

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 187
Week 16
24.04.06
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.....	4
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	4
3.2.3	JEM-X.....	5
3.2.4	OMC.....	5
3.2.5	IREM.....	6
4	Ground Facilities.....	6
4.1	Mission Operations Centre.....	6
4.2	Ground Stations & Network.....	6
4.3	Science Ground Segment.....	6
4.3.1	ISOC.....	6
4.3.2	ISDC.....	7
5	Special Events.....	7
6	Anomalies.....	7
7	Future Milestones.....	8
8	Appendix.....	9
8.1	Overview of Revolutions.....	9
8.2	Consumables.....	9
8.2.1	Detailed Fuel Book-keeping.....	9
8.3	Detailed Satellite Information.....	10
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 15/04/2006 – 21/04/2006.....	10
8.3.2	SPI Operations.....	15
8.3.3	IBIS Operations.....	18
8.3.4	JEM-X Operations.....	22
8.3.5	OMC Operations.....	24
8.3.6	IREM Operations.....	25

DISTRIBUTION LIST

Addressees	Copy	Addressees	Copy
D/OPS		ESA HQ	
G. Winters D/OPS	1	D. Southwood D/SCI	1
W. Frank OPS-O	1		
A. Smith OPS-OF	1	ESTEC	
J. F. Kaufeler OPS-G	1	J. Louet SCI-P	1
N. Bobrinsky OPS-ON	1	A. Gimenez-Canete SCI-S	1
		ESTEC / PG	
M. Schmidt	1	G. Sarri	1
R. Southworth	1		
F. Di Marco	1		
F. Cordero	1		
M. Walker	1		
P. Lippi	1	ESTEC/RSSD	
R. Lemme	1	M. Kessler SCI-SD	1
S. Fahmy	1	C. Winkler	1
SPACONs	1	A. Parmar	1
O. Bergogne	1	L. Hansson	1
I. Bayliss	1	E. Kuulkers	1
G. Di Girolamo	1		
F. Dreger	1	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 15.04.06 until 21.04.06 (both dates inclusive) and covers the revolutions 428, 429 and 430.

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 hexagonal and raster dithers of the Galactic Bulge region (RA 17:45:36.00; DEC -28:56:00.0) and the Galactic Centre (RA 17:45:40.00; DEC -29:00:28.0) respectively, an OMC Flat Field Calibration, a Galactic Plane Survey and 2 Scutum arm cycles.

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.

1 slew was lost during the observation period due to problem on the link with REDU station.

The fuel consumption over the period between 14/04/2006 and 19/04/2006 was 0.1382 kg. The remaining propellant is in the order of 155.0597 Kg.

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

3.1.2 Power

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

3.1.3 Thermal

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

3.1.4 OBDH

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

3.1.5 RFS

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

3.2 Payload

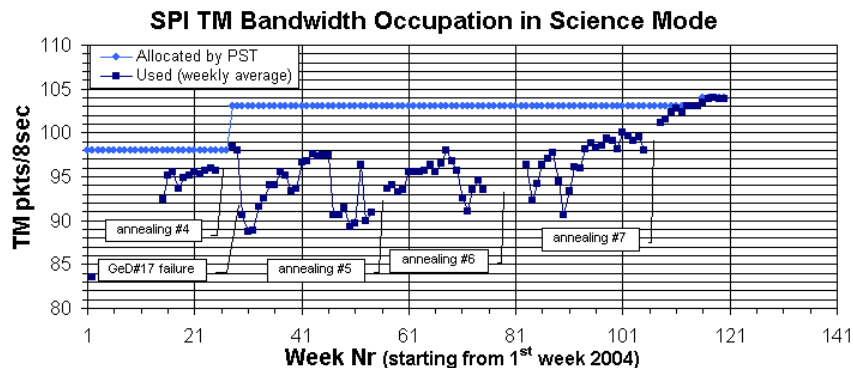
3.2.1 SPI

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 failed on 06.12.2003, detector #17 on 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 and the average telemetry occupation was 103.9 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 following plot shows the assigned and the average occupation of the SPI TM bandwidth.



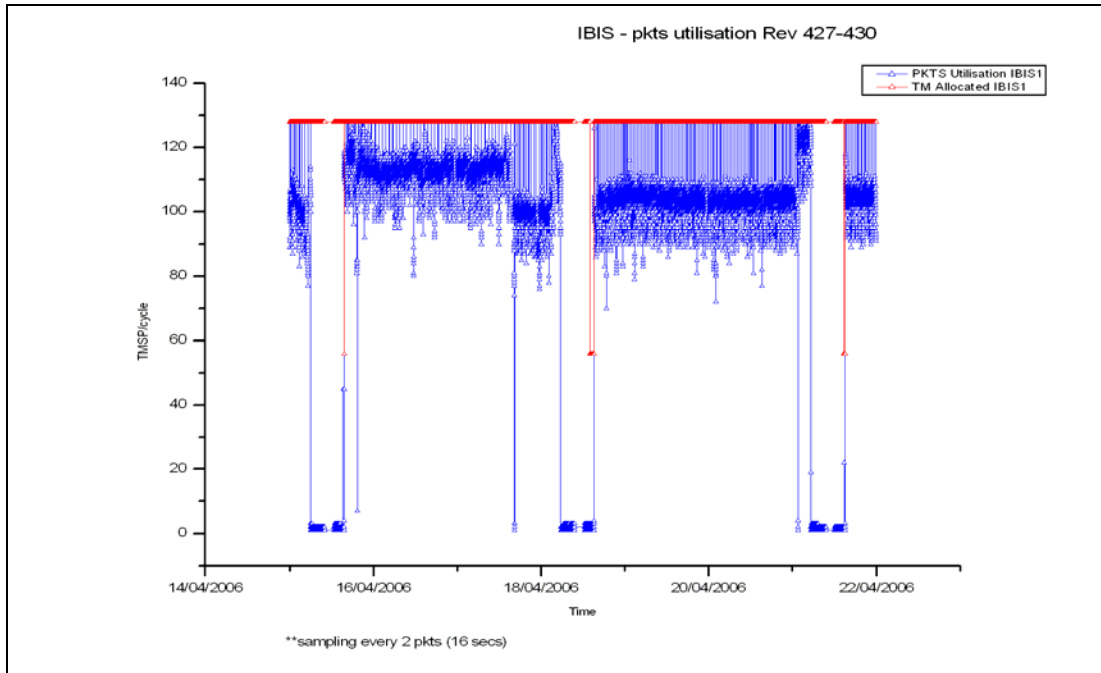
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

The Overall status of the unit is nominal.

During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 108.2 TMPS/cycle, down 3.84 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.

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, 196 of the 197 planned science pointings for OMC were executed nominally, 1 was lost.

Doc. Title : INTEGRAL Mission Report #187
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 24/04/06

Issue : 1
Rev. : 0
Page : 6

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.

Sunspots 871, 872 and 873 posed no threat for strong solar flares. They had all disappeared on the 19th of April. On the 20th new sunspot 874 appeared but posed no threat either.

