EUROPEAN SPACE AGENCY
DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL
Mission Report

INT-MOC-SYS-RP-1001-OPS-OF

No. 192
Week 21

29.05.06

Routine Phase

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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 20.05.06 until 26.05.06 (both dates inclusive) and covers the revolutions 440 and 441.

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 a raster dither of GRO J0852-4642 (RA 08:51:38.31, DEC -46:41:50.9), a hexagonal dither of 1ES 1426+428 (RA 14:28:32.60, DEC +42:40:21.0) and a Galactic Plane Survey.

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 terminated with the 7th and 8th eclipse passages on 21-24 May 2006.All the eclipse passages were nominal from an AOCS point of view.

As part of the AOCS routine activities for the 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.

No slew was lost during the observation period.

The fuel consumption over the period between 16/05/2006 and 25/05/2006 was 0.1361 kg. The remaining propellant is in the order of 154.2471 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.

A summary of Eclipse Season #8 is given below:

Date	Penumbra Entry	Umbra Entry	Umbra Exit	Penumbra Exit	Eclipse Duration		Observed Depth of Discharge		Mean Discharge Current in Umbra		Expected Recharge		Recharge Duration Battery	
					Total	Umbra	1	2	1	2	Ah	Time	1	2
03/05/06	07:22:49	07:27:48	07:51:32	07:55:55	0:33:06	0:23:44	2.52	2.49	5.72	5.65	2.13	1h 11m	1:27:10	1:26:14
06/05/06	06:55:53	06:58:30	07:50:20	07:52:24	0:56:31	0:51:50	5.2	5.14	5.85	5.78	5.39	2h 59m	3:04:57	3:03:13
09/05/06	06:36:12	06:38:20	07:40:14	07:41:53	1:05:41	1:01:54	6.25	6.18	5.94	5.88	6.43	3h 34m	3:43:12	3:41:12
12/05/06	06:20:26	06:22:25	07:26:55	07:28:24	1:07:58	1:04:30	6.53	6.46	5.96	5.9	6.70	3h 43m	3:53:53	3:51:45
15/05/06	06:08:51	06:10:46	07:12:52	07:14:21	1:05:30	1:02:06	6.29	6.22	5.89	5.95	6.45	3h 35m	3:44:52	3:42:52
18/05/06	06:01:39	06:03:40	06:58:48	07:00:21	0:58:42	0:55:08	5.61	5.54	5.97	5.91	5.73	3h 10m	3:20:28	3:18:36
21/05/06	05:57:33	05:59:55	06:42:23	06:44:18	0:46:45	0:42:28	4.29	4.24	5.88	5.81	4.41	2h 27m	2:32:48	2:31:12
24/05/06	05:56:42	06:01:14	06:17:50	06:21:56	0:25:14	0:16:36	1.85	1.83	5.65	5.58	1.73	0h 57m	1:04:38	1:03:58

From the EPS point of view all eclipse passages and subsequent battery recharge periods were completely nominal.

Before the next eclipse season starts a full reconditioning of both batteries will be executed.

Following the end of the eclipse season Full Charge Rate C/26 was re-selected and the MRU end of charge timer circuit was set to enabled.

3.1.3 Thermal

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

3.1.4 OBDH

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

On 24/5/2006 at 14.18z the On-board monitoring tables for use outside the eclipse season were loaded and enabled.

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 7th annealing, ended on 24th January, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #15, which is showing since 09.02.2006 a slightly degraded energy resolution. Detector #2 is failed since 06.12.2003, detector #17 since 17.07.2004.

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 of:

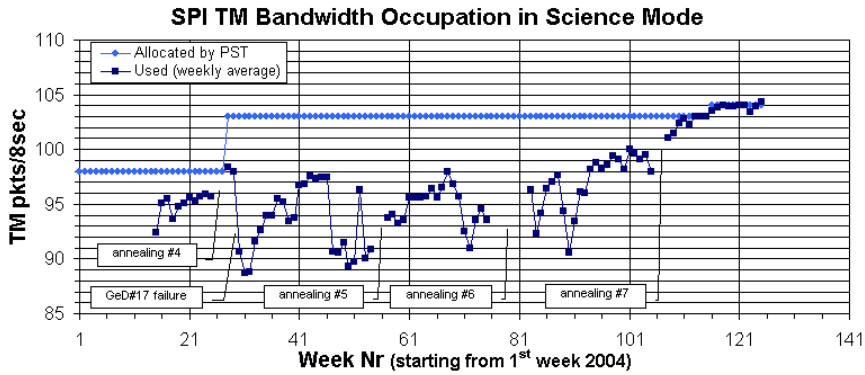
- 104 pkts/cycle up to rev.440 (24th May)
- 105 pkts/cycle from rev.441 onward (taken from the dormant JEMX)

and the average telemetry occupation was 104.3 pkts/cycle. The telemetry downlink of SPI has therefore reached the saturation.

The Stirling compressors work nominally, maintaining the Germanium detectors at 85K +/-1K.

The eclipse season, started on 3rd May, ended on 24th May. The instrument behaved nominally at each post-eclipse re-activation. Some non-critical out of limit (OOL) on temperatures were expected.

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.

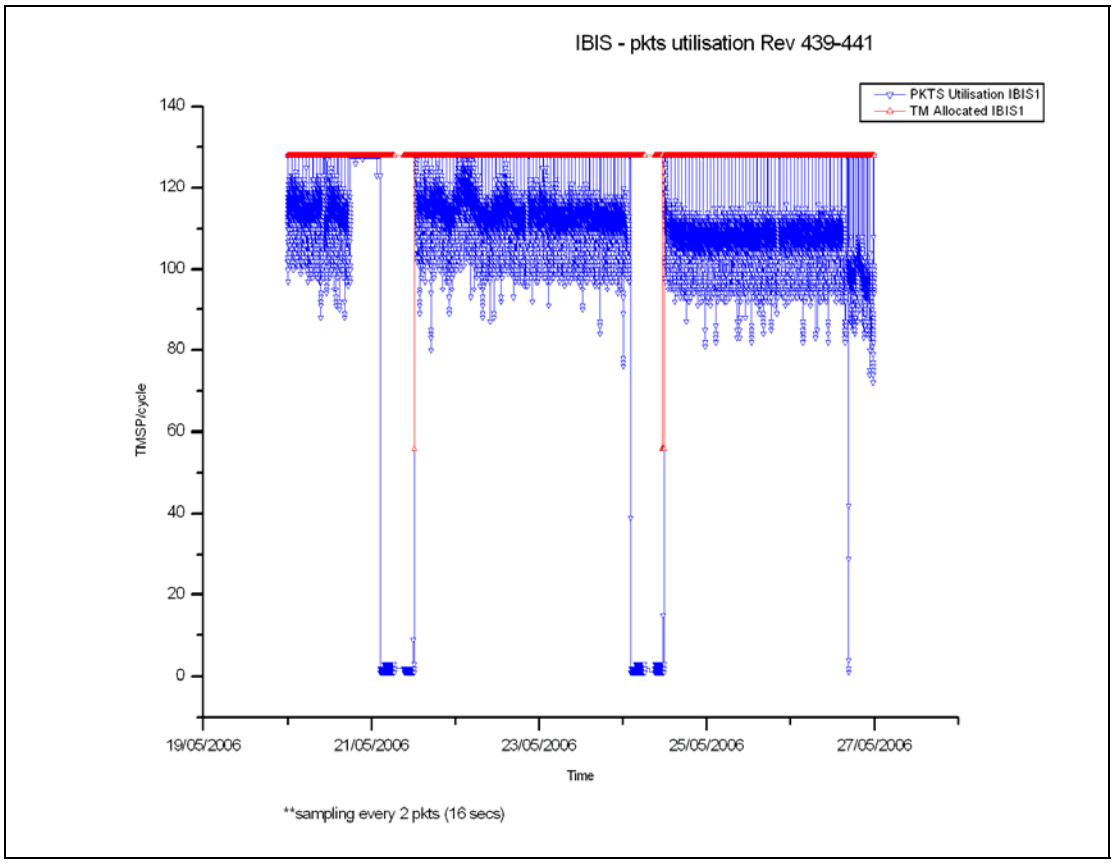
3.2.2 IBIS

The overall status of the unit is nominal.

The summer eclipse season started on 2006-05-03 and ended on 2006-05-24. The reconfiguration of IBIS after each eclipse exit was successful.

During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 112.20 TMPS/cycle, down 2.48 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 and JEM-X2 was dormant (DFEE OFF) with a TM allocation of 1 packet/cycle, until the JEM-X2 DPE was switched off on 2006-05-24 at 10:36:07Z (INTGSCCR-84). From this time onwards, the JEM-X2 DPE remained OFF, with no TM slots allocated to JEM-X2.

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, all of the 147 planned science pointings for OMC were executed nominally, none were lost.

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

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity
The observation period was characterised low solar activity.

The observation period was quiet as sunspots 884, 885 and 886 posed no threat for 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 excellent this week, with no pointings lost. There were a few other minor problems with ground stations, and the links with ISDC, but these had no impact. The overall performance was nearly 100%.

4.1 Mission Operations Centre

The performance of the MOC was excellent this week. The overall performance was nearly 100%.

4.2 Ground Stations & Network

The performance of the ground stations and Network was excellent this week, although there were a few instances of bad frames and TM drops from both Redu and DSS-27, but these had no impact on the mission. The overall performance though was nearly 100% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning
PSF for revolutions 447 and 448 were re-delivered and 449 delivered once. No ToO request was received and no replanning took place. Mission planning of revolution 445 was performed twice to get a more optimum perigee exit in revolution 446. In the beginning of this revolution there will be an AOCS calibration. There is an iteration ongoing between ISOC and MOC to obtain a correct set of slews for this calibration. In revolution 446 will also start an SPI annealing.
TSF for revolutions 441 to 444 were received from MOC.

2. Observation status
ECS for revolution 427 and 429 were received. The corresponding OCS's have been sent to ISDC. No extra time was credited.

3. ISOC science data archive

Nothing to report this week.

4. ISOC system
The ISOC system version 12.3 has been used without modifications or problems.

5. AO 4
The results of the technical evaluation have been made available to the TAC members.

6. Problems
No new problems encountered

4.3.2 ISDC

Status of ISDC observation processing on 29/05/2006:

- Latest Standard Analysis completed: observation 03201090063 (Galactic Bulge, Revolution 426) on 29/05/2006

- Latest products archived: observation 03200280002 (SGR1900+14, Revolution 423) on 17/05/2006

- Latest observation products sent to the observer: observation 03297000006 (SN1006, Revolutions 404 - 407) on 08/05/2006

5 Special Events

6 Anomalies

There were no problems reported that impacted the operations this week:

The following anomaly reports were entered into the ARTS system this week:

AR id	Date Created	Subject	Segment	Status
INT_SC-150	22/05/2006	IBIS-VETO Calibration, Bottom and Lateral Counters reported reduced count-rates	Payload	Open
INT-2852	24/05/2006	MCS problem to round engineering parameters	IMCS	Open

7 Future Milestones

On the 3rd May the summer eclipse season begins, which continues until the 24th May when. There are a total of 8 eclipses.

A new imcs release will be installed in June. This release will be based on SCOS 2000 3.1 patch M04, to bring the system in-line with that used by XMM.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 440

The observations in revolution 440 consisted of a raster dither of GRO J0852-4642 (RA 08:51:38.31, DEC -46:41:50.9) which lasted ~58.8 hours, which lasted the entire revolution.

Throughout these observations all instruments were in their nominal science modes, except JEM-X2 for which the DFEE was off, and the TM allocation was IBIS 128; SPI 104; JEM-X1 8; JEM-X2 1; OMC 5.

Revolution 441

The observations in revolution 441 began with a hexagonal dither of 1ES 1426+428 (RA 14:28:32.60, DEC +42:40:21.0), which lasted ~49.6 hours. This was followed by a Galactic Plane Survey lasting ~7.3 hours, until the end of the revolution.

