

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 195
Week 24
19.06.06
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.....	3
3.1.4	OBDH.....	3
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.....	7
4.3.1	ISOC.....	7
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, 10/06/2006 – 16/06/2006.....	9
8.3.2	SPI Operations.....	13
8.3.3	IBIS Operations.....	16
8.3.4	JEM-X Operations.....	20
8.3.5	OMC Operations.....	21
8.3.6	IREM Operations.....	23

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
M. Warhaut OPS-OP	1		
J. Dodsworth OPS-OA	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	ISDC	
G. Gienger	1	T. Courvoisier	1
S. Pallaschke	1	R. Walter	1
W. Hell	1	N. Mowlavi	1
K.J. Schulz	1	ISDC Shift Team	1
M.A. Larsen	1		
K. Capelle	1	ALENIA	
M. Butkovic	1	M. Montagna	1
D. Heinzer	1	F. Ravera	1
U. Feucht	1		
Shift - Coord	1	PI / Instrument Teams	
Scheduling Office	1	J. P. Roques – SPI	1
T. Beck	1	G. La Rosa – IBIS	1
J. Wardill	1	P. Ubertini – IBIS	1
M. Unal	1	S. Brandt – JEM X	1
P. Maldari	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 10.06.06 until 16.06.06 (both dates inclusive) and covers the revolutions 447 and 448.

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 raster dithers of Field_13 (RA 02:54:53.00, DEC -38:54:33.0) and LEDA170194 (RA 12:39:06.30, DEC -16:10:47.8), a Galactic Plane Survey, and a hexagonal dither of Mrk 421 (RA 11:04:27.31, DEC +38:12:31.8), which was a Target of Opportunity.

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.

No slews were lost during the observation period.

The fuel consumption over the period between 08/06/2006 and 15/06/2006 was 0.1608 kg. The remaining propellant is in the order of 153.7598 Kg.

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

3.1.2 Power

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

3.1.3 Thermal

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

3.1.4 OBDH

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

3.1.5 RFS

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

3.2 Payload

3.2.1 SPI

The overall status of the gamma-ray spectrometer is nominal.

The planned 8th annealing was started on the 8th June, after radiation belt entry of revolution 445 and is progressing nominally. The summary annealing timeline is included in the future activities section of this report.

The following table reports the major events/steps performed so far (i.e. up to 16th June) since the start of the annealing:

Date/Time	Activity
08/06/2006 00:50Z	Configure SPI for start of Annealing and stop SPI active cooling
08/06/2006 02:07Z	Annealing Heater Main ON
08/06/2006 04:07Z	Annealing Heater Redundant ON
08/06/2006 16:30Z	Heat Pipe Heater Main ON, All Antifreeze Heaters (1A; 2A; 1B; 2B) OFF
09/06/2006 04:30Z	Heat Pipe Heater Redundant ON
09/06/2006 13:40Z	Cold plate temperature reached 104degC

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

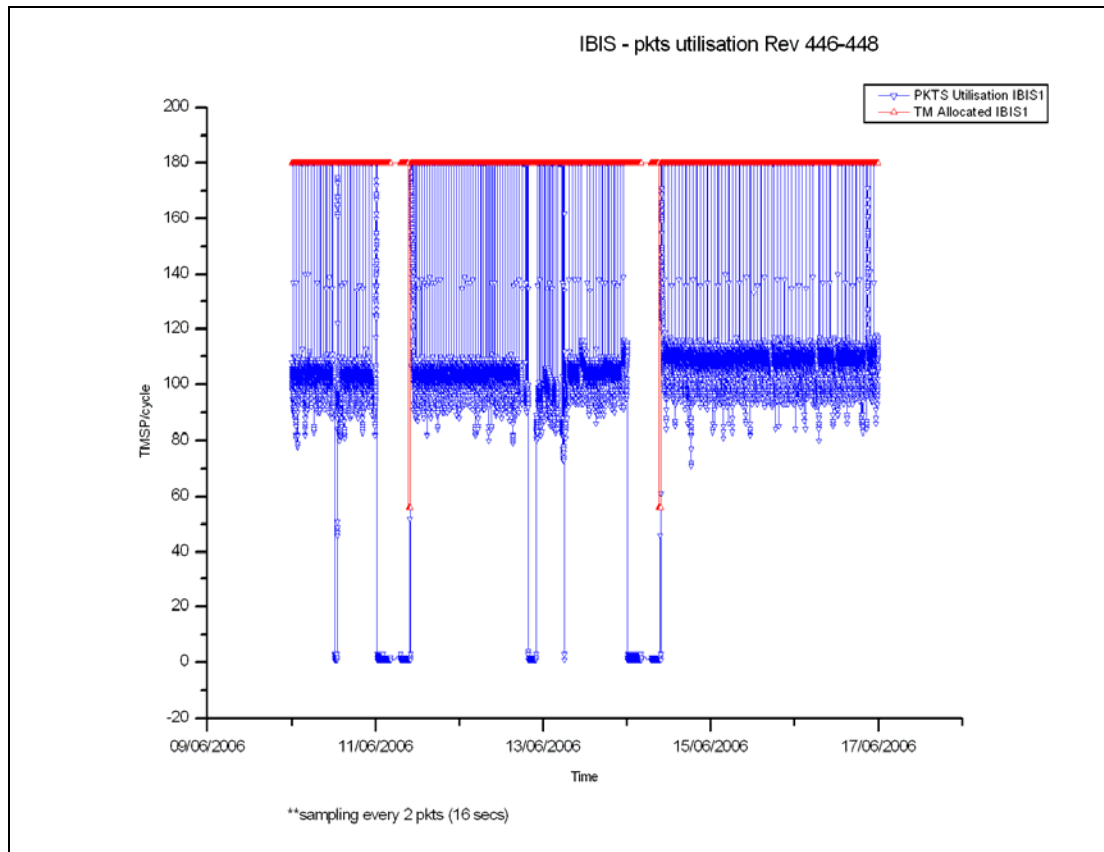
3.2.2 IBIS

The overall status of the unit is nominal.

On 2006-06-10 at 12:18Z, IREM SEU #31 occurred and caused IBIS to automatically go to Safe mode. The recovery was performed manually and IBIS was back into Scientific Standard mode at 13:06Z.

During the reporting period, the PST allocation to IBIS was 180 TMPS/cycle due to SPI annealing. The IBIS mean bandwidth utilisation during the observation period was 110.11 TMPS/cycle, up 7.43 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 with a TM allocation of 15 packets/cycle. JEM-X2 was dormant (DPE OFF) with no TM slots allocated.

On 2006-06-12 problems with the command verifier task of the IMCS caused the ED KEDATA02 from the Timeline to partially fail, leaving JEM-X1 in Setup mode. Once the verifier was recovered, this ED was resent manually, returning JEM-X1 to Data Taking mode.

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, 153 of the 157 planned science pointings for OMC were executed nominally, 2 were cut short and 2 were lost.

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

3.2.5 IREM

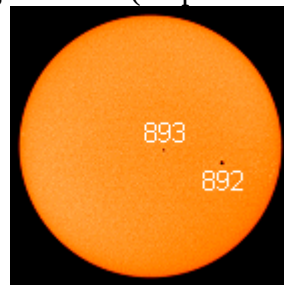
The overall status of the unit is nominal.

On 2006-06-10 at 12:18Z, IREM SEU #31 occurred. The recovery was performed manually using the new fast procedure FCP_RM_0081 for the patch. IREM was back running at 15:05Z.

Solar Activity

The observation period was characterised low solar activity.

At the beginning of the observation period, sunspots 892 and 893 posed a threat for M-class solar flares but nothing occurred (cf. picture from 11/06/2006).



From June the 12th these sunspots started decaying and posed no threat for the rest of the week.

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 very good this week, although some science data was lost to MOC problems. There were a few other minor problems with ground stations, and the links with ISDC, but these had no impact. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was in general good this week, with IMCS problems causing the loss of some science data. The overall performance was over 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 well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF for revolution 455 and 456 were delivered. Mission planning of revolutions 452 to 455 was performed. The ToO request mentioned in last week's report was approved for execution. This resulted in replanning of revolutions 448 to 450. TSF for revolutions 448 to 450 were received from MOC.

2. Observation status

ECS for revolution 438, 440 and 441 were received. The corresponding OCS's have been sent to ISDC. No extra time was credited.

3. ISOC science data archive

The planned availability of the next version 2.5.2 has to be delayed one to two weeks primarily due to workload situation within ISOC. The computer to replace the current rather unreliable hardware is now configured and the population with archive data can now start.

4. ISOC system

The ISOC system version 12.4 has been used this week. The migration of the data base was successfully re-performed. The system has been used without any problems. Scooping of the system for the extra AO in the autumn to get proposals for Key Programmes for AO 5 was started.

5. AO 4

Entry of the TAC results started this week to avoid time pressure in the coming weeks. Information to the PI's of the TAC results will only be done when D/SCI has approved the program.

6. Problems

No new problems encountered.

4.3.2 ISDC

Status of ISDC observation processing on 19/06/2006:

- Latest Standard Analysis completed: observation 03200200012 (GRS 1915+105, Revolution 431) on 14/06/2006.
- Latest products archived: observation 03201090065 (Galactic Bulge, Revolution 428) on 11/06/2006.
- Latest observation products sent to the observer: observation 03201090063 (Galactic Bulge, Revolution 426) on 01/06/2006.

5 Special Events

6 Anomalies

The following problems impacted operations this week:

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 447

The observations in revolution 447 began with a raster dither of Field_13 (RA 02:54:53.00, DEC -38:54:33.0), which lasted ~30.4 hours. This was followed by a Galactic Plane Survey lasting ~7.3hours. Finally, another raster dither, this time of LEDA170194 (RA 12:39:06.30, DEC -16:10:47.8) was performed, which lasted ~15.8 hours until the end of the revolution.

Revolution 448

The observations in revolution 448 consisted entirely of a hexagonal dither of Mrk 421 (RA 11:04:27.31, DEC +38:12:31.8), which was a Target of Opportunity, and lasted ~57.5 hours.

