status of the unit is nominal.

During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 115.00 TMPS/cycle, same as 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 with a TM allocation of 8 packets/cycle during science observations. JEM-X2 was dormant (DPE OFF) with no TM slots allocated.

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.

Doc. Title : INTEGRAL Mission Report #211
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 09/10/06

Issue : 1
Rev. : 0
Page : 10

During this reporting period, 177 of the 179 planned science pointings for OMC were executed nominally, 2 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.

During the whole observation period sunspots 913, 914 and 915 remained small and posed no threat of strong solar flares.

Reference: www.spaceweather.com

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

4 Ground Facilities

The Operational ground facilities performance was good this week. 5 slews were lost due to FD problems with a further lost when communications with Redu dropped, however only 2 of these were science pointings. The overall performance, however, was well above the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was again good this week. The main problems reported were with the FD system. GTP problems led to the loss of a pointing, and problems with wheel speed violations followed by a lack of stars during the subsequent recovery led to the loss of 4 further slews, although none of these were science pointings. The overall performance was well above the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was again good this week. There were, however, repeated instances of Reed-Solomon errors, bad frames, hits on the line and data drops from Redu, one of which caused the loss of a pointing. There was also several occurrences of errors sending data to the isds. The overall performance was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

Doc. Title : INTEGRAL Mission Report #211
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 09/10/06

Issue : 1
Rev. : 0
Page : 11

PSFs have been received up to revolution 491. Observations have been planned and files sent up to revolution 489. For revolution 490 it will be intended to include the new OMC FF calibration scheme.

Revolution 486 was replanned due to a TOO on EXO 2030+375 as already anticipated.

TSF's up to revolution 487 have been received.

2. Observation status

ECS's up to revolution 477 have been received and processed. No extra time has been credited.

3. ISOC Science Data Archive

The prototype of the visualization tool is ready for testing, its inclusion in the Archive will be discussed next week.

4. ISOC system

ISOC software version 13.1 is in final testing and expected to be installed on Monday, 09 October in the morning.

5. Problems

No new problems.

4.3.2 ISDC

Status of ISDC observation processing on 09/10/2006:

- Latest Standard Analysis completed: observation 03200140001 (Cygnus X-3, Revolution 462) on 08/10/2006.
- Latest products archived: observation 03200140001 (Cygnus X-3, Revolution 462) on 08/10/2006.
- Latest observation products sent to the observer: observation 03200140001 (Cygnus X-3, Revolution 462) on 09/10/2006.

5 Special Events

6 Anomalies

The following problems that impacted operations were reported:

- On DoY 274, at 22:47, a problem with one of the FD GTP processors caused the update for the slew 04840064 to fail. Subsequently, the attitude determination failed due to insufficient stars in the field of view. A recovery was subsequently

started with FD support, and the Timeline recovered at 00:13 the following day. The impact was the loss of pointing 04840064.

- On DoY 277, at 18:45, a problem with the TM/TC links with Redu, caused the commands for slew 04850061 to fail release. A recovery was performed, and the Timeline recovered at 19:18, the impact was the loss of pointing 04850061.
- On DoY 278, at 14:09, the FD update for slew 04850085 failed due to problems with Reaction Wheel speed violations. The recovery was postponed until after the Perigee Passage, and completed at 23:32. The impact was the loss of pointings 04850085 through to 04850088.

The following anomaly report was entered into the ARTS system this week:

AR id	Date Created	Subject	Segment	Status
INT-2884	06/10/2006	FDS: update slew failed due to wheels speed constraints violation	FDS	Pending

7 Future Milestones

Battery 2 reconditioning is currently on-going, it should finish on 8/10/2006.

The next eclipse season starts on 26/10/2006, it consists of 8 eclipses. The maximum duration will be just over one hour on 7th November.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 484

The observations in revolution 484 began with a raster dither of the Galactic Plane Region 3 (RA 19:43:54.33, DEC +23:53:25.4), lasting ~6.9 hours. This was followed by a hexagonal dither of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. After this, raster dithers of AO-4 KP: l=+6.9 (RA 18:01:12.94, DEC -22:59:28.5), AO-4 KP: l=-6.9 (RA 17:28:08.54, DEC -34:45:18.6) and AO-4 KP: l=+6.9 (RA 18:01:12.94, DEC -22:59:28.5) again, were performed for ~9.6, ~18.5 and ~17.8 hours respectively, which lasted until the end of the revolution.

Revolution 485

The observations in revolution 485 began with a hexagonal dither of the Galactic Bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. After this, raster dithers of AO-4 KP: l=-6.9 (RA 17:28:08.54, DEC -34:45:18.6), AO-4 KP: l=+6.9 (RA 18:01:12.94, DEC -22:59:28.5) and AO-4 KP: l=-6.9 (RA 17:28:08.54, DEC -34:45:18.6) again, were performed for ~18.5, ~19.3 and ~15.6 hours respectively, which lasted until the end of the revolution.

Revolution 486

The observations in revolution 486 began with a hexagonal dither of the object 2030+375 (RA 20:32:15.30, DEC +37:38:15.0), lasting ~53.6 hours. It continued with a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), lasting ~5.6 hours until the end of the revolution.

Throughout these observations all instruments were in their nominal science modes, except JEM-X2, which is switched off. The TM allocation was IBIS 128; SPI 105; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2006-09-22T09:21:45.000Z	151.9406	F	Automatic TM processing.
2006-09-23T17:23:17.000Z	151.9253	F	Automatic TM processing.
2006-09-24T05:00:22.000Z	151.9115	F	Automatic TM processing.
2006-09-25T09:24:33.000Z	151.8913	F	Automatic TM processing.
2006-09-26T15:21:40.000Z	151.8566	F	Automatic TM processing.
2006-09-26T17:07:56.000Z	151.8468	F	Automatic TM processing.
2006-09-26T22:37:25.000Z	151.8220	F	Automatic TM processing.
2006-09-29T16:55:08.000Z	151.8096	F	Automatic TM processing.
2006-09-29T22:25:09.000Z	151.7589	F	Automatic TM processing.
2006-09-30T08:06:06.000Z	151.6764	F	Automatic TM processing.
2006-10-01T08:11:12.000Z	151.6145	F	Automatic TM processing.
2006-10-02T16:44:12.000Z	151.5518	F	Automatic TM processing.

Doc. Title	: INTEGRAL Mission Report #211	Issue	: 1
Doc. Ref.	: INT-MOC-SYS-RP-1001-OPS-OF	Rev.	: 0
Date	: 09/10/06	Page	: 14

2006-10-02T22:08:12.000Z	151.5497	F	Automatic TM processing.
2006-10-04T08:12:25.000Z	151.4539	F	Automatic TM processing.
2006-10-05T22:00:45.000Z	151.3793	F	Automatic TM processing.

This report was generated Fri Oct 6 08:00:51 GMT 2006

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, 30/09/2006 – 06/10/2006

AOCS operations were executed from the Automatic Timeline.

During this period, 115 Open Loop Slews, 79 Closed Loop Slews and 7 Momentum Biases were executed.

8 slews (5 OSL, 3 CSL) were missed during the observation period mainly due to problems on FDS originated by crash of one GTP processor, sparse stars field and violation of the RW speeds constraint during the TPF update process. Few slews were lost due to problem on TM/TC links on REDU.

This is equivalent to a ~4 % of the total number of slews planned (198).

Orbit Control

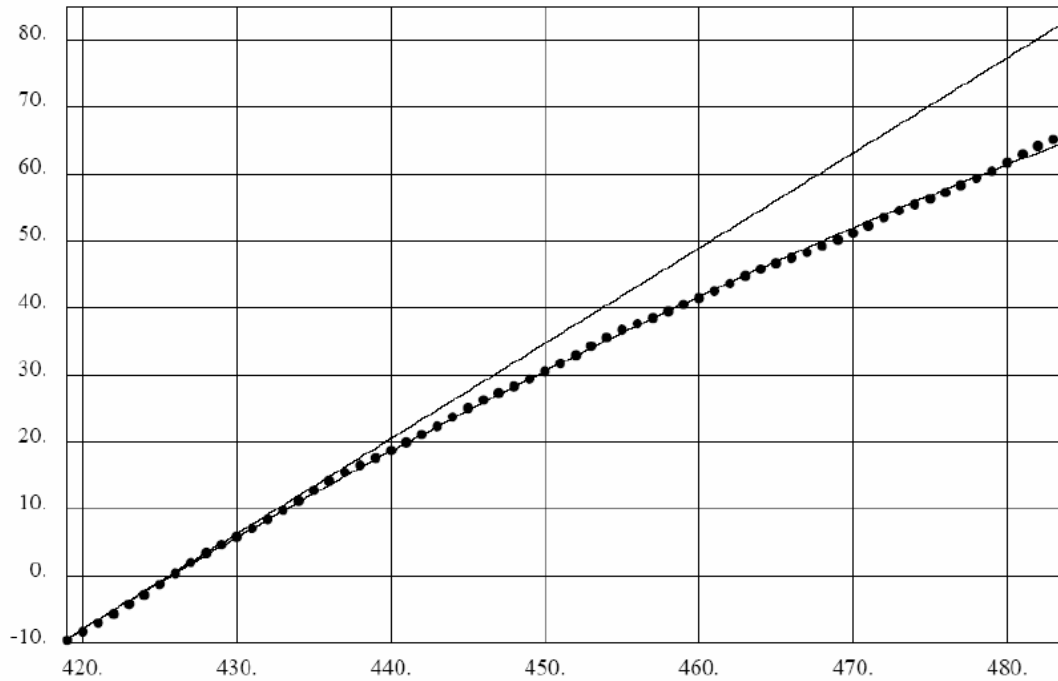
It has been noticed that the orbit is evolving in an unfavourable manner since May 2006 and it might be necessary to use Goldstone again to close the Apogee gap. This situation should be avoided as it will impact science activities. It has been decided to force the orbit in a more favourable direction.

The margins of Redu coverage relative to the period with sufficient altitude to operate the instrument:

Orbit	AOS REDU - 45000 km altitude (Crit.Instr.Alt.Asc.)	56000 km altitude(Crit.Instr.Alt.Des.) - LOS REDU
463	174 minutes	119 minutes
474	165 minutes	141 minutes
484	155 minutes	157 minutes

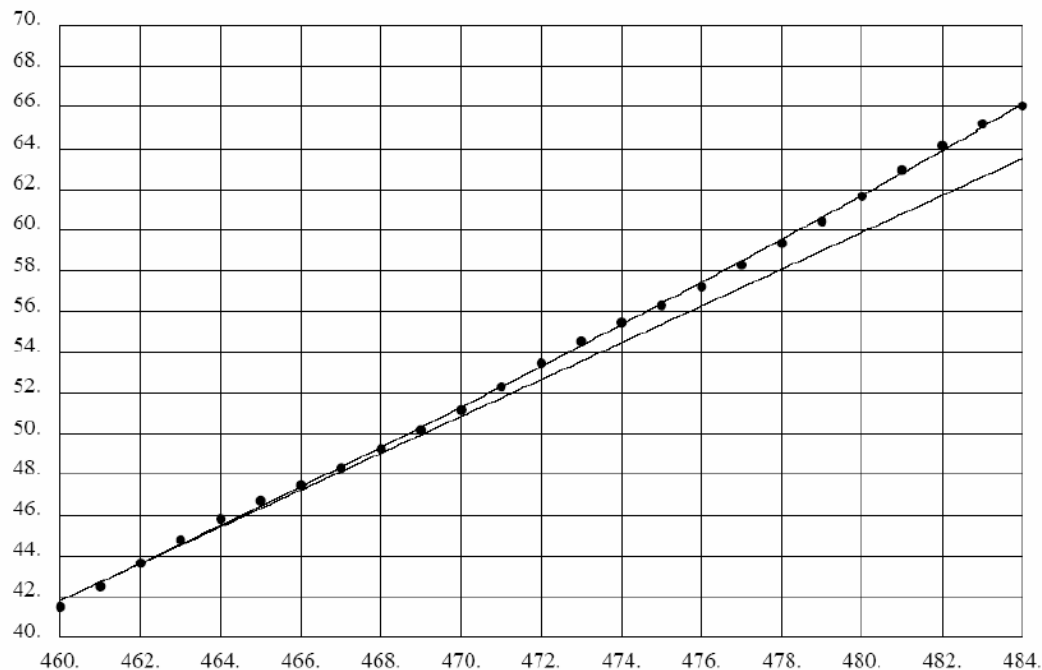
The attached plot shows the apogee longitude of Integral as a function of the orbit number. Using a parabolic approximation, the average semi-major axis increase due to momentum dumping manoeuvres is estimated to have been 464 m per orbital revolution.