Throughout these observations all instruments were in their nominal science modes, except JEM-X2, which was switched off, and 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

```
2006-05-12T04:48:20.000Z     154.5564    F   Automatic TM processing.
2006-05-12T11:33:56.000Z     154.5110    F   Automatic TM processing.
2006-05-12T13:32:53.000Z     154.5030    F   Automatic TM processing.
2006-05-12T15:51:33.000Z     154.4757    F   Automatic TM processing.
2006-05-13T23:11:36.000Z     154.4757    F   Automatic TM processing.
2006-05-14T01:20:24.000Z     154.4637    F   Automatic TM processing.
2006-05-15T04:36:27.000Z     154.4561    F   Automatic TM processing.
2006-05-16T21:25:52.000Z     154.4297    F   Automatic TM processing.
2006-05-16T22:53:12.000Z     154.3832    F   Automatic TM processing.
2006-05-19T20:45:51.000Z     154.3674    F   Automatic TM processing.
2006-05-21T04:26:50.000Z     154.3513    F   Automatic TM processing.
2006-05-22T20:56:23.000Z     154.3214    F   Automatic TM processing.
2006-05-24T02:01:14.000Z     154.3029    F   Automatic TM processing.
2006-05-24T10:14:11.000Z     154.2850    F   Automatic TM processing.
2006-05-25T20:48:31.000Z     154.2471    F   Automatic TM processing.

This report was generated  Fri May 26 08:00:31 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, 20/05/2006 – 26/05/2006

AOCS operations were executed from the Automatic Timeline.

During this period, 52 Open Loop Slews, 102 Closed Loop Slews and 5 Momentum Biases were executed.

No slew was lost during the observation period.

Summer Eclipse Season 2006 Summary

The AOCS eclipse operations were nominal. For the 7th and 8th (last) eclipse passages, 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. Some information regarding the eclipse times and IMU1 usage for the complete summer 2006 eclipse season are provided below:

AOCS Eclipse Times — **Summer 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	
2006-05-03	08:22:00	11:05:00	06:23:04	07:05:03	07:15:46	07:16:30	07:22:44	07:26:44	07:27:43	07:51:26	07:52:31	07:55:51	08:01:26	08:05:32	0:33:07
2006-05-06	08:17:00	10:44:00	05:56:17	06:38:06	06:49:31	06:50:15	06:55:57	06:58:05	06:58:32	07:50:24	07:50:52	07:52:29	07:58:39	08:02:00	0:56:32
2006-05-09	07:55:00	10:30:00	05:36:12	06:18:21	06:27:47	06:28:31	06:35:52	06:38:10	06:38:03	07:39:55	07:40:44	07:41:33	07:46:27	07:51:24	1:05:41
2006-05-12	07:19:00	10:15:00	05:20:06	06:02:05	06:13:21	06:14:05	06:19:46	06:22:24	06:21:45	07:26:15	07:27:26	07:27:44	07:34:13	07:37:25	1:07:58