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. A pointing was lost due to a TM data gap from Redu and there were several minor problems with ground station and ISDC links, 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 excellent this week. There were only minor problems reported, which had no impact. The overall performance was well over the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were though several instances of bad frames and TM drops, one of which led to the loss of a pointing, plus a couple of problems sending data to the ISDC, and a brief period where double TM was being sent from DSS-27, but these had no impact on the mission. The overall performance though was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's for revolutions 434 to 436 were received. Planning for revolution 433 was performed and the corresponding files sent to MOC and ISDC. Importing of the PSF's for revolutions 434 and subsequent PSF's in ISOC was not possible due to an unforeseen combination of events in these PSF's. MOC has agreed to regenerate a modified PSF set to overcome the problem. Delivery of this set is pending. TSF's for revolutions 430 to 432 were received.

Doc. Title : INTEGRAL Mission Report #187
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 24/04/06

Issue : 1
Rev. : 0
Page : 7

2. Observation status

No ECS's were received this week.

3. ISOC science data archive

Nothing to report.

4. ISOC system

The ISOC system version 12.3 has been used. A couple of minor problems were fixed through a patch to the system.

5. AO 4

The AO 4 proposal submission was completed this week. As expected the rate of submissions increased up to the moment of closure. In general the process has been smooth. A few proposers have had problems connecting to ESAC through their fire walls. This could be overcome by generating the files using the proposal generation tool and then sending the files as email attachments to the INTEGRAL helpdesk at ISOC for insertion into the proposal data base.

6. Problems

The archive hardware problem is still remaining. The problem with importing PSF's as mentioned above could be circumvented but a definite solution needs to be negotiated between ISOC and MOC.

4.3.2 ISDC

Status of ISDC observation processing on 24/04/2006:

- Latest Standard Analysis completed: observation 02201330004 (Gal.Center field, Revolutions 349, 358, 359 & 361) on 20/04/2006
- Latest products archived: observation 03297000004 (Cen X-4, Revolution 402-404) on 24/04/2006
- Latest observation products sent to the observer: observation 02297000019 (Cas A, Revolutions 352 & 384-385) on 13/02/2006

5 Special Events

6 Anomalies

There was one problem that impacted the operations:

- On DoY 110, at 18:46, there was a drop in VC0 & VC7 TM from Redu, the impact was the loss of pointing 04290091.

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

AR id	Date Created	Subject	Segment	Status
-------	--------------	---------	---------	--------

Doc. Title : INTEGRAL Mission Report #187
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 24/04/06

Issue : 1
Rev. : 0
Page : 8

INT-2850	20/04/2006	TM links disconnected - VIL2	ESA Stations	Pending
INT_SC-147	21/04/2006	AOCS: IMU 1 invalid status after self-test sequence triggered by autonomous switch ON	Spacecraft	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.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 428

The observations in revolution 428 began with a hexagonal dithering observation of the Galactic Bulge region (RA 17:45:36.00; DEC -28:55:60.0) lasting ~3.5 hours. A raster dithering observation of the Galactic Centre (RA 17:45:40.00; DEC -29:00:28.0) lasting ~43 hours was then performed, followed by a GPS, performed for the remaining ~12.5 hours of observation time.

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

Revolution 429

The observations in revolution 429 began with a Hexagonal dither of the Galactic Bulge region (RA 17:45:36.00; DEC -28:56:00.0), which lasted ~3.5 hours and continued with a Scutum arm Cycle 2 (a grid observation of the Galactic arm) for ~54.4 hours.

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 430

The observations in revolution 430 began with a Scutum arm Cycle 2 (a grid observation of the Galactic arm) for ~8.3 hours, it continued with a flat field calibration (a staring observation at attitude RA 21:58:00.00, DEC -51:18:00.0) for ~3.4 hours. The Scutum arm Cycle 2 was then resumed for ~4.4 hours, for the remainder of the revolution a Scutum arm Cycle 3 was performed for ~40 hours.

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, except during the OMC Flat Field Calibration from 2006-04-22T00:46:59Z to 2006-04-22T05:11:16Z, when the allocation was IBIS 90; SPI 84; JEM-X1 8; JEM-X2 1; OMC 63.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2006-04-02T01:26:27.000Z	155.3487	F	Automatic TM processing.
2006-04-03T14:32:07.000Z	155.3347	F	Automatic TM processing.
2006-04-05T01:39:14.000Z	155.3135	F	Automatic TM processing.
2006-04-06T14:15:10.000Z	155.2995	F	Automatic TM processing.
2006-04-08T00:33:30.000Z	155.2750	F	Automatic TM processing.
2006-04-09T13:58:06.000Z	155.2652	F	Automatic TM processing.
2006-04-11T00:16:34.000Z	155.2414	F	Automatic TM processing.

2006-04-12T13:39:34.000Z	155.2363	F	Automatic TM processing.
2006-04-14T00:03:14.000Z	155.1979	F	Automatic TM processing.
2006-04-14T21:51:00.000Z	155.1673	F	Automatic TM processing.
2006-04-15T08:16:29.000Z	155.1601	F	Automatic TM processing.
2006-04-16T23:40:02.000Z	155.1435	F	Automatic TM processing.
2006-04-17T15:32:36.000Z	155.1103	F	Automatic TM processing.
2006-04-18T13:06:22.000Z	155.0808	F	Automatic TM processing.
2006-04-19T23:45:30.000Z	155.0597	F	Automatic TM processing.

This report was generated Fri Apr 21 08:00:32 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, 15/04/2006 – 21/04/2006

AOCS operations were executed from the Automatic Timeline.

During this period, 117 Open Loop Slews, 94 Closed Loop Slews and 6 Momentum Bias were executed.

1 slew (CSL) was lost during the observation period due to problem on the link with REDU station.

This is equivalent to a 0.5 % of the total number of slews planned (211).

Orbit Control

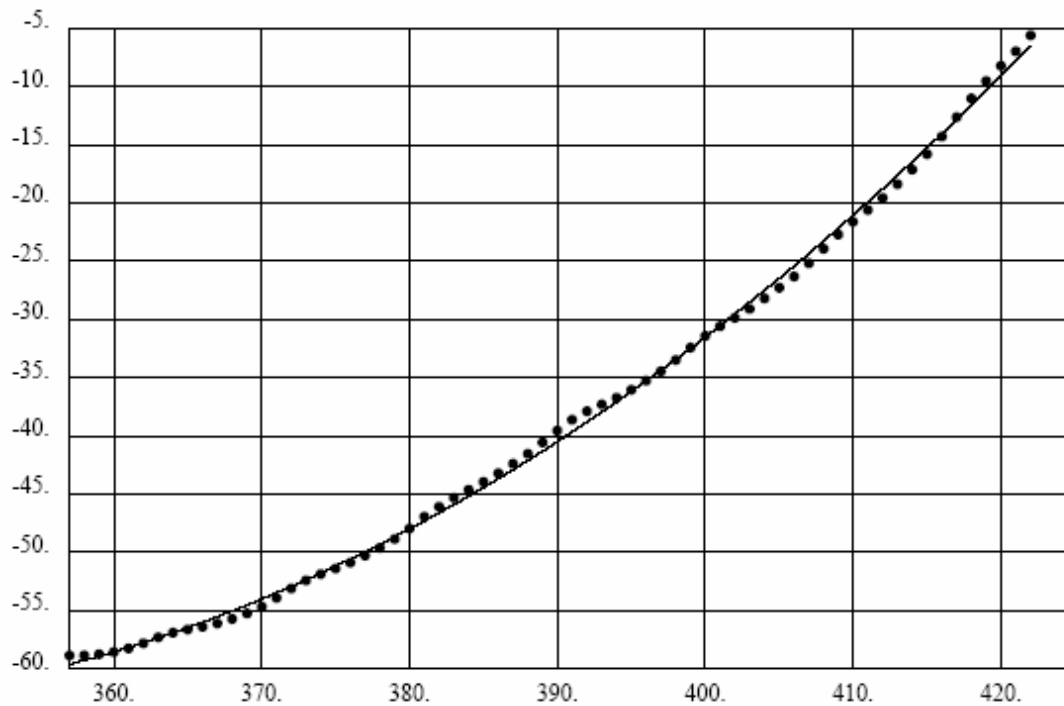
At present time the target is to reduce the eastward drift, by reversing the control and to increase the semi-major axis. From mid July onwards Redu should have coverage down to 40000 km altitude. The apogee longitude will be about 32 deg East.