Throughout these observations all instruments were in their nominal science modes, except SPI, which is undergoing annealing and JEM-X2, which is switched off. The TM allocation was IBIS 180; SPI 46; JEM-X1 15; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2006-06-05T08:32:18.000Z	154.0240	F	Automatic TM processing.
2006-06-05T20:58:03.000Z	154.0014	F	Automatic TM processing.
2006-06-06T18:47:10.000Z	153.9852	F	Automatic TM processing.
2006-06-08T04:21:05.000Z	153.9785	F	Automatic TM processing.
2006-06-08T08:17:46.000Z	153.9655	F	Automatic TM processing.
2006-06-08T23:49:15.000Z	153.9206	F	Automatic TM processing.
2006-06-09T18:51:17.000Z	153.9108	F	Automatic TM processing.
2006-06-11T01:13:28.000Z	153.8999	F	Automatic TM processing.
2006-06-11T08:35:29.000Z	153.8808	F	Automatic TM processing.
2006-06-12T18:09:50.000Z	153.8479	F	Automatic TM processing.
2006-06-13T02:39:42.000Z	153.8350	F	Automatic TM processing.
2006-06-13T04:25:51.000Z	153.8254	F	Automatic TM processing.
2006-06-14T03:49:05.000Z	153.7856	F	Automatic TM processing.
2006-06-14T07:36:33.000Z	153.7770	F	Automatic TM processing.
2006-06-15T17:51:49.000Z	153.7598	F	Automatic TM processing.

This report was generated Fri Jun 16 08:00:42 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, 10/06/2006 – 16/06/2006

AOCS operations were executed from the Automatic Timeline.

During this period, 99 Open Loop Slews, 71 Closed Loop Slews and 8 Momentum Biases were executed.

No slews were lost during the observation period.

Orbit Control

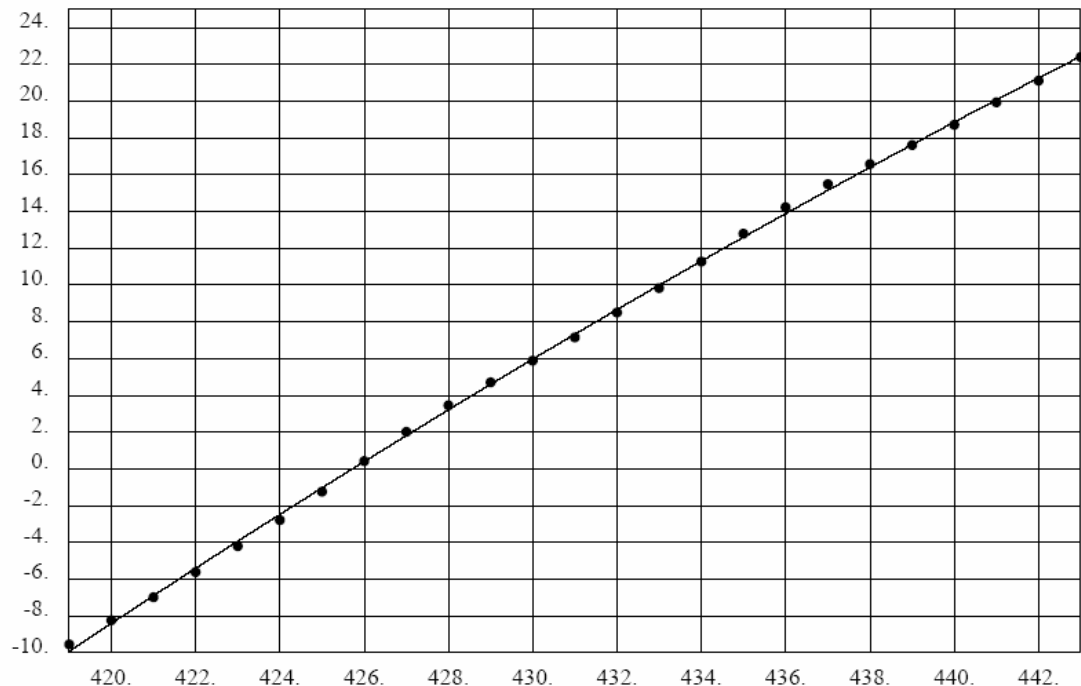
The following table shows the shortening of the necessary Goldstone pass:

Orbit number	Apogee passage date	Time from LOS Redu to 40000 km altitude
362	2005/10/01	284 min
372	2005/10/31	268 min
382	2005/11/30	244 min
393	2006/01/02	213 min
402	2006/01/29	188 min
412	2006/02/28	159 min
422	2006/03/30	122 min
433	2006/05/01	80 min
443	2006/05/31	46 min

From orbit 460 and onwards Redu will give coverage down to 40000 km altitude.

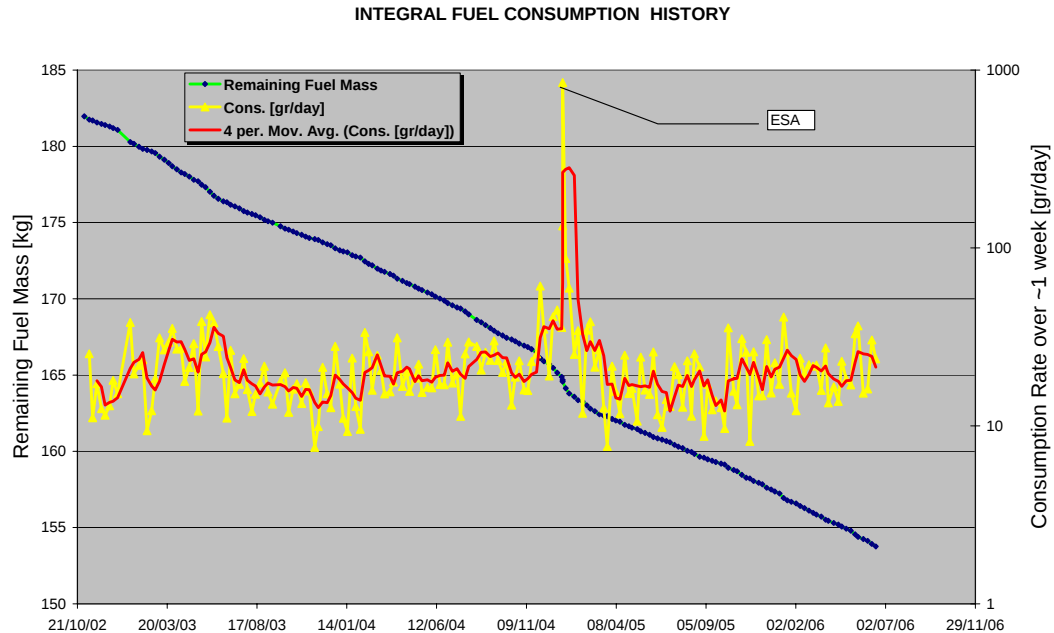
The attached plot shows the apogee longitude of Integral as a function of the orbit number. From this, an estimate of the rate of semi-major axis increase of about 800m per orbital revolution can be made.

APOGEE LONGITUDES OF INTEGRAL 21.03.2006 - 01.06.2006
 LEAST SQUARES APPROXIMATION WITH PARABLE

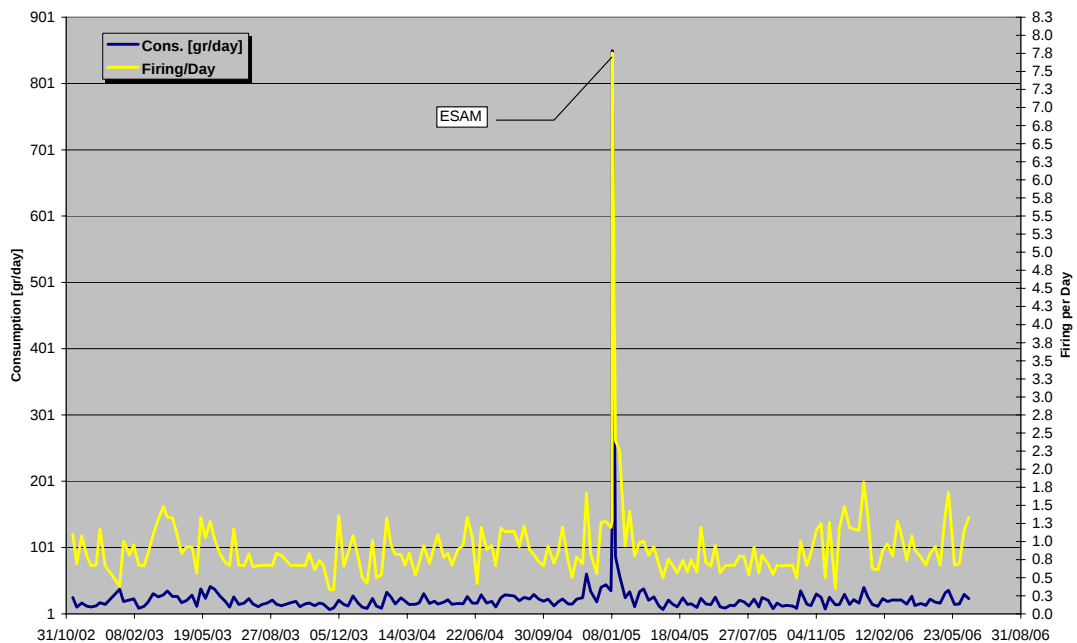


Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 15/06/2006 is reported in the plot below.

