

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 217
Week 46
20.11.06
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.....	4
3.1.4	OBDH.....	4
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	5
3.2.3	JEM-X.....	6
3.2.4	OMC.....	6
3.2.5	IREM.....	6
4	Ground Facilities.....	7
4.1	Mission Operations Centre.....	7
4.2	Ground Stations & Network.....	7
4.3	Science Ground Segment.....	7
4.3.1	ISOC.....	7
4.3.2	ISDC.....	8
5	Special Events.....	8
6	Anomalies.....	8
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, 11/11/2006 – 17/11/2006.....	9
8.3.2	SPI Operations.....	16
8.3.3	IBIS Operations.....	22
8.3.4	JEM-X Operations.....	26
8.3.5	OMC Operations.....	28
8.3.6	IREM Operations.....	29

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1 General

The Flight Control Team at MOC has compiled this report with some input provided by the Flight Dynamics Team, ISOC and ISDC.

It addresses the activities from 11.11.06 until 17.11.06 (both dates inclusive) and covers the revolutions 499 and 500.

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 a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), and a two raster dithers of the Galactic Plane Region 3.

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 7th (13/11/2006) and 8th (16/11/2006) eclipse passages. The eclipse passages were all nominal from an AOCS point of view.

As part of the AOCS preparation for the winter eclipse season, were verified the load of the TT sequence to re-enable the IMU Auto Switch-Off function in the ACC and the Eclipse ACC\FDE\FCE timers.

As part of the AOCS reconfiguration after the winter eclipse season, the Eclipse ACC\FDE\FCE timers were stopped during rev 500.

No slews were missed during the observation period.

The fuel consumption over the period between 10/11/2006 and 16/11/2006 was 0.1360 Kg. The remaining propellant is in the order of 149.8508 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.

Eclipse Passage:

During the reporting period Integral passed through eclipses #7 (13/11/2006) and #8 (16/11/2006) of eclipse season #9, details are in the table below:

Penumbra Entry	Umbra Entry	Umbra Exit	Penumbra Exit	Total Duration	Umbra duration	Observed DOD B1	Observed DOD B2	Mean discharge Current in Umbra B1	Mean discharge Current in Umbra B2	Recharge Duration Battery1	Recharge Duration Battery2
18:37:35	18:39:26	19:28:46	19:31:06	0:53:31	0:49:20	5.06Ah	5.01Ah	5.43	5.37	3:05:45	3:03:53
18:36:30	18:40:04	19:05:54	19:09:59	0:33:29	0:25:50	2.69Ah	2.66Ah	4.58	4.52	1:39:56	1:38:44

From the EPS point of view the eclipse passage was nominal in both cases. Eclipse #8 was the last eclipse of eclipse season #9.

On 17/11/2006 the EPS was reconfigured following the end of the eclipse season:

- FCP_EPS_1260 Select MRU Timer value = 0, the MRU timer status was left 'EOC Enabled'.
- FCP_EPS_1273 Select Full Charge Rate C/26 for Battery 1.
- FCP_EPS_1274 Select Full Charge Rate C/26 for Battery 2.

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.

On 17/11/2006 the DHSS was reconfigured following the end of the eclipse season:

- FCP_DHS_1231 Load On-board Monitoring Tables for use outside of eclipse season.

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

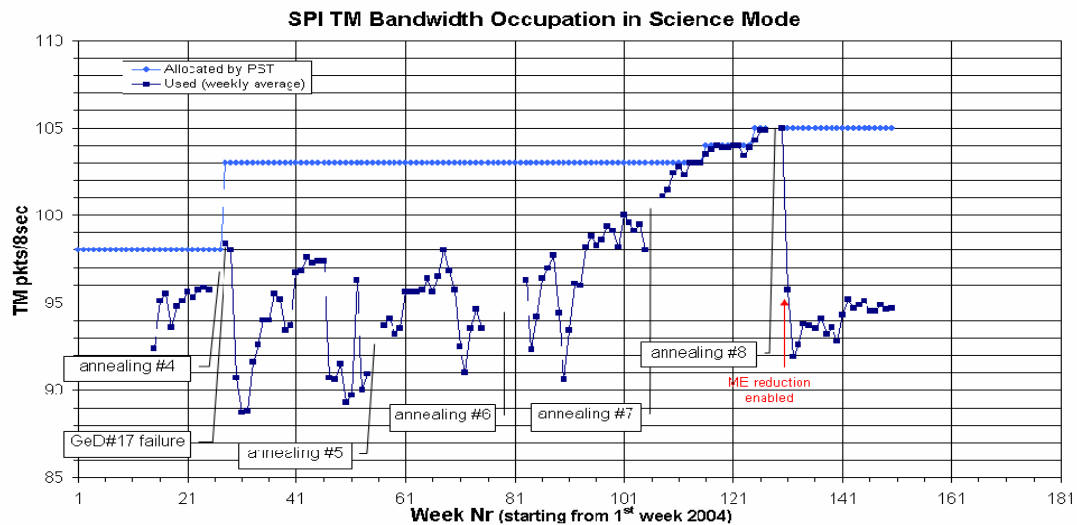
3.2.1 SPI

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 80 +/-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 when the allocation was 105 packets/cycle was 94.7 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.

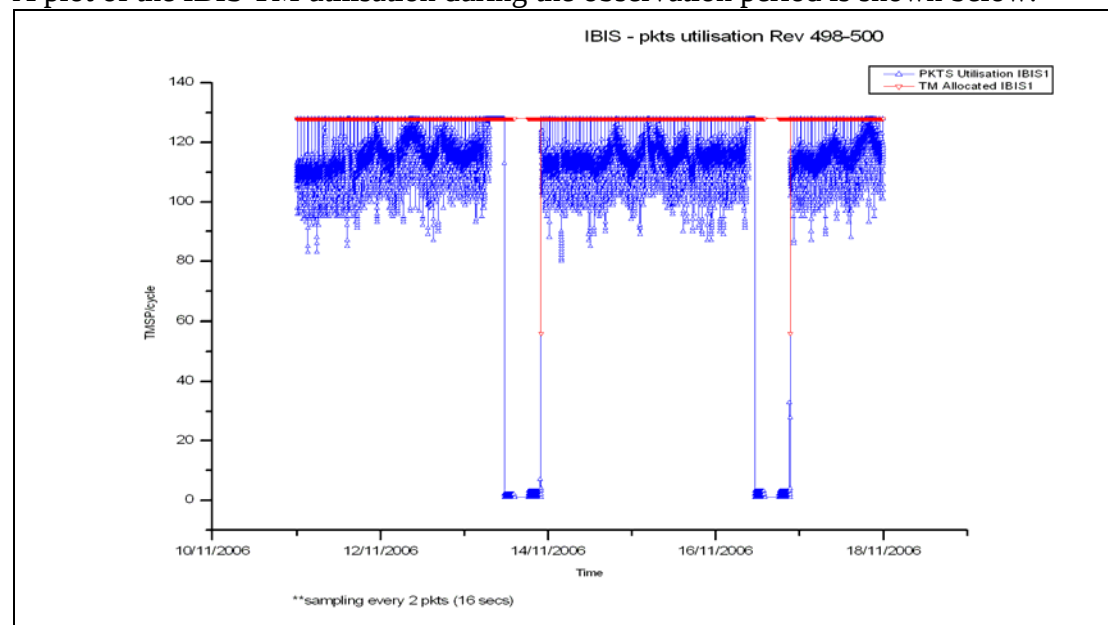
3.2.2 IBIS

The overall status of the unit is nominal.

The Eclipse season started on 26/10/2006. From the unit point of view, the eclipse passages were nominal this week.

During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 115.08 TMPS/cycle, up 2.7 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 8 packets/cycle during science observations. JEM-X2 was dormant (DPE OFF) with no TM slots allocated.

JEM-X1 made two autonomous transitions to Safe mode, triggered by the Software Ratemeter, during the reporting period. This was 1 hour before the planned transition to Safe mode before radiation belt entry of revolution 498 and ~15 minutes before that of revolution 499.

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, 142 of the 143 planned science pointings for OMC were executed nominally, 1 was degraded by a 21 minute TM gap.

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.

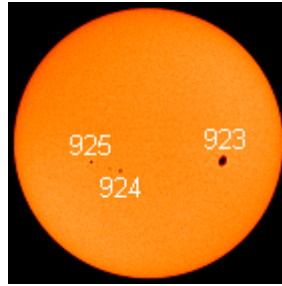
Solar Activity

The observation period was characterised by low solar activity.

During the whole observation period, big sunspot 923 was posing no threat for strong solar flares.

On 13/11/2006 small sunspot 924 appeared. On 15/11/2006 sunspot 925 appeared and grew quickly. None of these two posed a threat for strong solar flares.

The picture below presents the sun on 17/11/2006.



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 excellent this week. No slews were lost, although on one occasion the TM was down for 21 minutes. The overall performance was well above the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. The main problem reported was the TC History task crashing. The overall performance was nearly 100%.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There was, however, a 21 minute TM drop due to a problem with the Station Computer at Redu. There were also numerous (> 32) small drops in the link between Redu and the MOC, without impact. The overall performance was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's have been received up to revolution 506. Observations have been planned up to revolution 503. Further planning has been waiting for the setup of the new OMC FF calibration scheme and the decision on the SPI annealing.

TSF's up to revolution 502 have been received.

2. Observation status

ECS have been received and processed up to revolution 493 with no gaps.

3. ISOC Science Data Archive

The new disks are finally fully installed and working, all data has been restored.

The 2nd beta of the next ISDA release has been tested, fixing many issues noted previously. A progress meeting will be held this afternoon.

4. ISOC system

The ISOC planning software is operating nominally. Development is going routinely for version 14.0.

The database on the office network has been upgraded to the latest patch version of Oracle without problems. The operational database will be upgraded next week, after closure of the current AO5 Key Programme AO.

A test machine with Red Hat instead of Suse Linux is being set up.

5. Problems

4.3.2 ISDC

Status of ISDC observation processing on 20/11/2006:

- Latest Standard Analysis completed: observation 04200010021 (Galactic Bulge Region, Revolution 491) on 18/11/2006.
- Latest products archived: observation 04200010021 (Galactic Bulge Region, Revolution 491) on 18/11/2006.
- Latest observation products sent to the observer: observation 04200010021 (Galactic Bulge Region, Revolution 491) on 18/11/2006.

5 Special Events

6 Anomalies

The following problems that impacted operations were reported:

- On DoY 316, between 17:20 & 17:41, due to an incorrect Station Computer configuration, TM was lost. The impact was the loss of 21 minutes of TM data.

There were no new anomaly reports entered into the ARTS system this week:

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 499

The observations in revolution 499 began 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. It continued with a raster dither of the Galactic Plane Region 3, lasting ~52.0 hours, until the end of the revolution.

Revolution 500

The observations in revolution 500 consisted entirely of a raster dither of the Galactic Plane region 3, lasting ~58.9 hours.

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

2006-11-04T14:06:18.000Z	150.1218	F	Automatic TM processing.
2006-11-04T20:53:07.000Z	150.1142	F	Automatic TM processing.
2006-11-06T05:08:30.000Z	150.0944	F	Automatic TM processing.
2006-11-07T13:59:05.000Z	150.0547	F	Automatic TM processing.
2006-11-07T20:45:22.000Z	150.0129	F	Automatic TM processing.
2006-11-08T04:13:23.000Z	150.0078	F	Automatic TM processing.
2006-11-09T05:30:21.000Z	149.9868	F	Automatic TM processing.
2006-11-10T13:40:34.000Z	149.9764	F	Automatic TM processing.
2006-11-10T20:36:10.000Z	149.9733	F	Automatic TM processing.
2006-11-11T14:33:56.000Z	149.9342	F	Automatic TM processing.
2006-11-13T13:31:21.000Z	149.9147	F	Automatic TM processing.
2006-11-13T20:29:30.000Z	149.8839	F	Automatic TM processing.
2006-11-15T04:36:05.000Z	149.8689	F	Automatic TM processing.
2006-11-16T13:26:09.000Z	149.8529	F	Automatic TM processing.
2006-11-16T19:51:29.000Z	149.8508	F	Automatic TM processing.

This report was generated Fri Nov 17 08:00:38 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, 11/11/2006 – 17/11/2006

AOCS operations were executed from the Automatic Timeline.

During this period, 55 Open Loop Slews, 93 Closed Loop Slews and 6 Momentum Biases were executed.

No slews were missed during the observation period but the OTF for PID 04980018 was not reached due to lost of guide star.