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

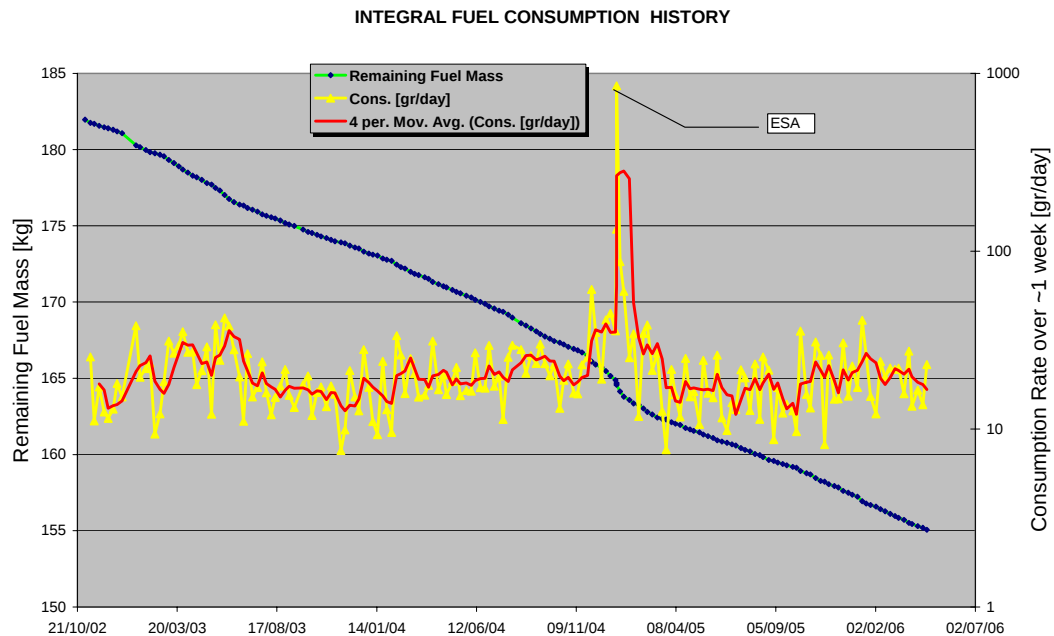
The attached plot shows the apogee longitude of Integral as a function of the orbit number. According to the linear least squares approximation with a parable the drift rate is 1.30 deg eastward shift per orbit at the end of the period.

APOGEE LONGITUDES OF INTEGRAL 16.9.2005 - 01.04.2006
 LEAST SQUARES APPROXIMATION WITH PARABLE

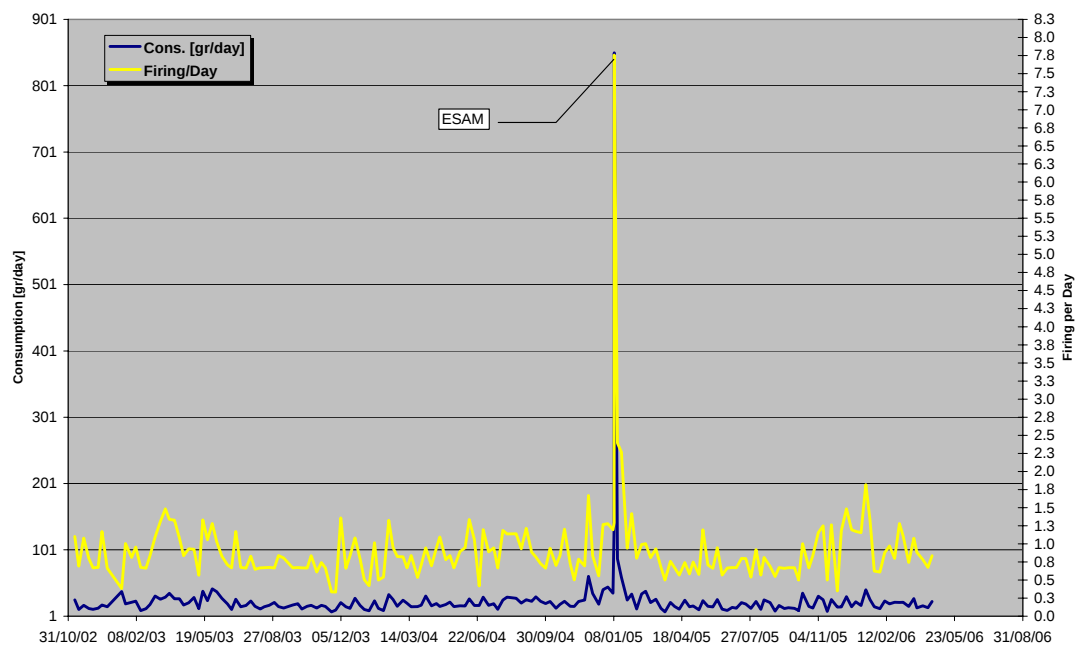


Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 19/04/2006 is reported in the plot below.

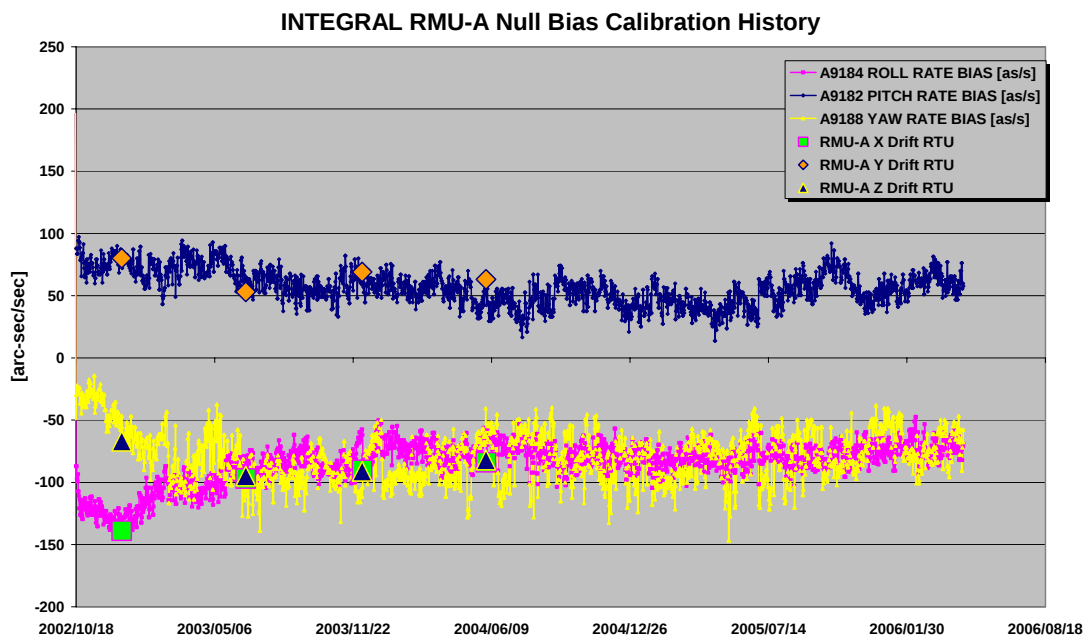


The firing\day over the period between 01/11/2002 and 19/04/2006 is reported in the plot below.