2006-05-15	07:14:00	09:54:00	05:09:32	05:51:38	06:01:18	06:02:02	06:09:12	06:10:46	06:11:07	07:13:13	07:13:24	07:14:40	07:19:14	07:24:30	1:05:28
2006-05-18	06:54:00	09:38:00	05:02:22	05:44:23	05:55:58	05:56:42	06:02:02	06:03:37	06:04:03	06:59:11	06:59:23	07:00:44	07:07:18	07:10:25	0:58:42
2006-05-21	06:28:00	09:24:00	04:58:17	05:40:22	05:51:02	05:51:46	05:57:57	05:59:47	06:00:19	06:42:46	06:43:04	06:44:41	06:50:38	06:54:28	0:46:44
2006-05-24	06:23:00	09:14:00	04:57:28	05:39:27	05:50:55	05:51:39	05:57:08	06:00:25	06:01:41	06:18:13	06:19:12	06:22:19	06:29:15	06:32:04	0:25:11

IMU Usage during Eclipse Season — **Summer 2006**

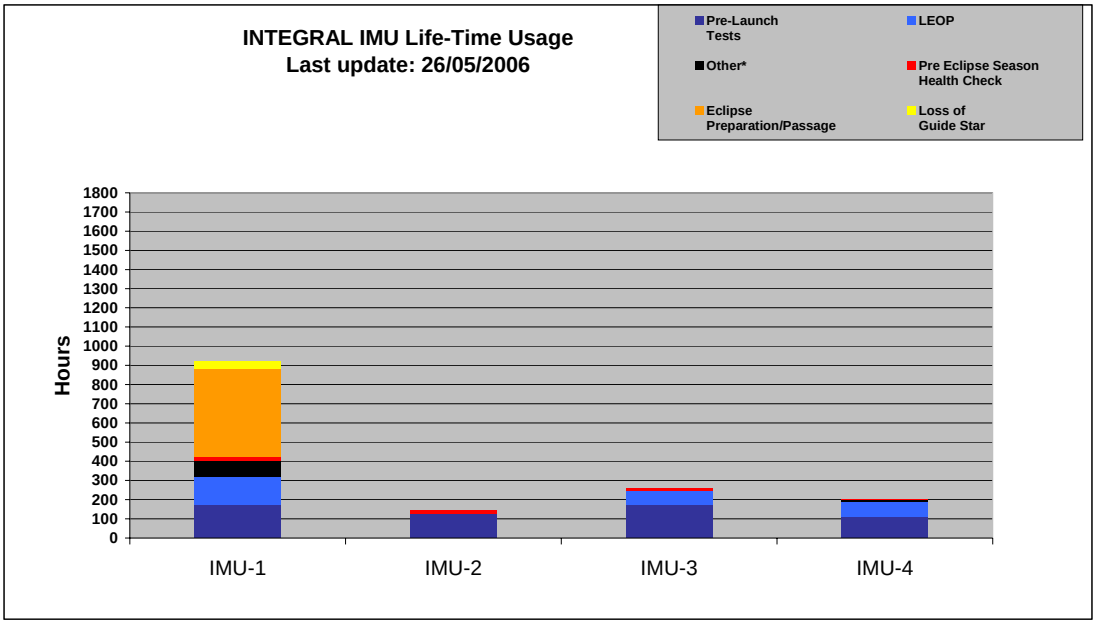
IMU On	IMU Off	From Health Check		From Auto Calibration	On Time	Accumulated On Time
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]		
2006-05-03 04:32:40	2006-05-03 08:07:51	0.1877	0.2750	0.2561	3:35:11	3:35:11
2006-05-06 03:55:06	2006-05-06 08:04:18	0.1941	0.2635	0.2515	4:09:12	7:44:23
2006-05-09 03:45:29	2006-05-09 07:53:33	0.2404	0.2567	0.2779	4:08:04	11:52:27
2006-05-12 03:02:01	2006-05-12 07:39:44	0.2105	0.2350	0.2137	4:37:43	16:30:10
2006-05-15 02:33:10	2006-05-15 07:26:23	0.2088	0.2263	0.2013	4:53:13	21:23:23
2006-05-18 03:13:27	2006-05-18 07:12:45	0.1913	0.3017	0.3373	3:59:18	25:22:41
2006-05-21 02:17:31	2006-05-21 06:56:40	0.2270	0.1617	0.1367	4:39:09	30:01:50
2006-05-24 03:07:41	2006-05-24 06:34:23	0.1722	0.1715	0.2225	3:26:42	33:28:32

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	924.286836	51.35	175.045556	147.371944	40.206280	460.453889	22.253889	78.955278	24/05/2006
IMU-2	144.940833	8.05	123.023889	3.871111	0.000000	0.000000	18.045833	0.000000	26/04/2006
IMU-3	258.148611	14.34	175.449167	70.057500	0.000000	0.000000	12.641944	0.000000	26/04/2006
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.



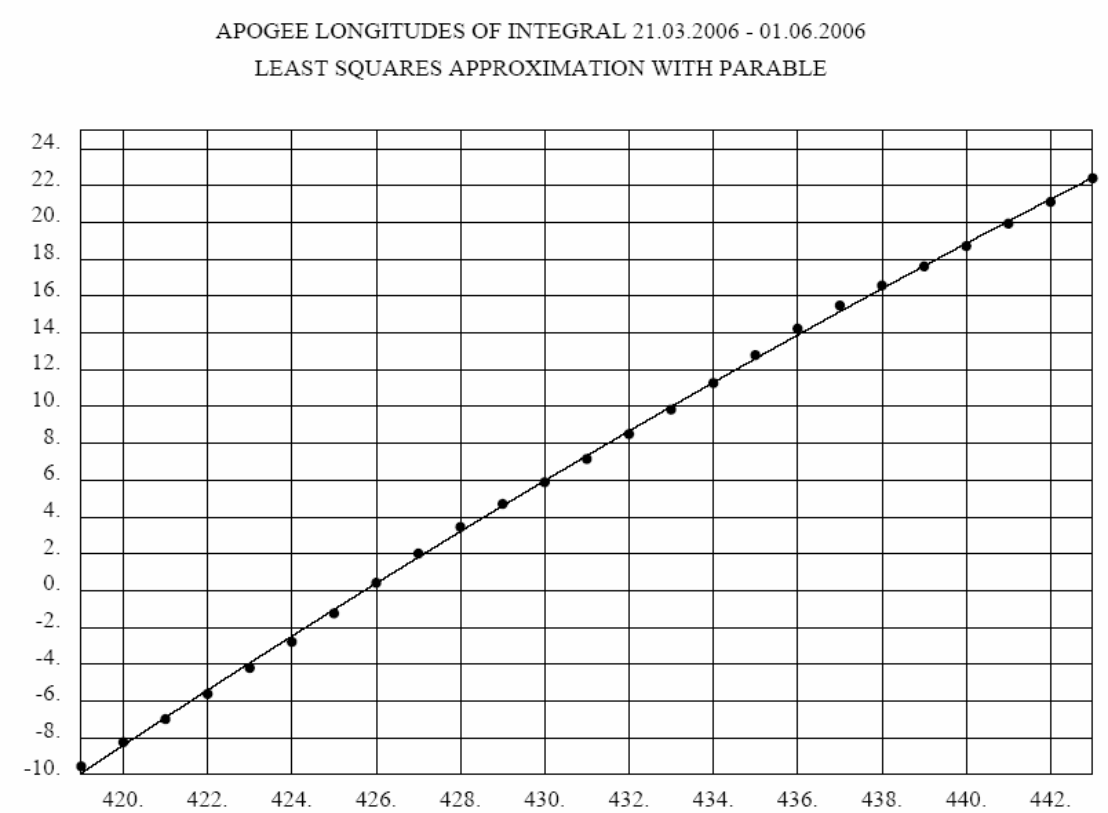
Orbit Control

The 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

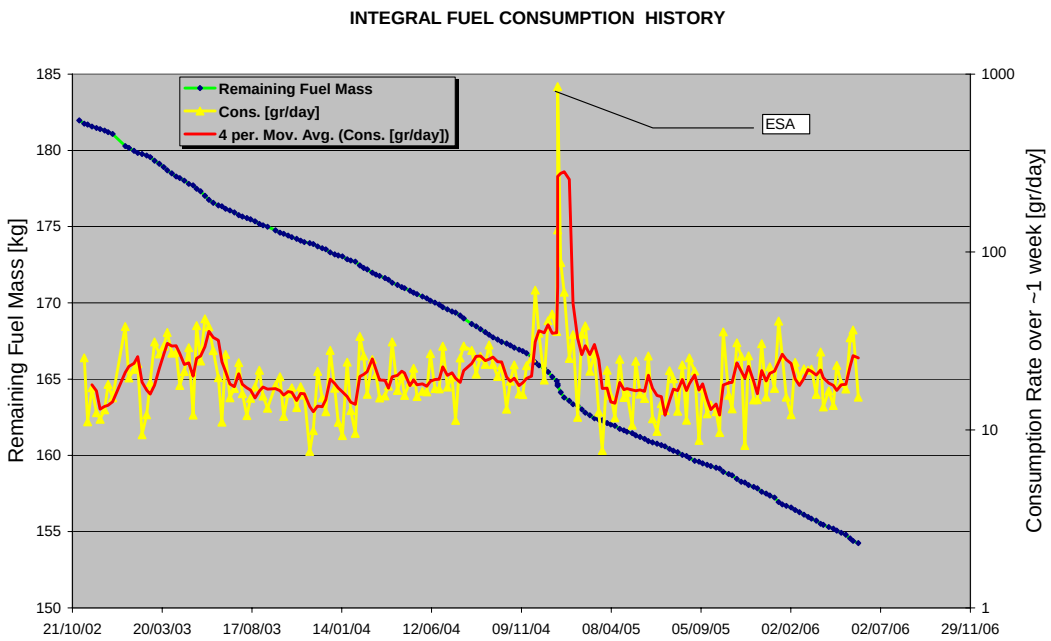
From orbit 460 and onwards Redu will give coverage down to 40000 km altitude.

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.

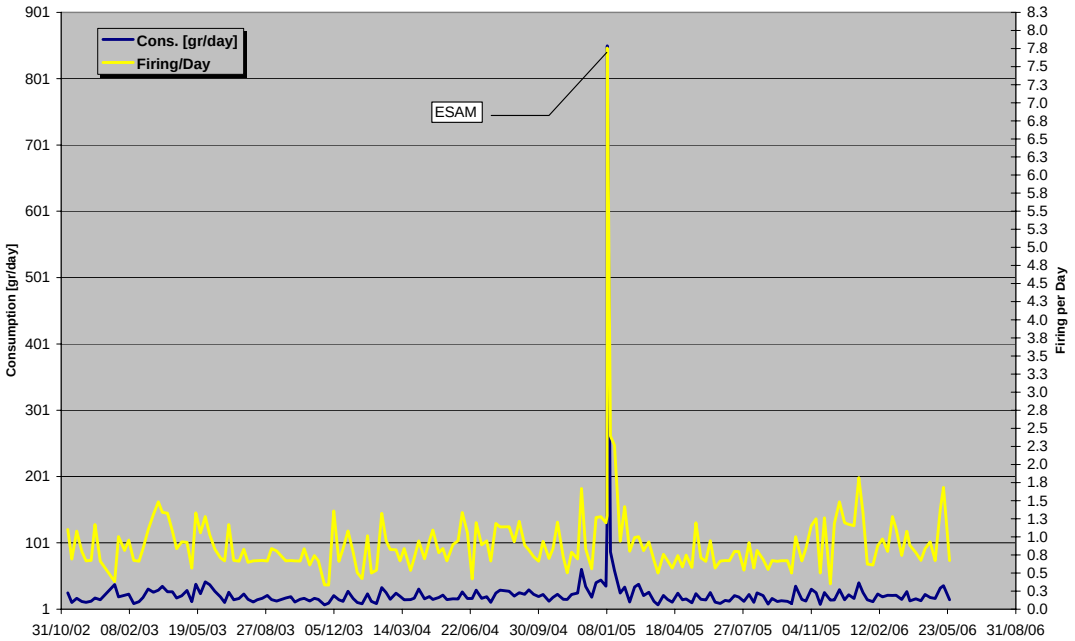


Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 25/05/2006 is reported in the plot below.

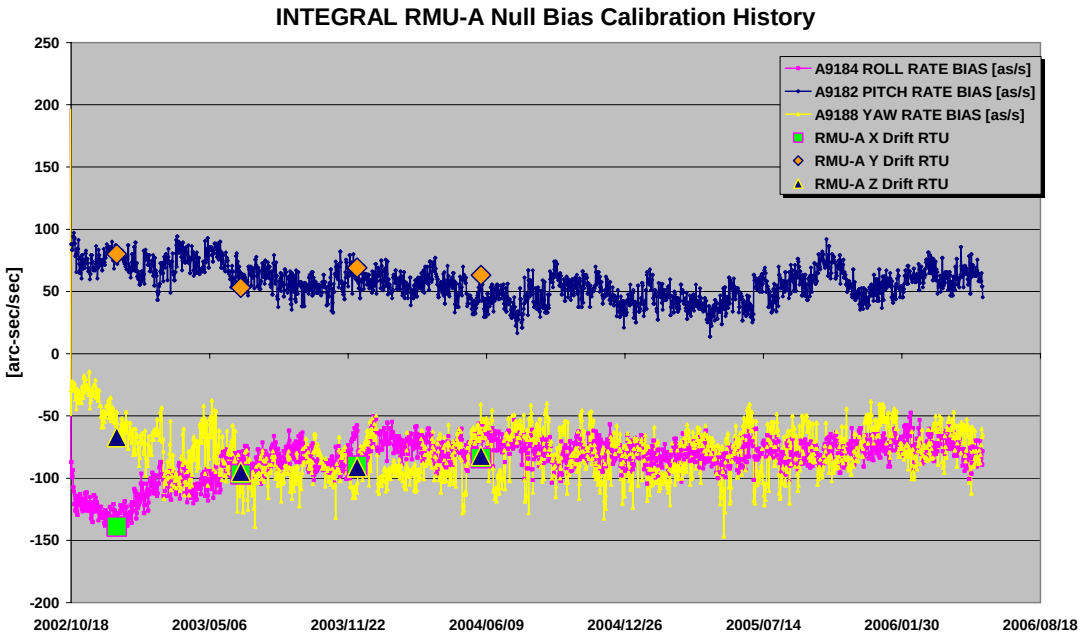


The firing\day over the period between 01/11/2002 and 25/05/2006 is reported in the plot below.

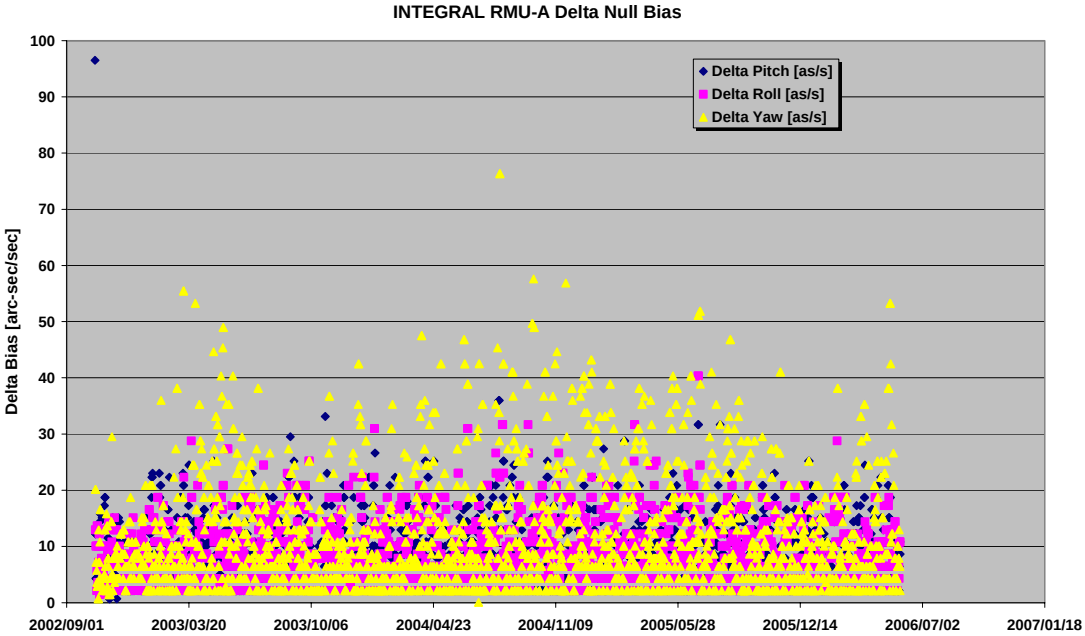