Winter Eclipse Season 2006 Summary

The AOCS eclipse operations were nominal. The ACC\FDE\FCE Eclipse Timers and the Time-Tagged sequence to re-enable the IMU Auto Switch-Off function of the ACC were loaded from the Timeline and the pre-eclipse IMU health checks was performed at the planned times. The complete eclipse times and IMU usage are provided below:

AOCS Eclipse Times															Winter 2006
Date	LOS	AOS	ACC Eclipse Imminent	Eclipse Start					Eclipse End					Eclipse Duration	
				ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbra	Umbra	FSS Sun In	Penumbra	FDE/FCE		ACC
2006-10-26	15:14:26	19:36:00	18:45:14	19:25:54	19:35:23	19:36:07	19:44:54	19:47:25	19:48:05	20:07:25	20:08:18	20:10:59	20:14:27	20:19:21	0:26:05
2006-10-29	15:02:00	19:25:00	18:28:40	19:10:41	19:19:53	19:20:37	19:28:20	19:30:22	19:30:02	20:10:57	20:12:01	20:13:04	20:17:17	20:22:47	0:44:44
2006-11-01	14:54:00	19:14:00	18:16:58	18:58:59	19:08:09	19:08:53	19:16:38	19:19:12	19:18:01	20:10:19	20:12:00	20:12:07	20:16:33	20:21:50	0:55:29
2006-11-04	15:02:00	19:02:00	18:08:36	18:48:12	18:58:55	18:59:39	19:08:16	19:09:24	19:09:36	20:08:12	20:08:32	20:09:57	20:13:11	20:17:15	1:01:41
2006-11-07	14:38:00	18:49:00	17:57:53	18:39:51	18:50:44	18:51:28	18:57:33	18:58:42	18:58:54	19:59:45	20:00:04	20:01:33	20:07:12	20:11:14	1:04:00
2006-11-10	14:14:00	18:41:00	17:48:41	18:30:42	18:41:57	18:42:41	18:48:21	18:49:36	18:49:50	19:48:18	19:48:39	19:50:13	19:56:13	19:59:55	1:01:52
2006-11-13	14:28:00	18:24:00	17:43:08	18:25:09	18:36:15	18:36:59	18:42:48	18:44:19	18:44:40	19:33:58	19:34:27	19:36:20	19:42:27	19:46:01	0:53:32
2006-11-16	14:13:00	18:12:00	17:42:57	18:24:53	18:34:12	18:34:56	18:42:37	18:45:19	18:46:11	19:12:00	19:12:09	19:16:04	19:20:36	19:25:42	0:33:27

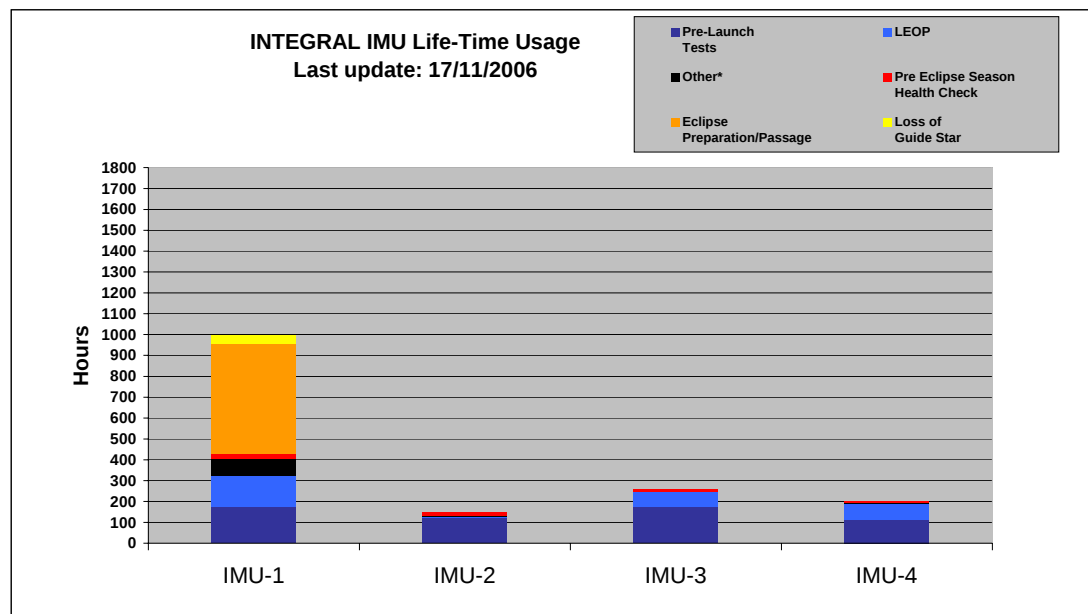
IMU Usage during Eclipse Season						Winter 2006
IMU On	IMU Off	From Health Check		From Auto Calibration	On Time	Accumulated On Time
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]		
2006-10-26 12:00:41	2006-10-26 20:21:37	0.2423	0.2417	0.2313	8:20:56	8:20:56
2006-10-29 11:39:32	2006-10-29 20:25:04	0.2136	0.2138	0.2370	8:45:32	17:06:28
2006-11-01 12:15:34	2006-11-01 20:24:06	0.1956	0.2434	0.2549	8:08:32	25:15:00
2006-11-04 12:14:55	2006-11-04 20:19:34	0.2150	0.2829	0.3143	8:04:39	33:19:39
2006-11-07 11:18:36	2006-11-07 20:13:28	0.1825	0.2533	0.3144	8:54:52	42:14:31
2006-11-10 10:56:51	2006-11-10 20:02:16	0.2186	0.1431	0.1635	9:05:25	51:19:56
2006-11-13 11:17:13	2006-11-13 19:48:19	0.2034	0.1382	0.3144	8:31:06	59:51:02
2006-11-16 11:20:31	2006-11-16 19:28:03	0.2264	0.2650	0.3194	8:07:32	67:58:34

After the end of the season the ACC/FDE/FCE Eclipse Timers were stopped.

Total IMUs Life-Time Usage

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	998.467391	55.47	175.045556	147.371944	42.426558	528.430000	21.246389	83.946944	16/11/2006
IMU-2	147.030556	8.17	123.023889	3.871111	0.000000	0.000000	18.045833	2.089722	19/10/2006
IMU-3	259.763889	14.43	175.449167	70.057500	0.000000	0.000000	12.641944	1.615278	09/07/2006
IMU-4	202.498333	11.25	111.528889	80.834167	0.000000	0.000000	5.155556	4.979722	26/04/2006

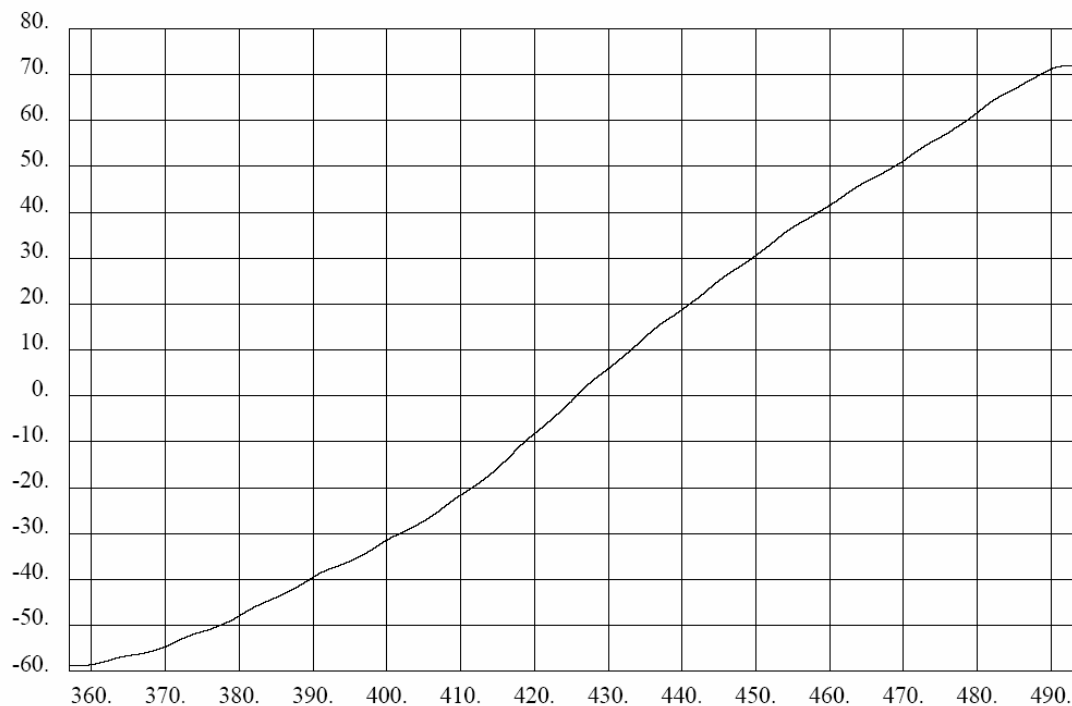
* Other consists of operations like STR bright object test, STR window dump, Earth Observation etc.



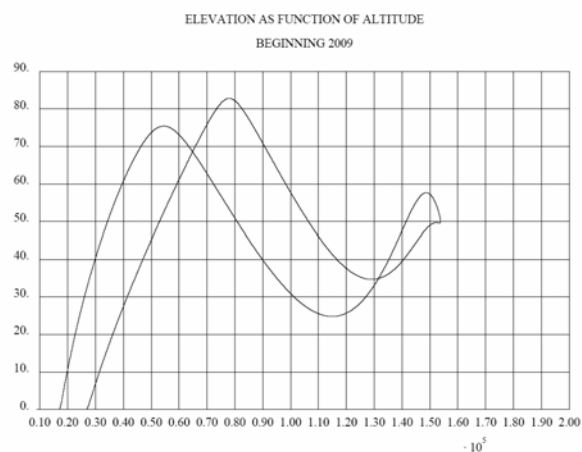
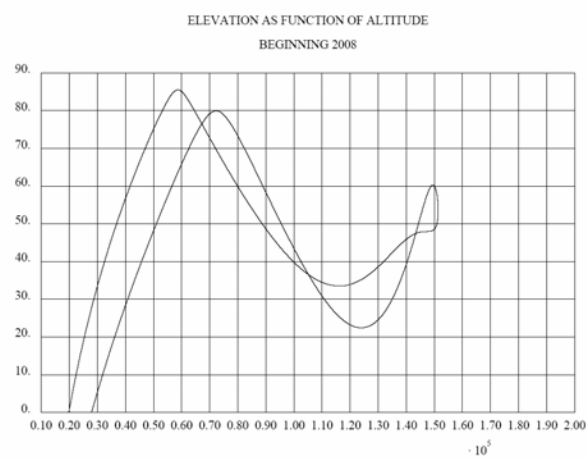
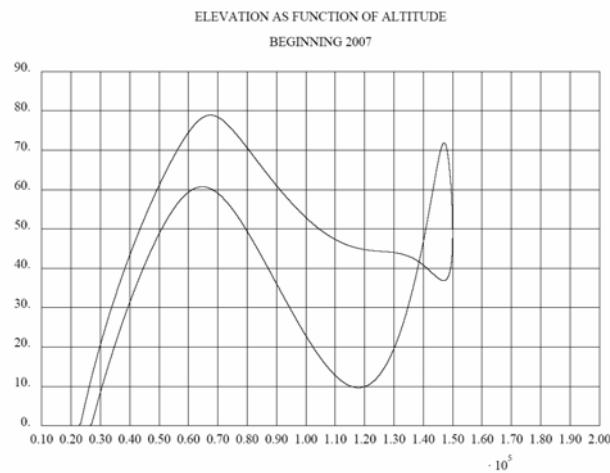
Orbit Control

The attached plot shows the apogee longitude of Integral as a function of the orbit The attached plot shows the apogee longitude of Integral (in deg East) as a function of the orbit number for the period September 2005 - October 2006. At present time the drift rate is close to zero and there is REDU coverage starting 1h53m before ascending through altitude 40000 km after a perigee passage and ending 51m after descending through altitude 40000 km before a perigee passage.

APOGEE LONGITUDES OF INTEGRAL 16.9.2005 - 31.10.2006



The target is to maximise the coverage, before ascending through altitude 40000 km, after a perigee passage, subject to the constraint of having 1 hour of coverage, after having descended through altitude 40000 km, before a perigee passage. The resulting coverage (elevation in deg as a function of the altitude in km) is displayed in the following 3 plots:



With 1 hour coverage after having descended through altitude 40000 km the coverage before ascending through altitude 40000 km will be:

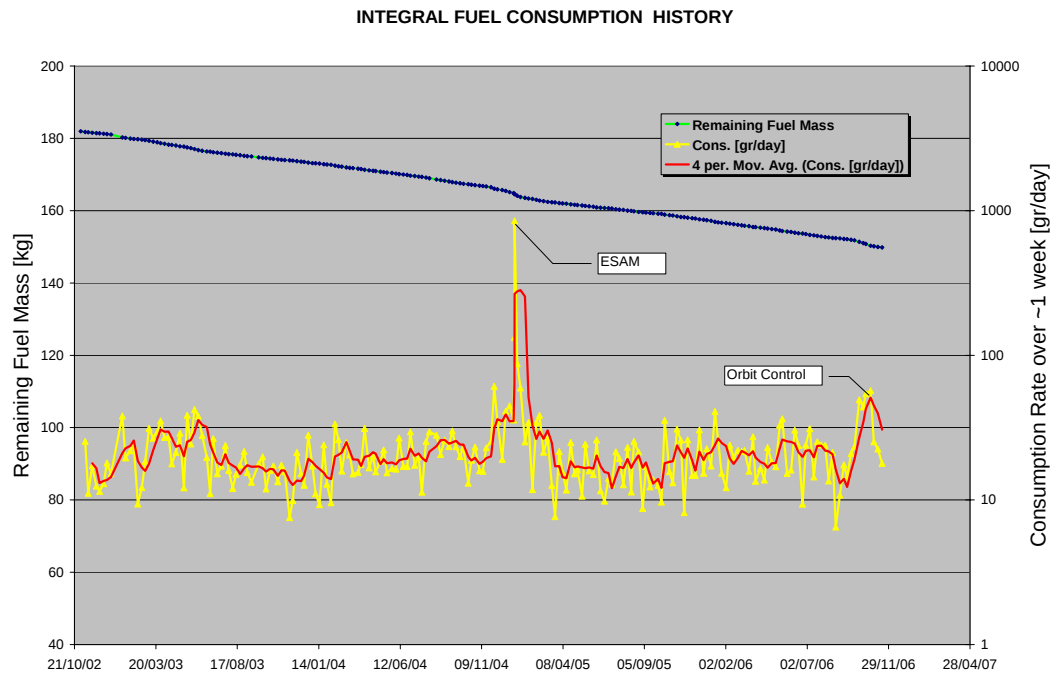
	Coverage before ascending through altitude 40000 km
Beginning 2007	1h45m
Beginning 2008	1h54m
Beginning 2009	1h59m

There is therefore no need for a second ground station.