APOGEE LONGITUDES OF INTEGRAL 21.03.2006 - 01.10.2006
LEAST SQUARES APPROXIMATION WITH PARABOLA



Making the same analysis for the last 2.5 month:

APOGEE LONGITUDES OF INTEGRAL 21.07.2006 - 01.10.2006
LEAST SQUARES APPROXIMATION WITH PARABOLA



It can be seen that in this period the drift rate has increased slightly instead of decreasing. The reason for this is that the pointing in this period has been towards the galactic centre and this attitude is unsuitable for momentum dumping activities close to perigee. In future this situation will be corrected by:

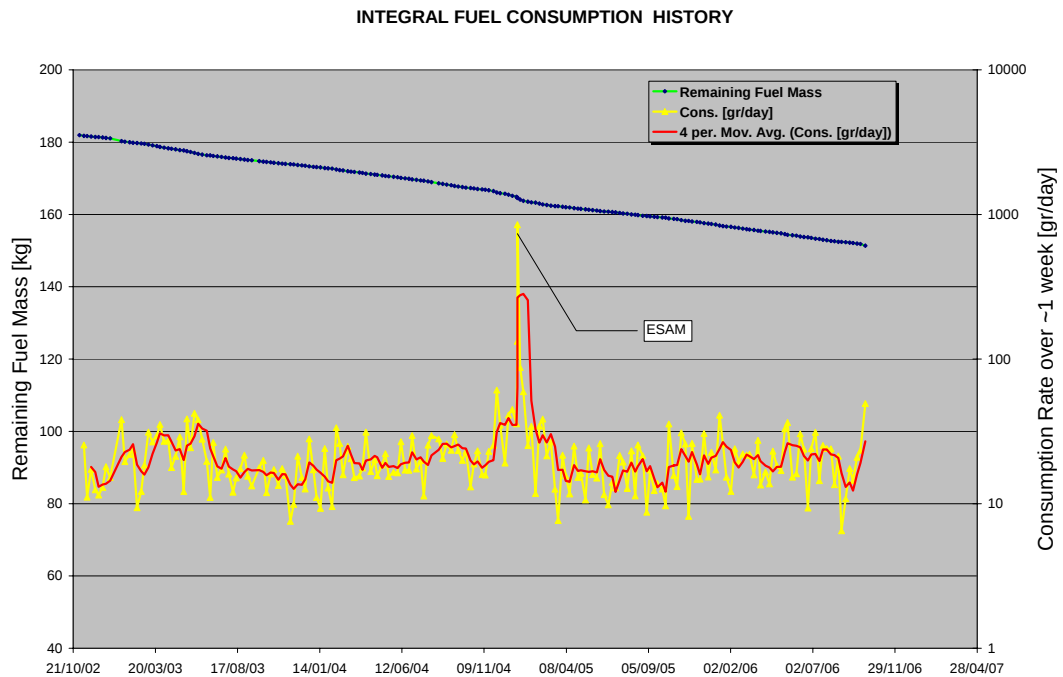
1. avoiding making momentum dumping manoeuvres close to perigee when pointing towards the "galactic centre";
2. performing artificial large momentum dump manoeuvres when the pointing is suitable for orbit control

In this way it should be possible to compensate for the lack of drift rate decrease during the last two months and achieve a REDU only situation in the future.

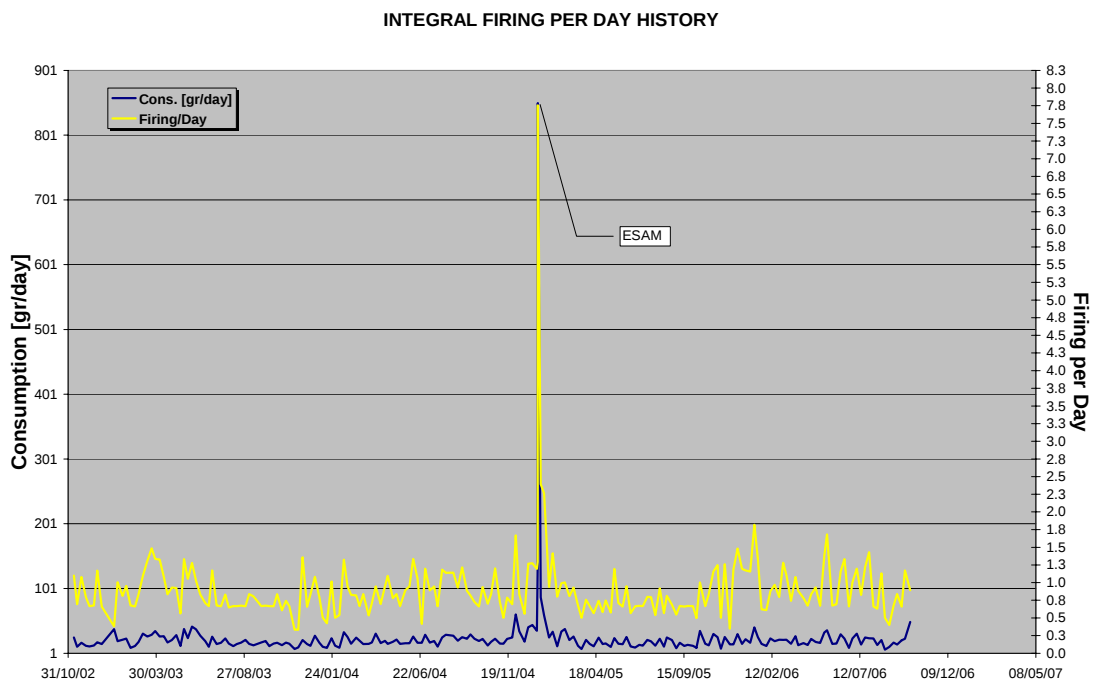
Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 05/10/2006 is reported in the plot below.

The larger fuel consumption observed this last week is due to the new strategy to perform artificial large momentum dump manoeuvres when the pointing is suitable for orbit control. In this way it will be possible to compensate for the lack of drift rate decrease during the last two months and achieve a REDU only situation in the future.

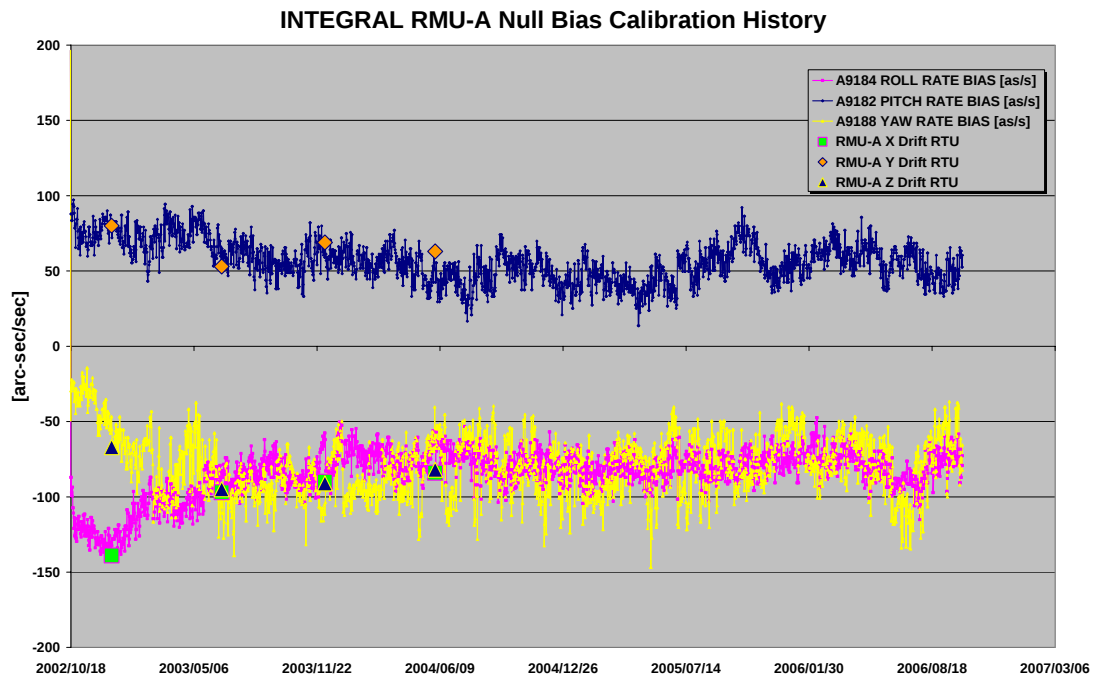


The firing\day over the period between 01/11/2002 and 05/10/2006 is reported in the plot below.

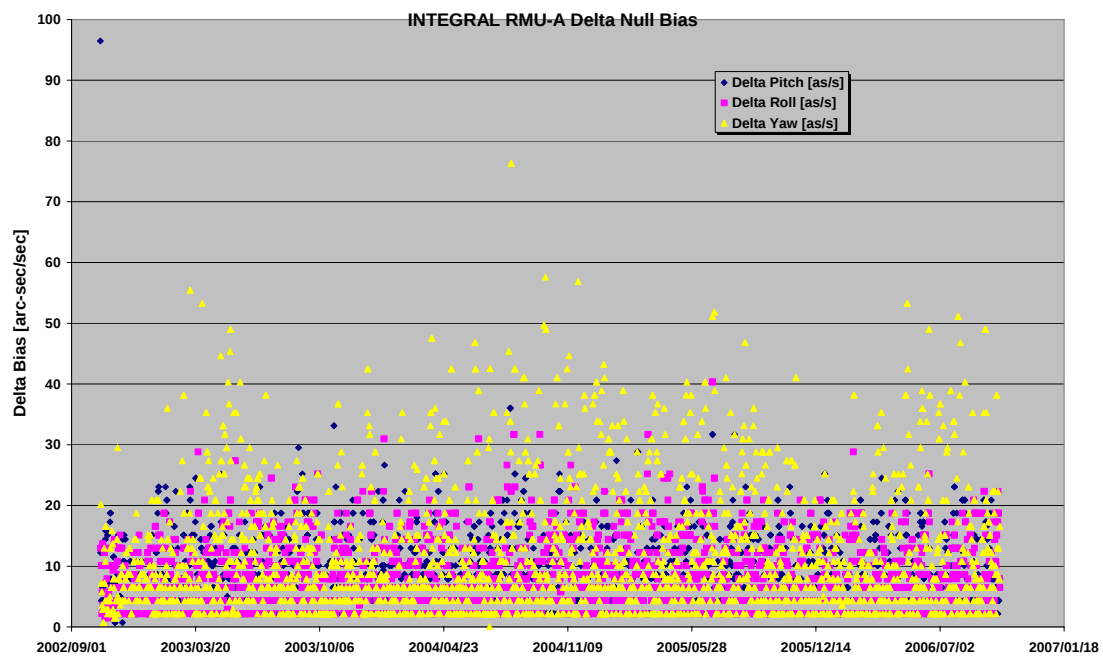


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 06/10/2006 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 06/10/2006 is reported in the plot below



30/09/06 (Day of Year 273, Revolution 483-484)

Nothing to report.