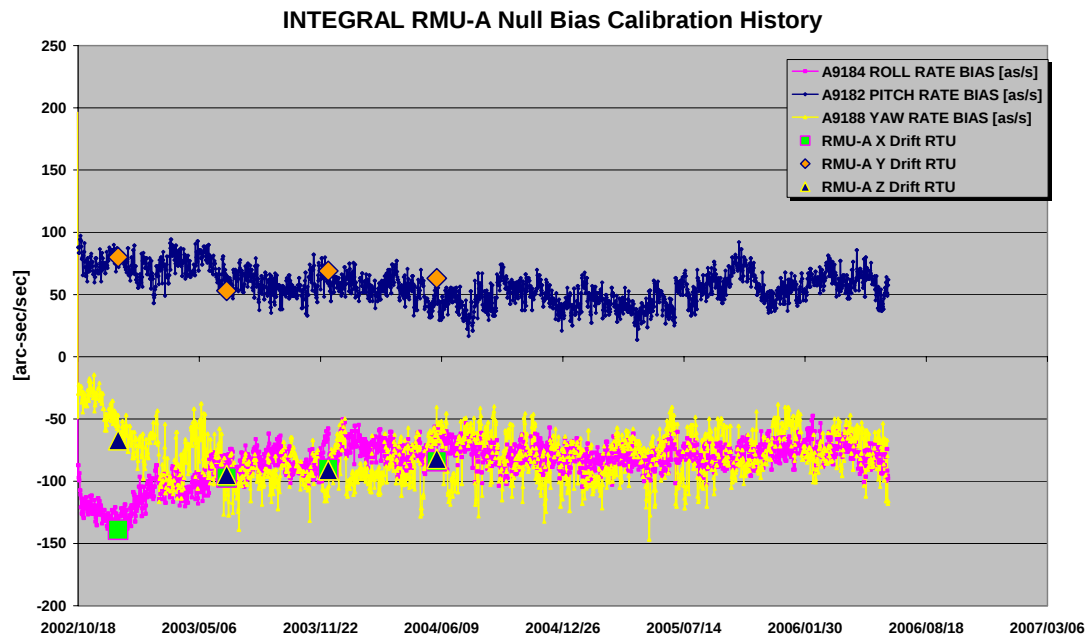


The firing\day over the period between 01/11/2002 and 15/06/2006 is reported in the plot below.

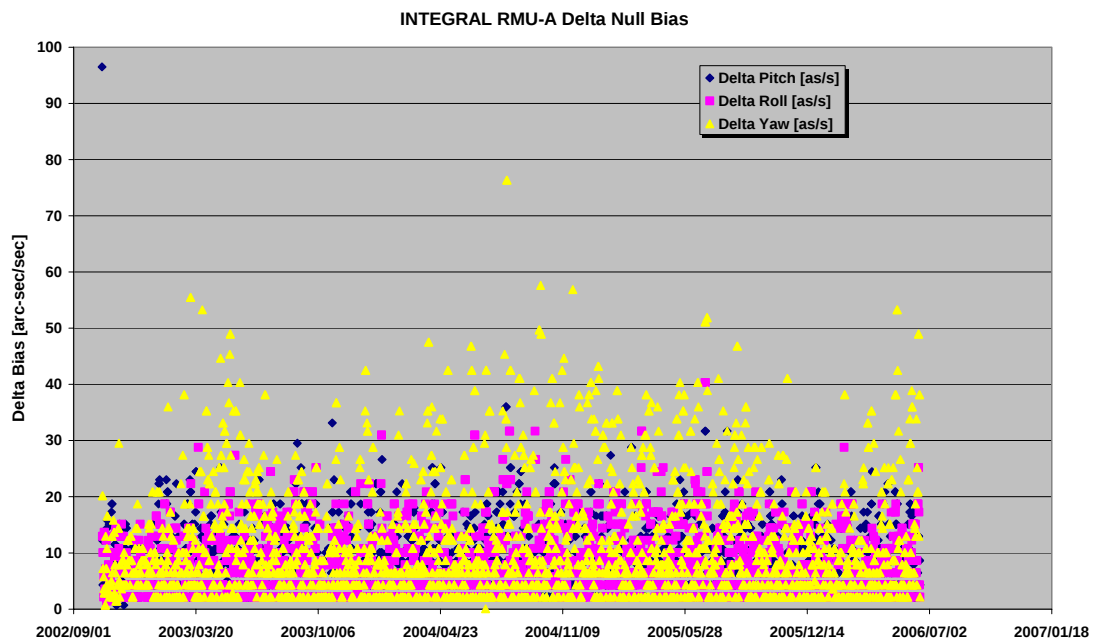


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 16/06/2006 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 16/06/2006 is reported in the plot below.



10/06/06 (Day of Year 154, Revolution 444)

Nothing to report.

11/06/06 (Day of Year 155, Revolution 444)

Static PTV failed due to problem on IMCS: at 03:45z due to a problem on the IMCS MISC dynamic server, the sequence for the S/T failed release due to static PTV NO GO (even if a valid star in slot # 2 was found). As consequence the planned CGS

and RWB were not executed as expected at the end of the revolution. A manual recovery was performed at beginning of rev 447.

12/06/06 (Day of Year 156, Revolution 444-445)

OTF low due to problem on IMCS: at 19:52z due to a problem on the IMCS Command Verifier Task, several TL sequences failed released. No impact on AOCS was reported but the failing of the sequence DEBPFU00 determined the OTF masked to low for PID 04470046 and 04470047.

13/06/06 (Day of Year 157, Revolution 445)

Nothing to report.

14/06/06 (Day of Year 158, Revolution 445)

STR threshold exceeded: at 07:59z the STR SEU threshold was exceeded, when the guide star was ID 6102-1403, with Mi 8.3 at CCD location [3991, -360]. The OTF went low after AOS rev 448. The star lost is due an initial false event rate $\sim 1/8\text{sec}$ and to the position of the guide star, at the edge of the STR FOV.

The same guide star was found after the automatic mapping commanded by ACC, at CCD location [4092, -312]. The difference in Y and Z coordinates is likely introduced by a small jitter when passing to IMU control.

The next slew for PID 04480001 was manually updated and executed from the Timeline.

15/06/06 (Day of Year 159, Revolution 445-446)

Nothing to report.

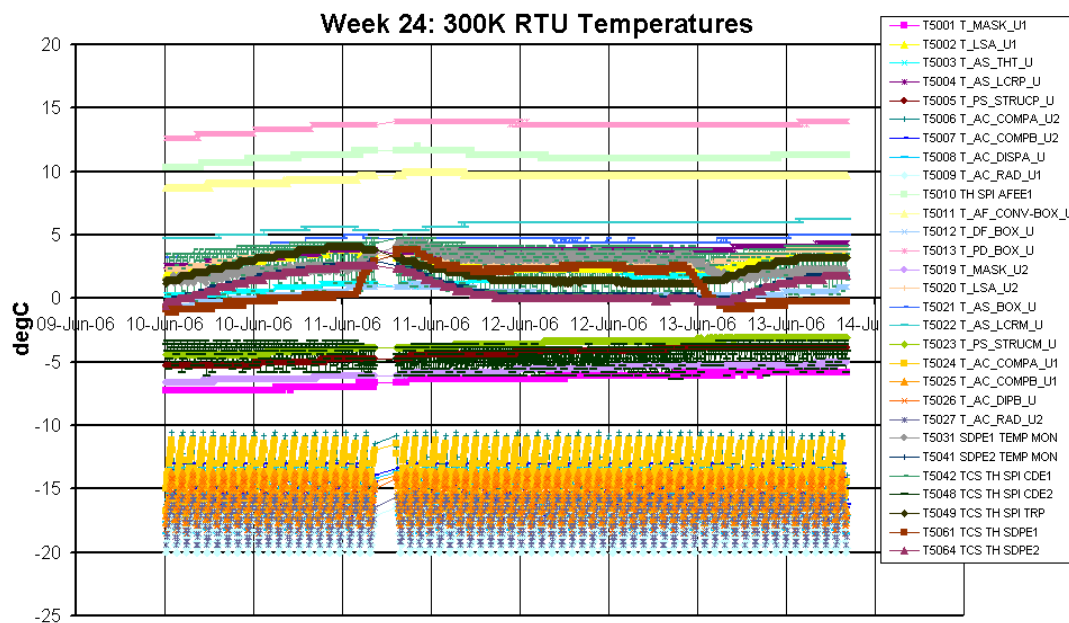
16/06/06 (Day of Year 160, Revolution 446)

Nothing to report.

8.3.2 SPI Operations

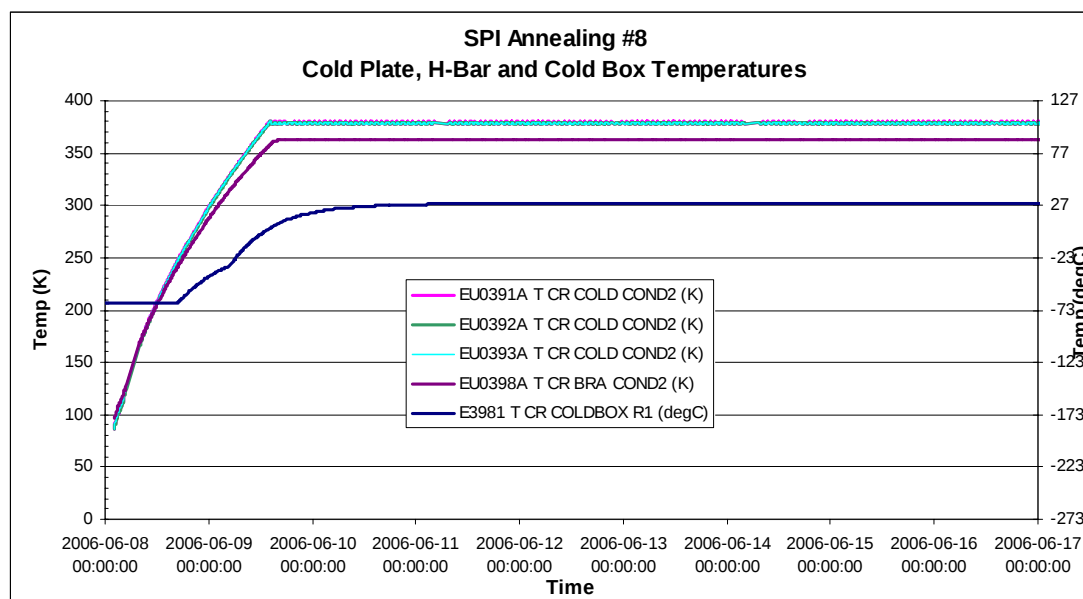
Unit Temperatures:

All the equipment temperatures are inside the operational limits. The following plot shows their evolution along the reporting period (due to data retrieval problems some gaps could be present).