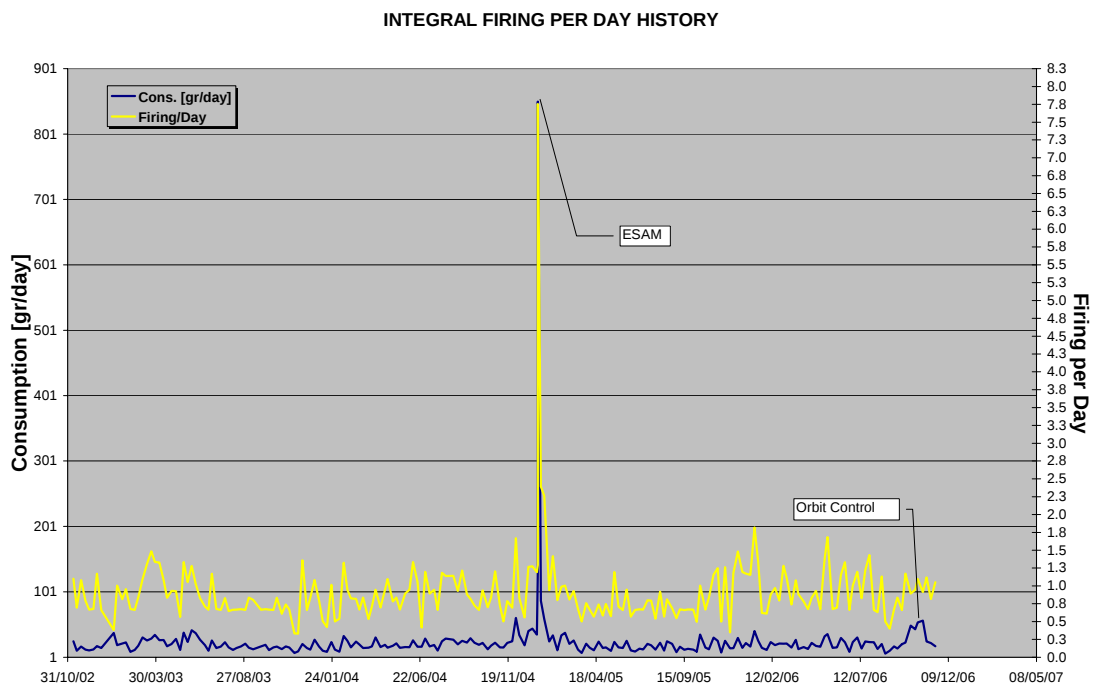
Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 16/11/2006 is reported in the plot below.

The large fuel consumption observed in the last weeks is due to the combination of the strategy to perform artificial large momentum dump manoeuvres when the pointing is suitable for orbit control and the starting of the eclipse season.

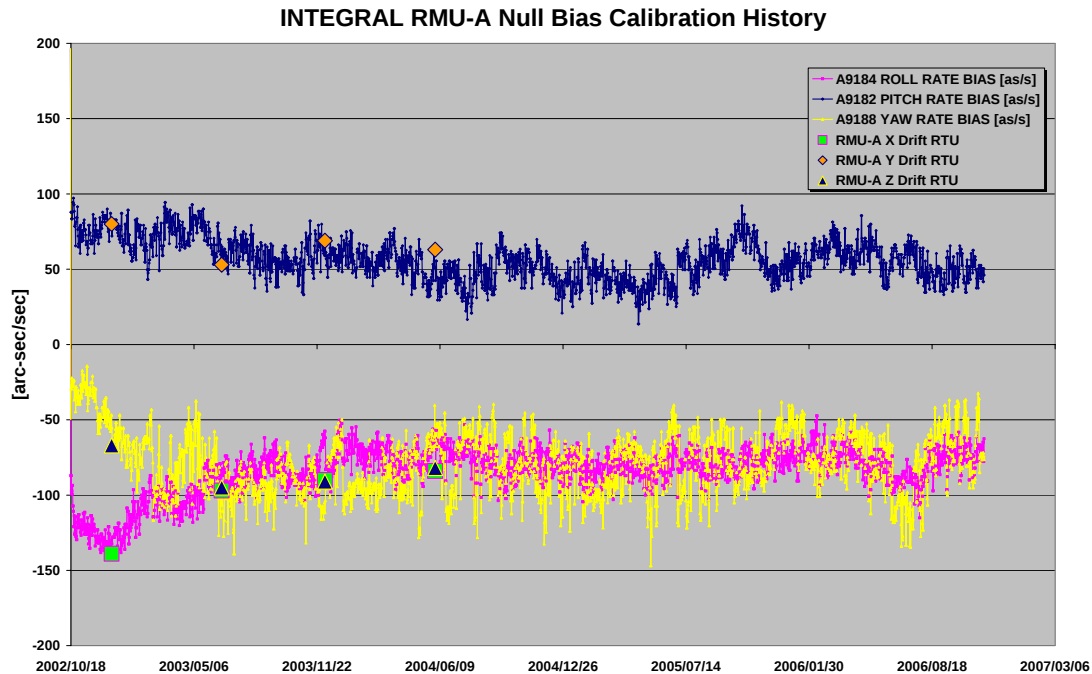


The firing\day over the period between 01/11/2002 and 16/11/2006 is reported in the plot below.

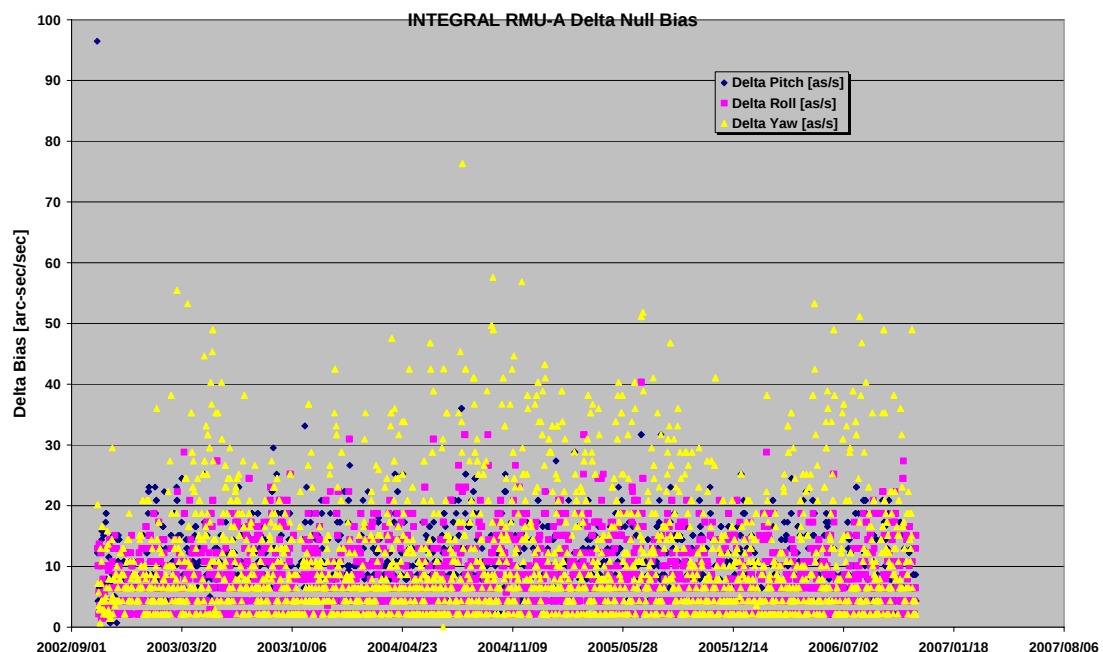


The RMU-A null bias calibration

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



11/11/06 (Day of Year 315, Revolution 498)

STR lost of guide star: at 16:20z, due to lost of the guide star, the IMU was switched ON by the ACC.

Doc. Title : INTEGRAL Mission Report #217
 Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
 Date : 20/11/06

Issue : 1
 Rev. : 0
 Page : 15

The guide star at moment of the false event was Mi 8.2 at CCD location [-980, 21850]. A new guide star, Mi 7.25 at CCD location [9657, -4620], was picked after the mapping commanded by the ACC autonomously.

No impact on TL except that the OTF was not reached during PID 04980018.

12/11/06 (Day of Year 316, Revolution 498)

Nothing to report.

13/11/06 (Day of Year 317, Revolution 498-499)

The eclipse operations were nominal from the AOCS point of view. A summary of the second eclipse passage during rev 499 is given below:

AOCS ECLIPSE MONITORING
Winter 2006

Revolution: 499
Date: 13/11/2006
DoY: 317

Penumbra Start: 13/11/2006 18:42:48
Umbra Start: 13/11/2006 18:44:40
Umbra End: 13/11/2006 19:33:58
Penumbra End: 13/11/2006 19:36:20

Eclipse Duration: 0:53:32
Eclipse Duration [sec]: 3212

IMU Health Check Start 13/11/2006 10:57:59
Eclipse Imminent Flag 13/11/2006 17:43:08
ACC IMU AutoCal Start 13/11/2006 17:57:34
ACC IMU AutoCal End 13/11/2006 18:17:34

Sun out of FSS FoV 13/11/2006 18:44:19
Sun back in FSS FoV 13/11/2006 19:34:27

Eclipse Timers	From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
	Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]		
ACC Eclipse Start	13/11/2006 18:25:09	-1059.00	13/11/2006 18:25:13	-1055.00	-1064	
FDE Eclipse Start	13/11/2006 18:36:15	-393.00	13/11/2006 18:36:26	-382.00	-404	176
FCE Eclipse Start	13/11/2006 18:36:59	-349.00	13/11/2006 18:37:07	-341.00	-360	176

	From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
	Absolute	WRT Pen. End [sec]	Absolute	WRT Pen. End [sec]		
FCE Eclipse End	13/11/2006 19:42:27	367	13/11/2006 19:42:34	374.00	360	176
FDE Eclipse End	13/11/2006 19:42:27	367	13/11/2006 19:42:34	374.00	360	176
ACC Eclipse End	13/11/2006 19:46:01	581	13/11/2006 19:46:05	585.00	578	

IMU	Uplink	Execution	WRT Penumbra End [sec]
IMU Auto Off Enable	10/11/2006 20:18:55	13/11/2006 19:47:58	698
IMU On	13/11/2006 11:17:13	IMU H/C Noise Roll [as/s]	0.2034
IMU Off	13/11/2006 19:48:19	IMU H/C Drift Roll [as/s]	0.1382
IMU On Time	8:31:06	IMU Auto Cal Drift Roll [as/s]	0.3144

14/11/06 (Day of Year 318, Revolution 499)

Nothing to report.

15/11/06 (Day of Year 319, Revolution 499)

Nothing to report.

16/11/06 (Day of Year 320, Revolution 499-500)

The eclipse operations were nominal from the AOCS point of view. A summary of the second eclipse passage during rev 500 is given below:

AOCS ECLIPSE MONITORING

Winter 2006

Revolution: 500

Date: 16/11/2006

DoY: 320

Penumbra Start: 16/11/2006 18:42:37

Umbra Start: 16/11/2006 18:46:11

Umbra End: 16/11/2006 19:12:00

Penumbra End: 16/11/2006 19:16:04

LOS: 16/11/2006 14:13:00

AOS: 16/11/2006 18:12:00

Eclipse Duration: 0:33:27

Eclipse Duration [sec]: 2007

IMU Health Check Start 16/11/2006 10:51:00

Eclipse Imminent Flag 16/11/2006 17:42:57

ACC IMU AutoCal Start 16/11/2006 17:57:23

ACC IMU AutoCal End 16/11/2006 18:17:23

Sun out of FSS FoV 16/11/2006 18:45:19

Sun back in FSS FoV 16/11/2006 19:12:09

Eclipse Timers	From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
	Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]		
ACC Eclipse Start	16/11/2006 18:24:53	-1064.00	16/11/2006 18:25:00	-1057.00	-1064	
FDE Eclipse Start	16/11/2006 18:34:12	-505.00	16/11/2006 18:36:11	-386.00	-404	176
FCE Eclipse Start	16/11/2006 18:34:56	-461.00	16/11/2006 18:36:51	-346.00	-360	176

	From Loaded Timers		Actual From Telemetry		UM [sec]	LSB [sec]
	Absolute	WRT Pen. End [sec]	Absolute	WRT Pen. End [sec]		
FCE Eclipse End	16/11/2006 19:20:36	272	16/11/2006 19:22:34	390.00	360	176
FDE Eclipse End	16/11/2006 19:20:36	272	16/11/2006 19:22:34	390.00	360	176
ACC Eclipse End	16/11/2006 19:25:42	578	16/11/2006 19:25:49	585.00	578	

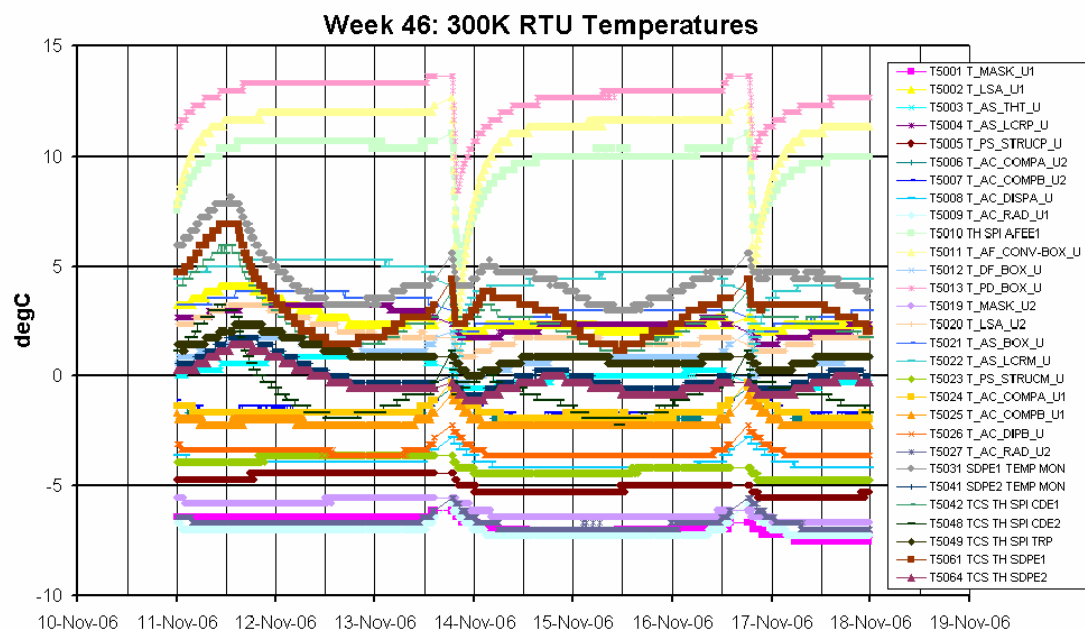
IMU	Uplink	Execution	WRT Penumbra End [sec]
IMU Auto Off Enable	13/11/2006 20:09:25	16/11/2006 19:27:42	698
IMU On	16/11/2006 11:20:31	IMU H/C Noise Roll [as/s]	0.2264
IMU Off	16/11/2006 19:28:03	IMU H/C Drift Roll [as/s]	0.2650
IMU On Time	8:07:32	IMU Auto Cal Drift Roll [as/s]	0.3194

17/11/06 (Day of Year 321, Revolution 500)

Nothing to report.