01/10/06 (Day of Year 274, Revolution 484)

FDS failed the slew update process: at 22:47z the update for the SID 04840064 failed due to a problem on one of the GTP processors and the AOCS s/s was disabled in TL at 22:58z.

The following attitude determination failed because were found not enough stars in TM matching catalogued stars (region of galactic centre close to the Oph constellation). Repeated mappings did not solve the problem. FD support was called in and in order to continue operations, was requested an on-line change on a FD environment variable used by the attitude determination algorithm: the conditions for overlap between TM and star catalogue were temporary relaxed.

A manual recovery was then started at 23:59z, from attitude of PID 04840063 to the attitude of PID 04840065. The next slew in TL (04840066) was manually updated at 00:13z.

The following slews were not executed from TL: ID 04840064(OSL)-65(CSL).

02/10/06 (Day of Year 275, Revolution 484)

Nothing to report.

03/10/06 (Day of Year 276, Revolution 484-485)

Nothing to report.

04/10/06 (Day of Year 277, Revolution 485)

Problem on TC/TM links to REDU station: at 18:45z due to a problem on TC/TM links to REDU station, the slew SID 04850061 (CSL) failing release.

The AOCS s/s was disabled in TL and a manual recovery was then started at 18:51z from attitude of PID 04850060 to the attitude of PID 04850061. The next slew in TL (04850062) was manually updated and the AOCS enabled at 19:18z.

The following slew was missed: 04850061(CSL).

05/10/06 (Day of Year 278, Revolution 485)

FDS failed update slew due to wheels speed constraints violation: at 14:09z the update of slew ID 04850085 failed after the execution of the planned RWB at the end of revolution.

FDS reported an error during the update process invoking a wheel constraint violation during the generation of the TPF. The AOCS s/s was disabled from TL, FD support called in and a manual recovery was performed as follows:

- the attitude of PID 04850084 was maintained during the PP, giving priority to the S/C safety, to avoid any rush in recovery due to the limited time available (the proposed recovery foresaw to divide the large slew to PID 85 in two shorter slews to

avoid speed constraints violation). The attitude validity, wheels speeds constraints, guide star validity and antenna predictions were verified to be safe across the PP;

- at 21:50z, after AOS 486, a manual RWB was performed to re-join the wheel speeds;

- manual OSL was performed from the attitude 04850084 to an “intermediate” valid attitude (constraints free), pre-identified by FD team during the pp in advance,

RA 19:00:00
 DEC 00:00:00
 POS 265:05:37

- manual OSL from the intermediate attitude to the PID 04860001 and update of SID 04860002 at 23:30z. No further corrective Bias was requested.

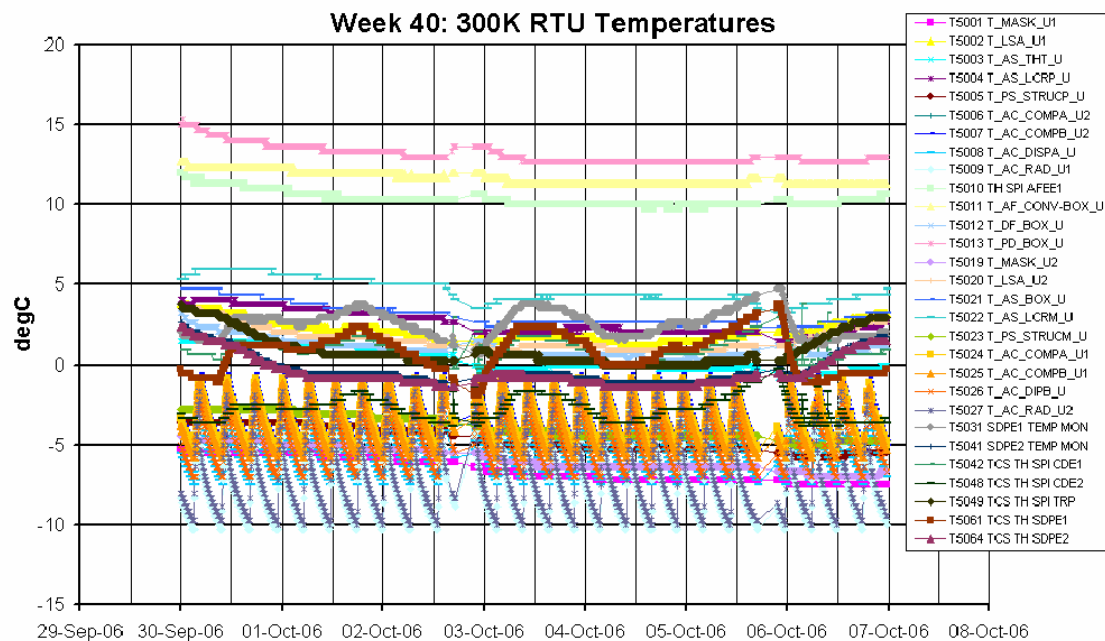
The following slews were missed: 04850085(OSL)-86(OSL)-87(OSL)-88(CSL); 04860001(OSL).

06/10/06 (Day of Year 279, Revolution 485-486)

Nothing to report.

8.3.2 SPI Operations

Unit Temperatures: All the equipment temperatures are inside the operational limits. The following plot shows their evolution during the reporting period:

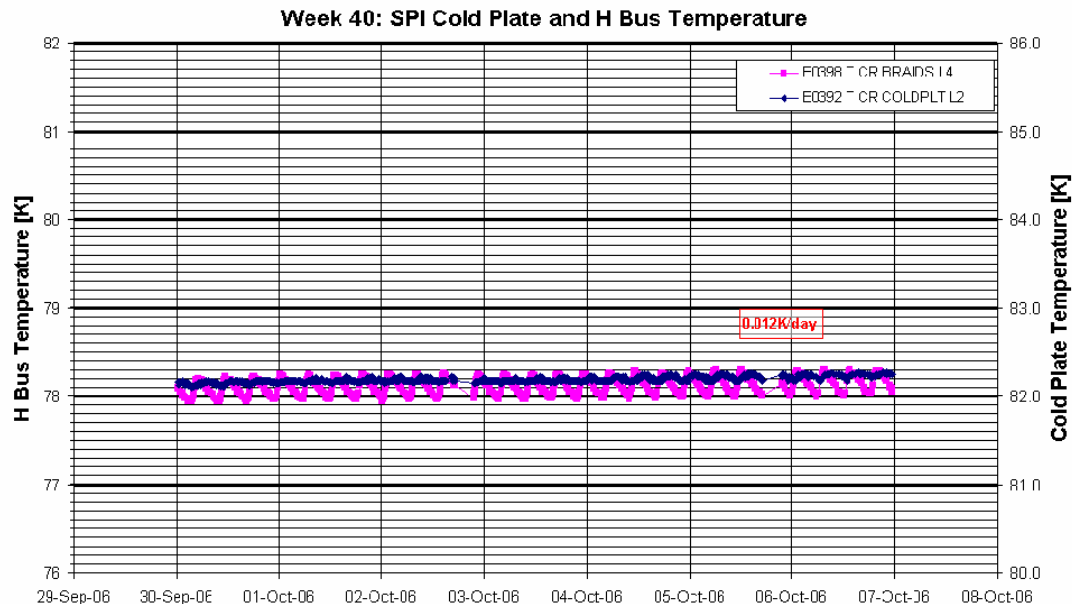


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range to 82K +/-1K with a

positive drift of 0.012deg/day. The stroke of all four compressors is currently set to 39. The average LCL currents of the CDEs over the week were:

- Average CDE1 LCL Current = 4.57A
- Average CDE2 LCL Current = 4.35A

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



DPE & IASW: The DPE health and IASW performance is nominal. The current IASW version installed is 432.

On 2006-09-30T00:23:56Z, at radiation belt exit of revolution 484, the following OEMs were received from SPI:

APID	1024	ID	176	ANOMALY	SPI1 CONFIGURATION STATUS	ACQ ERROR
	E9765			S/A AUTOTEST ERR		PSD
	E9079			MESS CLASS		2
	E9080			MESS ID		176
	E9766			HIGH BYTE		33
	E9767			MEDIUM BYTE		0
	E9768			LOW BYTE		0
	FIX8					161

>>indicating an error in the acquisition of the configuration status of the PSD.

APID	1024	ID	177	ANOMALY	SPI1 AUTOMATIC RECONFIGURATION ERROR
	E9769			AUTOMATIC STEP	CONF STATUS
	E9079			MESS CLASS	2
	E9080			MESS ID	177
	FIX16				0
	FIX16				0

>>indicating an error in the CONF STATUS step of the automatic reconfiguration. This is the penultimate step of the automatic reconfiguration, when the IASW asks each S/A which is ON for its configuration status.

APID	1024	ID	130	EVENT	SPI1 STATE CHANGE
	FIX6				0
	E9079			MESS CLASS	0
	E9080			MESS ID	130
	E9755			OLD STATE	AUTOMATIC
	E9756			NEW STATE	COMMANDED

>>This indicates that the nominal change of state following automatic reconfiguration at belt exit was executed.

APID 1024 ID 192	TC REJECT	SPI1 TC NOT EXECUTED
E9771	TC REJECT REASON	TC BAD EXEC
E9079	MESS CLASS	3
E9080	MESS ID	192
FIX5		0
E9781	APID REJECT TC	1025
FIX2		0
E9770	SSC NOT EXEC TC	8195

>>indicating that the TC from the DPE to the subassemblies to go to PHOTON mode was not executed.

The mode of the IASW and all subassemblies remained in CONF following the automatic reconfiguration after radiation belt exit, rather than transitioning to PHOTON/OPER.

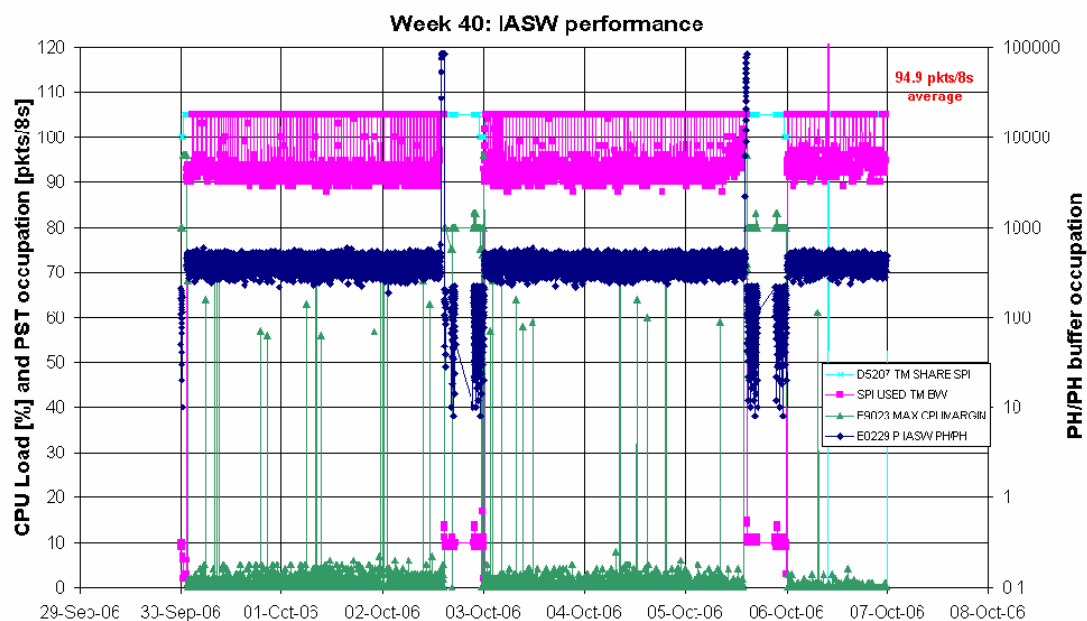
SPI was recovered by manually re-starting the automatic reconfiguration and commanding the transition into PHOTON mode as follows:

- 2006-09-30T01:21:20Z FCP_SPI1_0175 SPI RESTORE ALL CONFIGURATION SETTINGS
- 2006-09-30T01:32:55Z FCP_SPI1_0130 SPI TRANSITION TO PHOTON MODE

SPI operations continued nominally.