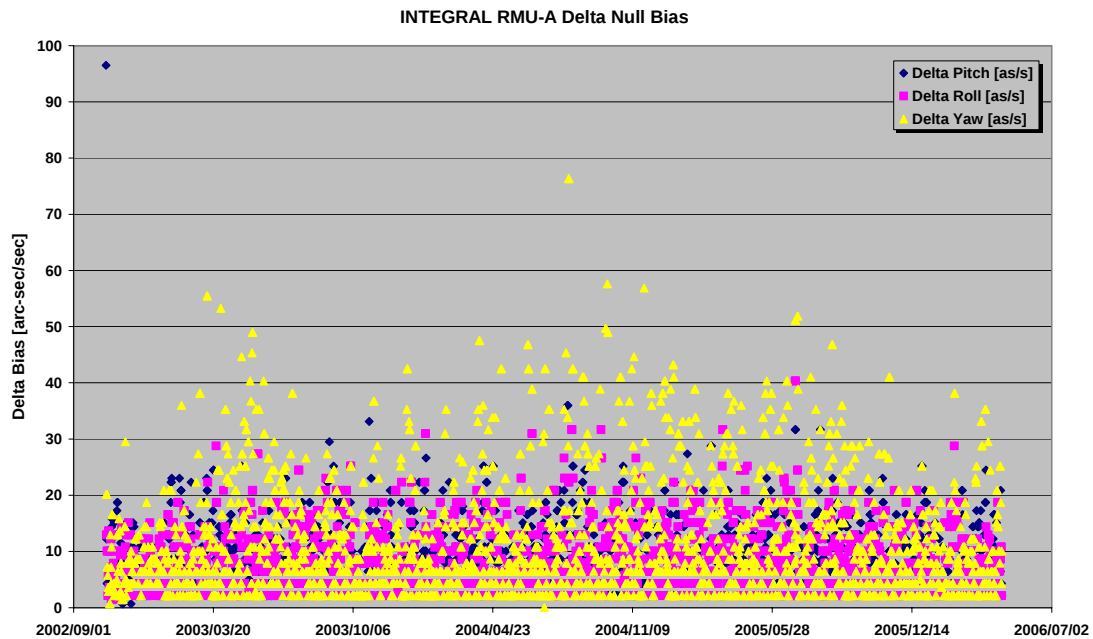


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 21/04/2006 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 21/04/2006 is reported in the plot below.



15/04/06 (Day of Year 105, Revolution 427-428)

IMU1 invalid status during self-test sequence triggered by autonomous switch ON: during the perigee passage (PP) for rev 427, were reported several occurrences of False events on STR, due to a concurrent strong geomagnetic activity that influenced the inner radiation (protons) belt.

The stored on-board OEMs, reported several violations of the STR SEU threshold that triggered autonomous IMU 1 switch ON from 12.37.41z -> 12.51.08z and automatic ACC-commanded mapping. The rate of the event reported was ~0.3 ev/sec while the guide star used during the PP was Mi 6.8 at CCD location [14175, -9051].

At AOS Redu (12:46z), the guide star was Mi 8.25 at CCD location [4468, -7438]. The rate of false events did not decrease, which forced the suspension of AOCS operations before the execution of a planned bias in TL.

At 12.53.12z a second IMU1 switch ON occurred lasting until 13.30.02z. During the warm-up phase of the equipment, at 12.53.55z, the IMU1 self-test sequence reported an error when processing the BES (measurement unit electronic) and BBS (measurement unit head) temperatures.

This was flagged by the following two status parameters in OOL:

A5160 START UP TEST Y = INVALID (synthetic status of built-in test during starting phase of equipment, inside SHORT STATUS WORD) **

A5154 START UP TEST Y = INVALID (self test temperature, inside the STATUS WORD 1) **

The remaining part of the SHORT STATUS WORD, reported values, consistent with the status of the unit at that phase, and no internal error function was triggered.

The mentioned two parameters are different from the known A5140 (on-line test Roll) and A5162(on-line test Yaw) TM parameters, that shown in the past (ground test) to be occasionally incorrectly set, and therefore to be ignored, as reported in the INTEGRAL FOP and Matra documentation.

The AOCS control loop after the triggering of the SEU filter and IMU 1activation at 12.53.55z, did revert the control to STR/FSS (DCA/RGA=1/5) as soon the mapping reported a valid star.

The guide star after IMU OFF (13.30.02z) was Mi 7.5 at CCD location [11242, -267]. During the last perigee passage (rev 428) no occurrences of STR THR EXCEEDED were reported.

A preliminary investigation on the IMU electronic head and sensor temperatures did not report evident anomalous behaviours over the period AOS- 13:30z, just a drop due to the switch OFF/ON of the unit over a 2 minutes period. As well the rate on Yaw axis did not show anomalous trend over the mentioned period.

The reason of the observed misbehaviour is due to the particular off /on sequence which is described above. In fact the gyro sensor temperature stayed above +55°C during all the off / on sequence. If the gyro temperature is above a +55°C threshold during the IMU starting phase, two events occur in terms of monitoring:

1. bit D5 of the composite_temp_status is set to 1 (as a consequence of D5 of the complete status word n°1: self test temperature during starting phase)
2. bit D0 of the composite_init_status is set to 1 (as a consequence of point 1)

Therefore under unusual operational conditions where the IMU is started already with the gyro warmed up, the INVALID flags may appear on the TEMP TEST and START UP TEST status of the IMU overview display. This has no impact on unit healthy.

At 13:10z the AOCS s/s was disabled in TL.

The update for the slew ID 04280001 was manually performed at 14:01Z.

At 14:09z the AOCS s/s was re-enabled in TL. No impact on TL reported.

*** The reference for the information above is the IMU UM (XM-MA-SAG-0001).*

16/04/06 (Day of Year 106, Revolution 428)

Nothing to report

17/04/06 (Day of Year 107, Revolution 428)

Guide star released by the STR SEU Filter: at 15:58Z the ACC reported (twice) STR threshold exceeded during the execution of slew ID 042800053: the guide star

was released and the IMU1 was switched ON. A new guide star was picked in the first automatic mapping, which was kept afterwards.

No impact on TL reported.

18/04/06 (Day of Year 108, Revolution 428-429)

Nothing to report

19/04/06 (Day of Year 109, Revolution 429)

Nothing to report

20/04/06 (Day of Year 110, Revolution 429)

Slew failed execution due to problem on link to REDU: at 18:49Z a problem on the link to REDU station caused the slew ID 04290091 to fail. A manual recovery was performed to the attitude of PID 04290091. The next slew ID 04290092 was manually updated in TL at 19:19Z.

The following slew ID 04290091 (CSL) was not executed by TL.