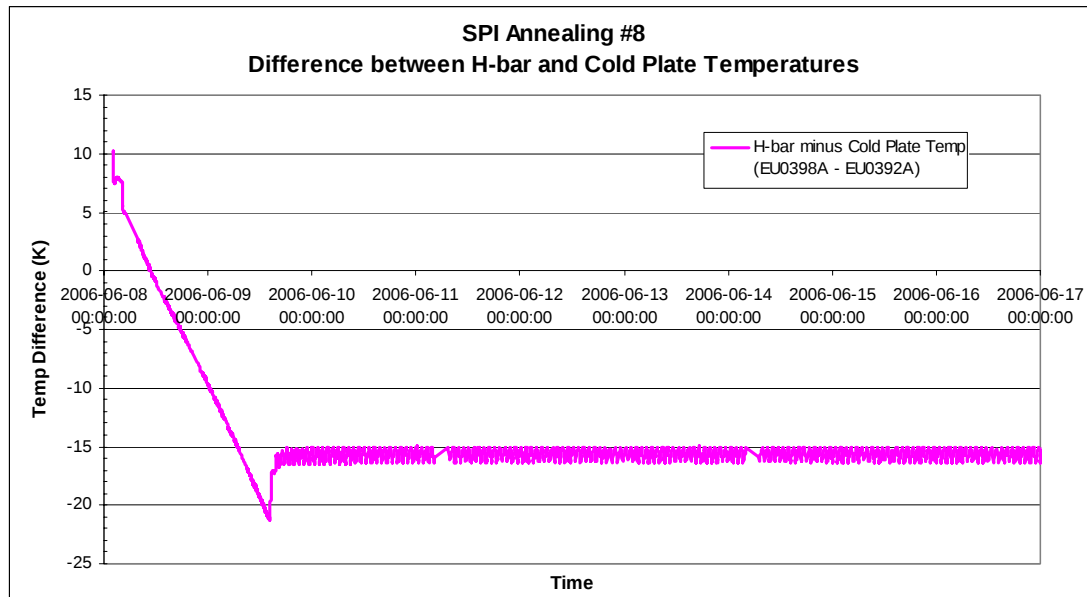


Stirling Compressors and Cryostat:

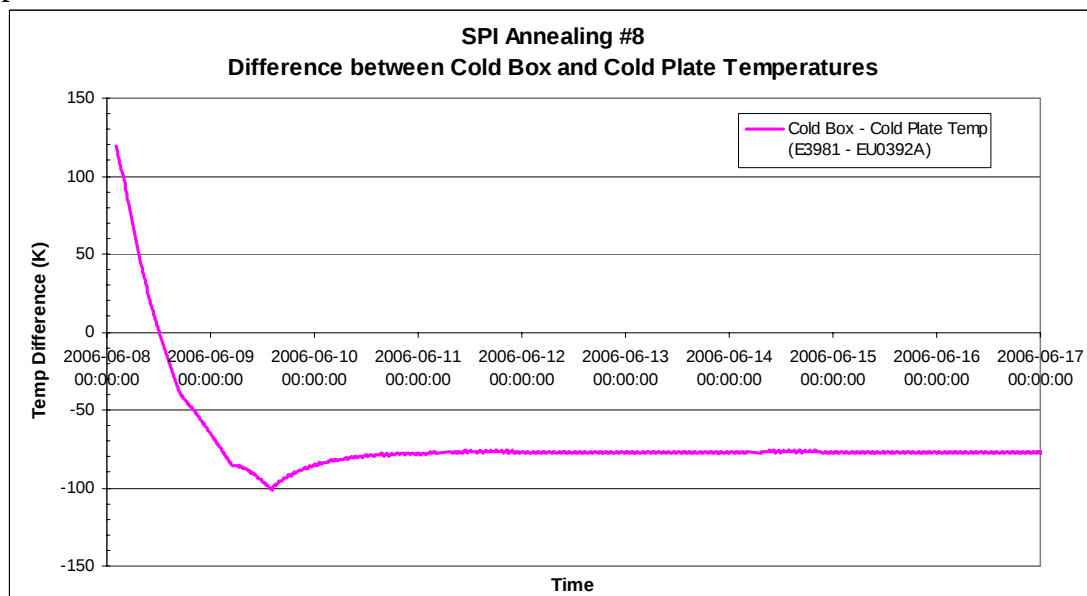
The compressors are off and the CDEs in stand-by mode since the annealing start.
 The following plot shows the evolution of the cold box, the cold-plate and H-bar temperatures since the start of annealing:



The following plot shows the temperature difference between the cold plate and the H-bar, to identify where the temperature inversions took place during the warm up phase:



The following plot shows the temperature difference between the cold plate and the cold-box, to identify where the temperature inversions took during the warm up phase:



DPE & IASW:

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

The allocated and the actually required PST TM bandwidth during the annealing is here reported:

Revolution	Phase	Assigned bandwidth	Required bandwidth
rev.445	start of annealing	105	20
rev.446	warm up	46	20
rev.447	annealing	46	20
rev.448	Annealing	46	20
rev.449	passive cooling	46	20

rev.450	active cooling	46	20
rev.451	camera switch-on	105	105

ACS:

The health of the ACS is nominal. ACS HVPSs were maintained switched on during the annealing at the minimum voltage (~980V).

The plot showing the ACS overall count rate evolution during the reporting period is not available due to problems in the retrieval system.

AFEE:

The health of the AFEE is nominal. The detector HVPSs are switched off during the annealing. Only the LVPSs are left on.

DFEE:

The health of the unit is nominal. DFEE is maintained in Conf mode during annealing.

PSD:

The health of the unit is nominal. PSD is maintained in Conf mode during annealing.

SPI Event Log:

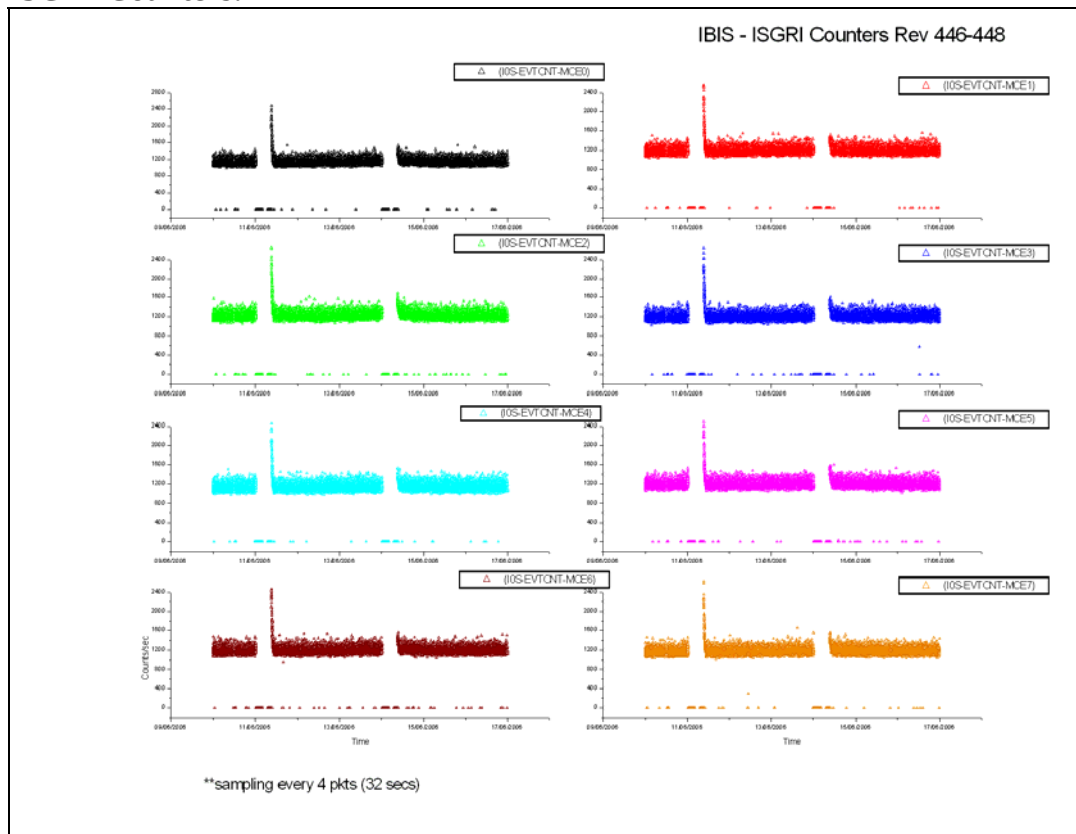
The following event log has been extracted from the revolution pass summary.

Time	Description	Analysis
160 / 12:16	Seq. ES1815 "Cryotemp" uplinked for the first time. The sequence was successively uplinked every 60'.	Nominal operational event during annealing
162 – 08:19	TC ES1815 Cryotemp uplinked (once per hour)	Nominal operational event during annealing
162 – 09:53	TM: P2014 OOL, back in limits @ 09:55	OOL due to ACS configuration during annealing
162 – 09:53	TM: E2121 OOL, back in limits @ 09:55	OOL due to ACS configuration during annealing
164 – 00:56	TM: E2121 OOL, back in limits @ 01:08	
167 – 06:48	TM: E2121 OOL, back in limits @ 07:00	
167 – 08:13	TM: E2121 OOL, back in limits @ 08:24	

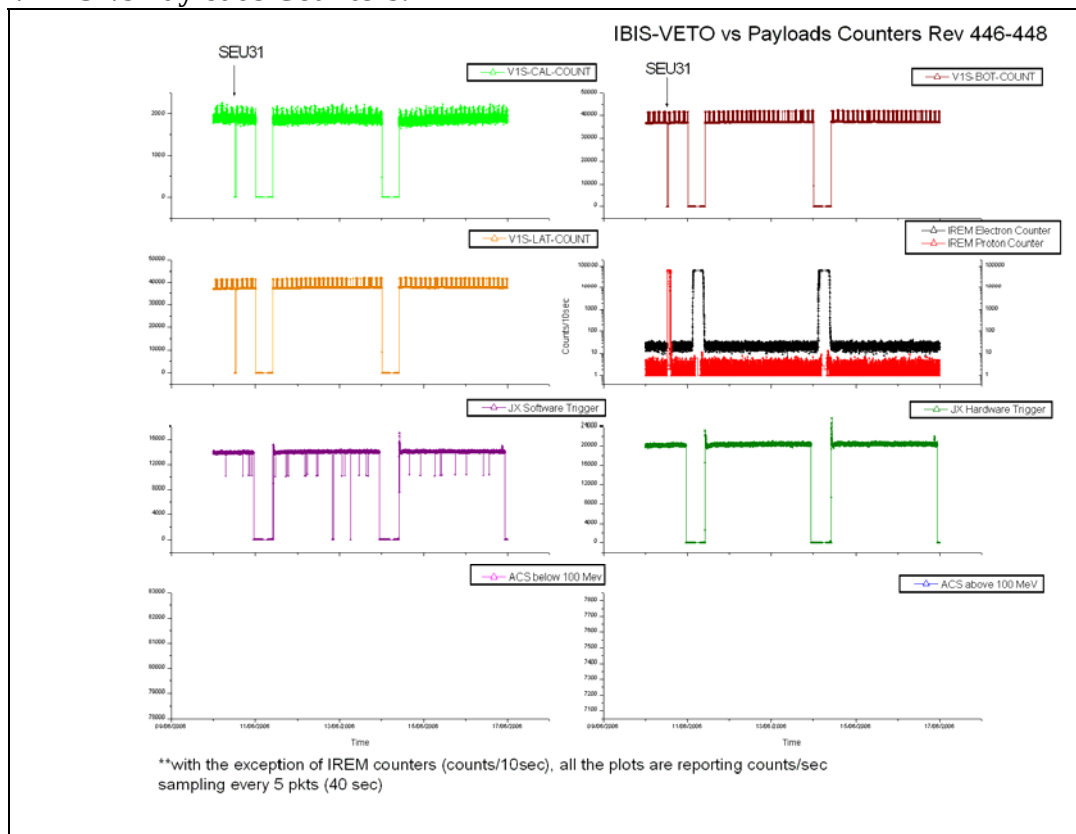
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