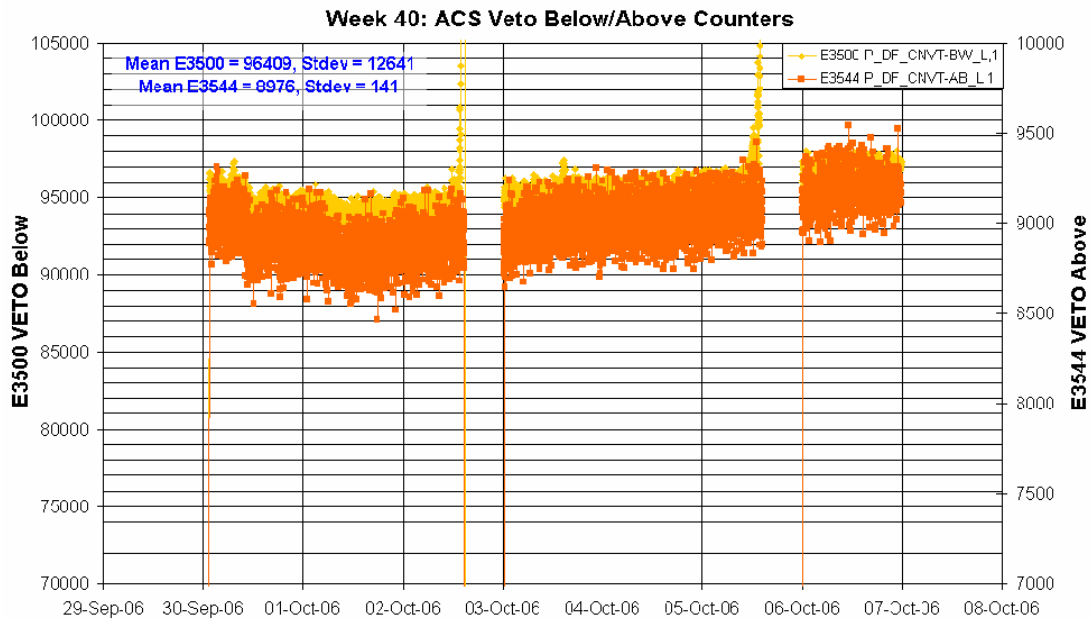
This anomaly is recorded in the ARTS system as INT_SC-160. This is the first time that this anomaly has occurred and it has not reoccurred so far.

The average TM bandwidth occupation of SPI was 94.9 packets/cycle over the science window when the TM allocation was 105 packets/cycle. The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



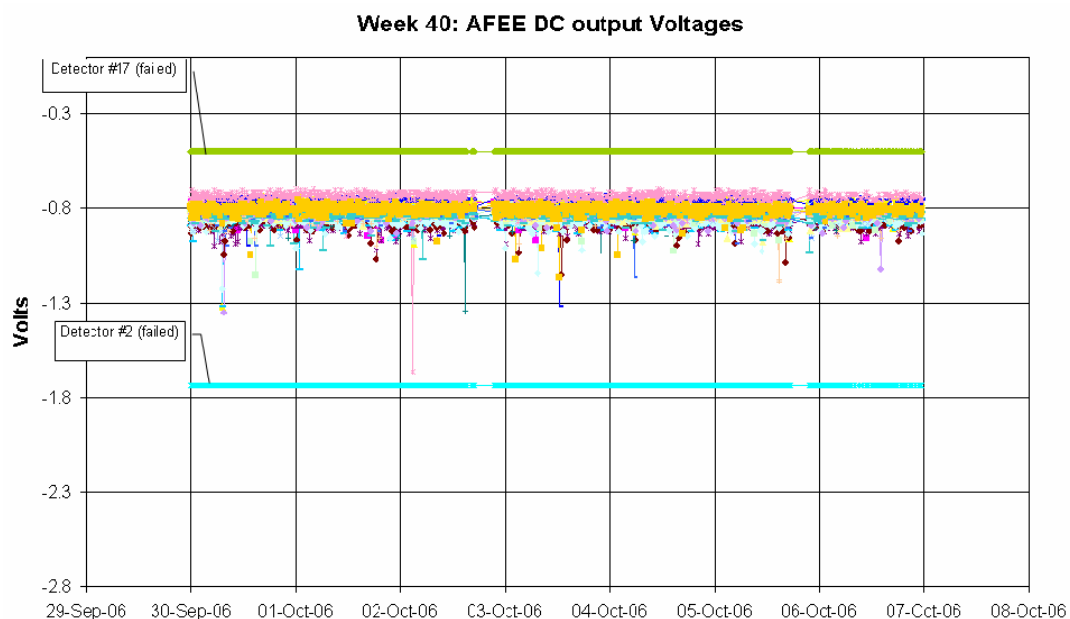
ACS: The performance of the ACS is nominal.

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

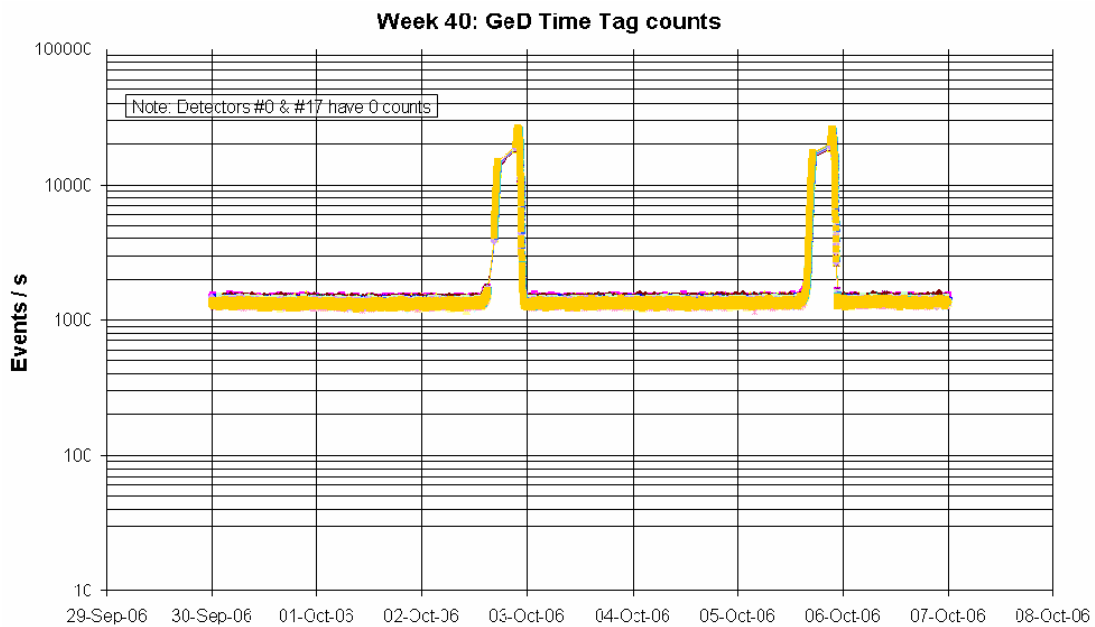
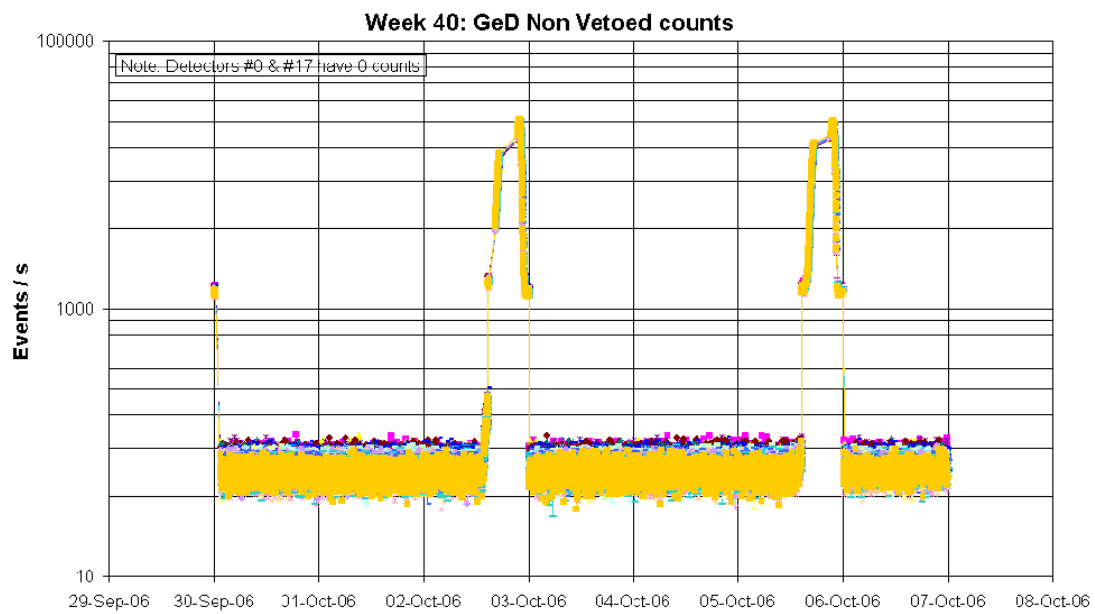


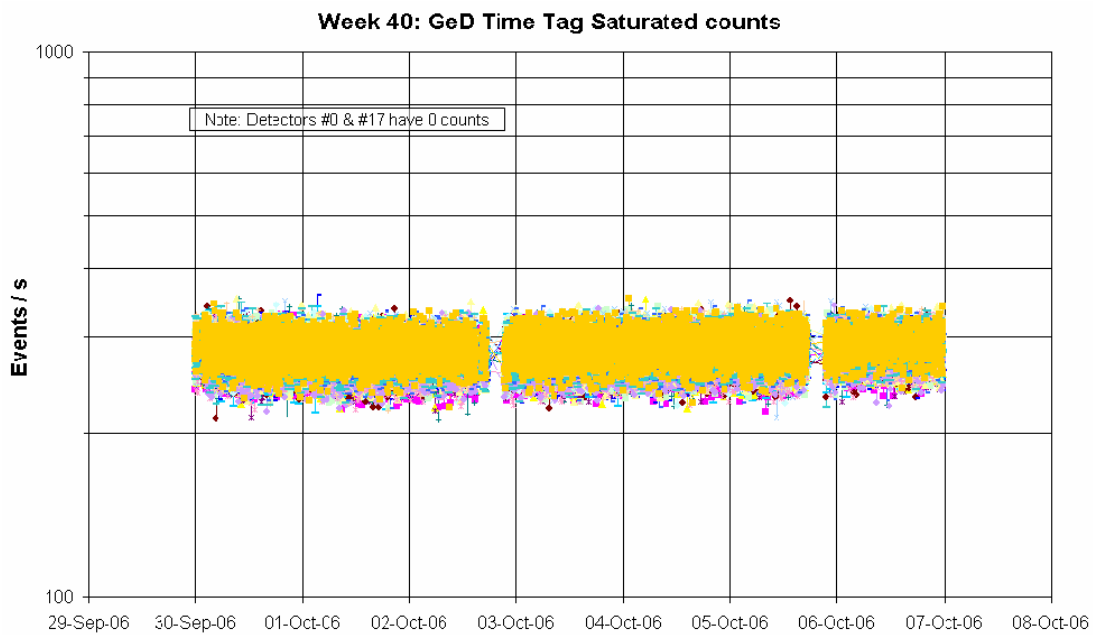
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detectors #4 and #12 which are showing a slightly degraded energy resolution. The energy resolution of GeD#15 was recovered with the last annealing.