21/04/06 (Day of Year 111, Revolution 429-430)

Guide star released by the STR SEU Filter: at 12:11Z the ACC reported several STR threshold exceeded during the first part of the orbit (shortly after AOS): the guide star was released and the IMU1 was switched ON. A new guide star was picked in the first automatic mapping, which was kept afterwards.

At 13:31 the AOCS s/s was disabled in TL.

The update for the slew ID 04300001 was manually performed at 13:31Z.

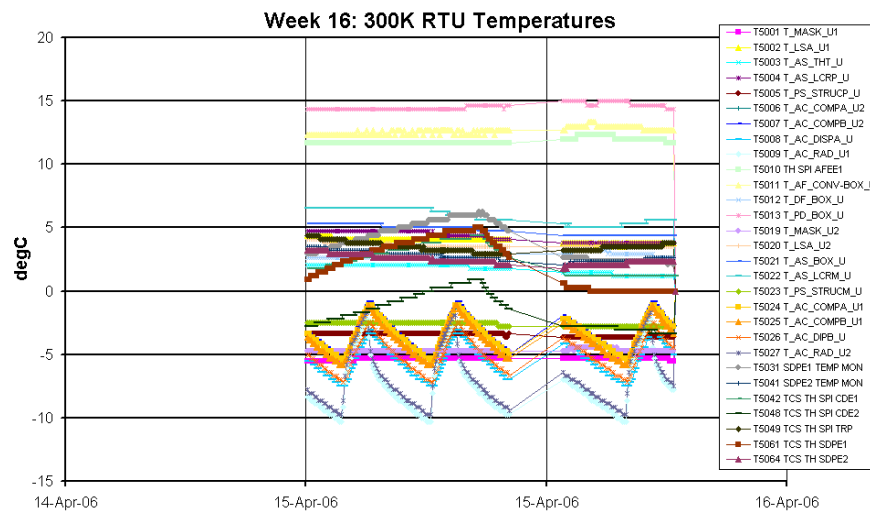
At 14:03 the AOCS s/s was re-enabled in TL.

No impact on TL reported.

8.3.2 SPI Operations

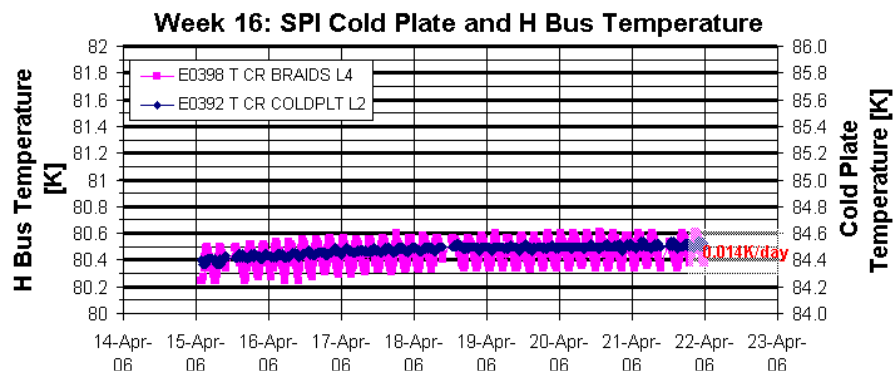
Unit Temperatures:

All the equipment temperatures are inside the operational limits. The following plot shows their evolution along the reporting period.



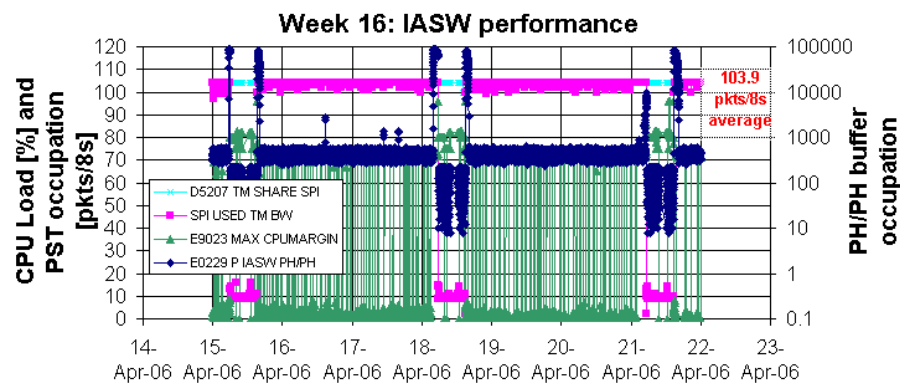
Stirling Compressors and Cryostat:

The performance of the compressors is nominal. The cold plate temperature was maintained at 85K $\pm$ 1K showing the expected positive drift. The stroke was increased during this week to compensate the accumulated effects of the drift. The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



DPE & IASW:

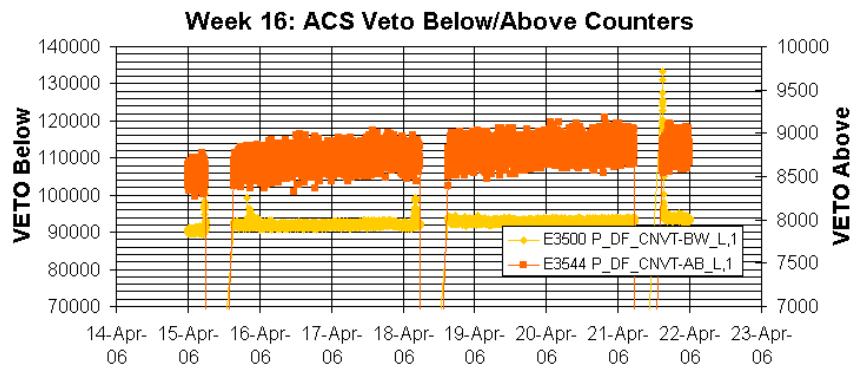
The Iasw performance is nominal. The current IASW version installed is 432. The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal.

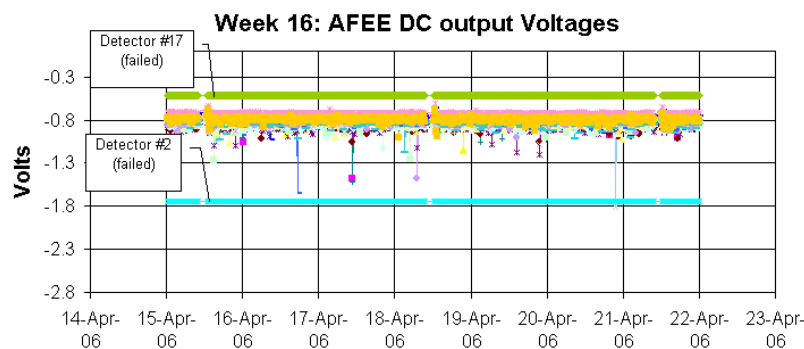
The following plot shows the ACS overall count rate evolution during the reporting period



AFEE:

The performance of the AFEE and the detectors is nominal, except for detector #15, which shows a degraded energy resolution. The anomaly has been recorded in the ESOC Anomaly Report and Tracking System (ARTS) as INT_SC-140.