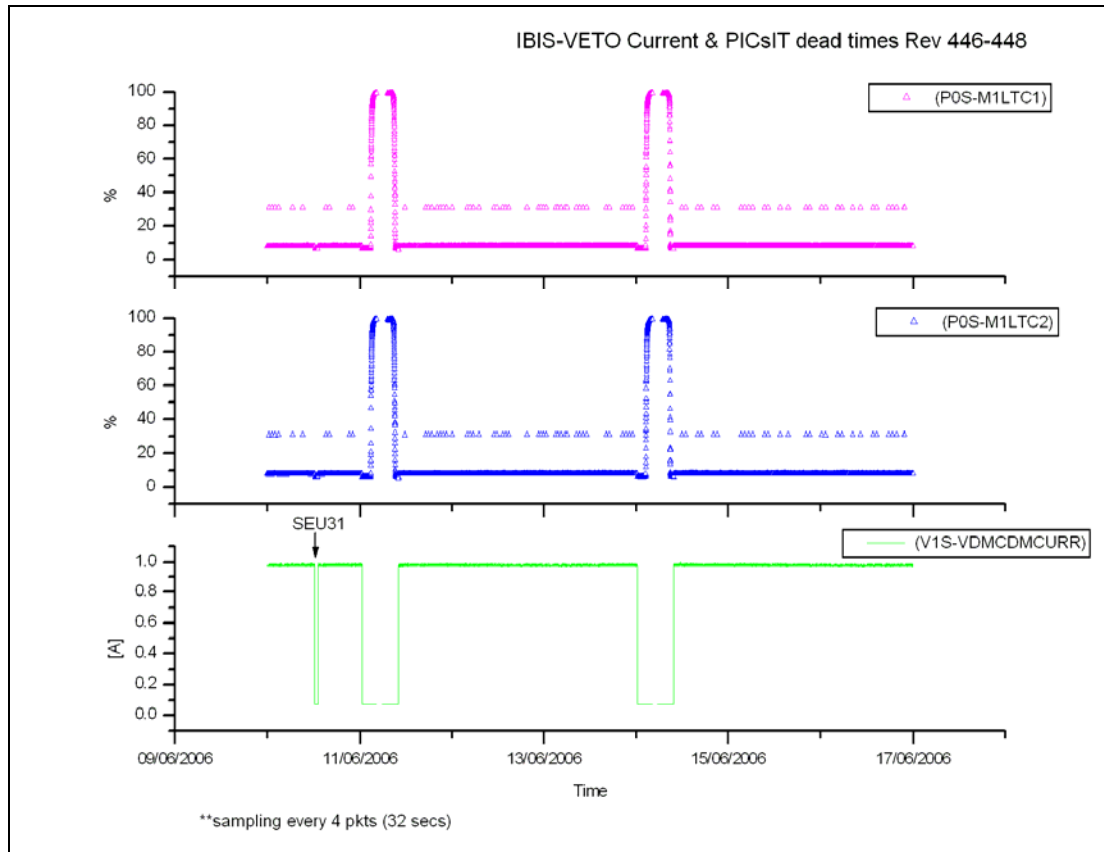


VETO vs Payloads Counters:

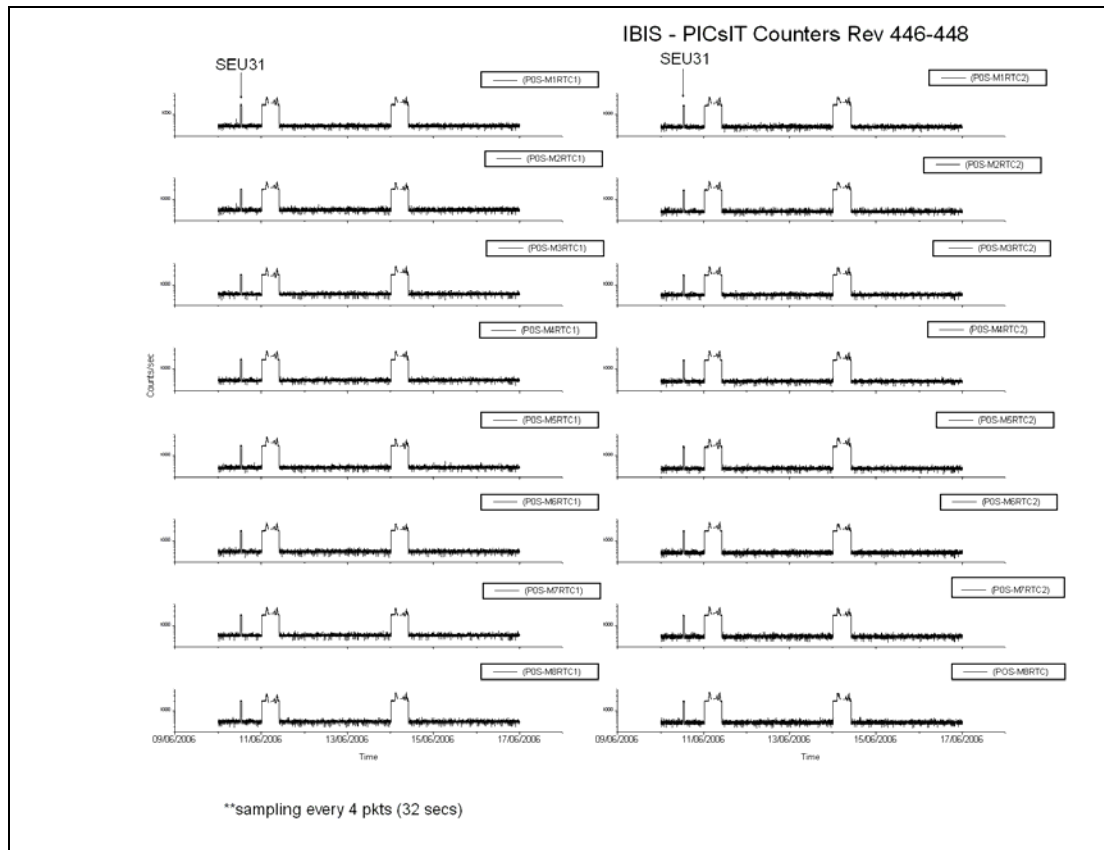


The week was characterised by low radiation.
 SPI data are missing due to the on-going annealing.

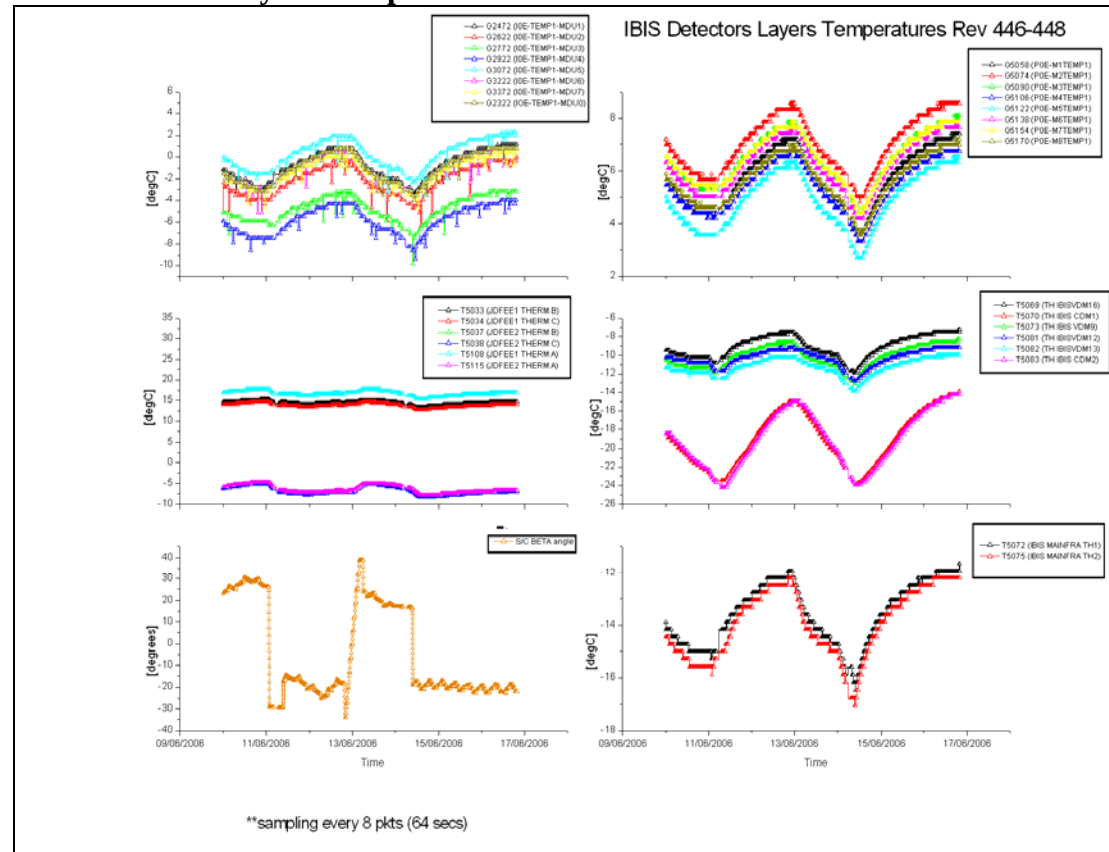
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2006.161 (10//06/2006):

At 12:18Z TM parameter G8015 (S1E-A2_PMT_V) went OOL High due to a forced switch to IBIS safe configuration following IREM SEU #31. It went back inside limit at 13:04Z, when VETO was sent back to Nominal mode. IBIS was back in Scientific Standard mode at 13:07Z.