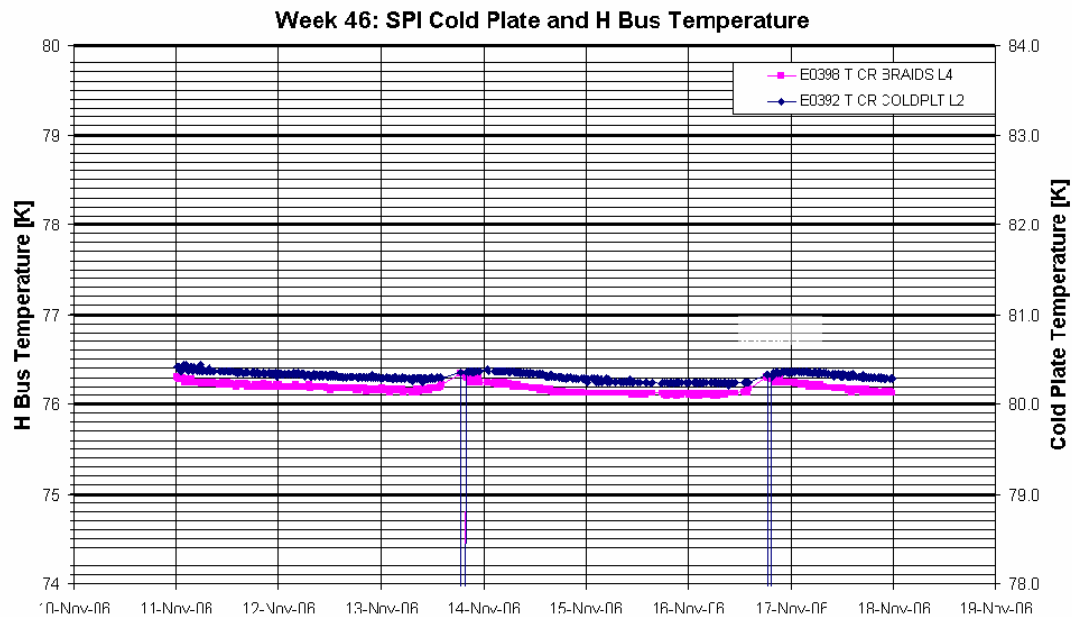
8.3.2 SPI Operations

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 80K +/-1K with a variable drift due to eclipse season activities (see plot below).

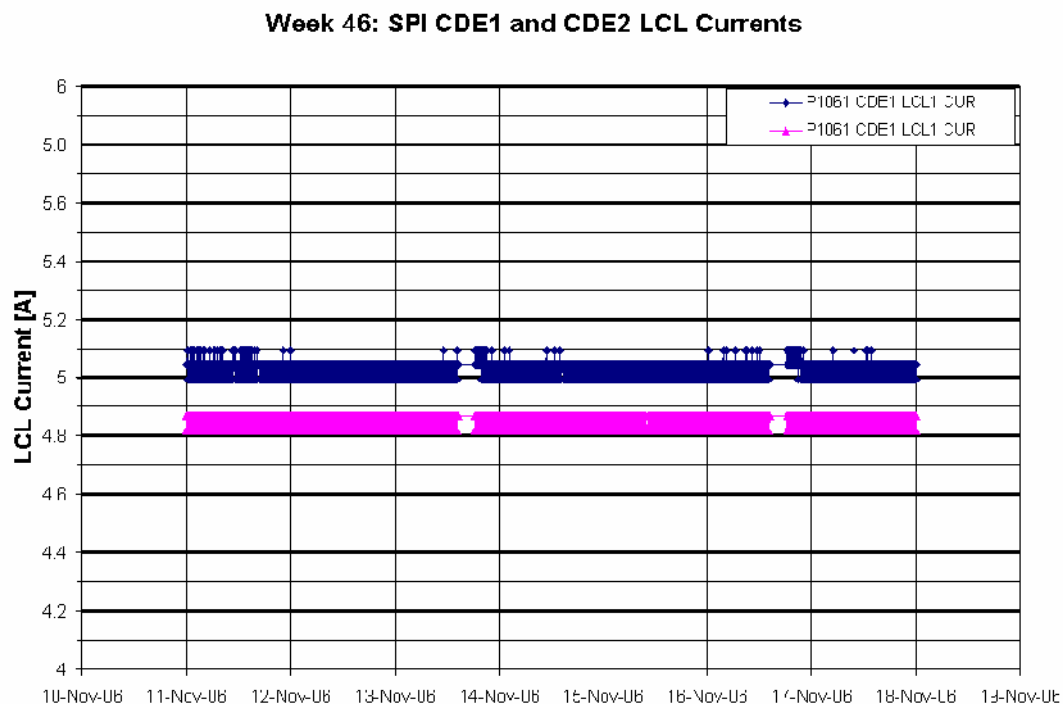
The following plot shows the evolution of the cold plate and H bus temperatures during the reporting period.



The stroke of all four compressors is currently set to 41. The average LCL currents of the CDEs over the week were:

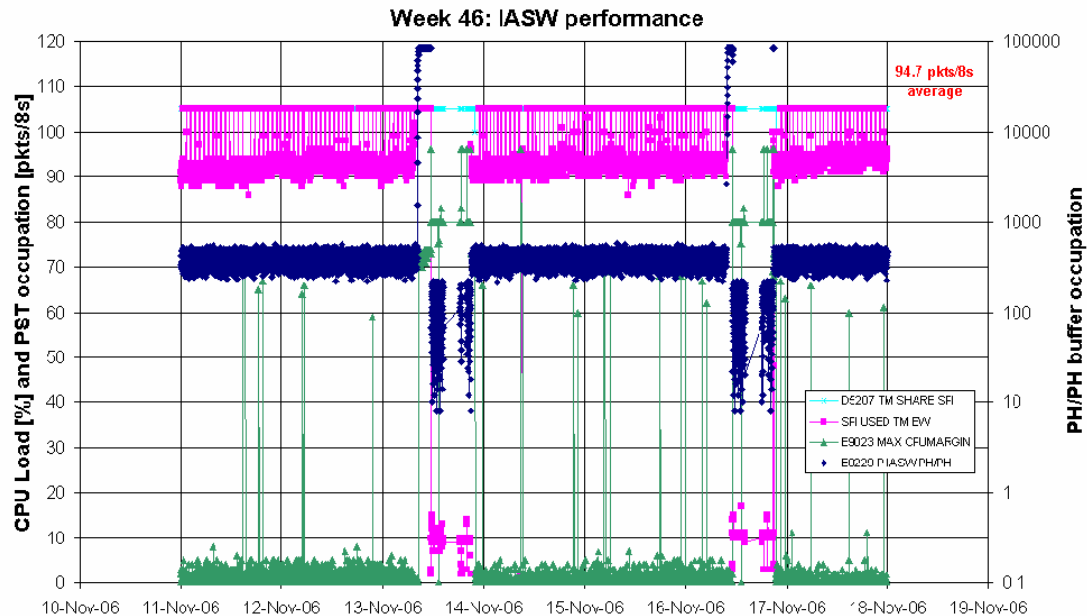
- Average CDE1 LCL Current = 5.03A
- Average CDE2 LCL Current = 4.84A

The following plot shows the evolution of the CDE currents during the reporting period.



DPE & IASW: The DPE health and IASW performance is nominal. The current IASW version installed is 432. The average TM bandwidth occupation of SPI was 94.7 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.

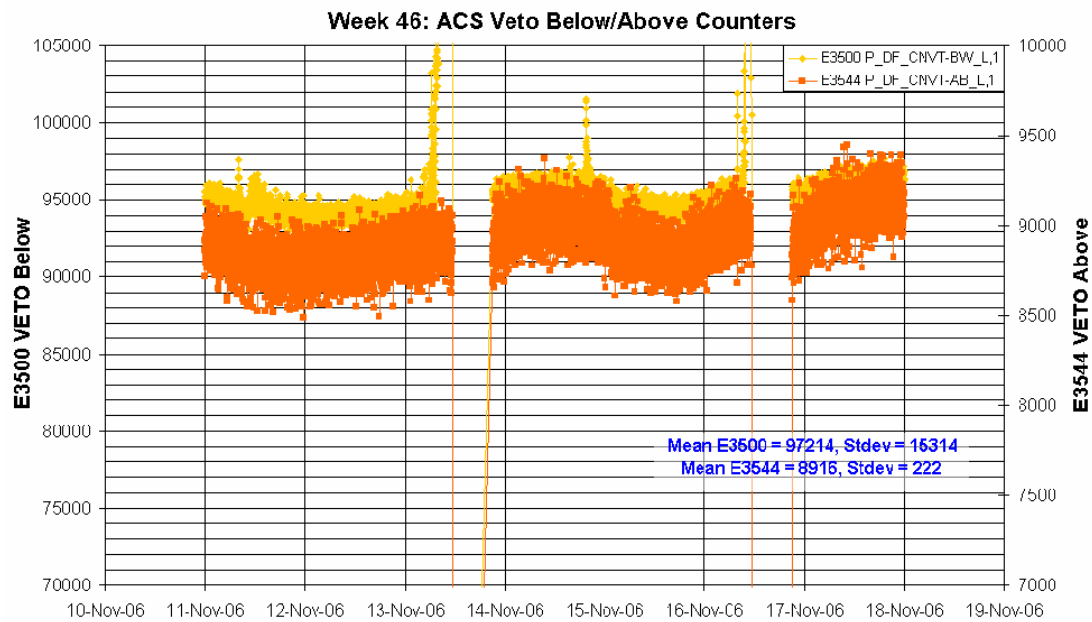


ACS: The performance of the ACS is nominal, except for FEE 81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162). FEE #57 is also still off due to the anomaly on 5/8/2003 (INT_SC-61).

Due to the execution of the ED EEXIT-02 following eclipse, which restores the previous default ACS configuration with FEE #81 ON, the FEE #81 was switched OFF again as follows:

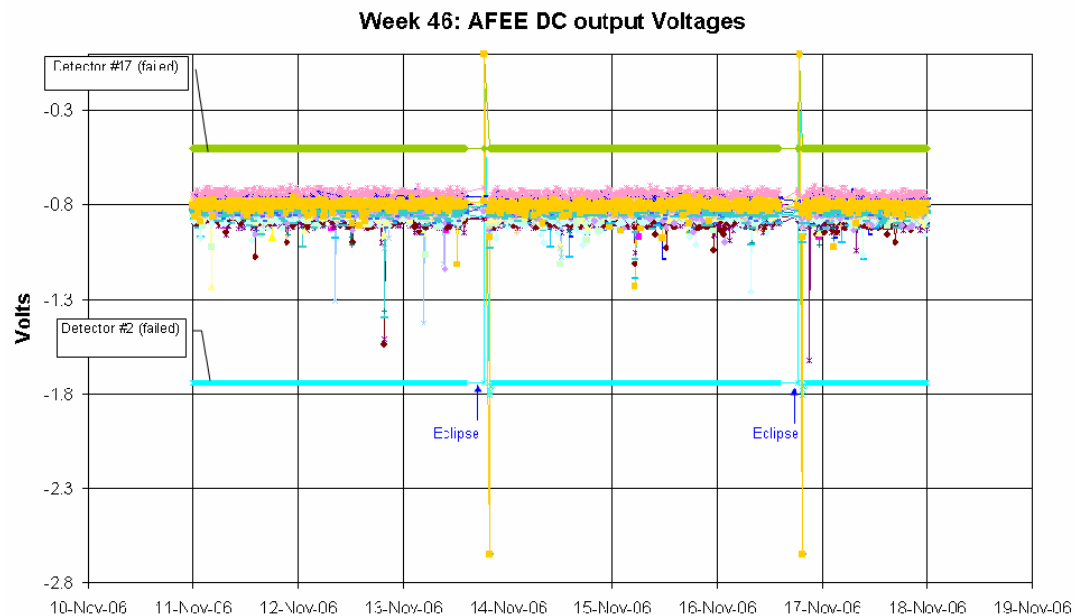
- On 2006-11-14 starting at 08:52:39Z (SPI to CONF), with SPI back in PHOTON mode at 08:57:20Z.
- On 2006-11-16 starting at 21:05:25Z (SPI to CONF), with SPI back in PHOTON mode at 21:08:00Z.