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 26/05/2006 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 26/05/2006 is reported in the plot below.



20/05/06 (Day of Year 140, Revolution 439)

STR 1750 processor fault: at 10:22:42z a STR1750 processor fault occurred ~2 minutes after the end of slew 04390045. The sequence of the events was:

10:21:04z	Close Loop Slew End for PID 04390045
10:22:06z	Mapping start
10:22:42z	Mapping End prematurely (aborted)
10:22:42z	IMU 1 ON
10:22:42z	New automatic mapping commanded by the ACC.
10:32:42z z	IMU 1 OFF

The Fault is likely due to the presence of a bright object (star ID 7689-2617, Mi 2.21) in the same CCD column of the guide star (ID 8152-139) , Mi 7.5 at CCD location [26718, 11228], determining a mapping duration shortened to ~30 secs.

A manual recovery was then performed at 10:41z by executing a CSL to the attitude of PID 04390045. The update for the slew ID 04390046, was manually performed at 10:59z.

The OTF for PID 04390045 was not reached at the expected time.

21/05/06 (Day of Year 141, Revolution 439-440)

The eclipse operations were nominal from the AOCS point of view. Hereafter is reported a summary of the 7th eclipse passage during rev 439:

AOCS ECLIPSE MONITORING
Summer 2006

Revolution: 439
Date: 21/05/2006
DoY: 141

Penumbra Start:	21/05/2006 05:57:57	**LOS:**	21/05/2006 06:28:00
Umbra Start:	21/05/2006 06:00:19	**AOS:**	21/05/2006 09:24:00
Umbra End:	21/05/2006 06:42:46		
Penumbra End:	21/05/2006 06:44:41		
Eclipse Duration:	0:46:44		
Eclipse Duration [sec]:	2804		

IMU Health Check Start	21/05/2006 02:15:00
Eclipse Imminent Flag	21/05/2006 04:58:17
ACC IMU AutoCal Start	21/05/2006 05:12:43
ACC IMU AutoCal End	21/05/2006 05:32:43

Sun out of FSS FoV	21/05/2006 05:59:47
Sun back in FSS FoV	21/05/2006 06:43:04

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	21/05/2006 05:40:22	-1055.00	21/05/2006 05:40:21	-1056.00	**-1064**	
FDE Eclipse Start	21/05/2006 05:51:02	-415.00	21/05/2006 05:51:29	-388.00	**-404**	**176**
FCE Eclipse Start	21/05/2006 05:51:46	-371.00	21/05/2006 05:52:17	-340.00	**-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	21/05/2006 06:50:38	357			**360**	**176**
FDE Eclipse End	21/05/2006 06:50:38	357			**360**	**176**
ACC Eclipse End	21/05/2006 06:54:28	587	21/05/2006 06:54:27	586.00	**578**	

IMU	**Uplink**	**Execution**	**WRT Penumbra End [sec]**
IMU Auto Off Enable	18/05/2006 10:39:47	21/05/2006 06:56:21	700