DoY 2006.162 (11//06/2006):

At 00:33Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 10:05Z. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 no action was taken.

At 09:33Z, TM family G2013 (I0E-EVTCNT-MCEi) went OOL High and back as the radiation background was high at the exit of belts. According to I-CNT-1, no action was taken.

At 09:41Z TM parameter G2014 (I0E-OVFWPXADD-M1) failed SCC and back. According to I-OVF-1, no action was taken.

DoY 2006.163 (12//06/2006):

At 19:52Z, because the Command Verifier died, ED GESTAN02 failed release. It was manually up-linked at 22:05Z.

DoY 2006.165 (14//06/2006):

At 00:18Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 09:49Z. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-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.

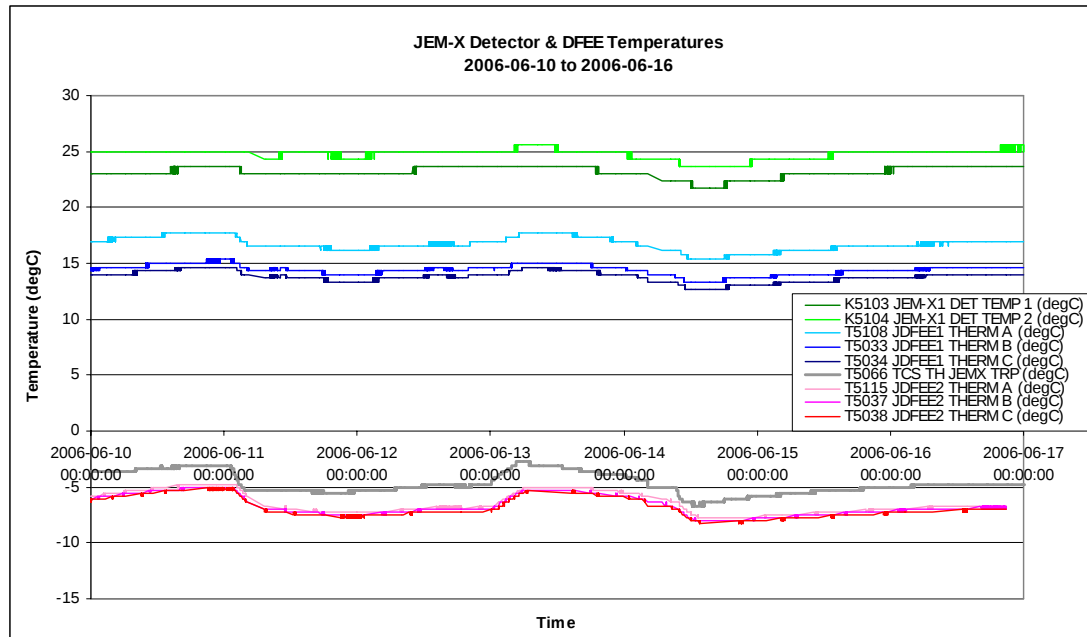


8.3.4.2 JEM-X Temperatures

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

2006-06-10 (DOY 161, Rev 446) to 2006-06-11 (DOY 162, Rev 446-447)

Nothing to report

2006-06-12 (DOY 163, Rev 447)

At 19:52Z, due a problem with the command verifier task of the IMCS, the TCs KU0014 and K0021 of the ED KEDATA02 (scheduled at 19:52:13Z) had their on-board acceptance verification stage 'Unknown' and the TC K0011 STATE DATA TAKE failed release. Thus JEM-X1 remained in Setup mode until the IMCS was recovered and this ED was re-uplinked manually, at 20:32:07Z, returning JEM-X1 to Data Taking mode. JEM-X1 operations then continued nominally.

2006-06-13 (DOY 164, Rev 447)

Nothing to report

2006-06-14 (DOY 165, Rev 447-448)

At 10:08:34Z the TM parameter K5136 BUFFER LOSS went Out of Limits High (value = 111) but then returned within limits at the next TM cycle.

2006-06-15 (DOY 166, Rev 448) to 2006-06-16 (DOY 167, Rev 448)

Nothing to report.

8.3.5 OMC Operations

2006-06-10 (DOY 161, Rev 446)

At 12:18:45, an IREM SEU caused the instrument to switch to SAFE mode. The unit was manually switched back to Stand-by mode at 12:53:19, and was returned into Science mode by the Timeline at 13:28:44. The impact was pointing 04460071 was interrupted after 2065 from a scheduled duration of 3000 seconds, and 04460072 was lost altogether.

2006-06-11 (DOY 162, Rev 446)

Nothing to report

2006-06-12 (DOY 163, Rev 447)

At 19:52, a crash of the Command Verifier caused the loss of pointing 04470046, and as the OTF was not set during the next pointing (04470047) there was a delay, such that, the pointing was cut short from a scheduled 2200 to 1568 seconds.

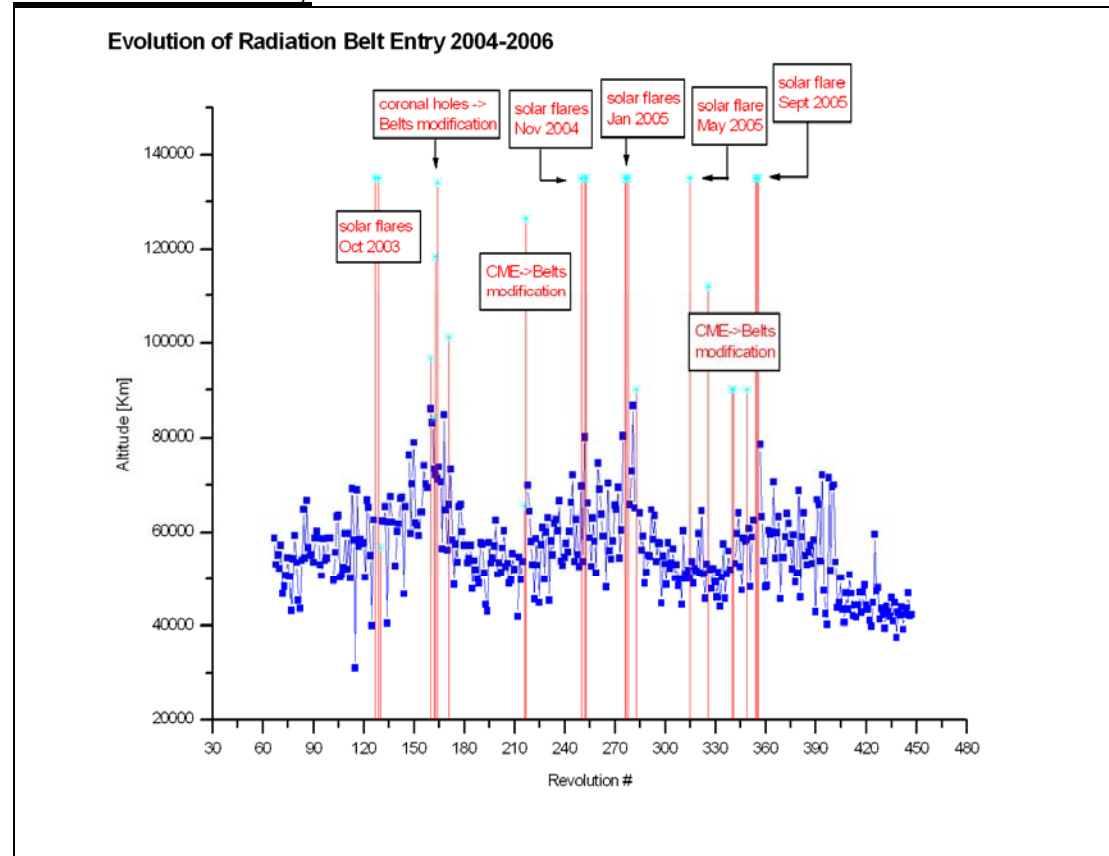
2006-06-13 (DOY 164, Rev 447) to 2006-06-16 (DOY 167, Rev 448)

Nothing to report

On DoY 162 at 00:33:48 and DoY 165 at 00:18:21 OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

DoY 2006.161 (10/06/2006):

On 2006-06-10 at 12:18Z, a local reset of the IREM CSCI S/W (SEU #31) occurred: as previously (see anomalies on 16/12/02, 01/01/03, 03/06/03, 11/07/03, 19/07/03, 05/08/03, 24/08/03, 26/12/03, 13/05/04, 16/05/04, 09/06/04, 12/06/04, 10/09/04, 14/09/04, 28/10/04, 06/11/04, 01/12/04, 11/12/04, 30/01/05, 11/02/05, 04/03/05, 11/05/05, 17/05/05, 15/06/05, 30/07/05, 07/09/2005, 20/09/2005, 21/11/2005, 09/04/2006, 30/04/2006) the status of the unit, before the anomaly, was nominal, here is a summary:

- 1) The temperatures were nominal
- 2) The LCL current was nominal
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits
- 4) The anomaly occurred at 2006.161.12.18Z at 122252.4km. The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex); just before the anomaly, radiation counters reported nominal values considering the position of the S/C along the orbit
- 5) The recovery of the unit started at 12:51Z using procedure CRP_SYS_2570. The first dump of the status word after the anomaly showed a value of 3CC0 HEX = 15552 DEC = 0011110011000000, i.e the Ground Link was OFF (nominal in Perigee)

Passage) and the Checksum Failure shows YES. The unit was still reporting the status as if it was in Integral mode with counting ON, accumulation ON and checksum failure flag ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.

6) A dump of all the registers gave a status word 3C80 HEX = 15488 DEC = 0011110010000000, ie. the unit was still reporting the status as if it was in Integral mode but the checksum failure flag was this time OFF and the checksum counter in the register number 3 incremented by 1 unit.

7) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 15:00Z.

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

The recovery of the payload was performed with OMC re-enabled at 12:53Z, and IBIS at 13:06Z.

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

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT- OFF Observed Entry/Exit	Observed Entry/Exit Altitude [Km]	Electron CUT-OFF Predicted Entry/Exit	Predicted Entry/Exit Altitude [Km]
446	RAD_ENTR R 2006-06-11T00:33:41Z	2006-06-11 02:46:27	42120.5	2006-06-11 02:02:13	48366.38
447	RAD_EXIT R 2006-06-11T09:52:45Z	2006-06-11 09:30:59	<37250.2	2006-06-11 09:42:13	38352.88
447	RAD_ENTR R 2006-06-14T00:18:14Z	2006-06-14 02:25:55	42337.1	2006-06-14 01:44:44	48522.62
448	RAD_EXIT R 2006-06-14T09:36:32Z	2006-06-14 09:19:47	37595.6	2006-06-14 09:24:44	38302.42

Reference

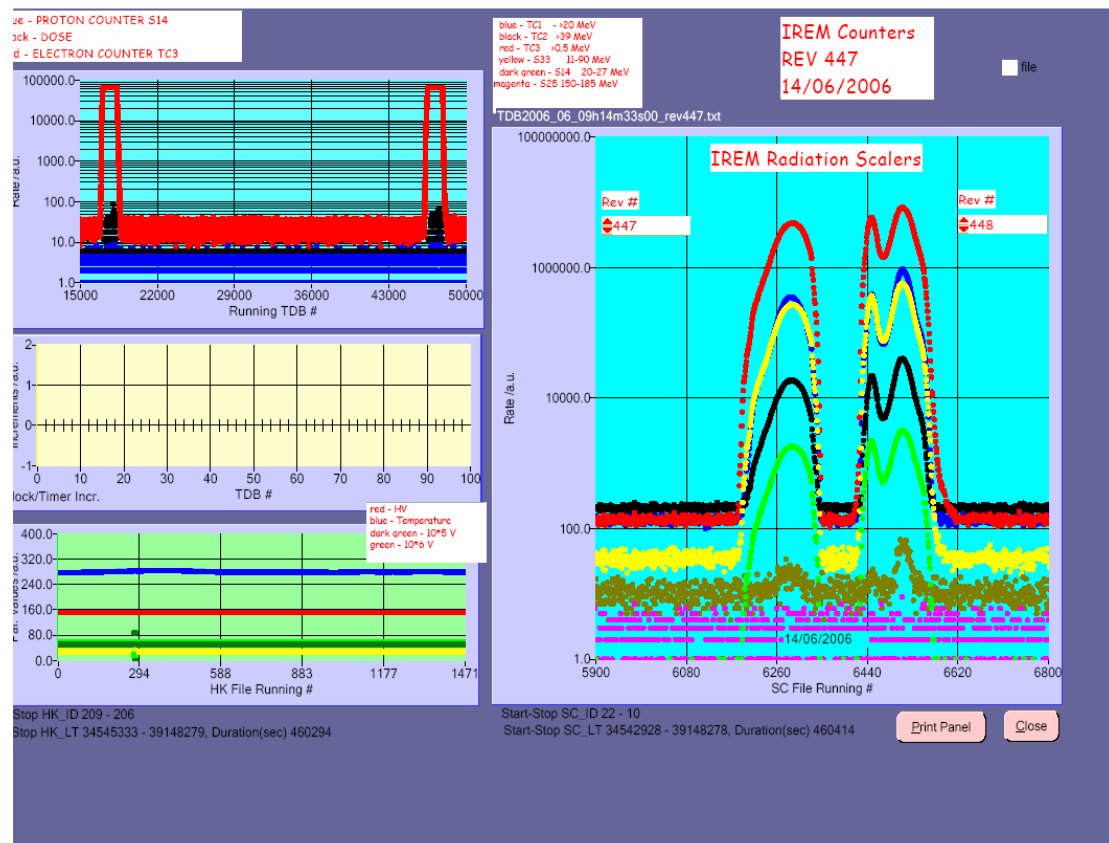
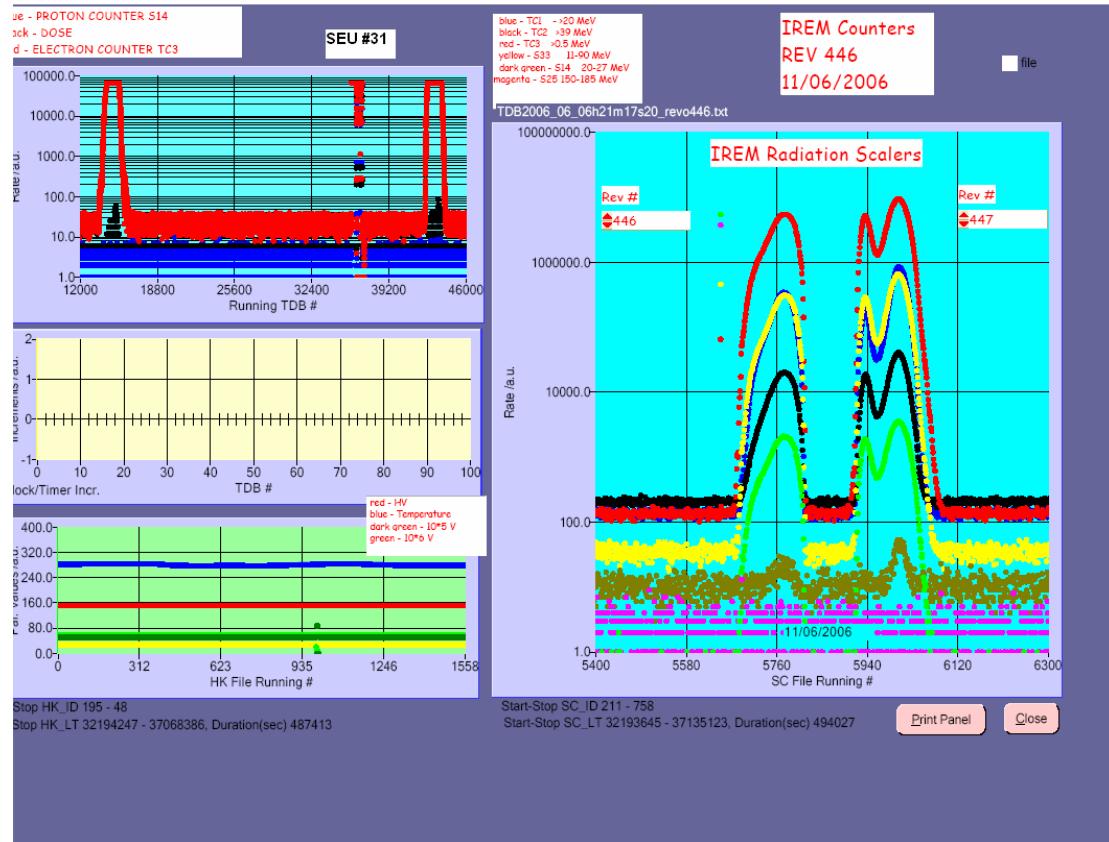
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

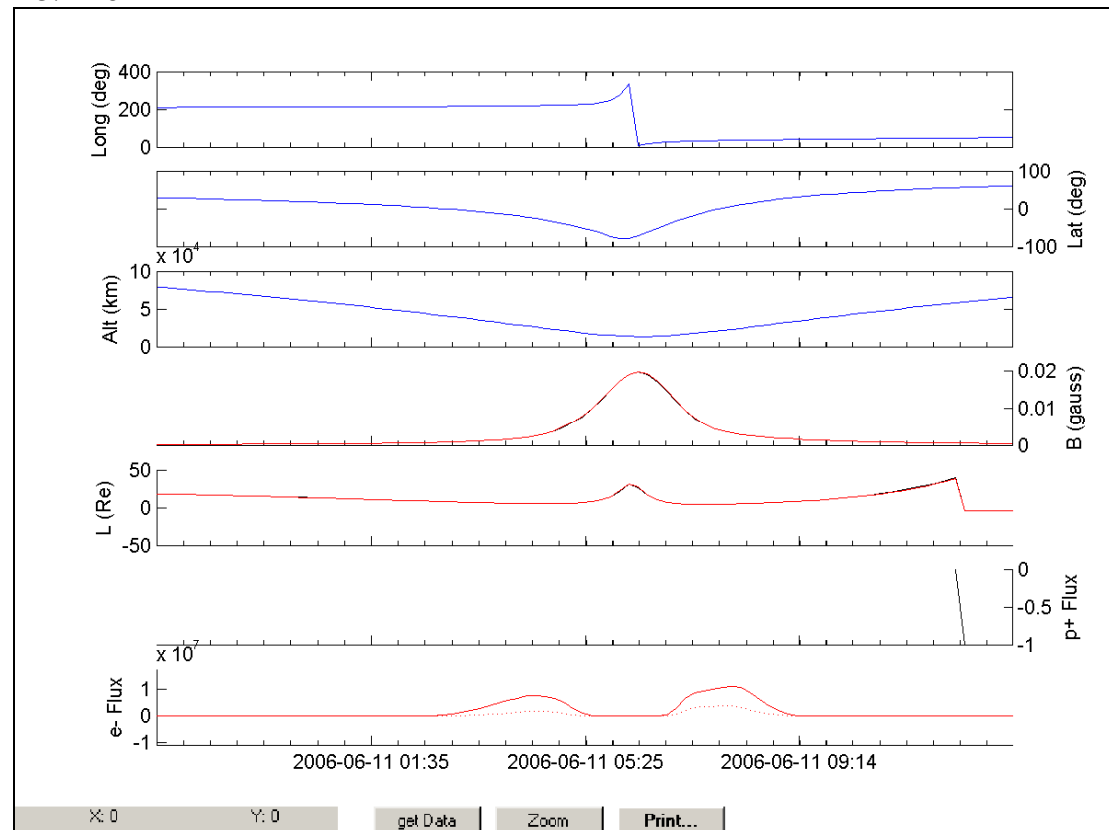
Radiation Spike

IREM radiation counters:

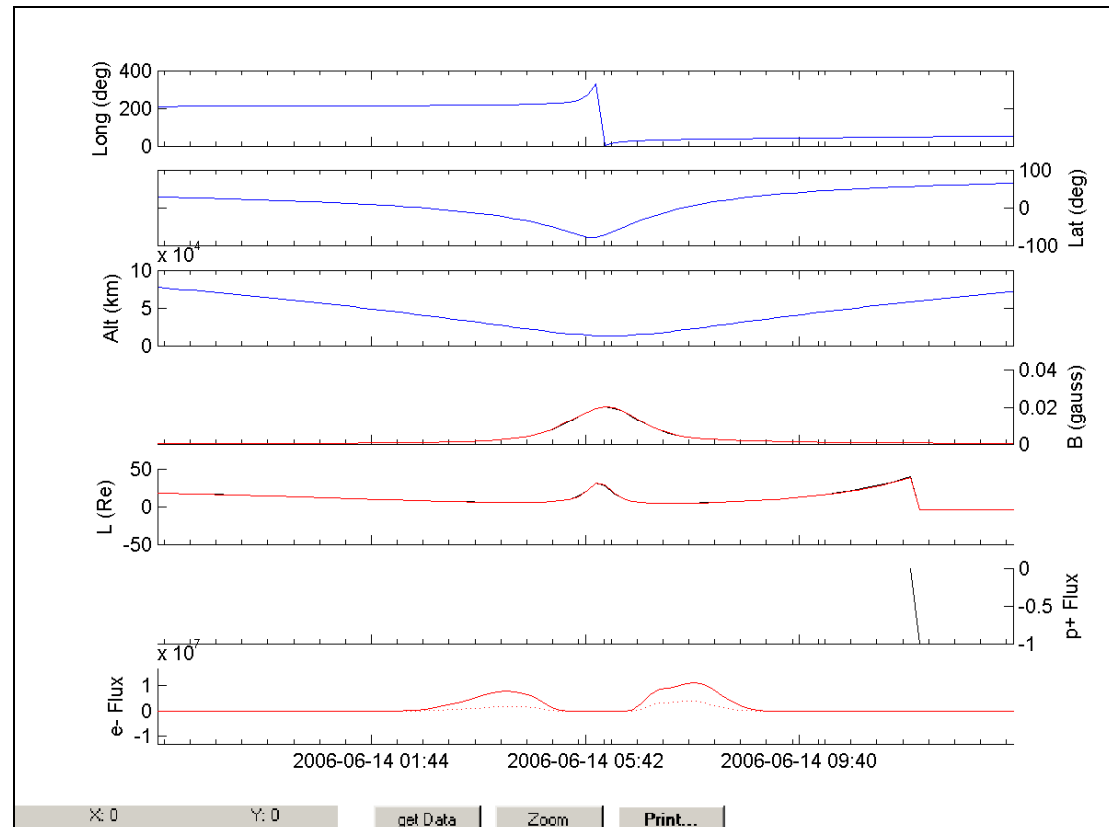


IREM Predicted Radiation Belt Passages:

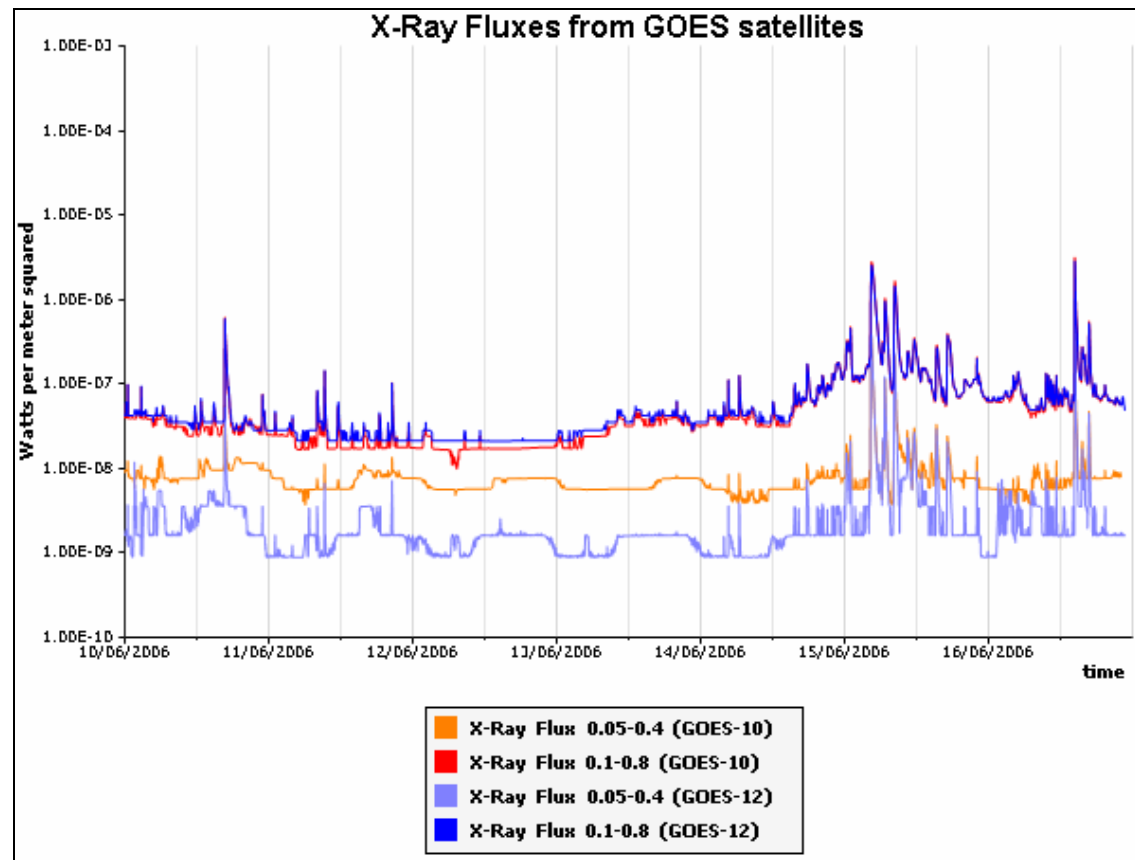
Rev 446



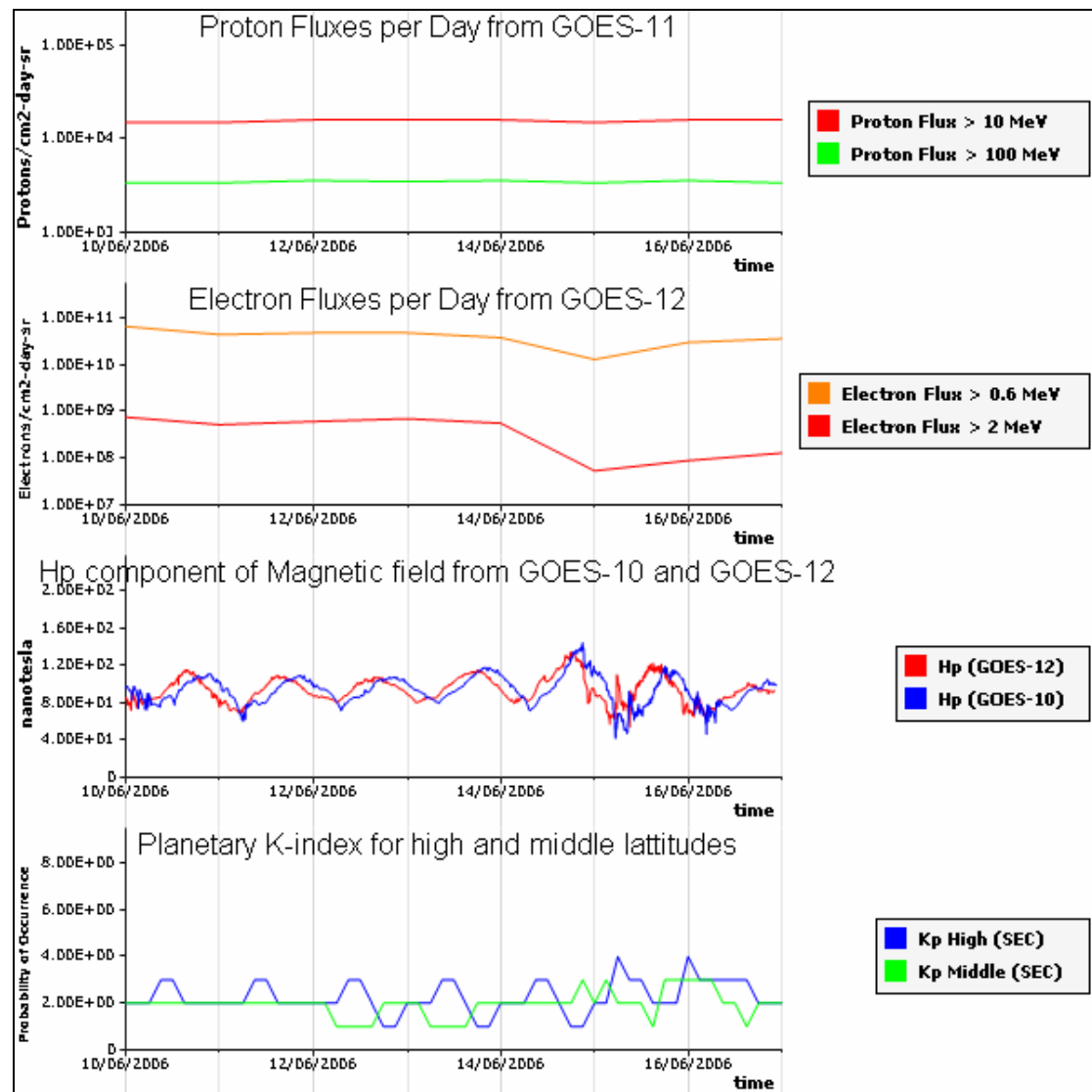
Rev 447



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



X-Ray fluxes start to be significant over 10^{-5}W/m^2 (corresponding to M-class flares). Above 10^{-4}W/m^2 , they correspond to strong X-class flares.



Proton and electron flux are rather low, reporting no high radiation background. Hp component of the Geomagnetic Field is essentially parallel to the Earth's rotation axis. A drop near 0 nT is associated with a significant variation in the magnetic field. Kp index is based on ground magnetometers. Kp ≥ 5 features storm-level geomagnetic activity.