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

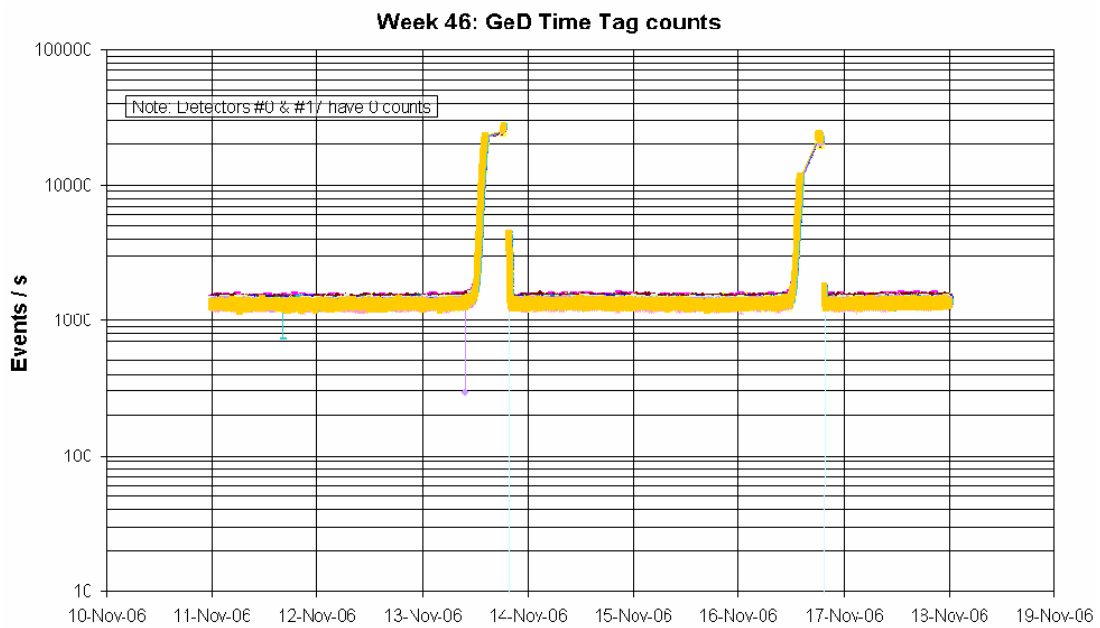
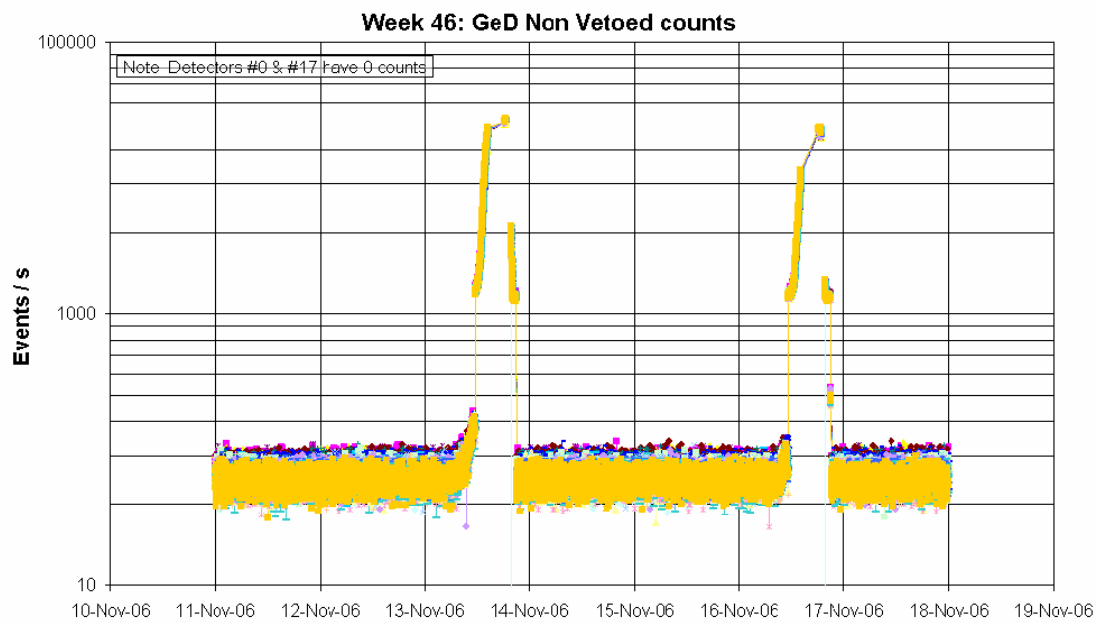


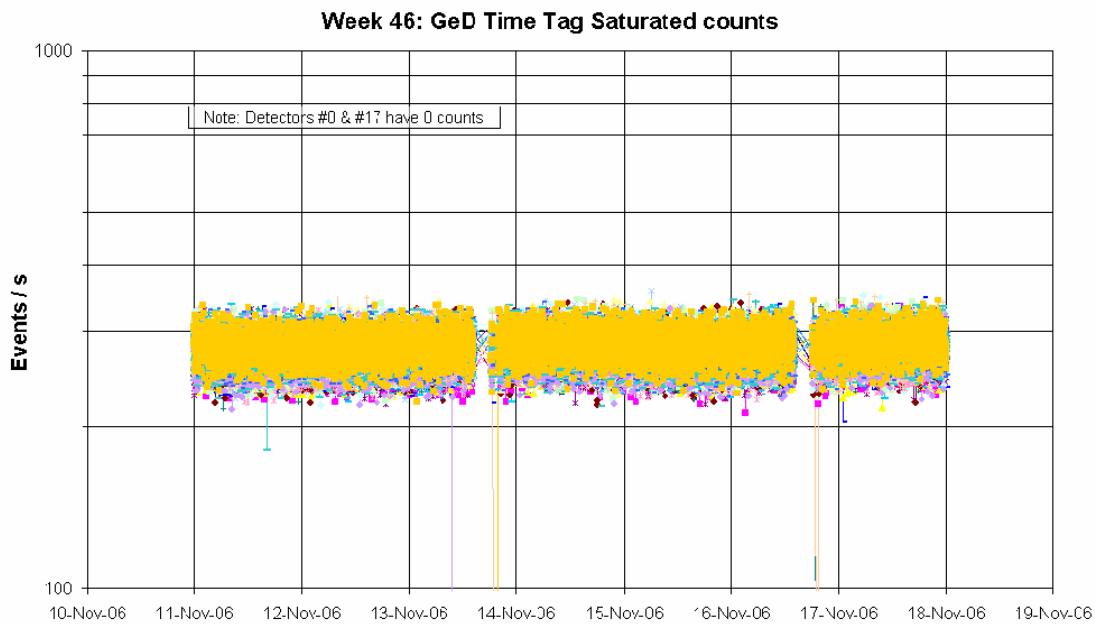
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detectors #4 and #12 which are showing a slightly degraded energy resolution. The energy resolution of GeD#15 was recovered with the last annealing.

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

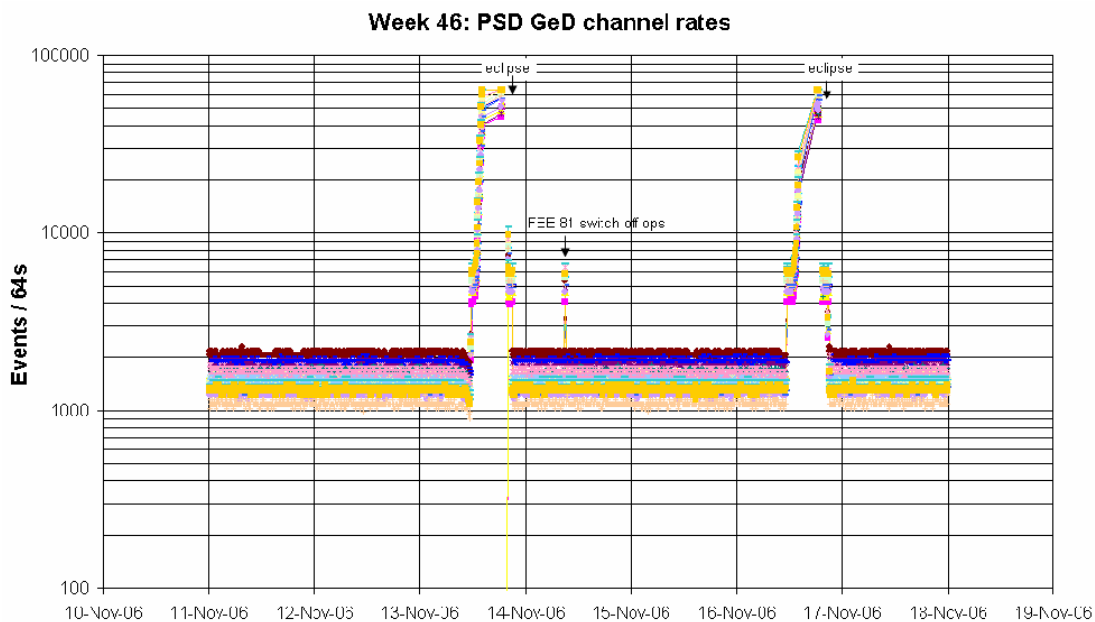


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





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 events occurred on SPI during the reporting period:

- On 2006-11-13 at 07:55Z the TM parameter E3500 P_DF_CNVT-BW_L starting going OOL High. This was ~3.5 hours before radiation belt entry of revolution 498. No action was taken.
- On 2006-11-16 at 09:48Z the TM parameter E3500 P_DF_CNVT-BW_L starting going OOL High. This was ~1.5 hours before radiation belt entry of revolution 499 and therefore no action was taken.
- On 2006-11-16 several TCs of the ED EEXIT-02 failed, starting with the TC EU0201D at 20:48:53Z. This was due to an IMCS problem of the late update of dynamic default parameters which occurs sometimes (see Anomaly Report

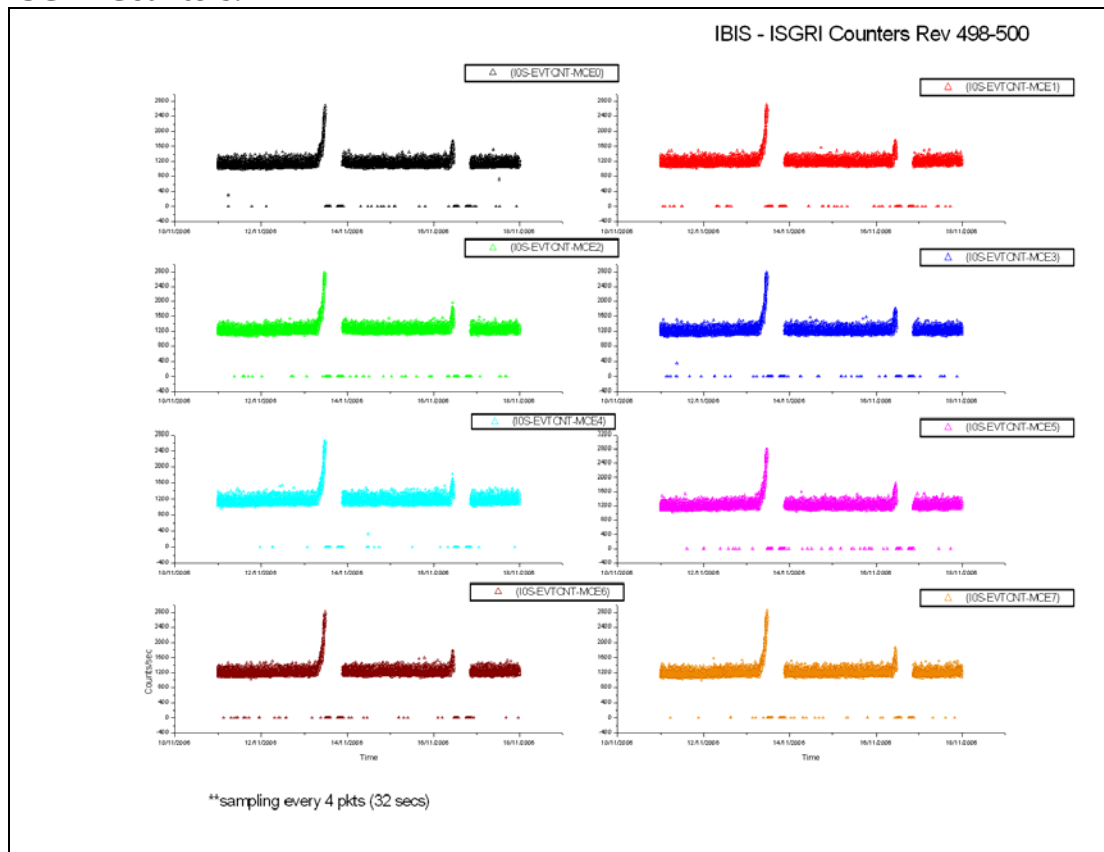
INT-2892). As the rest of the ED had executed, leaving SPI in Photon mode, the whole ED EEXIT-02 was re-uplinked starting at 20:59:20Z. This was executed successfully.

- TM parameter E2116 T AS PSAC L2 (Plastic Scintillator temperature) went OOL Low several times during the week. No action was taken as this is a known and recurring problem due to this thermistor being unreliable. The limit conditions for this parameter will be updated in the next IODB release.

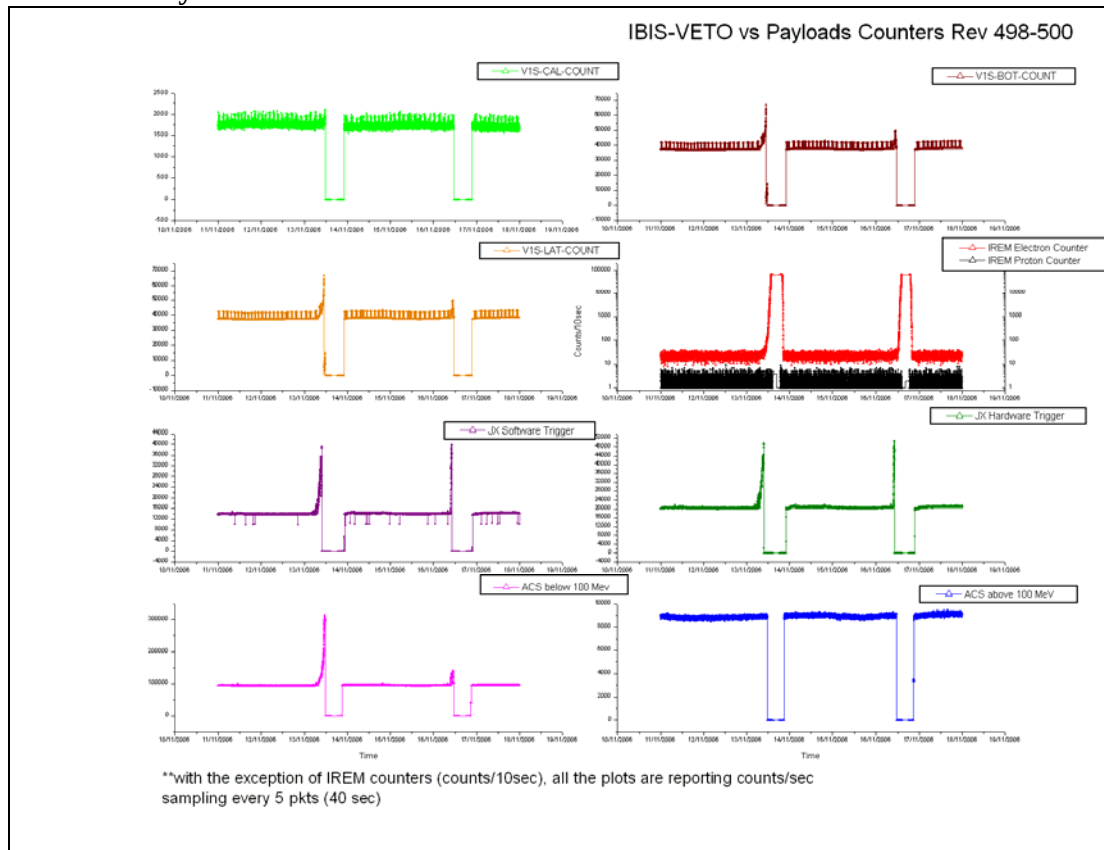
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