IMU On	21/05/2006 02:17:31	**IMU H/C Noise Roll [as/s]**	0.2270
IMU Off	21/05/2006 06:56:40	**IMU H/C Drift Roll [as/s]**	0.1617
IMU On Time	4:39:09	**IMU Auto Cal Drift Roll [as/s]**	0.1367

22/05/06 (Day of Year 142, Revolution 440)

Nothing to report

23/05/06 (Day of Year 143, Revolution 440)

Nothing to report

24/05/06 (Day of Year 144, Revolution 440-441)

The eclipse operations were nominal from the AOCS point of view. Hereafter is reported a summary of the 8th (last) eclipse passage during rev 440:

AOCS ECLIPSE MONITORING
Summer 2006

Revolution: 440
Date: 24/05/2006
DoY: 144

Penumbra Start:	24/05/2006 05:57:08	**LOS:**	24/05/2006 06:23:00
Umbra Start:	24/05/2006 06:01:41	**AOS:**	24/05/2006 09:14:00
Umbra End:	24/05/2006 06:18:13		
Penumbra End:	24/05/2006 06:22:19		
Eclipse Duration:	0:25:11		
Eclipse Duration [sec]:	1511		

IMU Health Check Start	24/05/2006 03:05:00
Eclipse Imminent Flag	24/05/2006 04:57:28
ACC IMU AutoCal Start	24/05/2006 05:11:54
ACC IMU AutoCal End	24/05/2006 05:31:54

Sun out of FSS FoV	24/05/2006 06:00:25
Sun back in FSS FoV	24/05/2006 06:19:12

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	24/05/2006 05:39:27	-1061.00	24/05/2006 05:39:32	-1056.00	**-1064**	
FDE Eclipse Start	24/05/2006 05:50:55	-373.00	24/05/2006 05:50:50	-378.00	**-404**	**176**
FCE Eclipse Start	24/05/2006 05:51:39	-329.00	24/05/2006 05:51:29	-339.00	**-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	24/05/2006 06:29:15	416			**360**	**176**
FDE Eclipse End	24/05/2006 06:29:15	416			**360**	**176**
ACC Eclipse End	24/05/2006 06:32:04	585	24/05/2006 06:32:09	590.00	**578**	

IMU	**Uplink**	**Execution**	**WRT Penumbra End [sec]**
IMU Auto Off Enable	21/05/2006 10:25:43	24/05/2006 06:34:03	704
IMU On	24/05/2006 03:07:41	**IMU H/C Noise Roll [as/s]**	0.1722
IMU Off	24/05/2006 06:34:23	**IMU H/C Drift Roll [as/s]**	0.1715
IMU On Time	3:26:42	**IMU Auto Cal Drift Roll [as/s]**	0.2225

FDS failed slew update: At 10:24z the update of the first slew of the revolution failed due to a problem on FDS job update task (failed determination of attitude).

The update of the slew ID 04410001 was manually performed at 10:52z.

No impact on TL.

25/05/06 (Day of Year 145, Revolution 441)

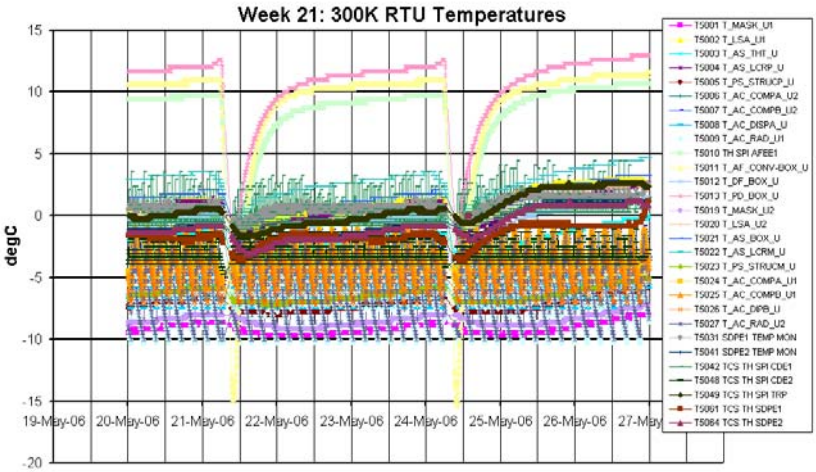
Nothing to report

26/05/06 (Day of Year 146, Revolution 441)

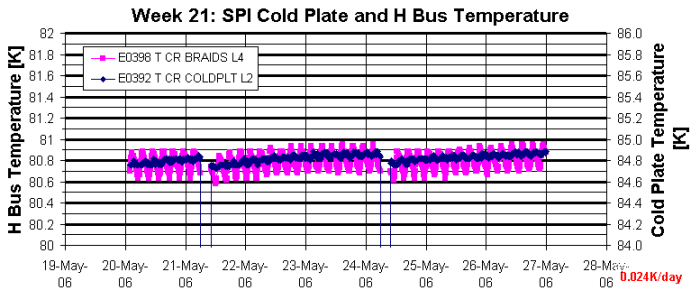
Nothing to report

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).

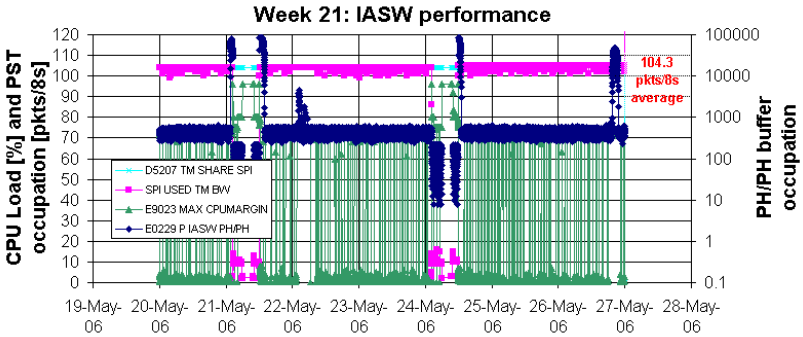