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

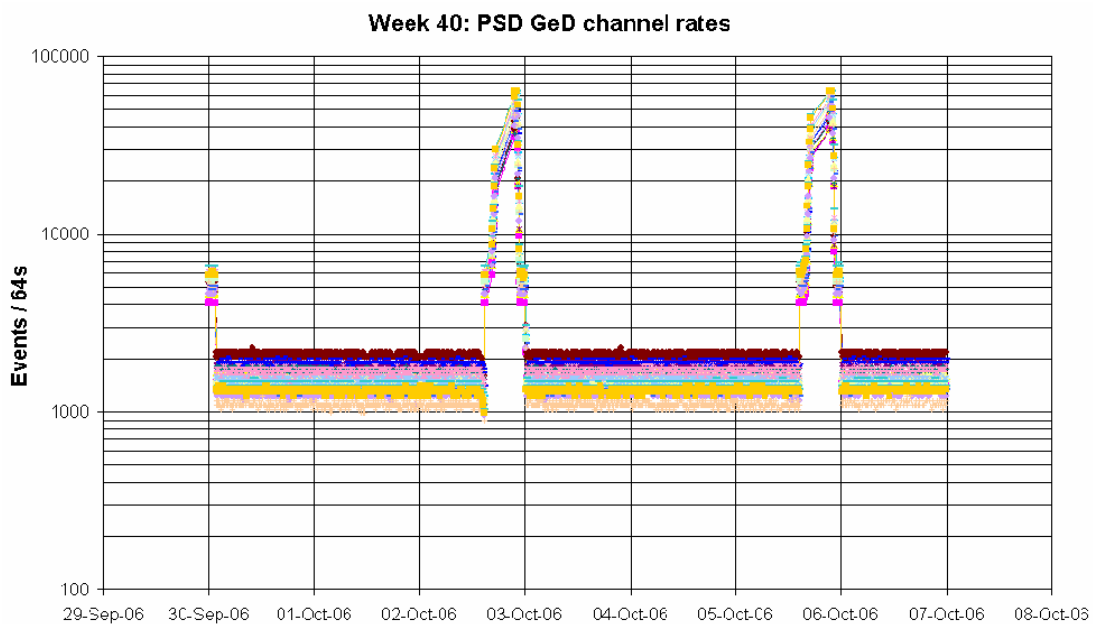


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





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



Event Log:

The following non-nominal OEMs were received from SPI during the reporting period:

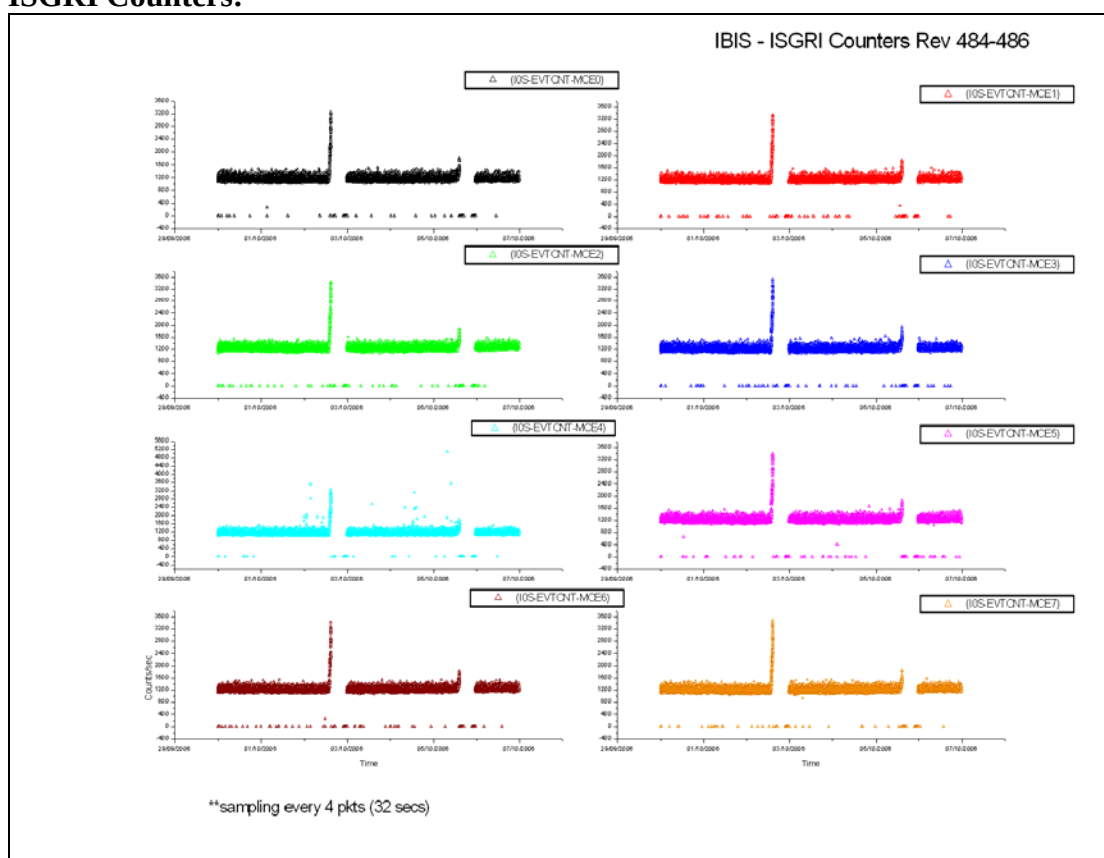
- On 2006-10-02 at 05:44:22Z the TM parameter E3263 S AS HV-ST L67 went OOL (value = NO EXIST VAL). This is the FEE HV status #67. It returned within limits when the next packet was received at 05:55:02Z.
- On 2006-10-02 at 13:55:47Z the TM parameter E3500 P_DF_CNVT-BW_L went OOL High (value = 142327). This was ~50 minutes before radiation belt entry of revolution 484 and therefore no action was taken. This parameter remained OOL until radiation belt entry.

- On 2006-10-05 at 13:46:00Z the TM parameter E3500 P_DF_CNVT-BW_L went OOL High (value = 111174). This was ~50 minutes before radiation belt entry of revolution 485 and therefore no action was taken. This parameter remained OOL until radiation belt entry.
- Starting on 2006-10-05 at 21:42:29Z the TM parameter E2116 T AS PSAC L2 began to go OOL Low (value = -45.067451degC). This is the Plastic Scintillator temperature. This parameter continued to fluctuate around the low limit for the rest of the reporting period. No action was taken as this is a known and recurring problem due to this thermistor being unreliable.

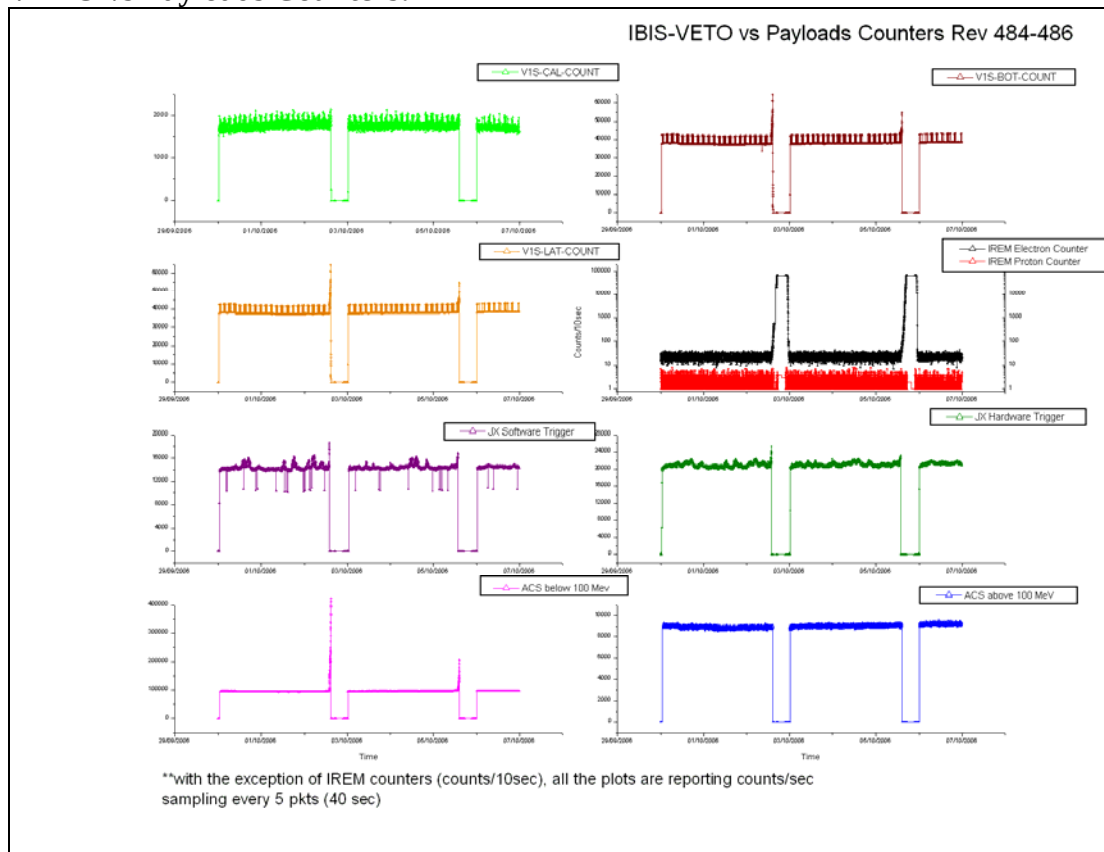
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

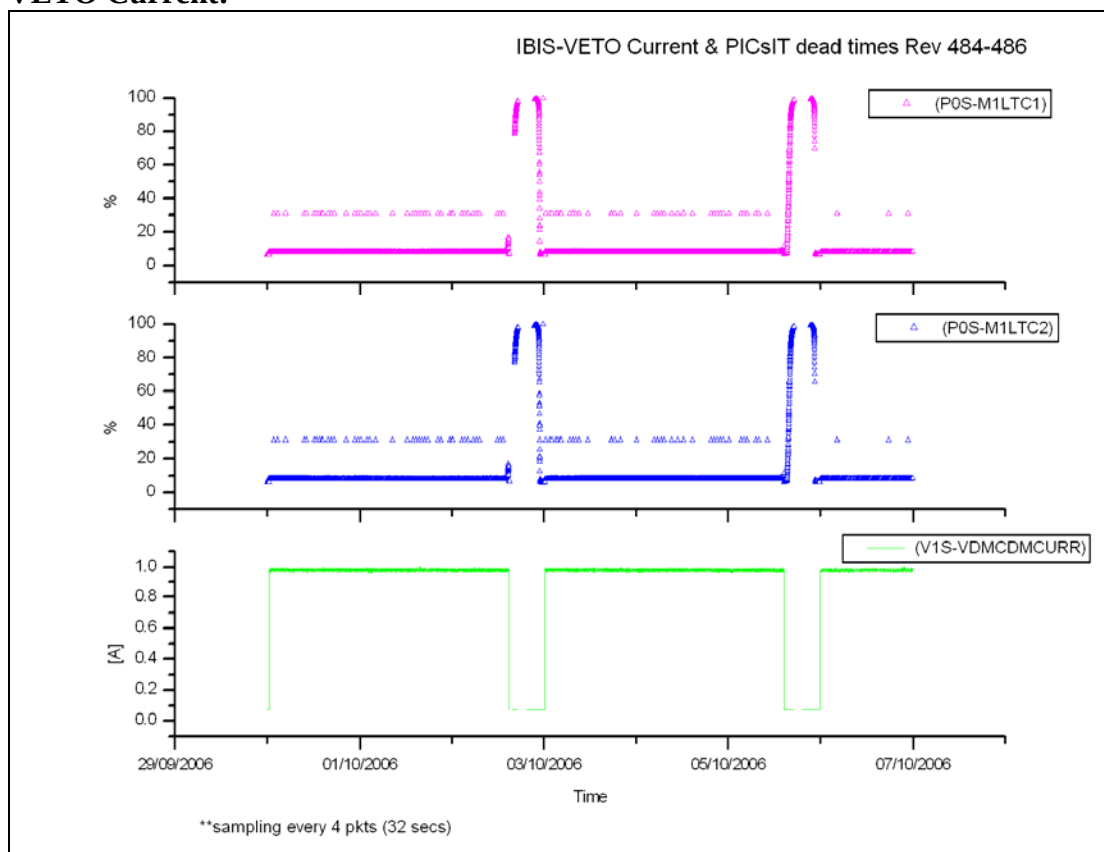


VETO vs Payloads Counters:

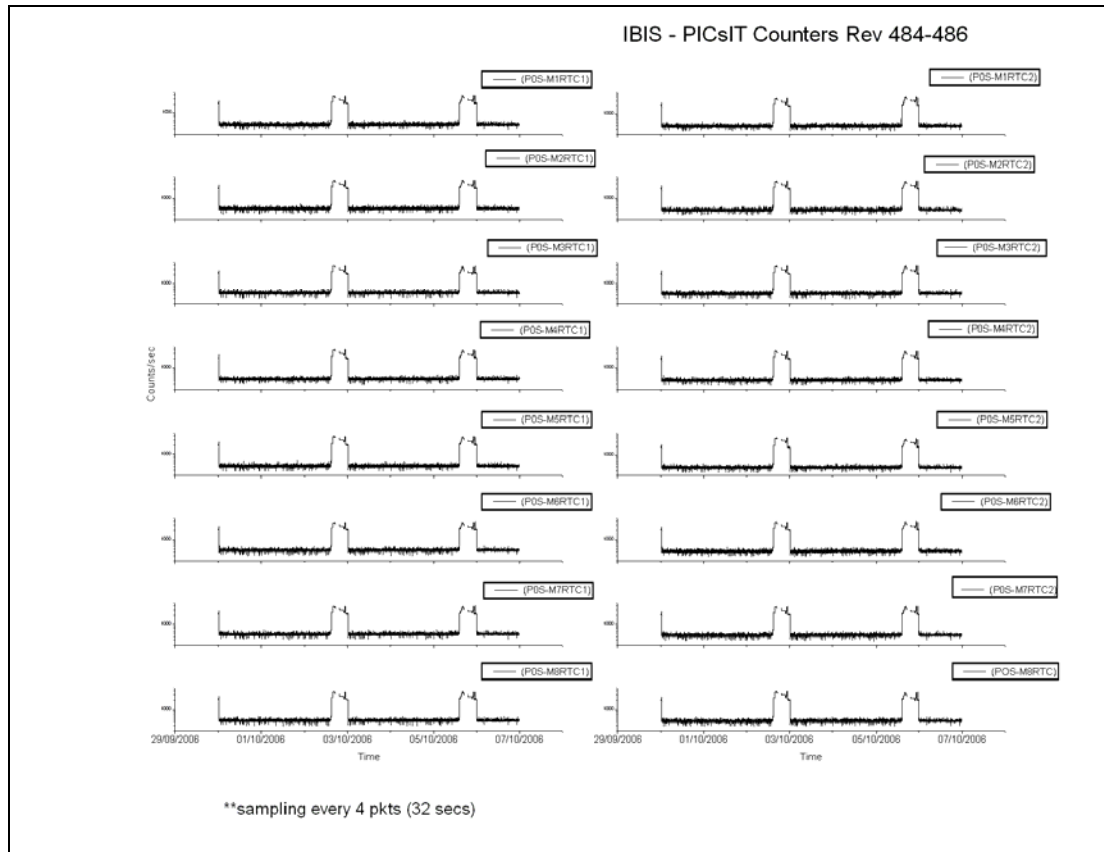


The week was characterised by low radiation.

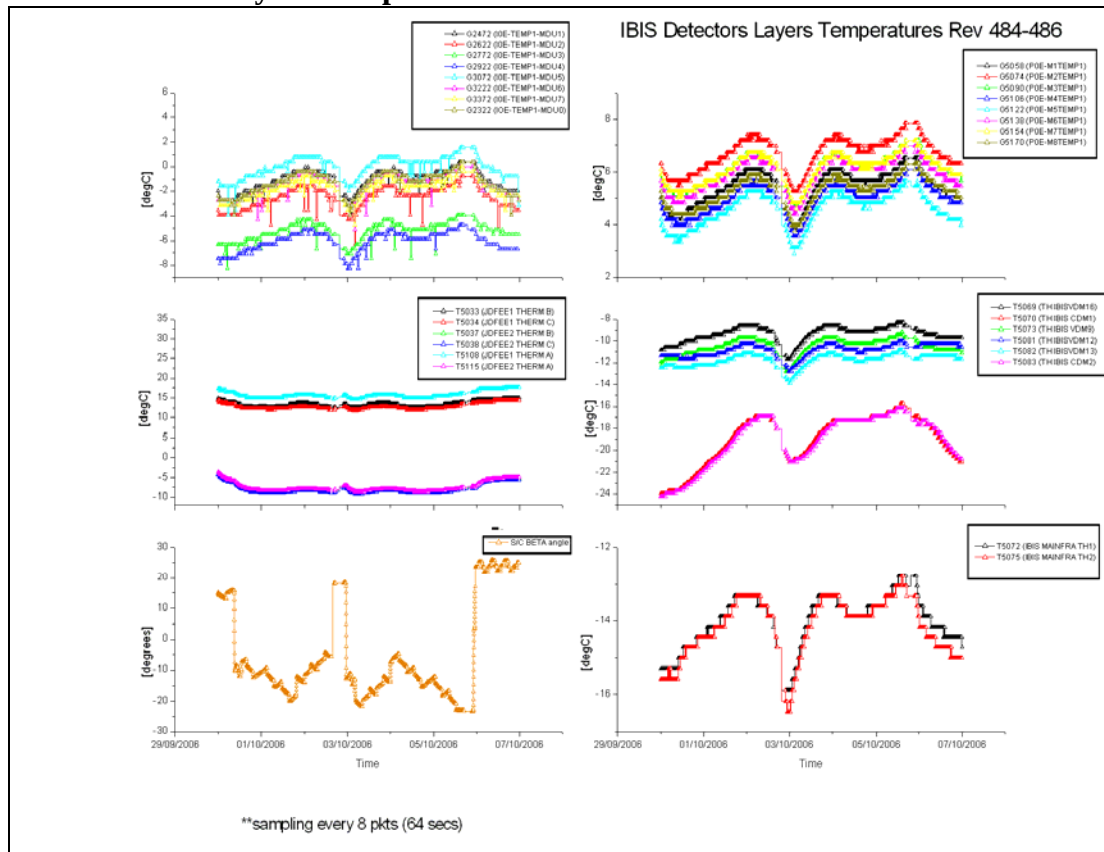
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 275 (02/10/2006):

At 08:15Z TM parameter G2056 (I0E-OVFWPADD-M4) failed SCC. According to I-OVF-1 in FDIR, no action was taken.

At 14:18Z, TM family G2013 (I0S-EVTCNT-MCEi) went OOL High.

At 14:21Z TM parameters G6062 (V1S-BOT-COUNT) and G6063 (V1S-LAT-COUNT) went OOL High until 14:36Z when they changed to OOL Low (= see below VETO wrap-around).

At 14:29Z TM parameter G8080 (S1E-VS HBRA-RT) started toggling OOL High. These OOL were due to high radiation background as the spacecraft was approaching the radiation belts. They stopped when IBIS went automatically into Stand-By mode at belts entry at 14:48Z.

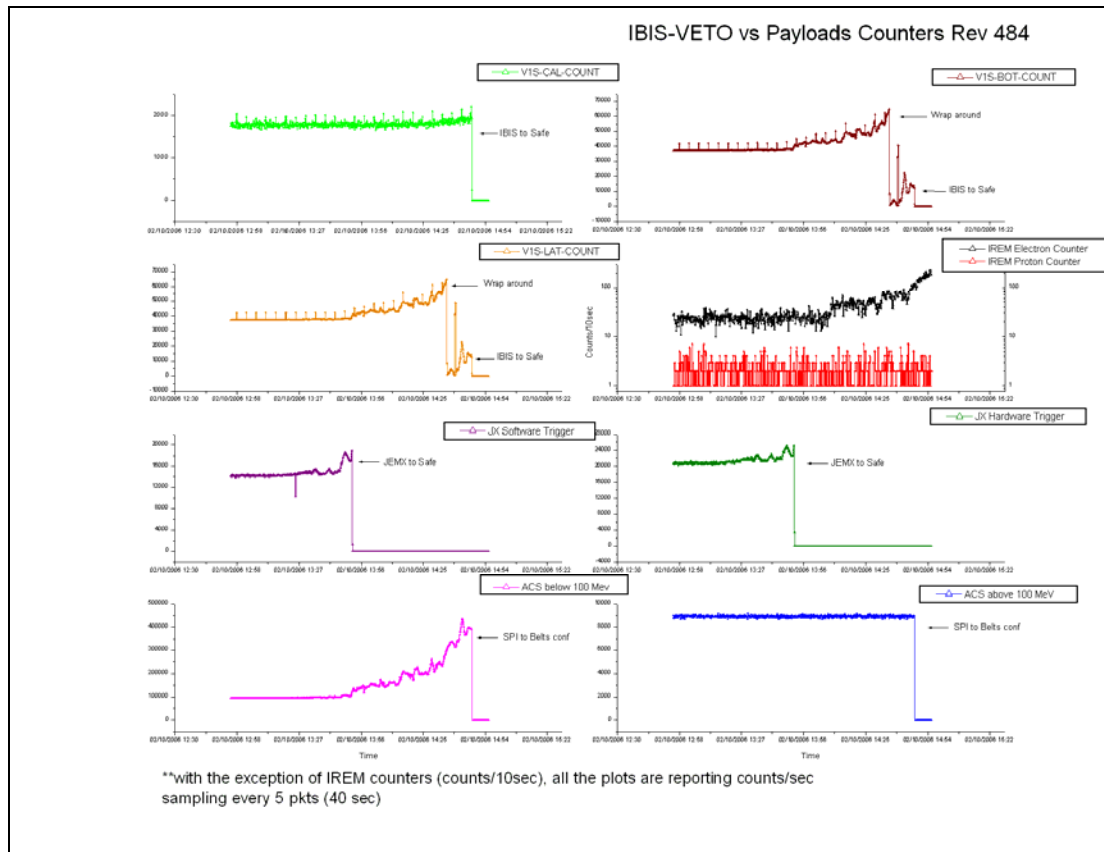
At 14:48Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit High. It went back inside limits at 00:20Z on DoY 276. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 in FDIR, no action was taken.

During the Belts, several TM parameters from families G5002 (P0S-Mi RTC1) and G5003 (P0S-Mi RTC2) went Out Of Limit High and back. According to P-CNT-1 in FDIR, no action was taken.

At 23:46Z, TM parameter G2014 (I0E-OVFWPXADD-M1) failed Status Consistency Check. At 23:55Z, TM parameter G2070 (I0E-OVFWPXADD-M5) failed Status Consistency Check. On DoY 276 (03/10/2006) at 00:04Z, TM parameter G2014 (I0E-OVFWPXADD-M1) failed Status Consistency Check. According to I-OVF-1 in FDIR, no action was taken.

DoY 275 (02/10/2006): VETO wrap-around

VETO Lateral and Bottom counters reported a wrap-around at 14:36Z. This featured high radiation as the spacecraft was approaching the Belts. The other instruments of the payload confirmed this background.



No action was taken as VETO went into Stand-By mode automatically at 14:48Z in response to the Broadcast Packet flagging the Radiation Belts Entry.

DoY 276, 277 and 278: ISGRI M4 Overflow Wrong Pixel Address toggling

At 13:38Z, TM parameter G2056 (I0E-OVFWPXADD-M4) failed Status Consistency Check. It happened again on DoY 277 (04/10/2006) at 08:00Z and 14:54Z, and on DoY 278 (05/10/2006) at 09:44Z and 13:44Z. According to I-OVF-1 in FDIR, no action was taken. However, this behaviour is not so usual and worth keeping an eye on.