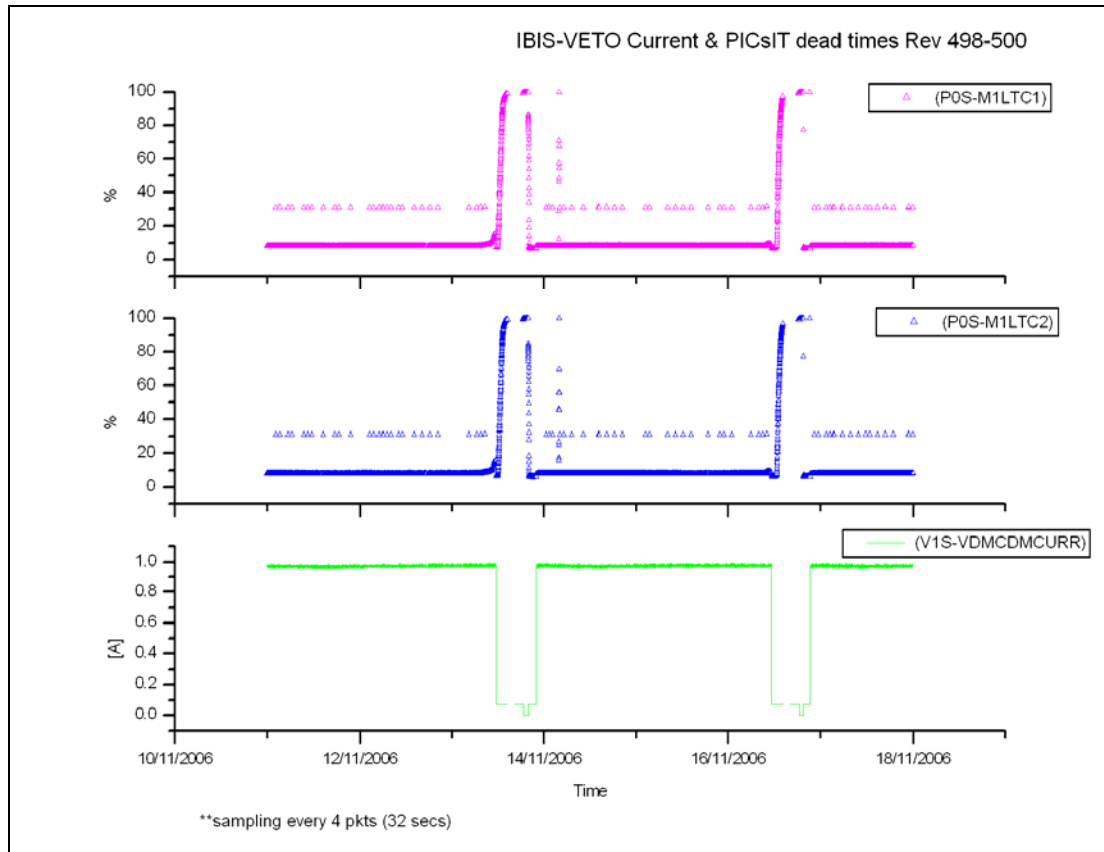


VETO vs Payloads Counters:

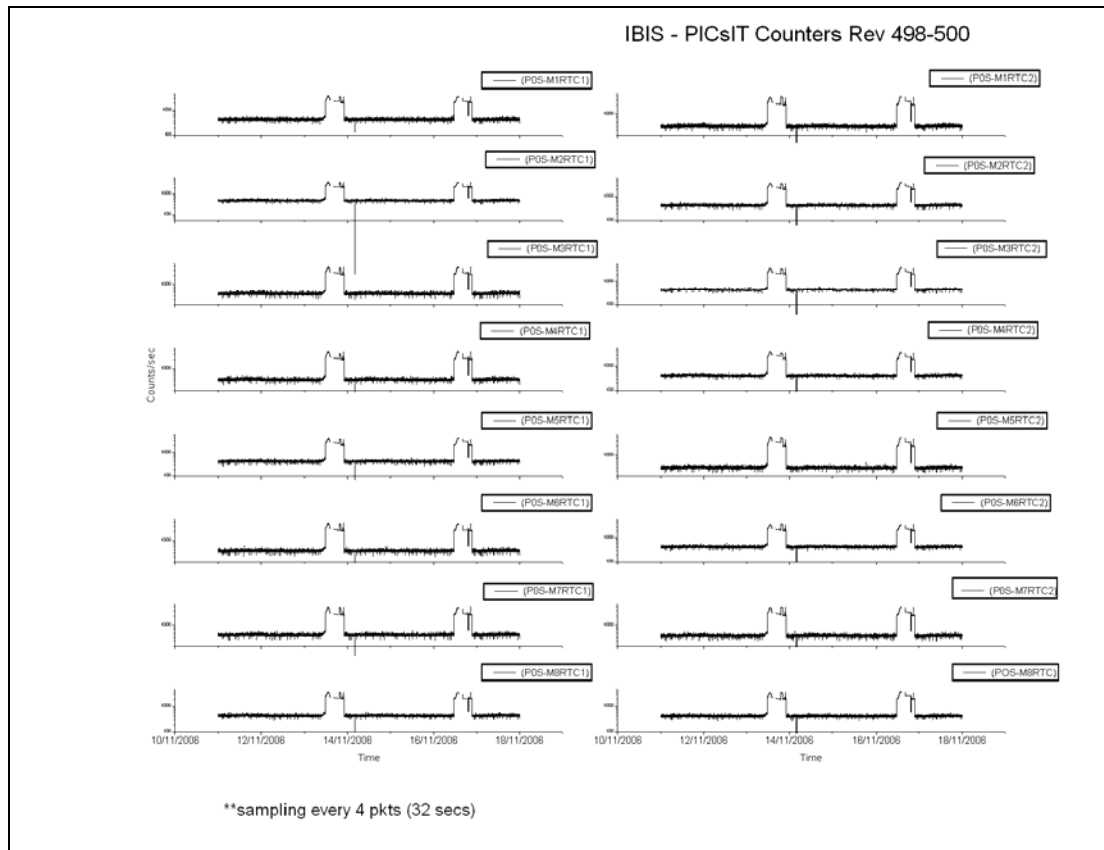


The week was characterised by low radiation.

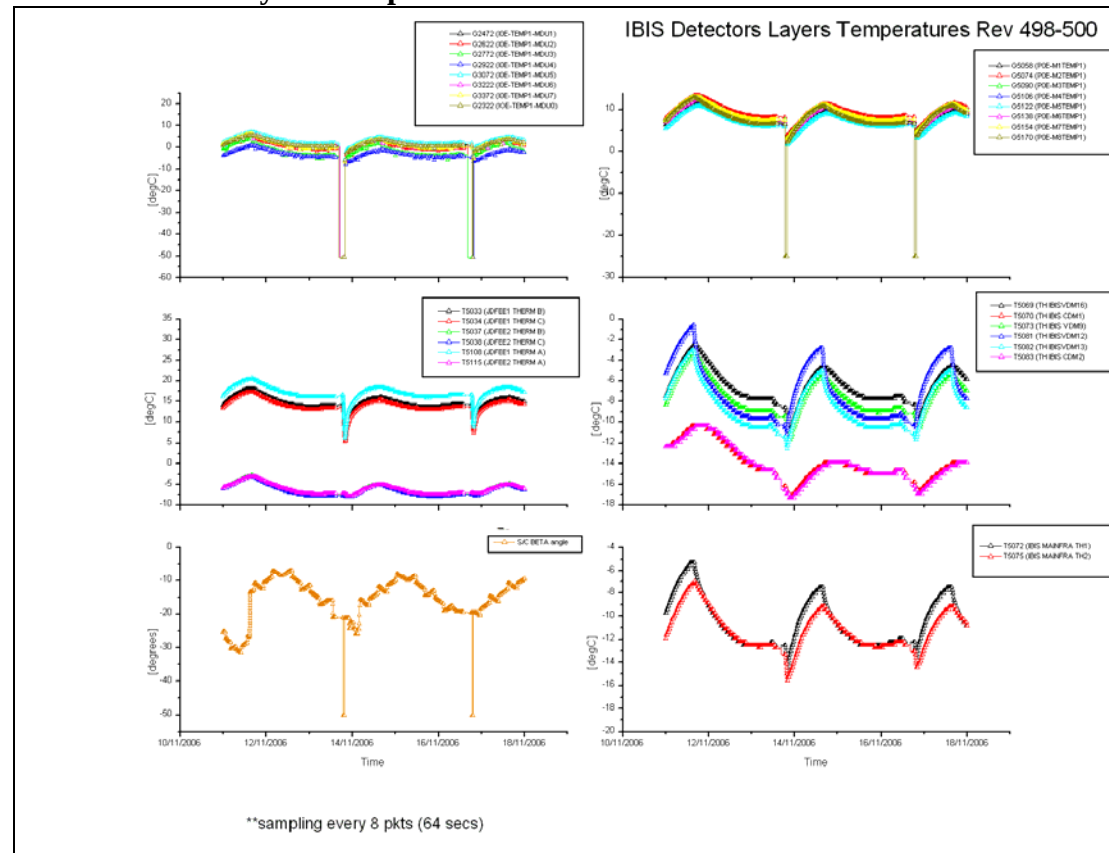
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:

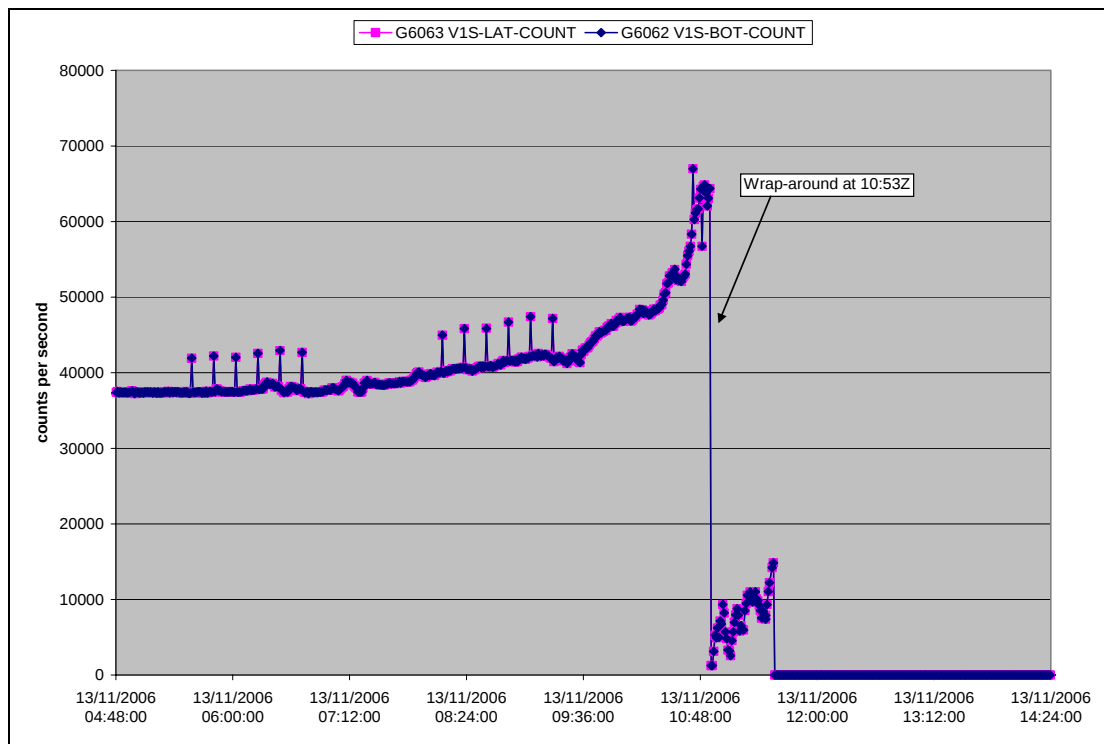


IBIS daily report

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), families G5002 (P0S-Mi RTC1) and G5003 (P0S-Mi RTC2), families G2014 (I0E-OVFWPXADD-Mi) were reported at Radiation Belts passage.

DoY 2006.317 (13/11/2006): VETO wrap-around

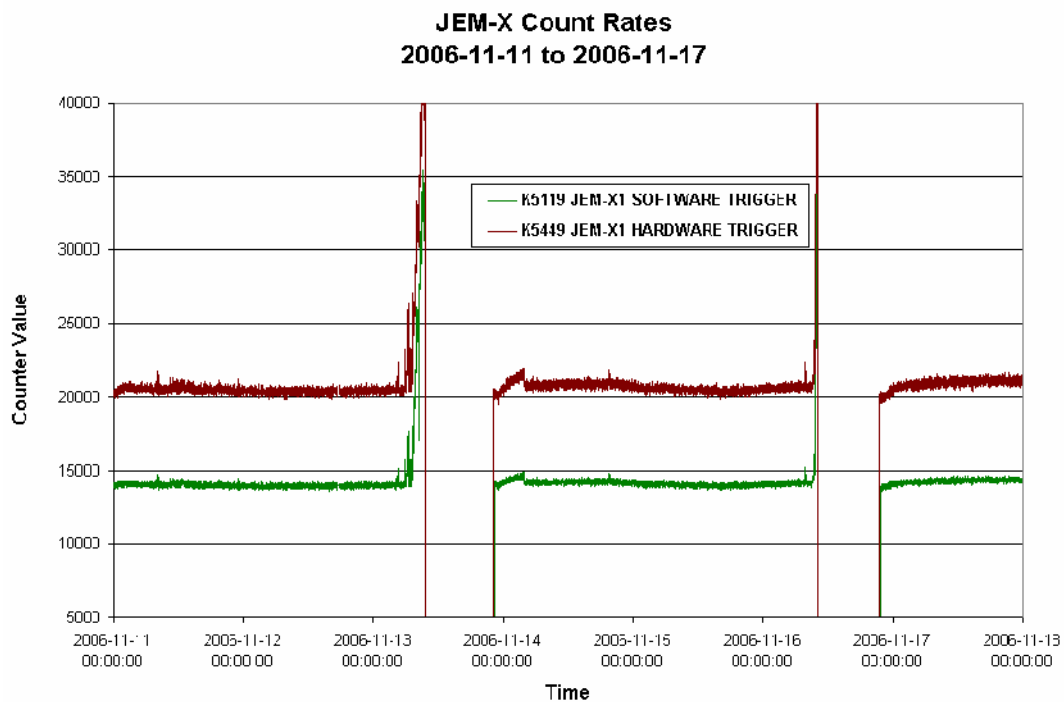
At 10:25:54Z TM parameters G6062 (V1S-BOT-COUNT) and G6063 (V1S-LAT-COUNT) were reported Out Of Limit high due to high radiation when approaching the radiation belts. The values kept increasing until 10:53:54Z when the counters wrapped around and were reported Out Of Limits Low. According to V-BOT-1 and V-LAT-1 no action was taken. At 11:33Z VETO went into Stand-By mode as automatic reaction to Broadcast Packet at Belts Entry.