Stirling Compressors and Cryostat:
The performance of the compressors is nominal. The cold plate temperature was maintained at 85K+/-1K showing the expected positive drift.
The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.

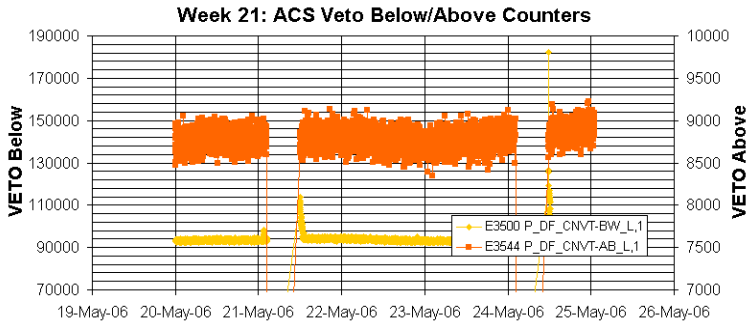


DPE & IASW:

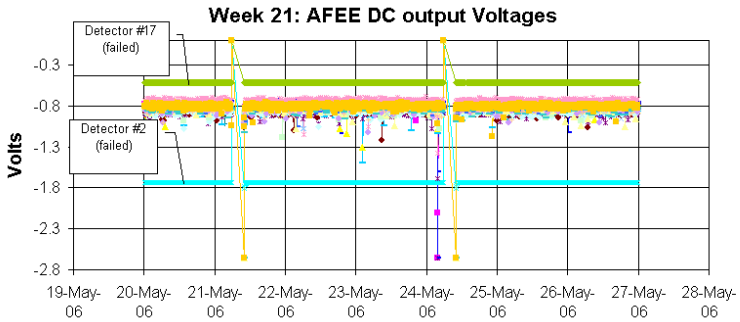
The IASW performance is nominal. The current IASW version installed is 432.
The TM bandwidth of 105 pkts/cycle can be fully exploited when needed.
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



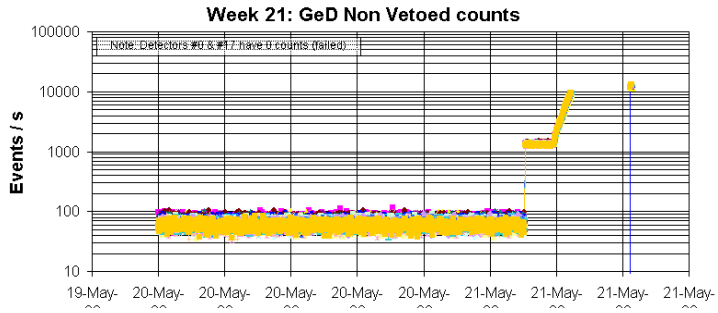
ACS:
The performance of the ACS is nominal.
The following plot shows the ACS overall count rate evolution during the reporting period

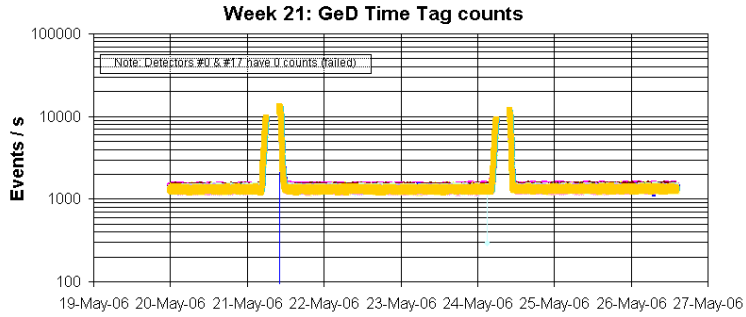


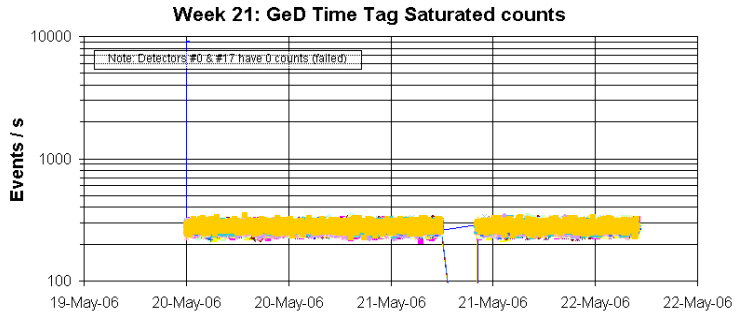
AFEE:
The performance of the AFEE and the detectors is nominal, except for detector #15, which shows a degraded energy resolution and for this works with a reduced bias of 3Kv (anomaly INT_SC-140).
The following plot shows the dc voltage offset of the detector channels during the reporting period. The 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 (due to data retrieval problems, some gaps could be present).



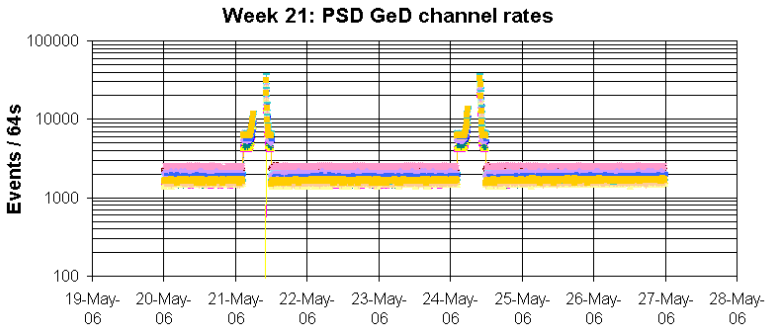




PSD:

The performance of the unit is nominal.

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



SPI Event Log:

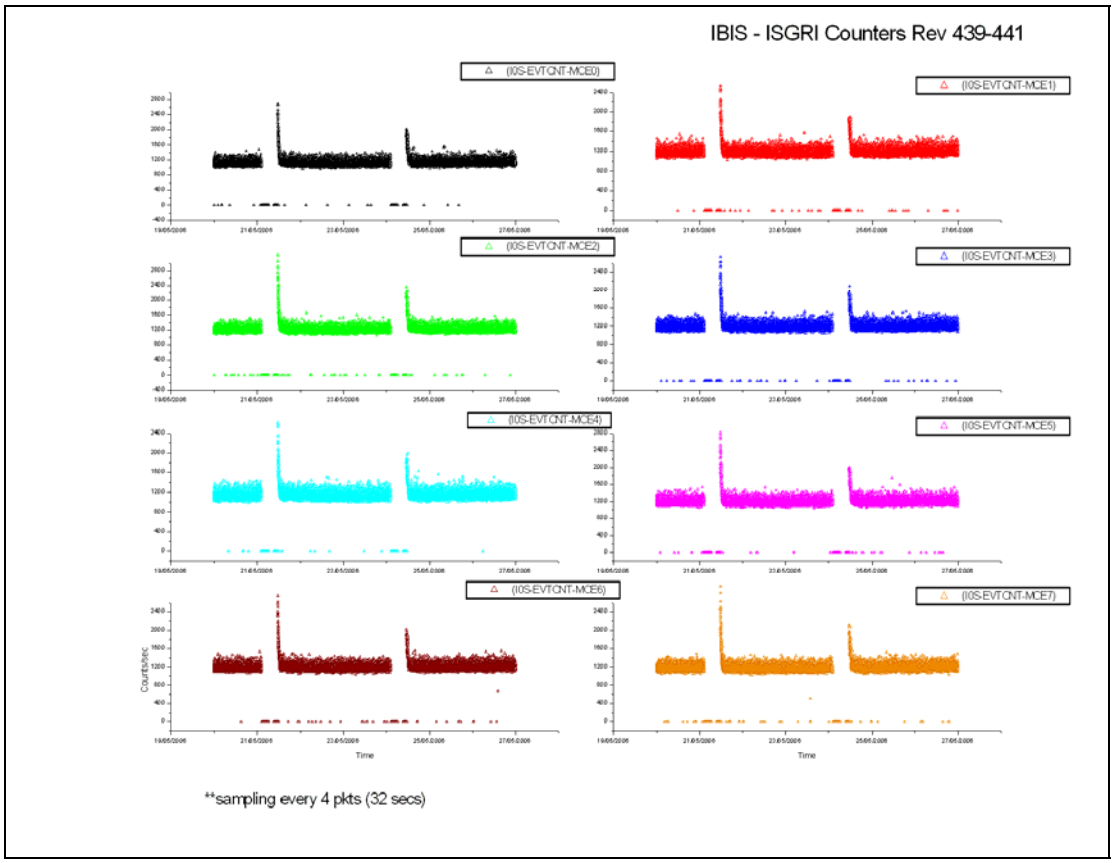
The following event log has been extracted from the revolution pass summary.

Time	Description	Analysis
141 – 12:23	EV: SPI1 LSL Error	Expected at post eclipse reactivation
142 – 17:30	TM: E2189 OOL, back in limits @ 13:36	On-board OOL: One off occurrence on FEE#39 5V pwr supply. Nothing to do.
144 – 02:50	Execution of INT_OR_0199 – TM E0069 in in "Commanded" mode and not "Protégé"	Actually the state "Commanded" was to be expected during the eclipse season. OR emended.
144 – 05:54	EV: Exception – SPI1 Failure in Analysing HSL Data	Temporary, due to high event rate. Nothing to do.
144 – 06:08	EV: Exception – SPI1 Fixed Point Overflow	Expected at every Time report command.

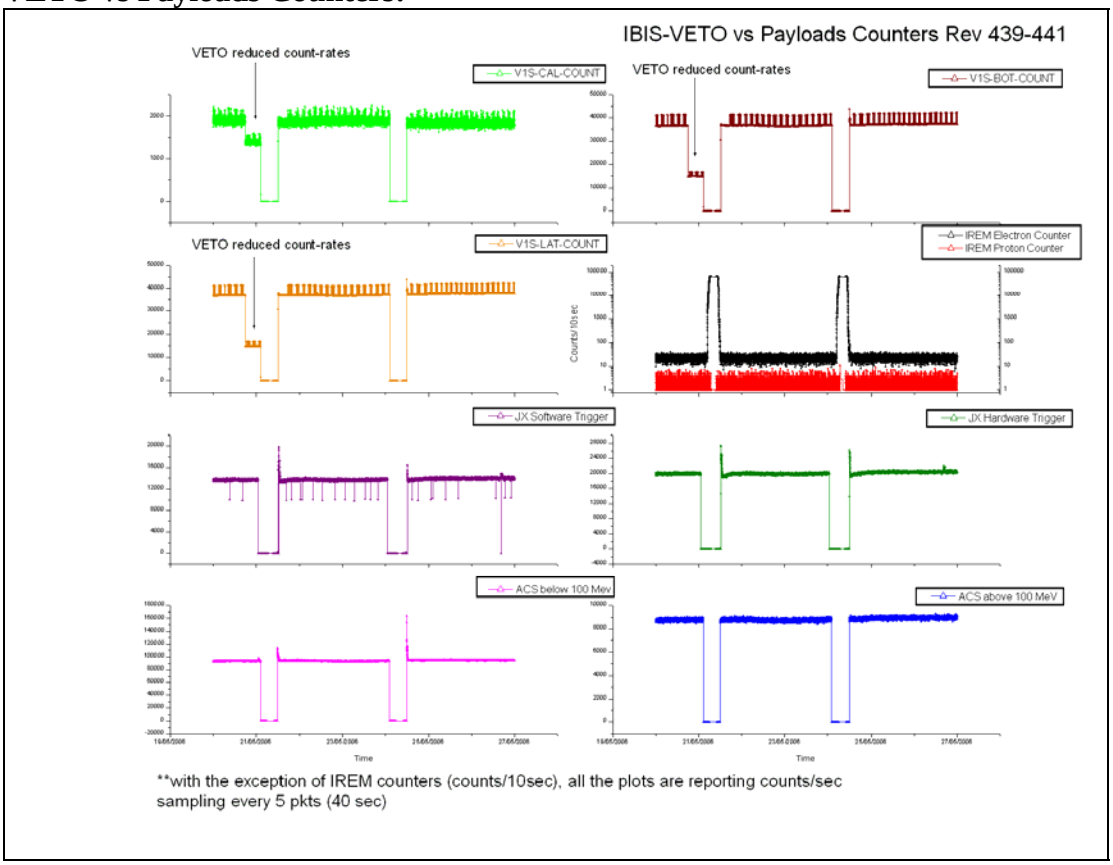
8.3.3 IBIS Operations

<u>IBIS Event Counters Plots.</u>

ISGRI Counters:

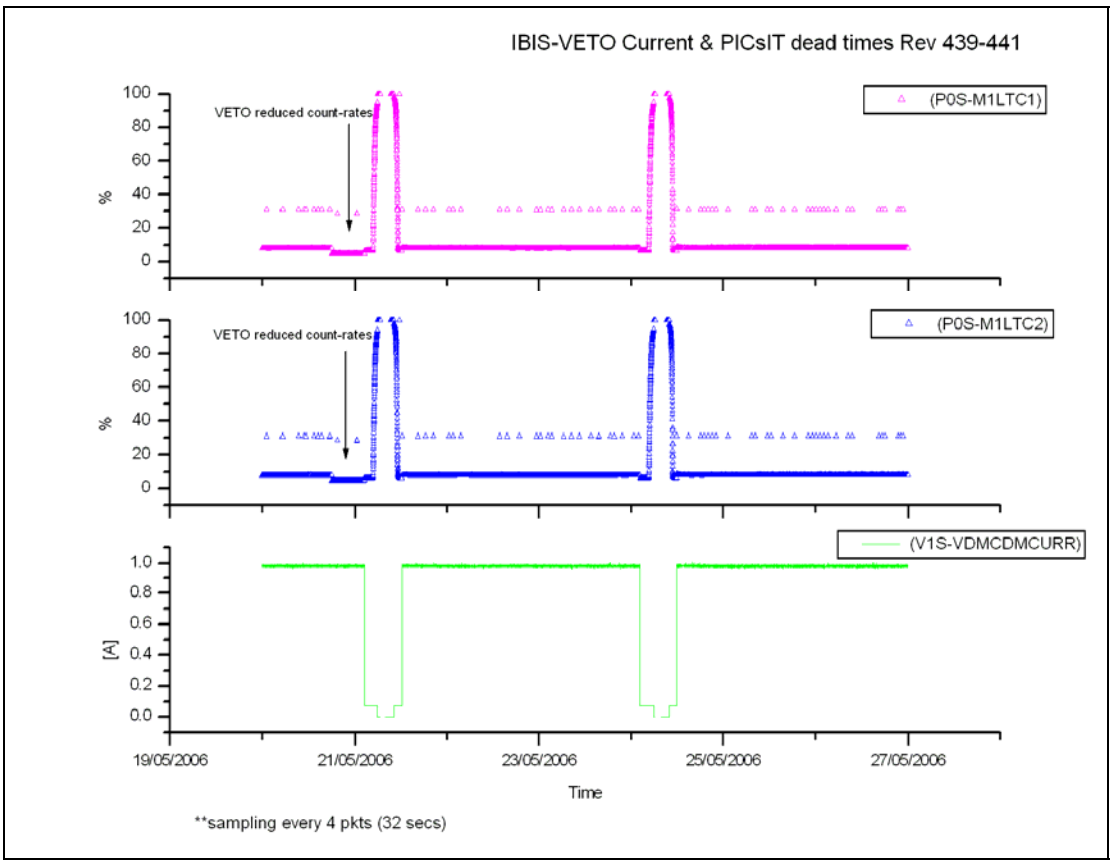


VETO vs Payloads Counters:

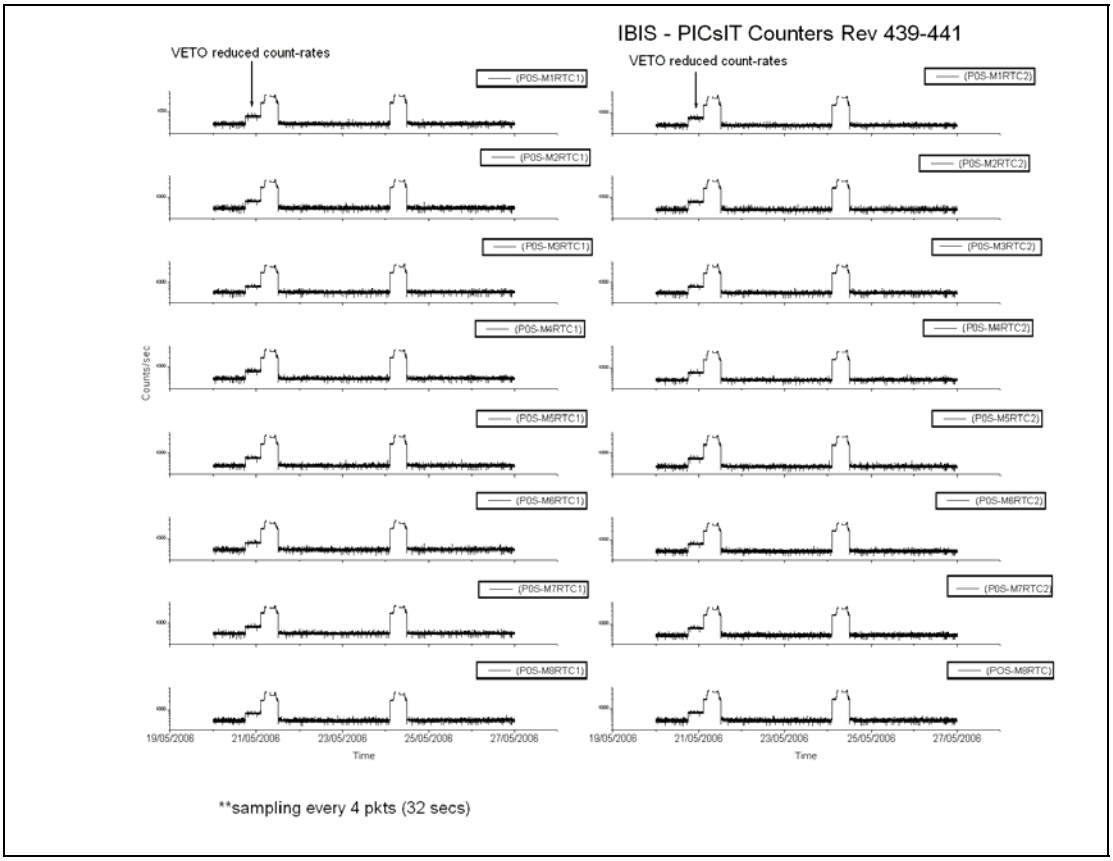


The week was characterised by low radiation.

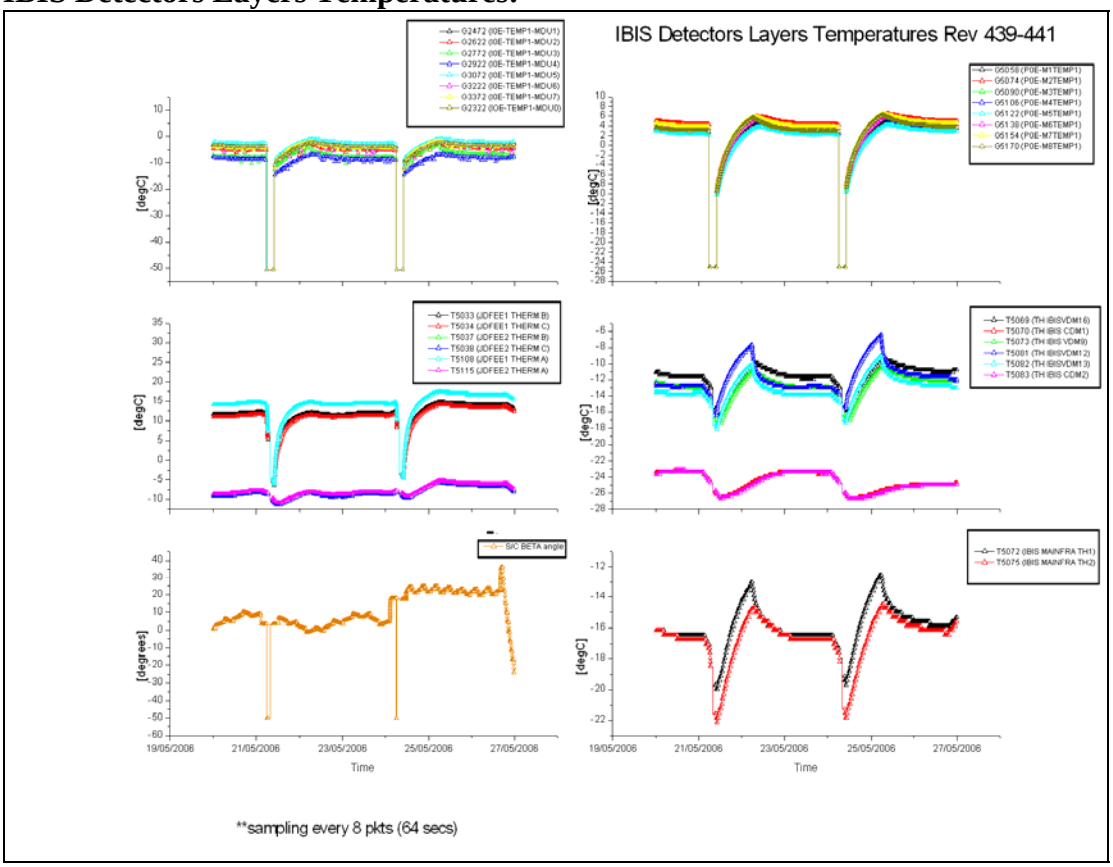
VETO Current:



PICsIT Counters:



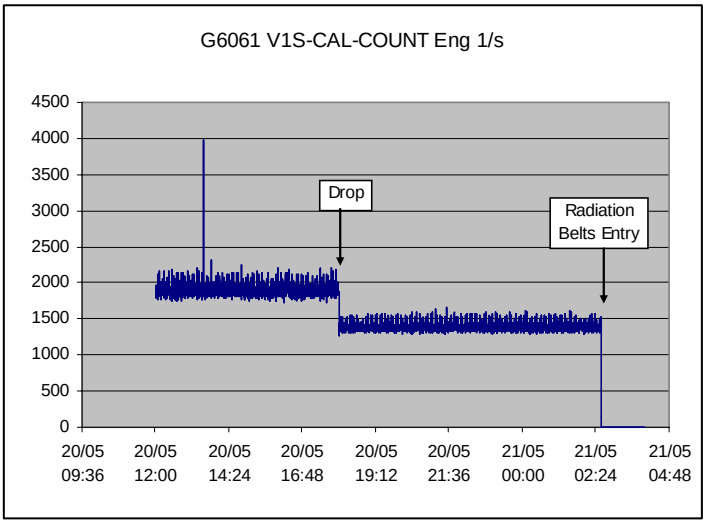
IBIS Detectors Layers Temperatures:

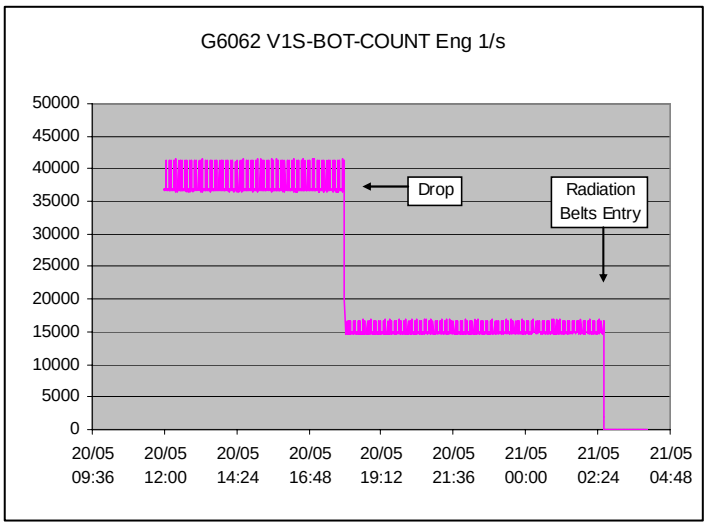


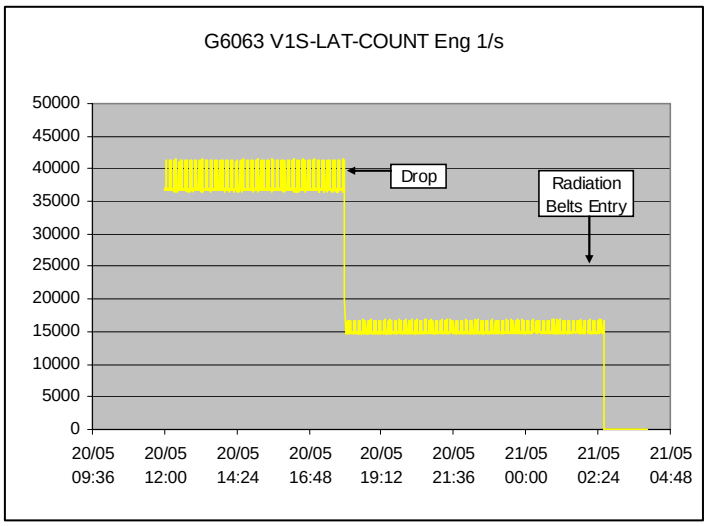
IBIS daily report

DoY 2006.140 (20//05/2006): VETO reduced count-rates

As reported in INT_SC-150, on 2006-05-20 at 17:59Z, parameters G6061 (V1S-CAL-COUNT), G6062 (V1S-BOTCOUNT) and G6063 (V1S-LAT-COUNT) reported a drop. This triggers the OOL "alarm low" for G6061.







Coincidently with this event, an increase of VETO total current (G6012) was reported.

	Before anomaly:	After anomaly:
G6061 (V1S-CAL-COUNT) =	1828 cnt/s	1360 cnt/s
G6062 (V1S-BOT-COUNT) =	36808 cnt/s	14856 cnt/s
G6063 (V1S-LAT-COUNT) =	36792 cnt/s	14856 cnt/s
G6012 (V1S-VETOCURR) =	1.63 A	1.65 A

About 15min after the anomaly, P2002 (LCL CUR VEB A) also increased slightly from 1.48A to 1.50A.

The radiation background was quiet according to the SEIS-tool and to IREM counters.

Therefore, it was decided to monitor the counters until the entry in Radiation Belts (DoY 141 02:36Z). Since the start of new revolution (440), the VETO counters report nominal values.

In case this event occurs again, after consultation of the subsystem SOE, a cycle Nominal/Stand-By/Nominal of VETO could be preformed.

DoY 2006.141 (21//05/2006):

At 02:36Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 12:18Z. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 no action was taken.

TM parameters from G5002 (P0S-MiRTC1) and G5003 (P0S-MiRTC2) families were toggling OOL High while the spacecraft was in Radiation Belts. According to reaction P-CNT-1, no action was taken.

At 11:41Z TM parameters G2000 (I0E-OVFWPXADD-M0), G2028 (I0E-OVFWPXADD-M2), G2070 (I0E-OVFWPXADD-M5), G2084 (I0E-OVFWPXADD-M6) and G2098 (I0E-OVFWPXADD-M7) failed SCC and back. According to I-OVF-1, no action was taken.

DoY 2006.144 (24//05/2006):

At 02:19Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 11:52Z. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 no action was taken.

TM parameters from G5002 (P0S-MiRTC1) and G5003 (P0S-MiRTC2) families were toggling OOL High while the spacecraft was in Radiation Belts. According to reaction P-CNT-1, no action was taken.

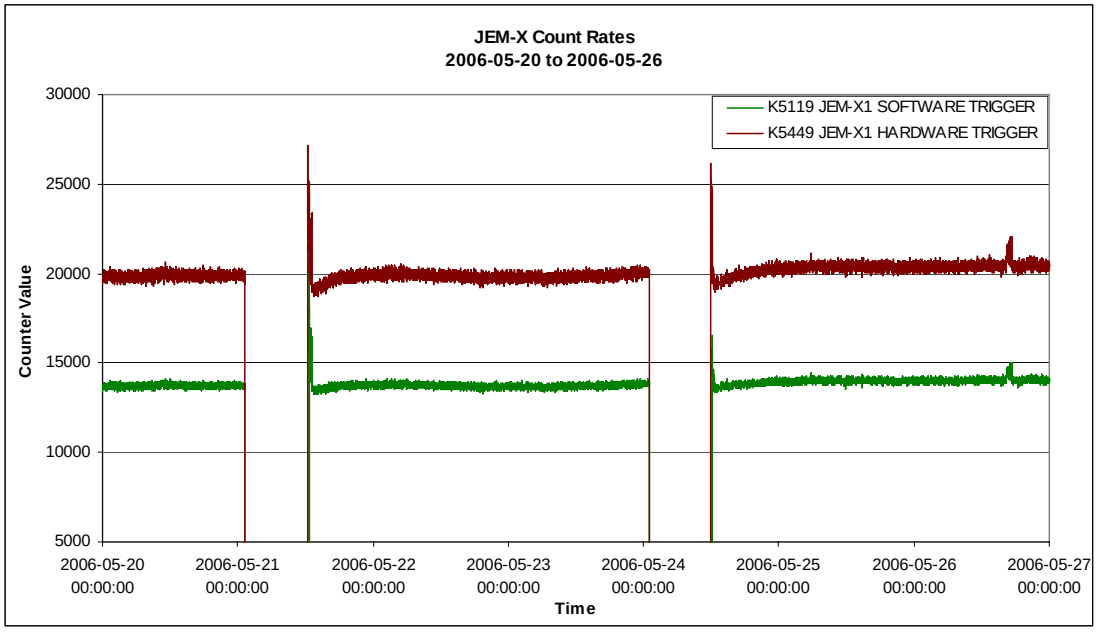
At 10:44Z, the Spectral Timing changes were successfully sent as per GSCR following the import of the updated database.

At 11:15Z TM parameters G2000 (I0E-OVFWPXADD-M0), G2028 (I0E-OVFWPXADD-M2) and G2098 (I0E-OVFWPXADD-M7) failed SCC and back. According to I-OVF-1, no action was taken.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