DoY 278 (05/10/2006):

At 13:55Z, TM parameter G8080 (S1E-VS HBRA-RT) started toggling OOL High.
 At 14:28Z TM parameters G6062 (V1S-BOT-COUNT) and G6063 (V1S-LAT-COUNT) went OOL High.
 These OOL were due to high radiation background as the spacecraft was approaching the radiation belts. They stopped when IBIS went automatically into Stand-By mode at belts entry at 14:33Z.

At 14:33Z, TM parameter G8015 (S1E-A2_PMT_V) was reported Out Of Limit High. It went back inside limits at 00:06Z on DoY 279. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 in FDIR, no action was taken.

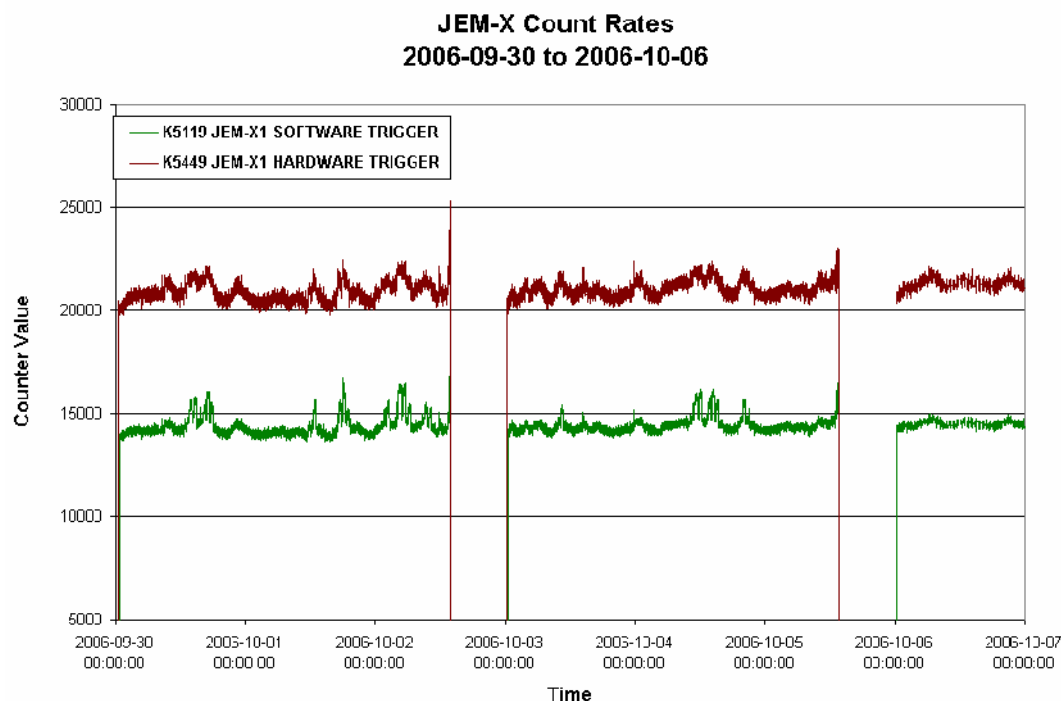
During the Belts, several TM parameters from families G5002 (P0S-Mi RTC1) and G5003 (P0S-Mi RTC2) went Out Of Limit High and back. According to P-CNT-1 in FDIR, no action was taken.

At 23:29Z, TM parameter G2000 (I0E-OVFWPXADD-M0) failed Status Consistency Check. At 23:37Z, TM parameter G2084 (I0E-OVFWPXADD-M6) failed Status Consistency Check. At 23:48Z, TM parameter G2014 (I0E-OVFWPXADD-M1) failed Status Consistency Check. According to I-OVF-1 in FDIR, no action was taken.

8.3.4 JEM-X Operations

JEM-X Count Rates

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

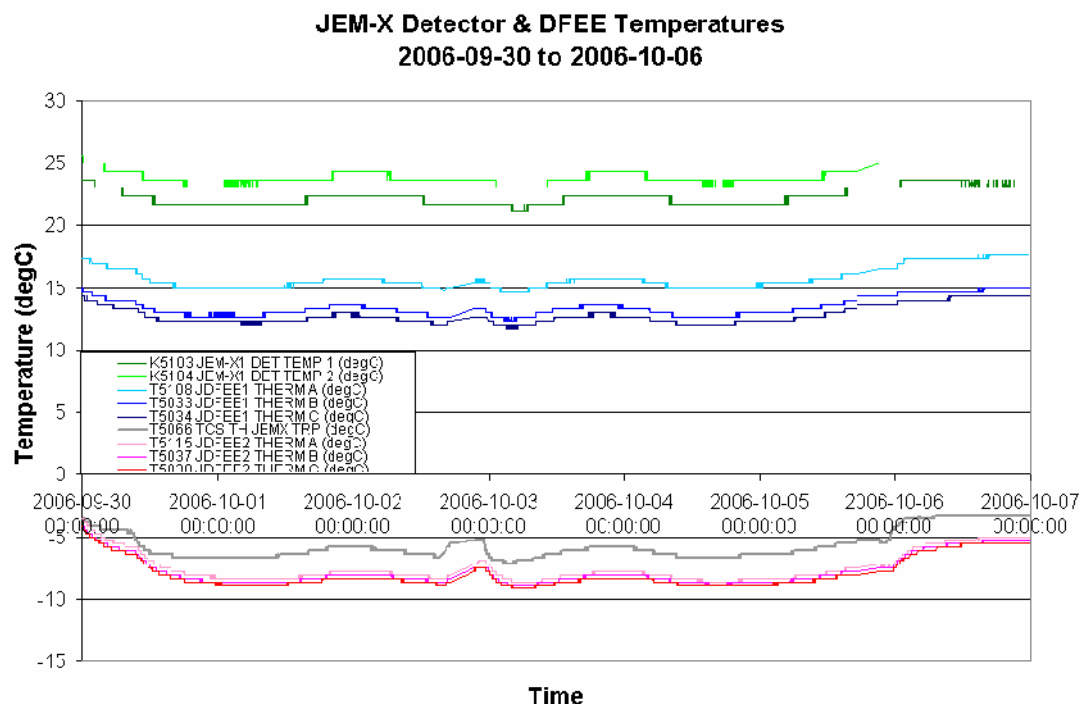


JEM-X Temperatures

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)



JEM-X Daily Report

2006-09-30 (DOY 273, Rev 484) to 2006-10-06 (DOY 279, Rev 486)

Nothing to report

8.3.5 OMC Operations

2006-09-30 (DOY 273, Rev 484)

Nothing to report.

2006-10-01 (DOY 274, Rev 484)

At 23:30, a Flight Dynamics problem caused the loss of pointing 04840064. It was at this time the following commands were rejected:

2006.274.23.27.20.023	2006.274.23.27.24.490	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					
2006.274.23.27.26.148	2006.274.23.27.32.370	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					

Which correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing.

2006-10-02 (DOY 275, Rev 484) to 2006-10-03 (DOY 276, Rev 485)

Nothing to report.

2006-10-04 (DOY 277, Rev 485)

Doc. Title : INTEGRAL Mission Report #211
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 09/10/06

Issue : 1
Rev. : 0
Page : 33

At 18:45, a hit on the line with Redu knocked out the TM. The impact was the loss of pointings 04850061. It was at this time the following commands were rejected:

2006.277.18.47.22.161	2006.277.18.47.32.415	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					
2006.277.18.47.28.036	2006.277.18.47.32.434	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					

Which correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing.

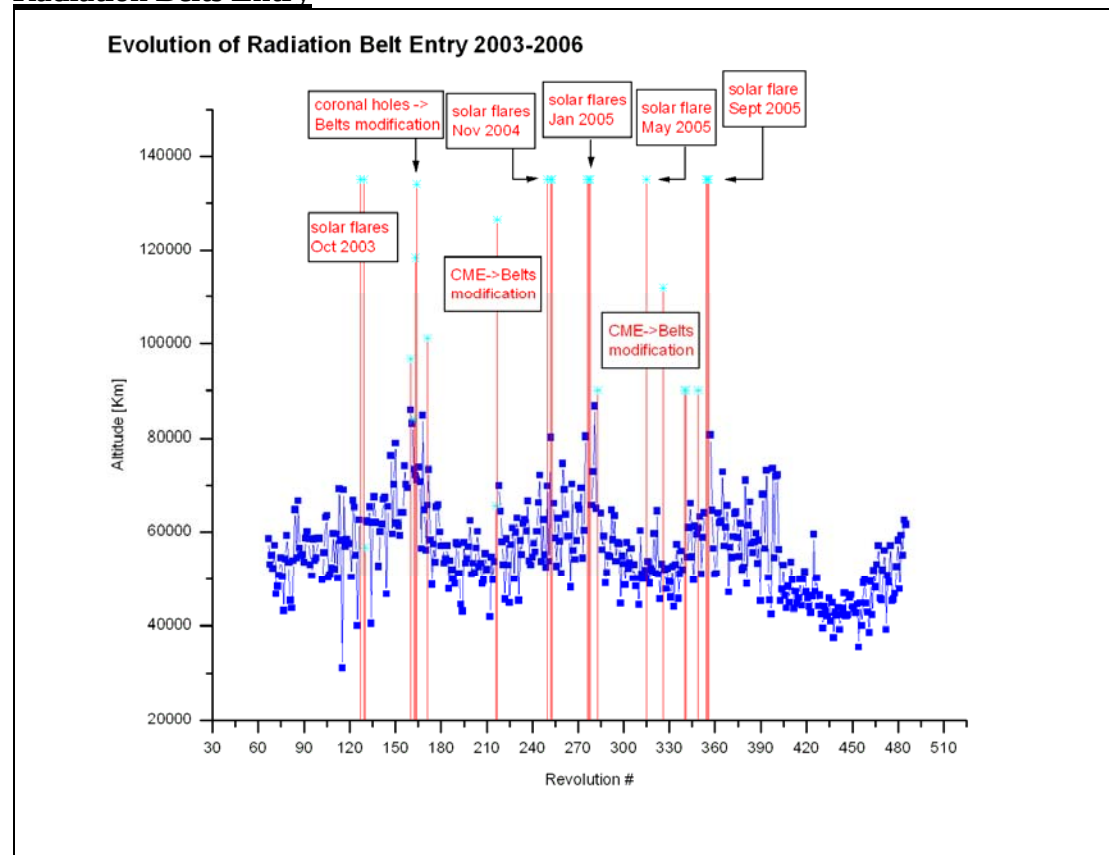
2006-10-05 (DOY 278, Rev 485) to 2006-10-06 (DOY 279, Rev 486)

Nothing to report.