8.3.4 JEM-X Operations

JEM-X Count Rates

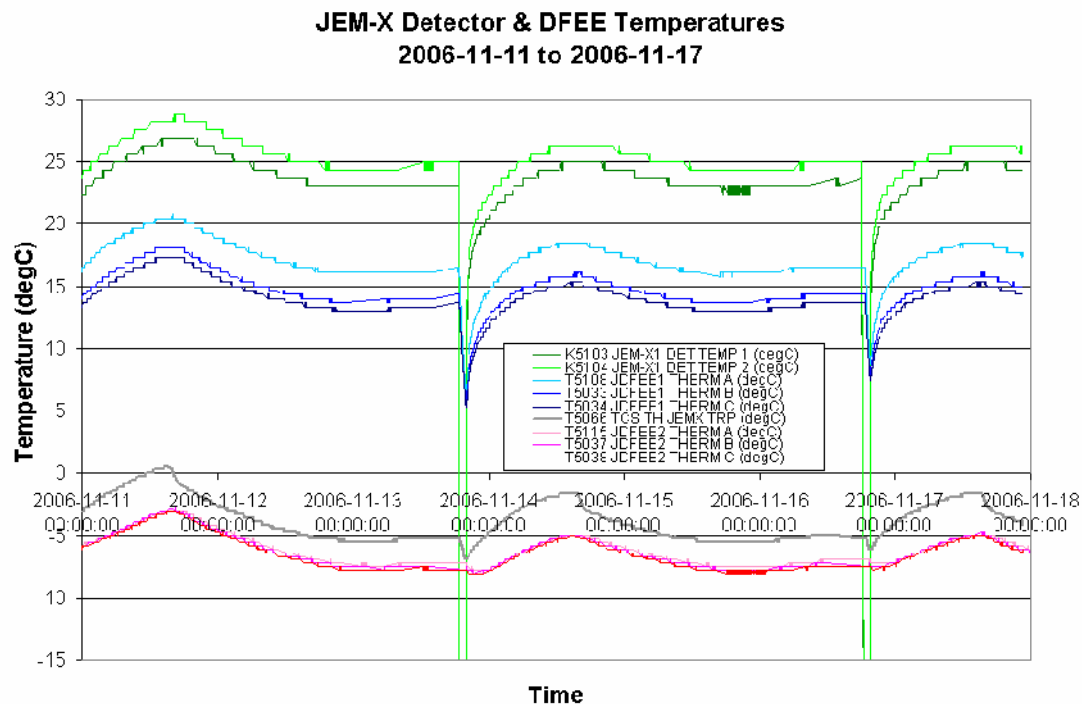
JEM-X count rates over the reporting period are displayed in the following graph¹.



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

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.



JEM-X Daily Report

2006-11-11 (DOY 315, Rev 498) to 2006-11-12 (DOY 316, Rev 498)

Nothing to report

2006-11-13 (DOY 317, Rev 498-499)

Due to high background radiation conditions before the expected radiation belt entry of revolution 498, at 08:01:07Z the TM parameter K5449 HARDWARE TRIGGER began to go Out of Limits High. At 08:32:19Z K5136 BUFFER LOSS began to toggle OOL High and at 09:06:03Z K5119 SOFTWARE TRIGGER also began to toggle OOL High. At 09:37:47Z JEM-X1 made an autonomous transition to Safe mode, triggered by the Software Ratemeter. OEM 189 JEM-X1 PROB DFEE 9 (Unexpected DFEE state reported in housekeeping) was received at this time, as the TM parameter K5462 DFEE STATE IASW was reporting state Setup while K5022 DFEE STATUS was Safe.

At 09:53:20Z FCP_JEM1_0040 was executed, setting K5462 DFEE STATE IASW to Safe as well and OEM 254 ERROR OFF was received.

JEM-X1 operations continued nominally.

² Data sampled (1 frame in 8)

2006-11-14 (DOY 318, Rev 499) to 2006-11-15 (DOY 319, Rev 499)

Nothing to report

2006-11-16 (DOY 320, Rev 499-500)

Due to high background radiation conditions before the expected radiation belt entry of revolution 499, at 09:44:27Z the TM parameter K5449 HARDWARE TRIGGER went Out of Limits High. At 09:55:15Z K5119 SOFTWARE TRIGGER began to toggle OOL High and from 10:02:03Z to 10:03:39Z K5136 BUFFER LOSS also went OOL High. At 10:08:59Z JEM-X1 made an autonomous transition to Safe mode, triggered by the Software Ratemeter. OEM 189 JEM-X1 PROB DFEE 9 (Unexpected DFEE state reported in housekeeping) was received at this time, as the TM parameter K5462 DFEE STATE IASW was reporting state Setup while K5022 DFEE STATUS was Safe.

At 10:24:20Z the ED KESAFE02 was sent from the Timeline, setting K5462 DFEE STATE IASW to Safe as well and OEM 254 ERROR OFF was received.

JEM-X1 operations continued nominally.

2006-11-17 (DOY 321, Rev 500)

Nothing to report

8.3.5 OMC Operations

2006-11-11 (DOY 315, Rev 498)

Nothing to report

2006-11-12 (DOY 316, Rev 498)

Between 17:20 and 17:41, due to a ground station problem, there was no TM available. The impact was that pointing 04980043 was partially lost.

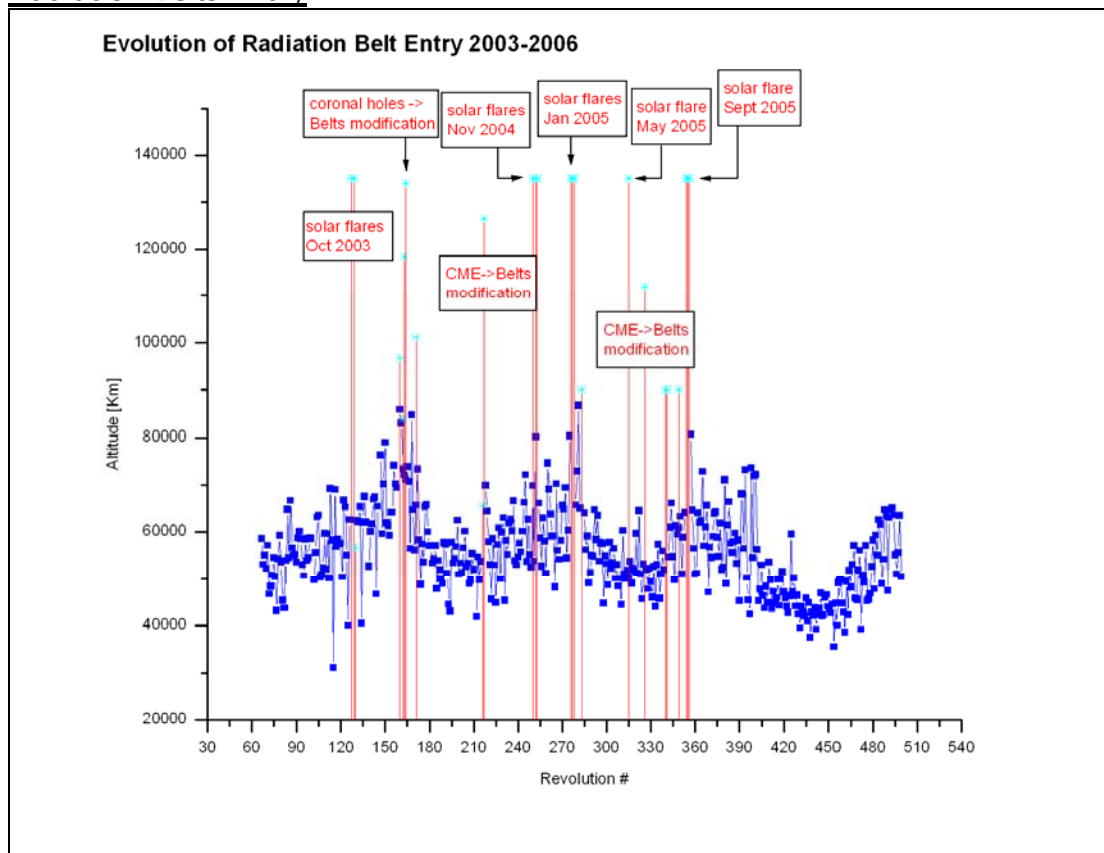
2006-11-13 (DOY 317, Rev 498) to 2006-11-17 (DOY 321, Rev 500)

Nothing to report

On DoY 317 at 11:33:25 and DoY 320 at 11:20:21 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

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]
498	RAD_ENTR R 2006-11-13T11:33:20Z	2006-11-13 10:47:24	63550.9	2006-11-13 12:17:27	49608
499	RAD_EXIT R 2006-11-13T20:55:03Z	2006-11-13 20:28:28	39020.9	2006-11-13 20:27:27	41502
499	RAD_ENTR R 2006-11-16T11:20:15Z	2006-11-16 12:17:48	50473.0	2006-11-16 11:28:24	50182
500	RAD_EXIT R 2006-11-16T20:42:13Z	2006-11-16 19:59:24	35965.8	2006-11-16 19:48:24	42109

Reference

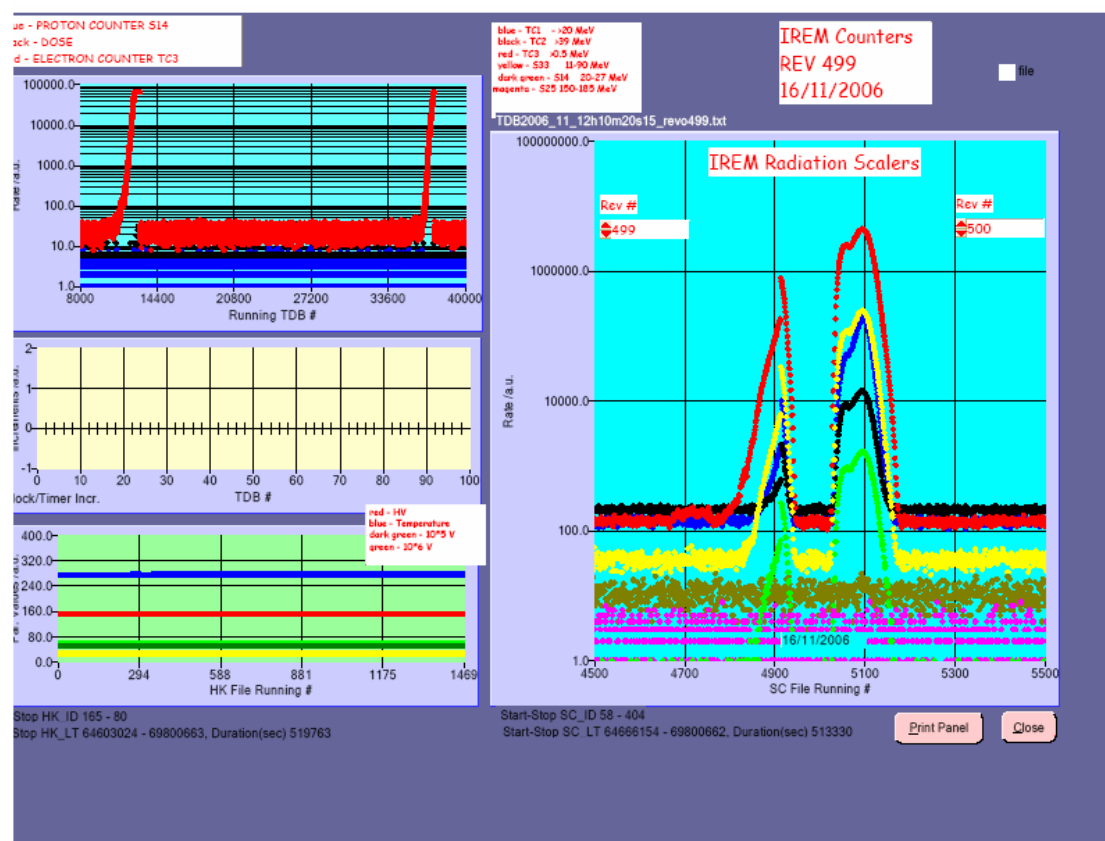
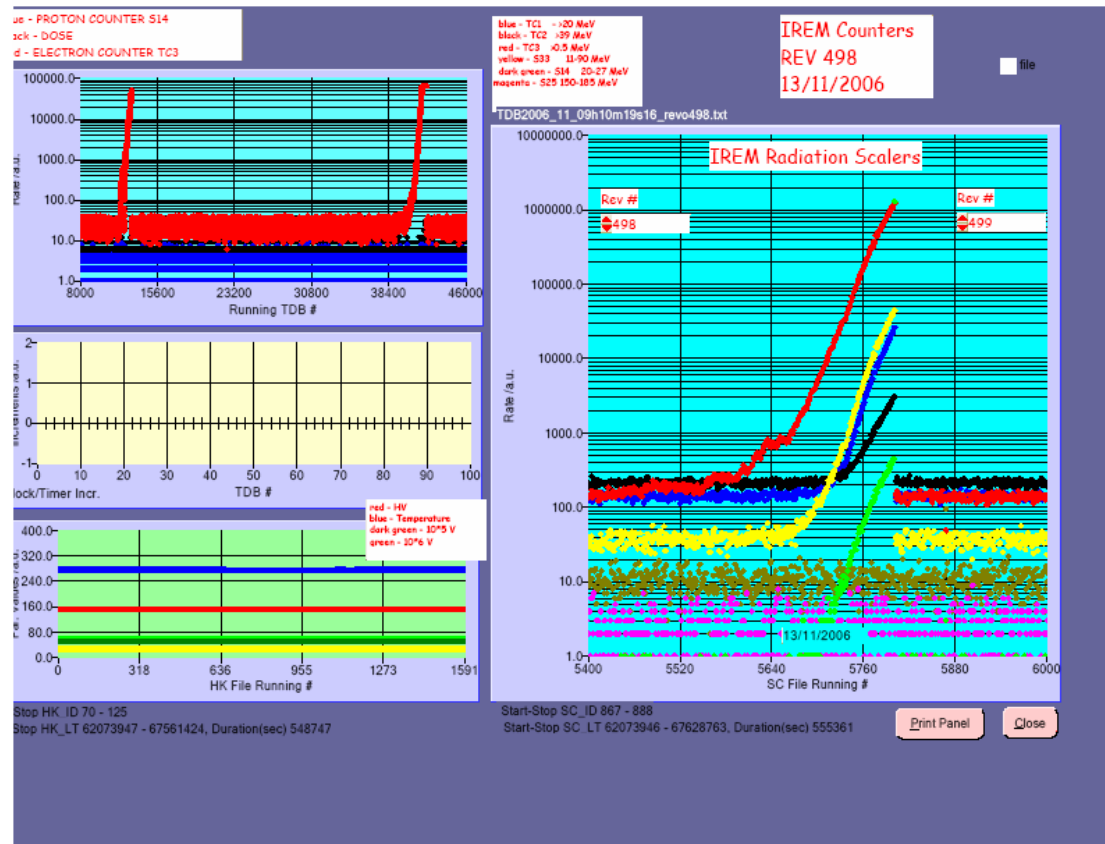
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