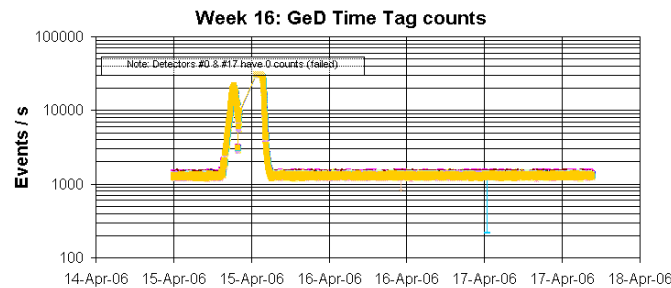
The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.

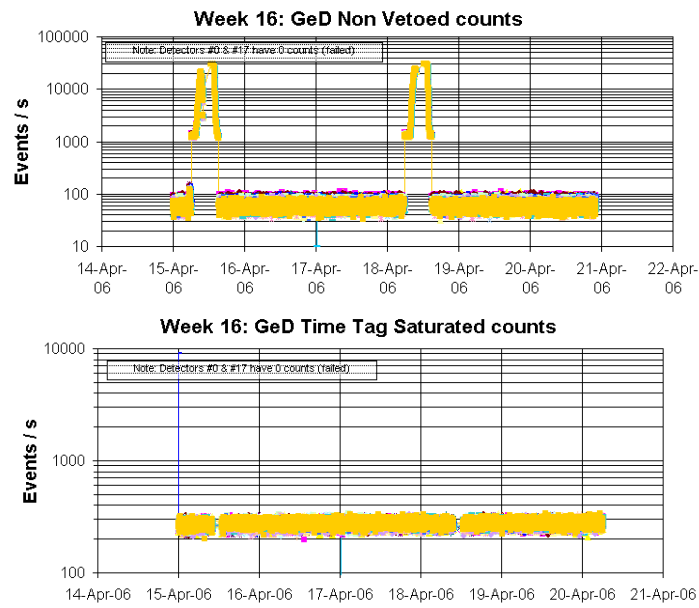


DFEE:

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.

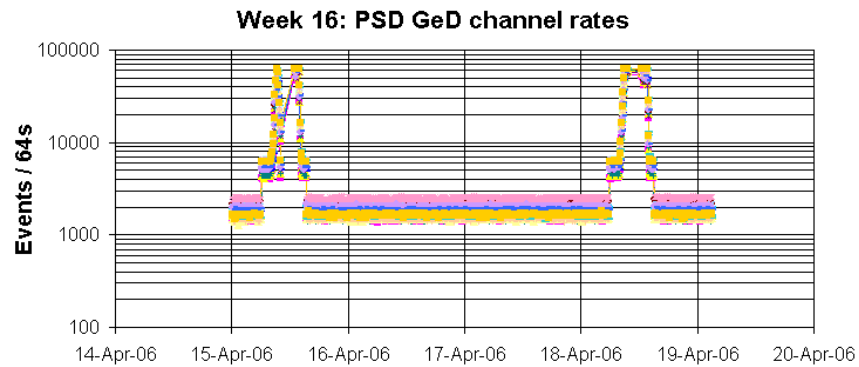




PSD:

The performance of the unit is nominal.

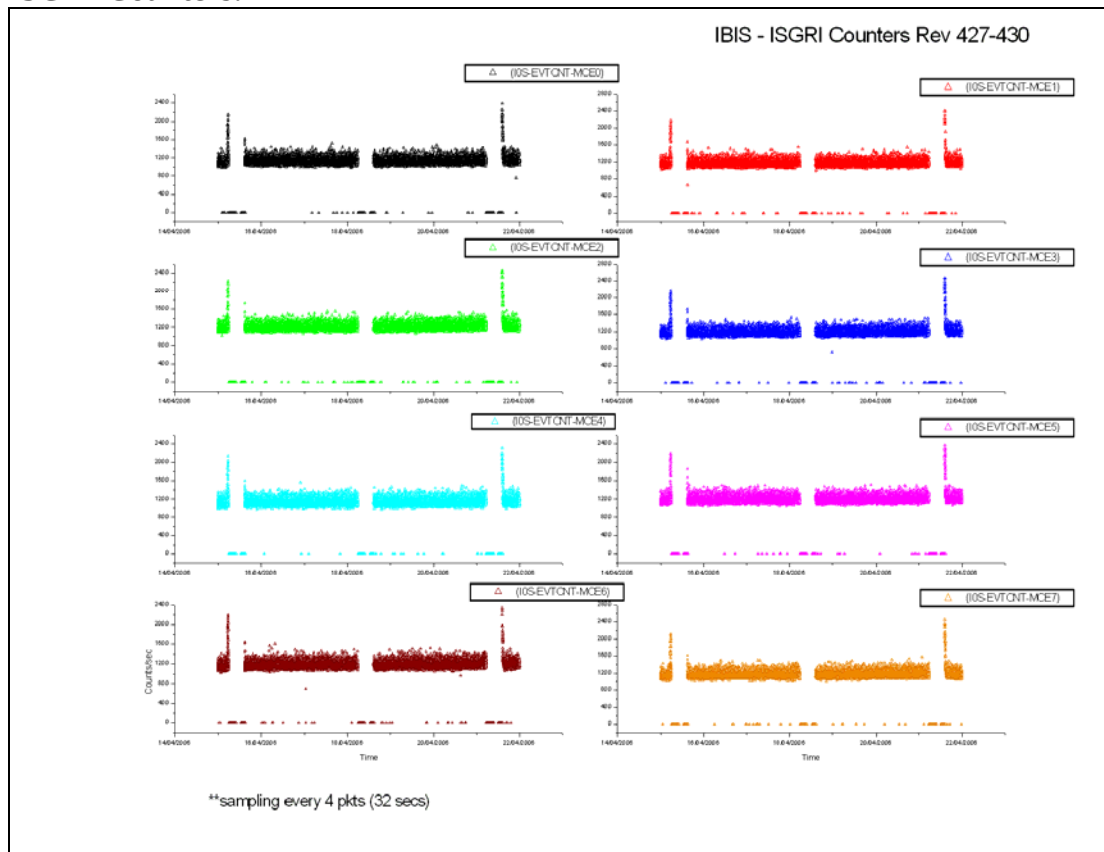
The following plots show the PSD channel rates during the reporting period.