On DoY 275 at 14:48:03 and DoY 278 at 14:33:06 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]
484	RAD_ENTR R 2006-10-02T14:47:55Z	2006-10-02 13:57:45	62585.7	2006-10-02 15:37:12	49102
485	RAD_EXIT R 2006-10-03T00:07:44Z	2006-10-02 23:12:17	36778.2	2006-10-02 23:37:12	40806
485	RAD_ENTR R 2006-10-05T14:33:05Z	2006-10-05 13:46:41	61717.3	2006-10-05 15:17:42	50114
486	RAD_EXIT R 2006-10-05T23:53:25Z	2006-10-05 22:42:49	>40363.3	2006-10-05 23:27:42	41087

Reference

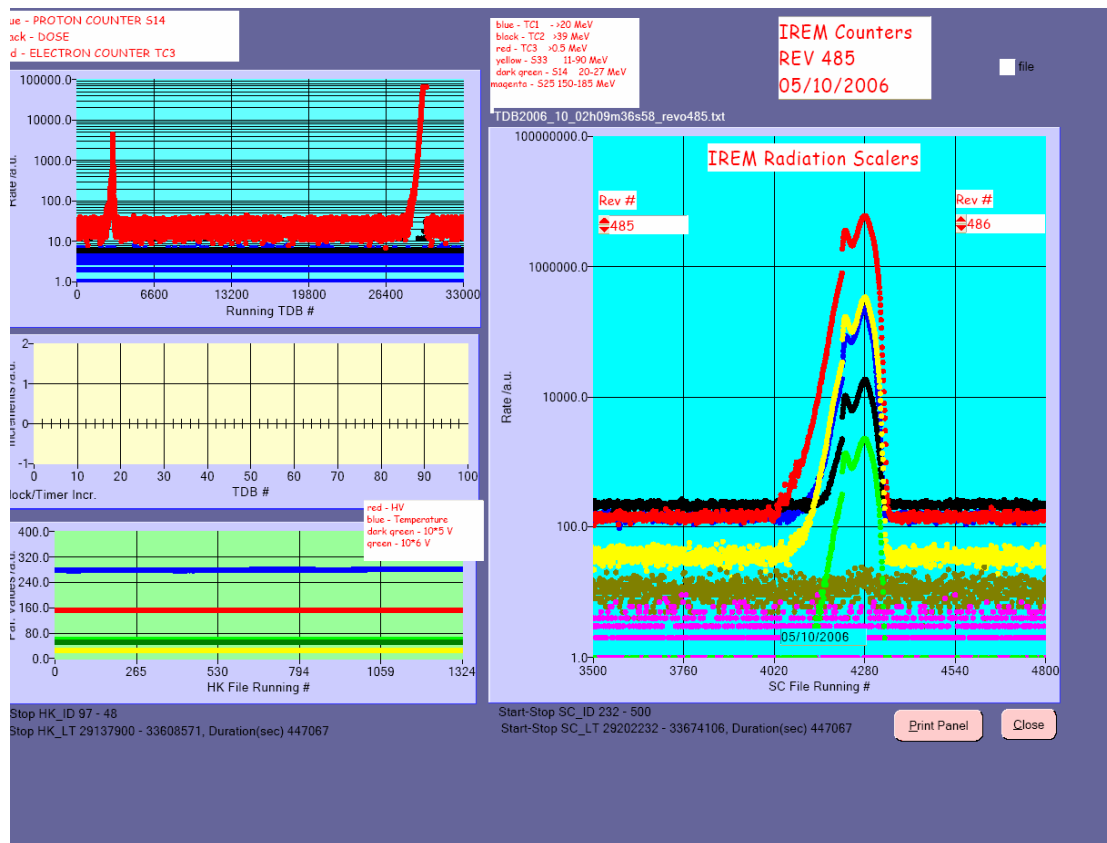
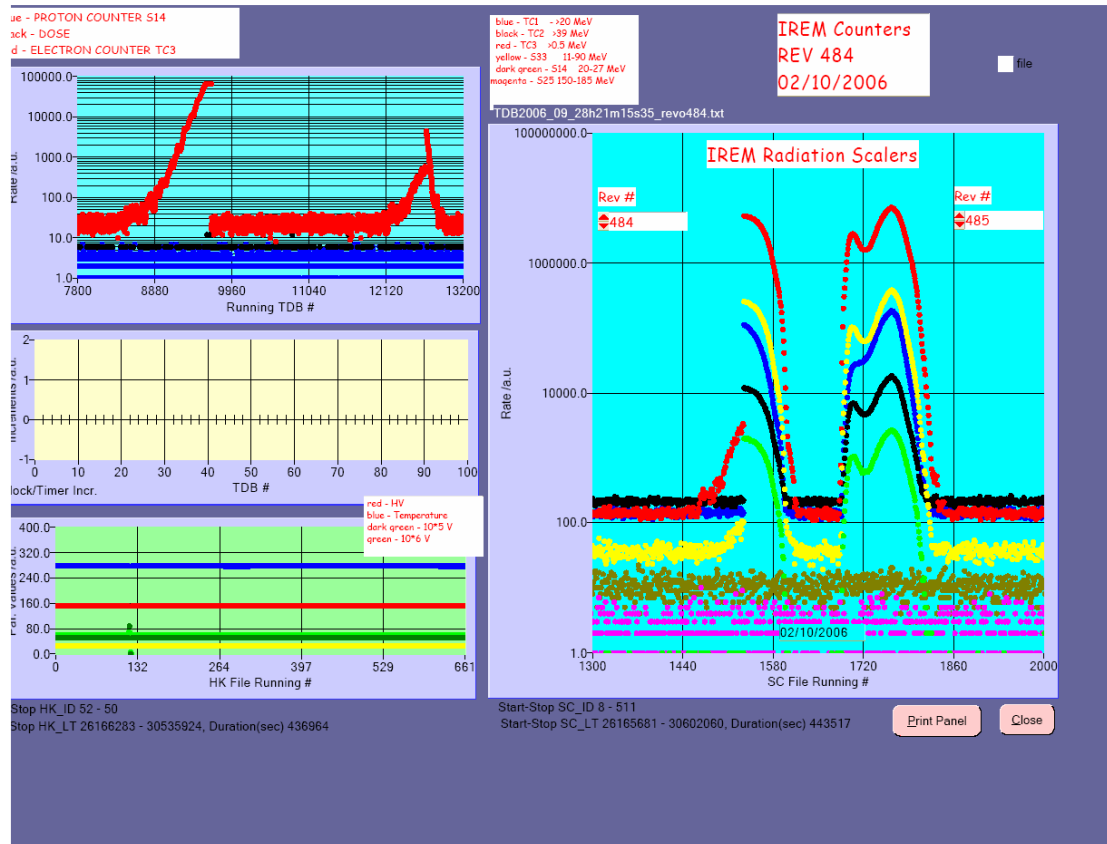
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

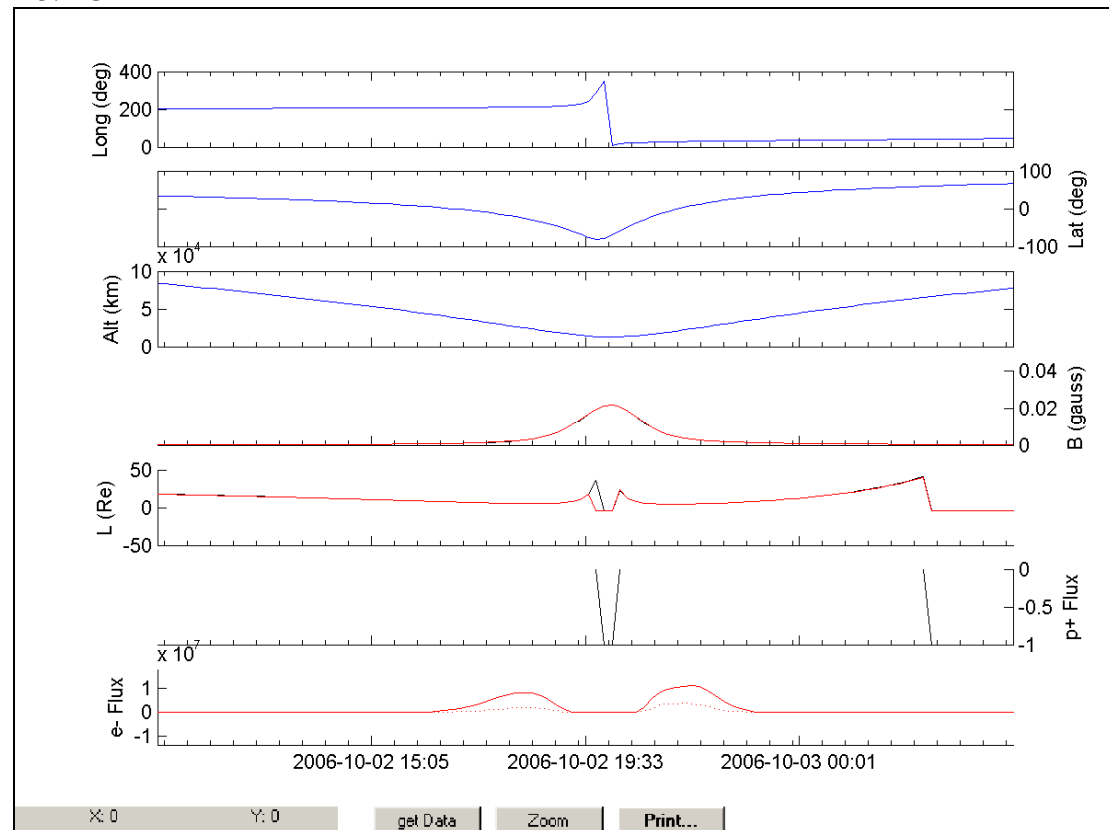
Radiation Spike

IREM radiation counters:

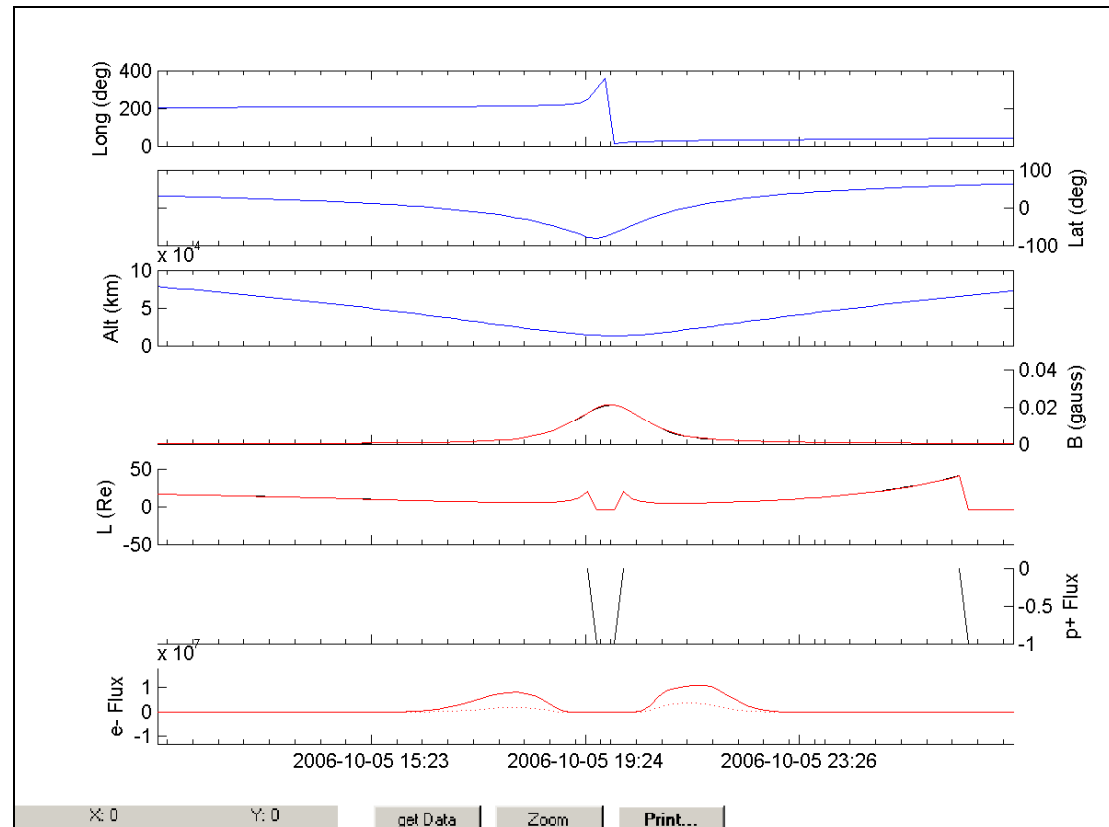


IREM Predicted Radiation Belt Passages:

Rev 484



Rev 485



Doc. Title : INTEGRAL Mission Report #211
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 09/10/06

Issue : 1
Rev. : 0
Page : 37

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

Due to a problem with the SEIS tool, no data are available this week.