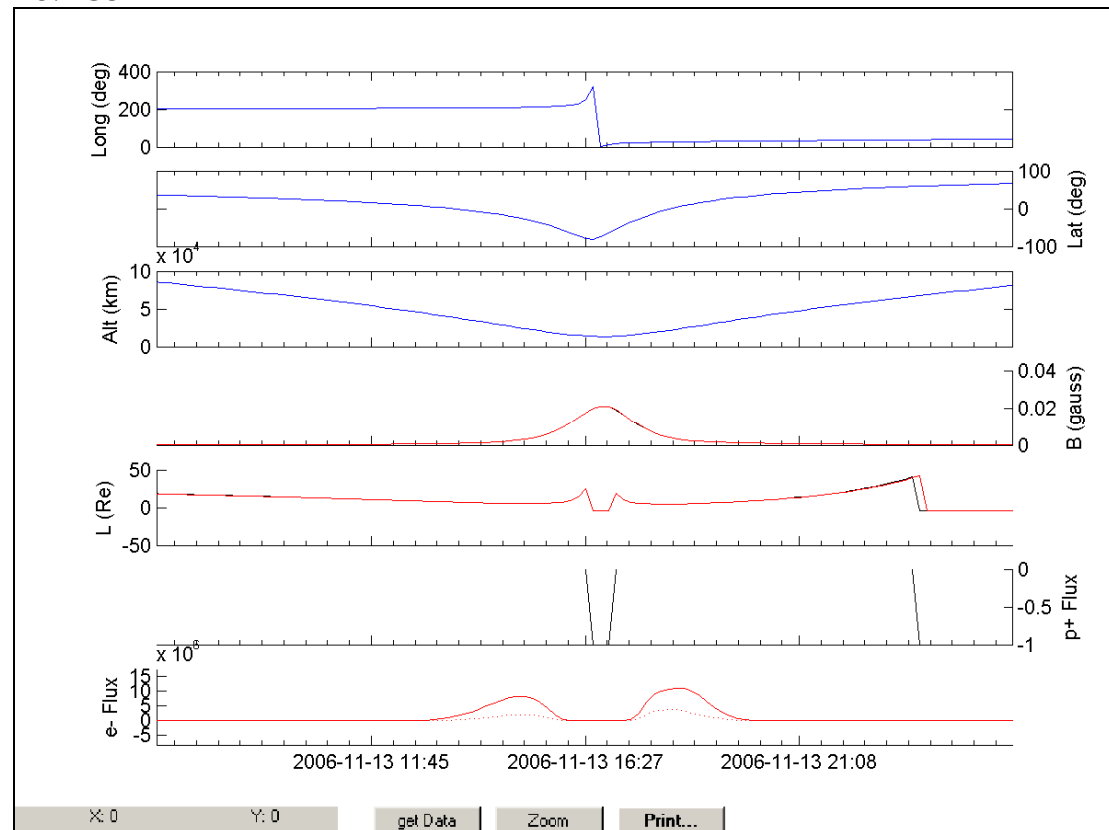
Radiation Spike

IREM radiation counters:

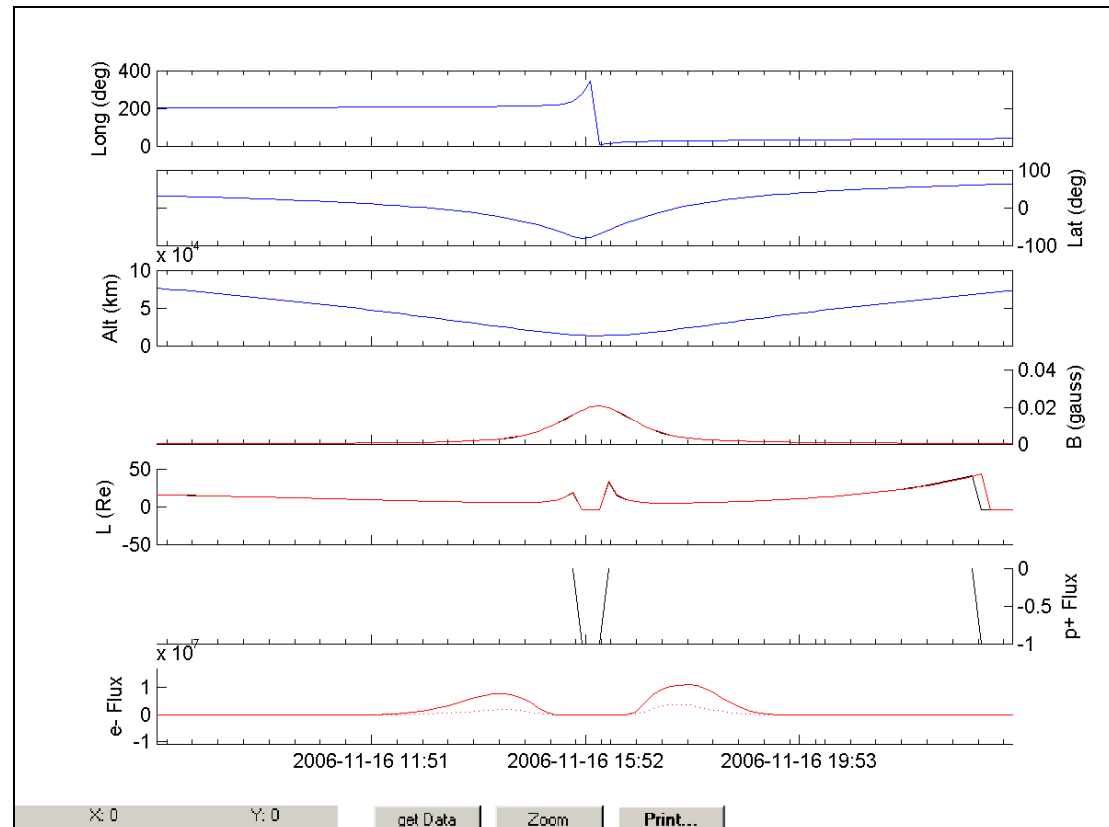


IREM Predicted Radiation Belt Passages

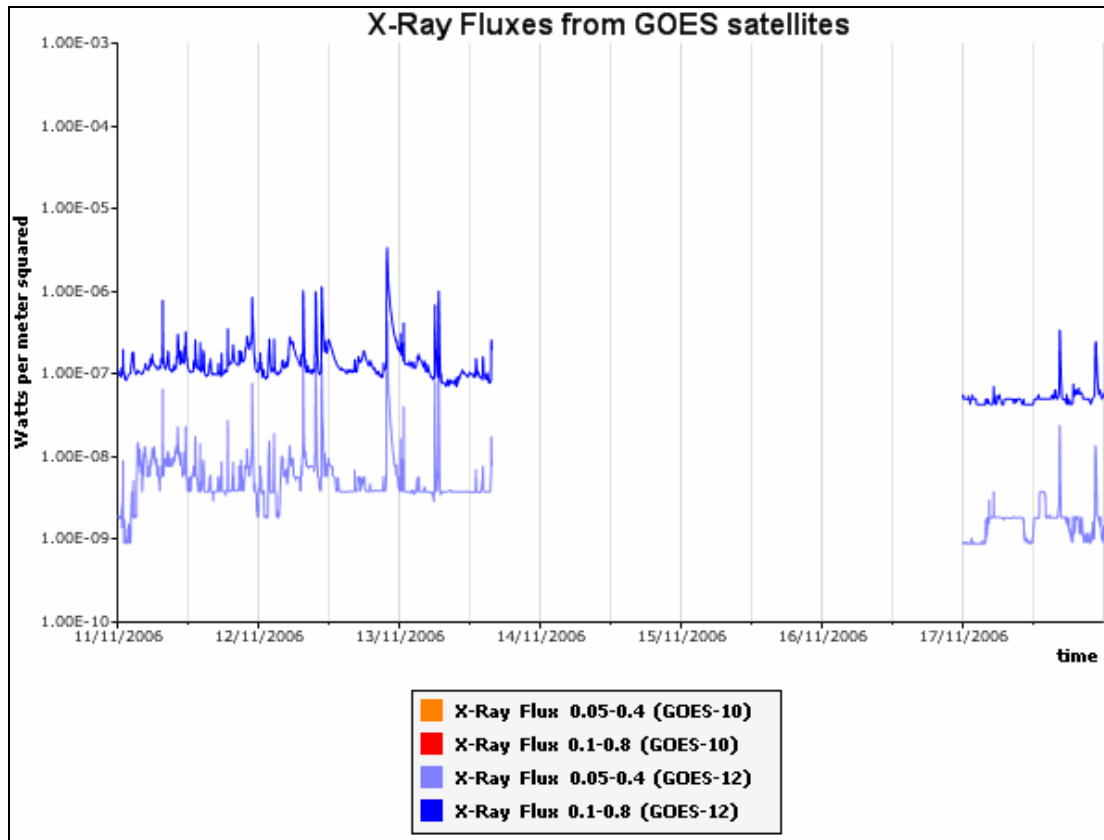
Rev 498



Rev 499

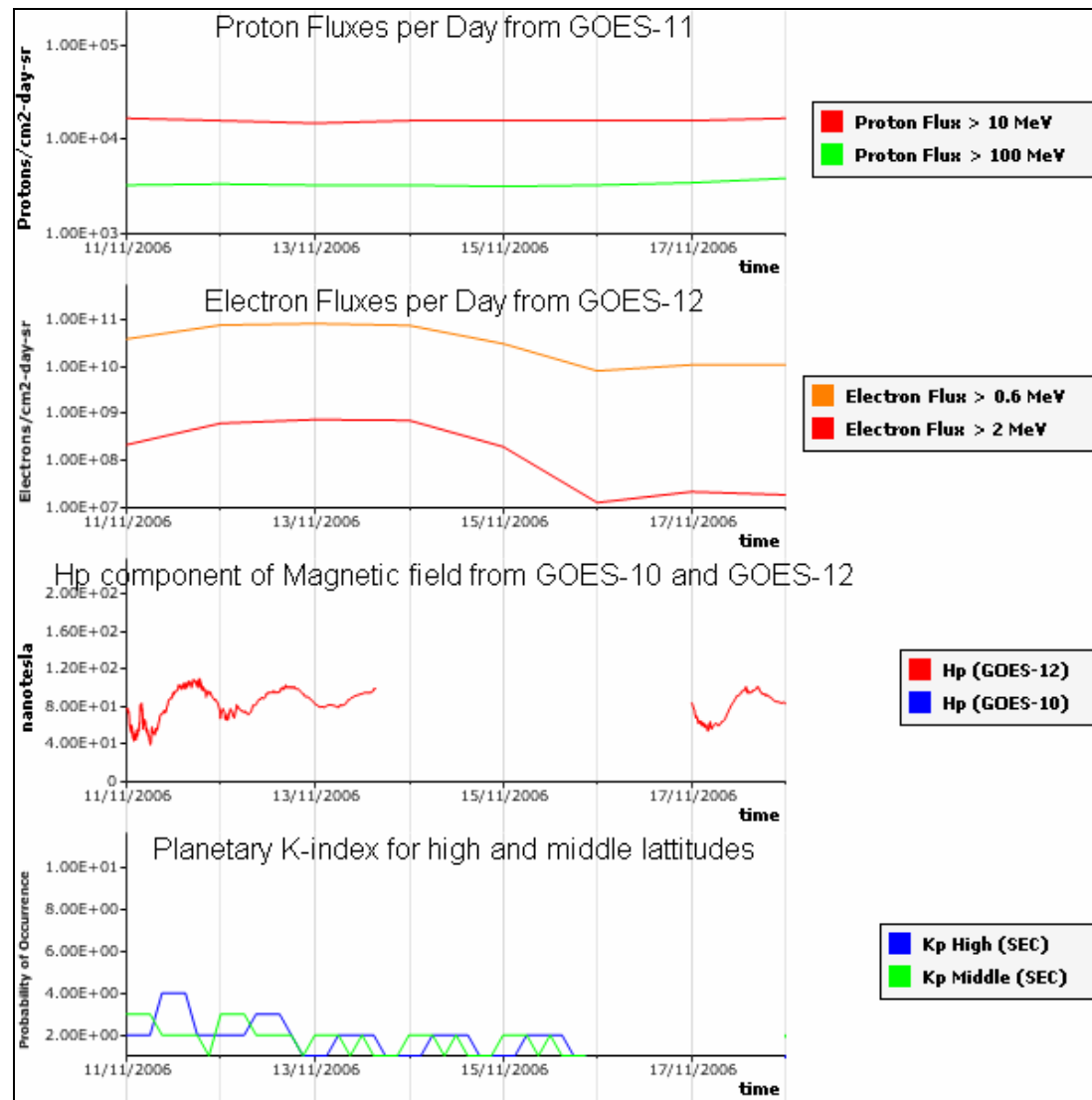


SEC-GOES Observed Particles Fluxes (using SEIS/RAT tool):



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.

Data are partially missing due to problems with the server but no X-ray event occurred at this time.



Proton and electron flux report low 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.

Data are partially missing due to problems with the server but no event occurred at this time.