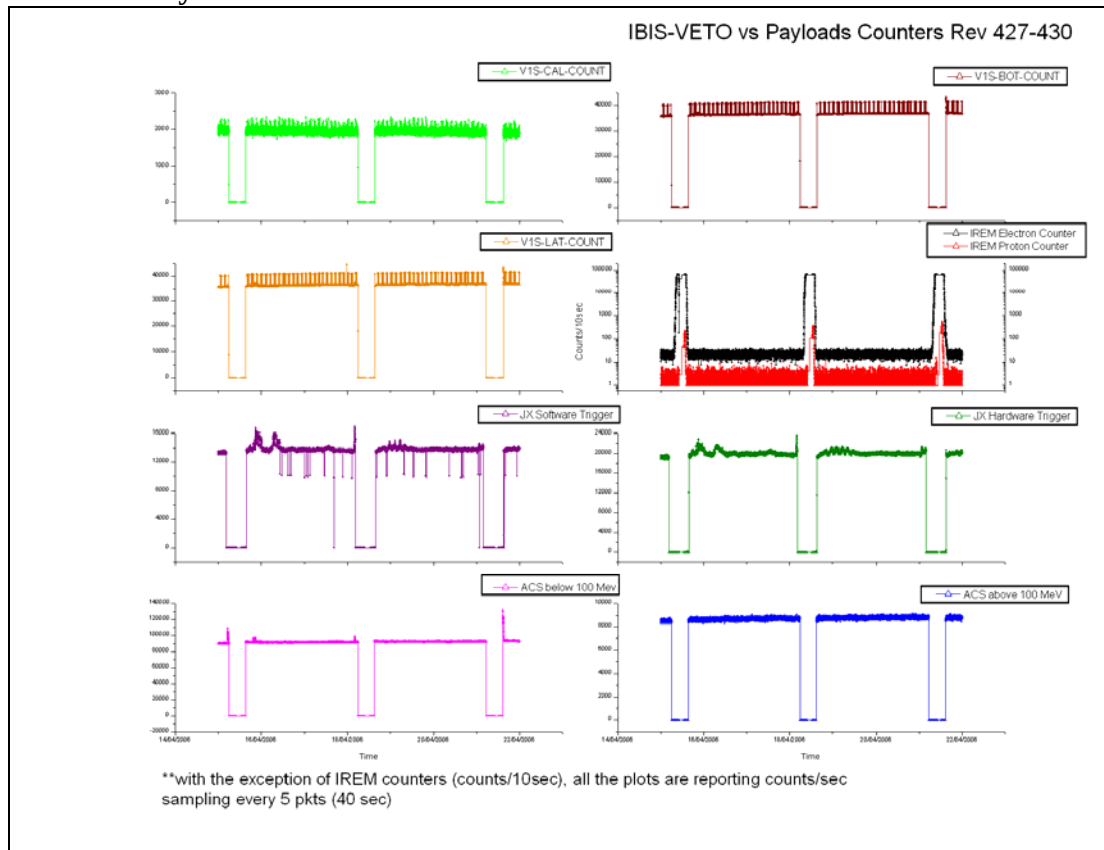
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

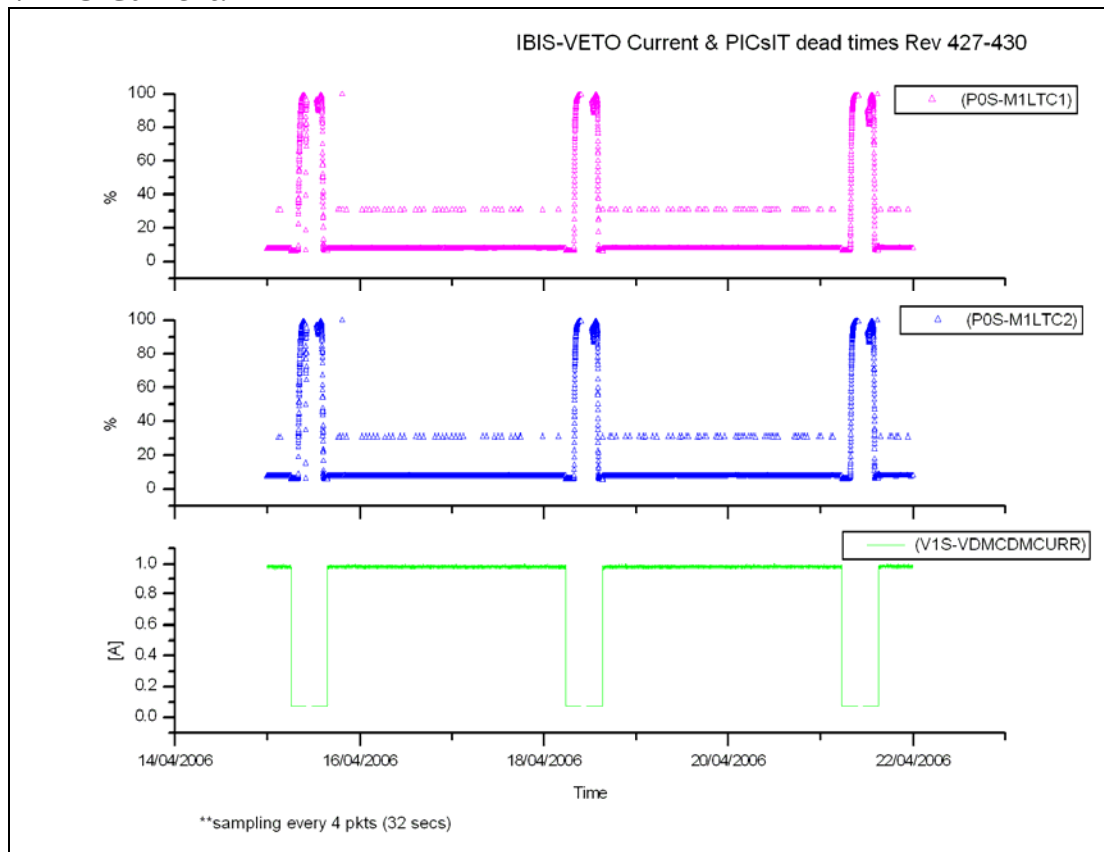


VETO vs Payloads Counters:

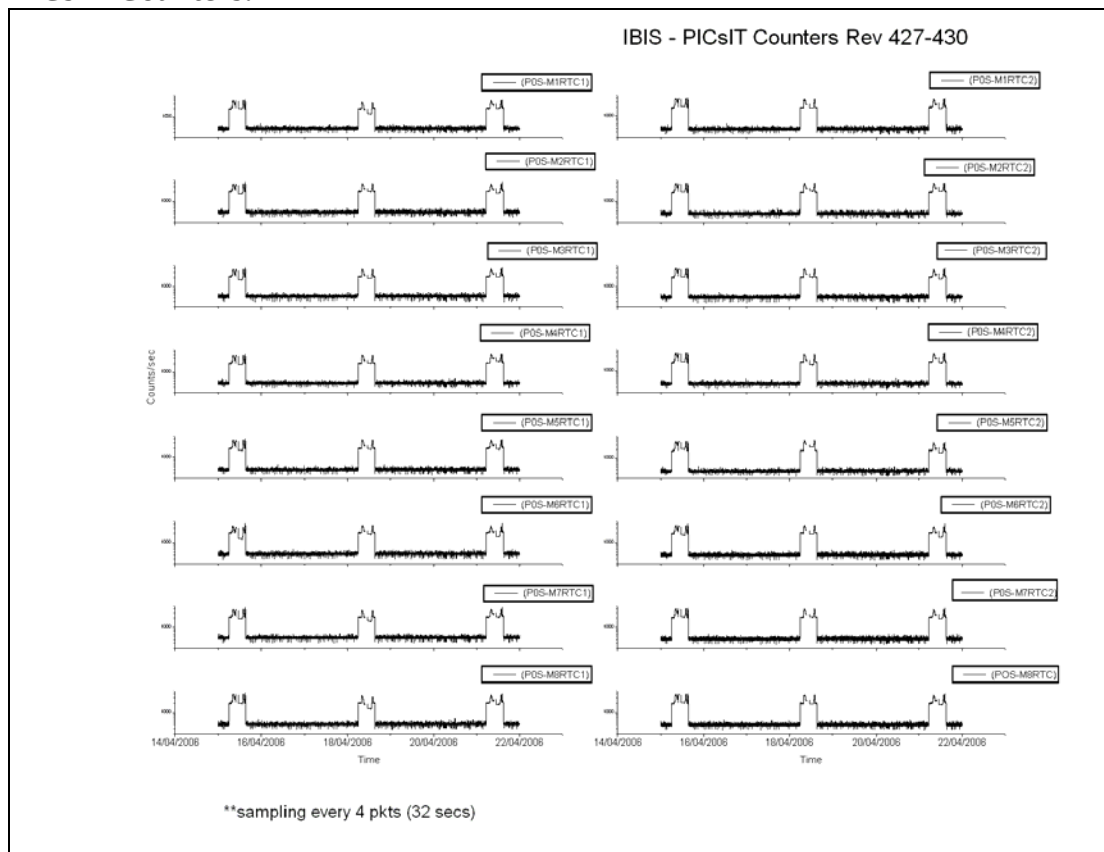


The week was characterised by low radiation.