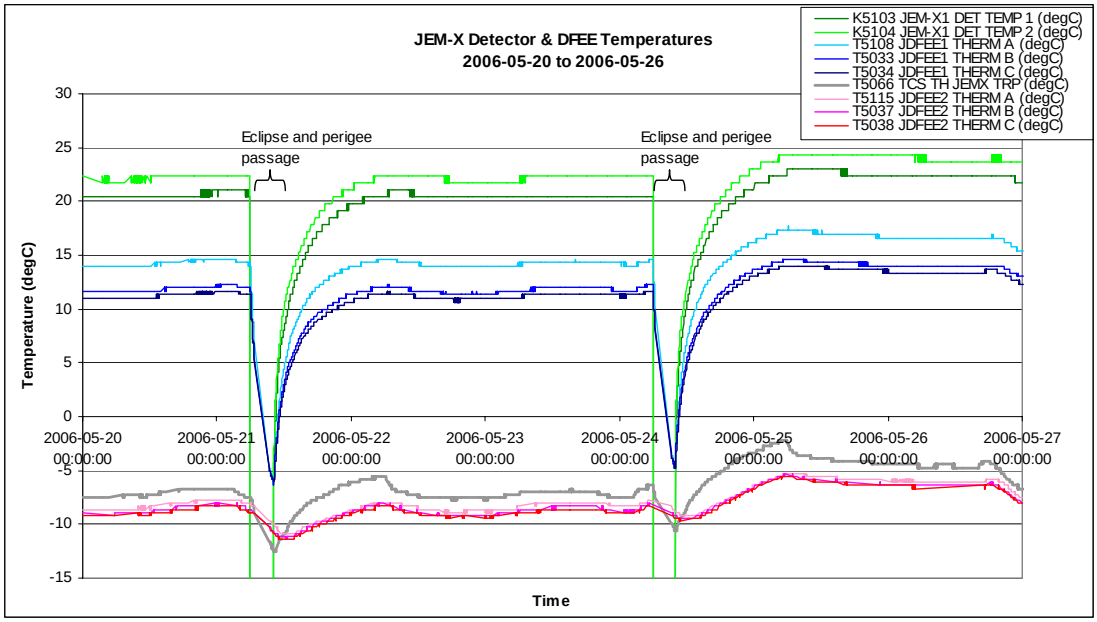
JEM-X count rates over the reporting period are displayed in the following graph[1].



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 graph[2].

[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

2006-05-20 (DOY 140, Rev 439) to 2006-05-23 (DOY 143, Rev 440)

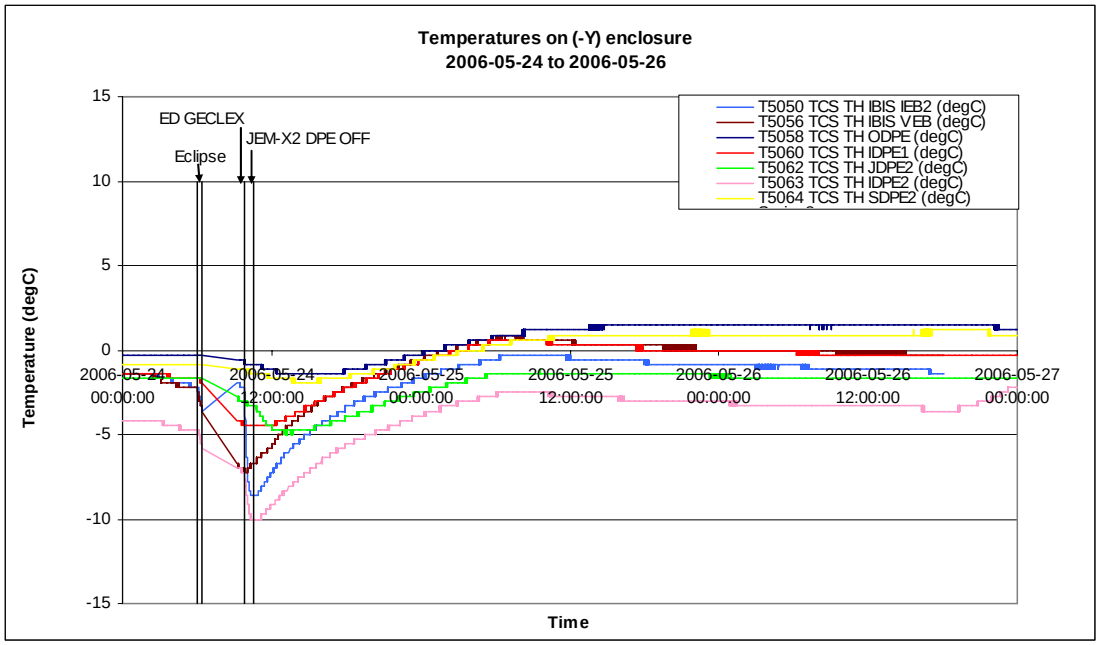
Nothing to report

2006-05-24 (DOY 144, Rev 440-441)

In line with INTGSCCR-84 (Switch off JEM-X2 DPE and give telemetry to SPI), the JEM-X2 DPE was switched off before radiation belt exit of revolution 441, as follows:

- At 10:31:18Z FCP_JEM2_9001 JEMX2 DISABLE BCP DISTRIBUTION executed
- At 10:36:07Z FCP_JEM2_9000 JEMX2 DPE SWITCH OFF executed

A range of temperatures on the -Y enclosure were monitored after the switch-off to verify their stability. The evolution of these temperatures is given in the following plot, which shows the temperature variations due to the eclipse and subsequent reconfiguration, with all temperatures stabilising at their pre-eclipse values after ~22 hours. Thus the JEM-X2 DPE switch-off had a negligible effect on the surrounding thermal environment.



2006-05-25 (DOY 145, Rev 441) to 2006-05-26 (DOY 146, Rev 441)

Nothing to report

8.3.5 OMC Operations

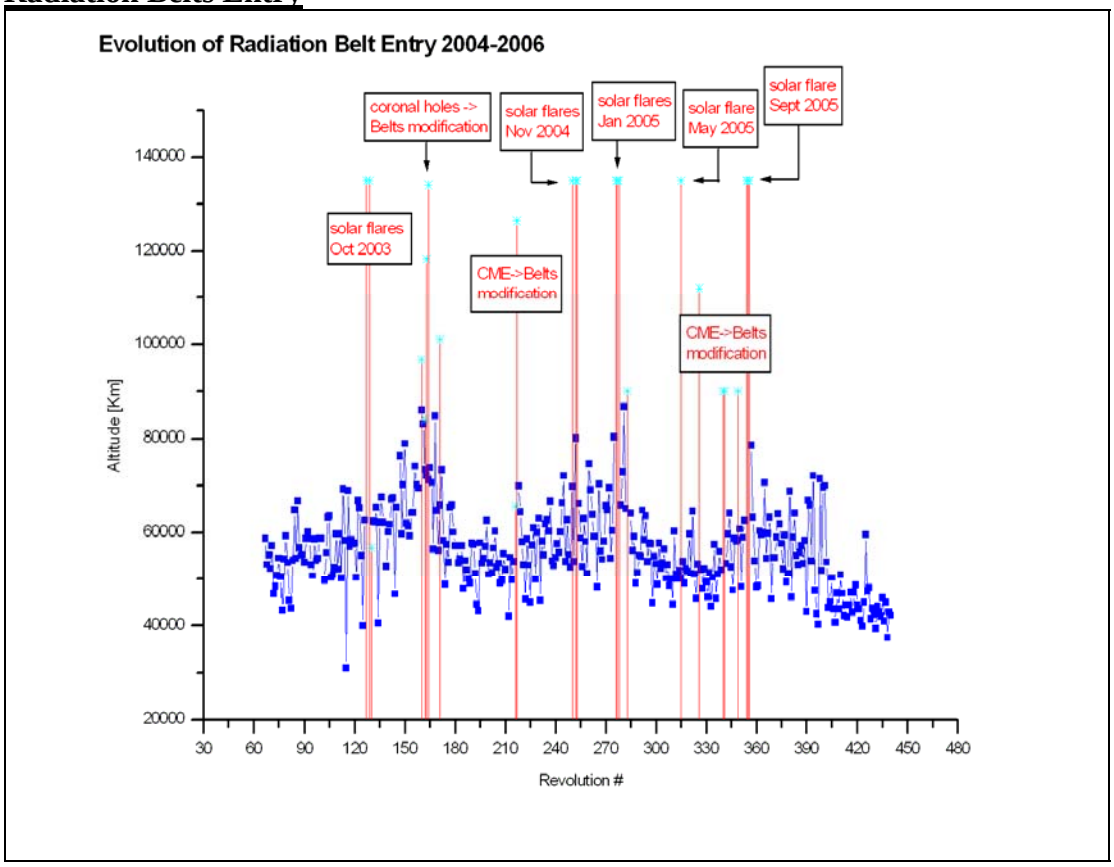
2006-05-20 (DOY 140, Rev 439) to 2006-05-26 (DOY 146, Rev 441)

Nothing to report

On DoY 141 at 02:36:11 and DoY 144 at 02:19:31 OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

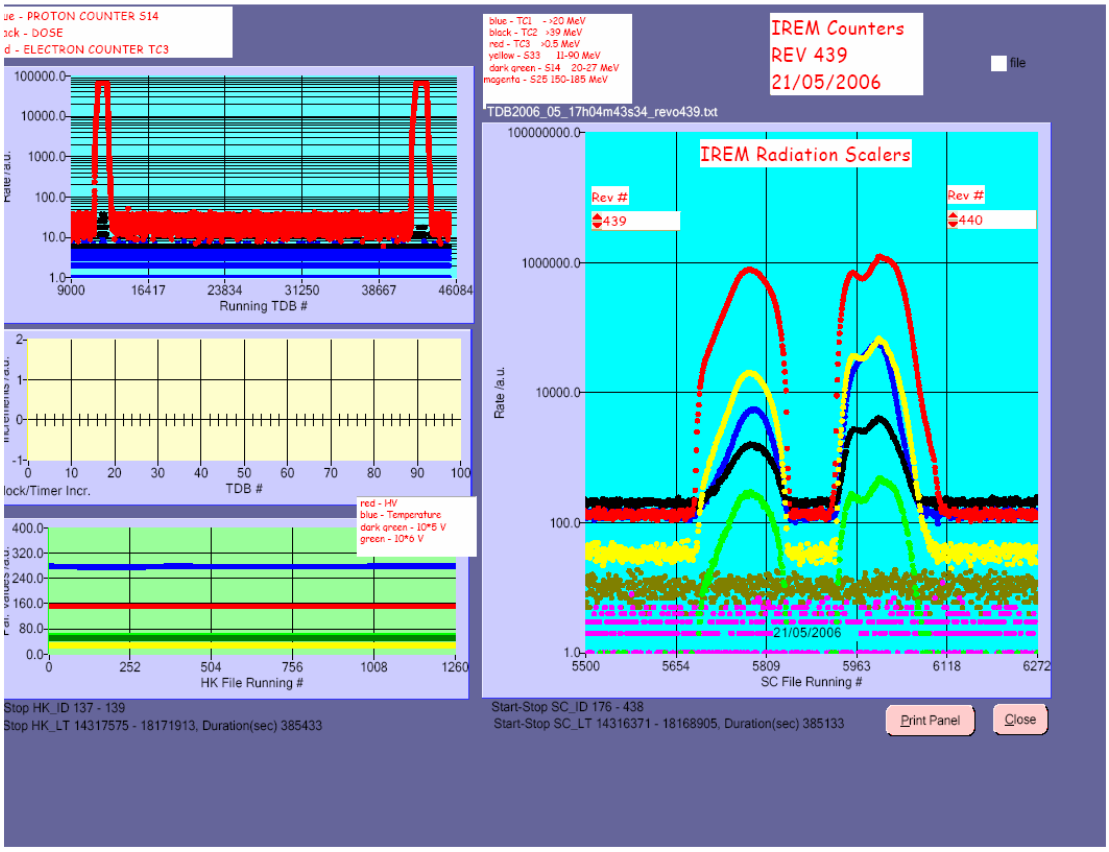
Nothing to report

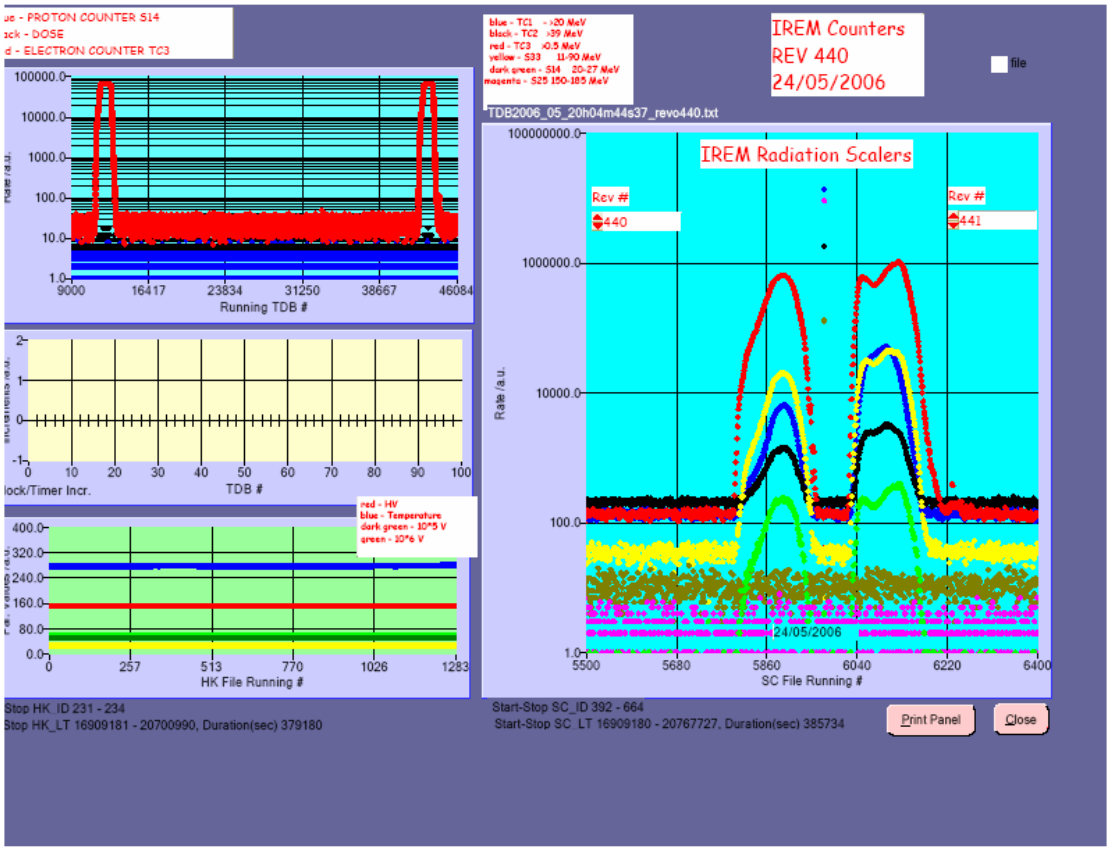
Electron Belts

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]
439	RAD_ENTR R 2006-05-21T02:36:06Z	2006-05-21 04:40:34	>42846.0	2006-05-21 04:07:39	47630
440	RAD_EXIT R 2006-05-21T11:55:07Z	2006-05-21 11:39:06	<<43631.6	2006-05-21 11:27:39	36090
440	RAD_ENTR R 2006-05-24T02:19:30Z	2006-05-24 04:30:15	42185.3	2006-05-24 03:53:23	47567
441	RAD_EXIT R 2006-05-24T11:39:07Z	2006-05-21 11:51:46	<41949.5	2006-05-24 11:23:23	37595

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

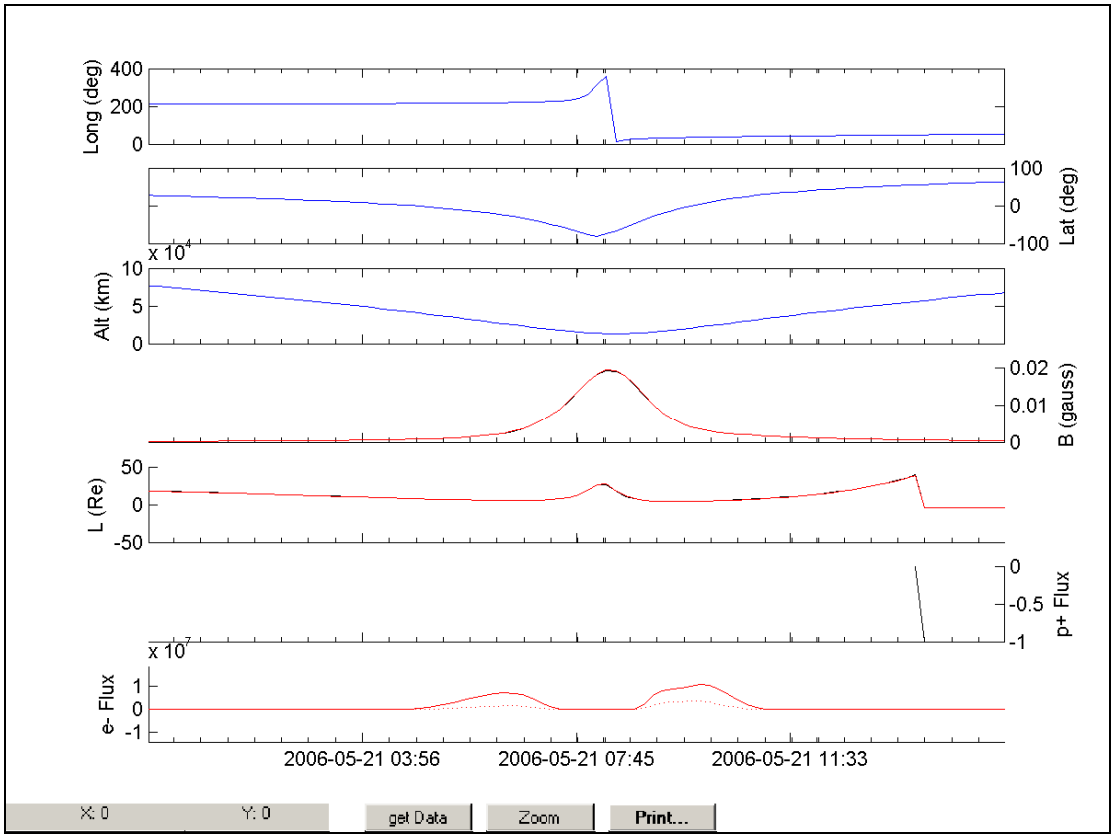
IREM radiation counters:



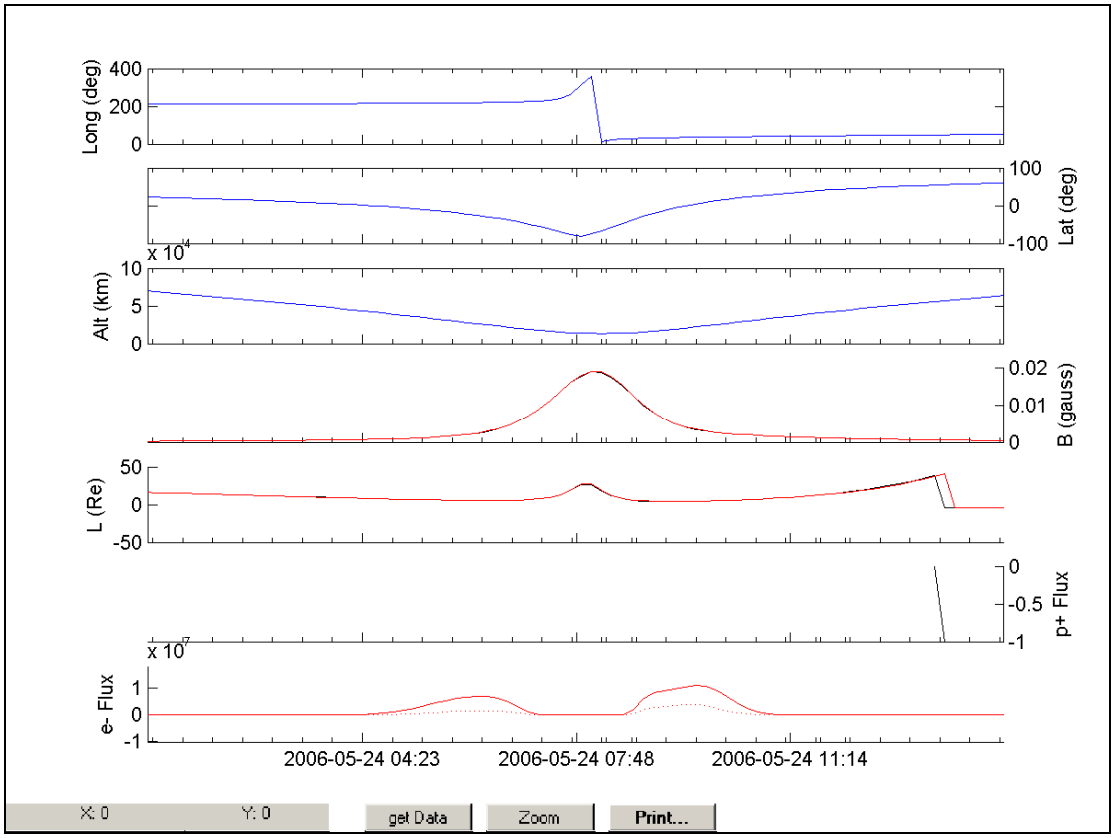


IREM Predicted Radiation Belt Passages:

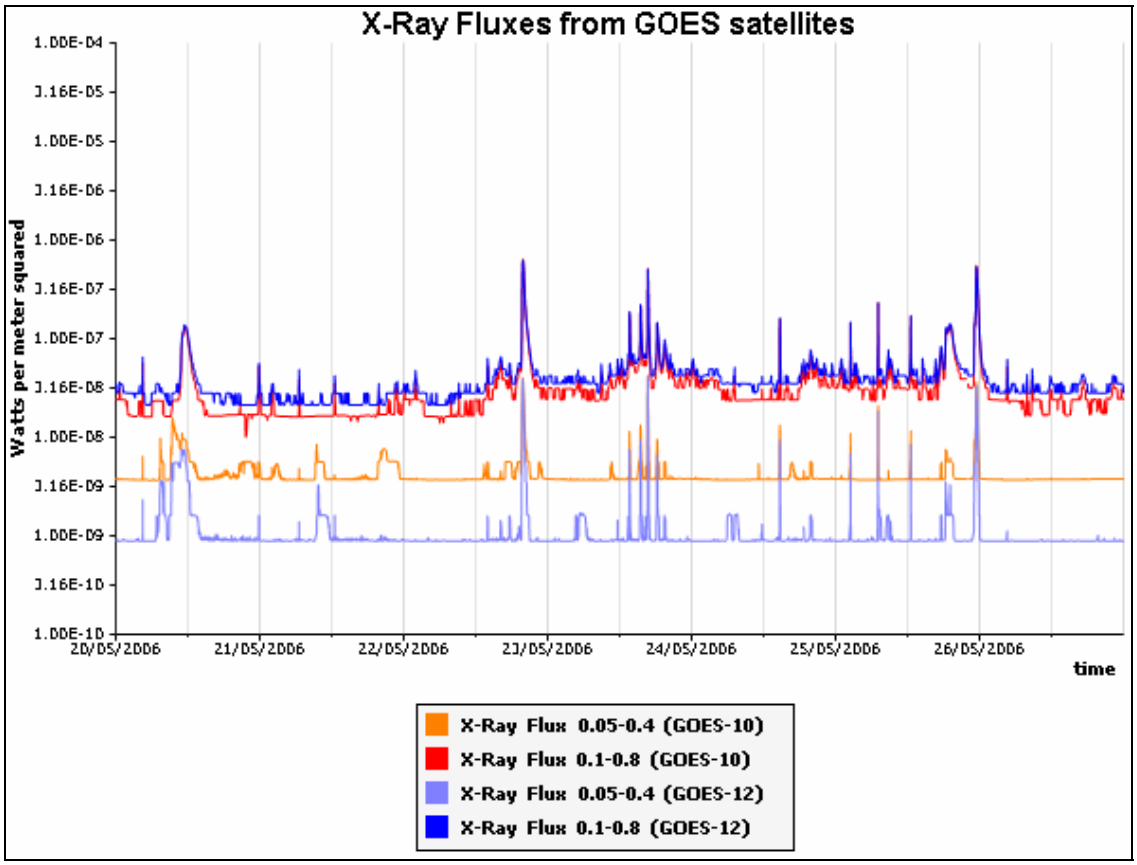
Rev 439



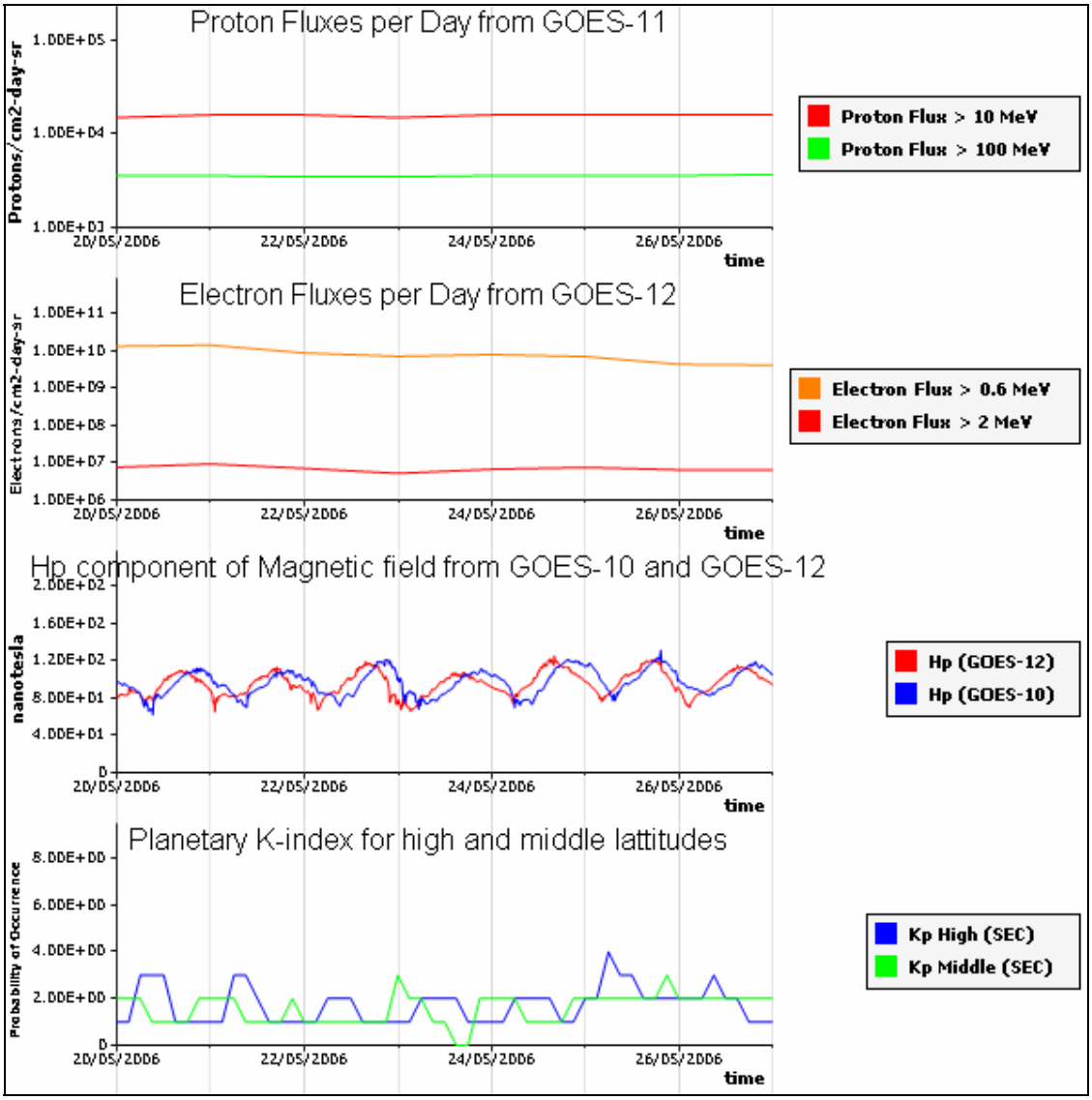
Rev 440



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.