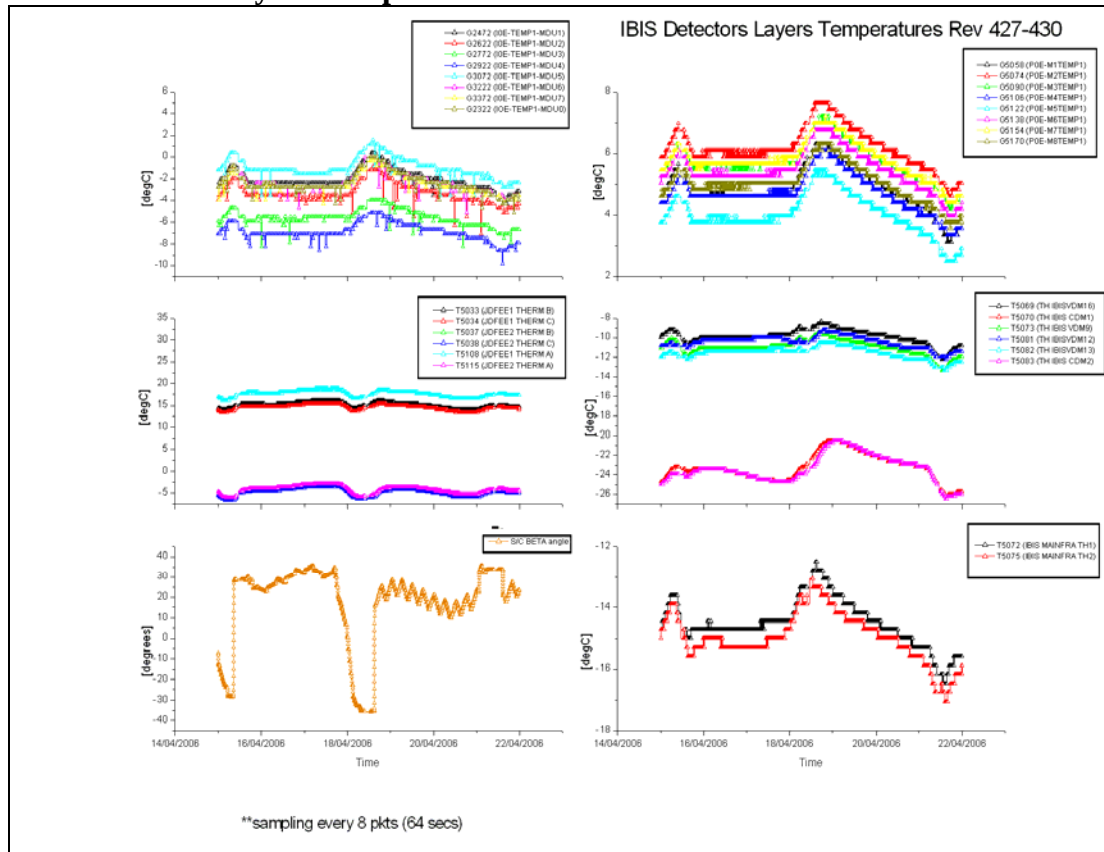
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2006.105 (15/04/2006):

At 06:03Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 15:35Z. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 no action was taken.

Inside the radiation belts, TM parameters of G5002 (POS-MiRTC1) and G5003 (POS-MiRTC2) families were toggling OOL high. According to P-CNT-1, no action was taken.

At 14:59Z, TM parameter G2014 (IOE-OVFWPXADD-M1) failed SCC and back. It occurred again at 15:08Z and 15:16Z. According to I-OVF-1, as this happened inside radiation belts, no action was taken.

At 19:21Z, TM families G5002 and G5003 (POS-MiRTC1 & 2) were reported OOL low-low. At the same time, TM families G5068 and G5072 (POS-MiF1 & 2- ERRF) failed SCC and back. As this has happened only for few cycles, according to P-FIF-1 and P-CNT-1, no action was taken.

DoY 2006.108 (18/04/2006):

At 05:45Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 15:16Z. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 no action was taken.

Inside the radiation belts, TM parameter G5023 (P0S-M5RTC2) was toggling OOL high. According to P-CNT-1, no action was taken.

At 14:47Z, TM parameter G2014 (I0E-OVFWPXADD-M1) failed SCC and back. At 14:54Z, TM parameter G2070 (I0E-OVFWPXADD-M5) failed SCC and back. According to I-OVF-1, as this happened inside radiation belts, no action was taken.

DoY 2006.111 (21/04/2006):

At 05:28Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 14:58Z. As this happened inside the radiation belts (following VETO Stand-By mode), according to V-VLT-1 no action was taken.

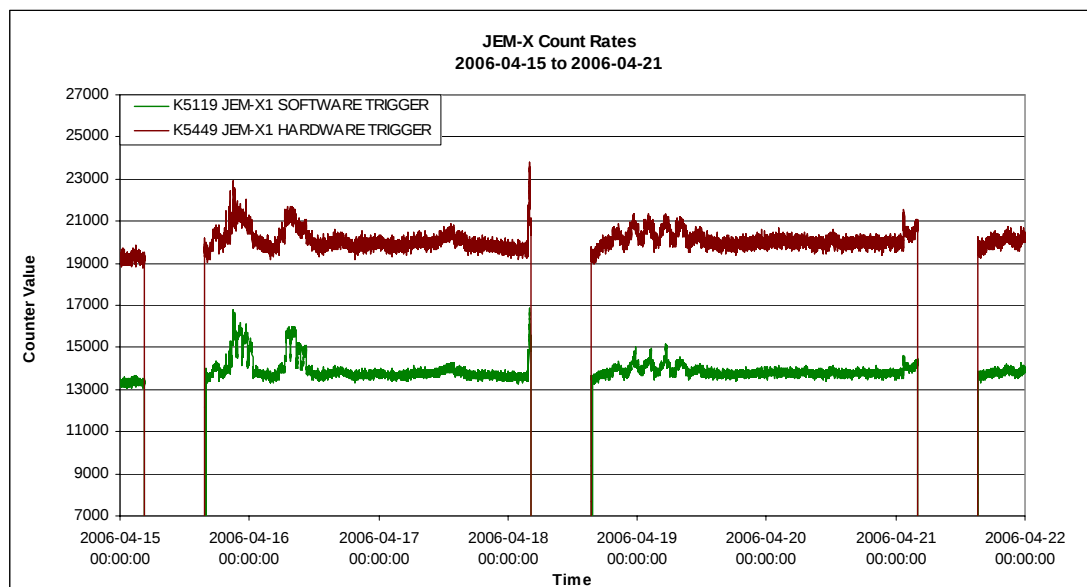
Inside the radiation belts, TM parameter G5017 (P0S-M4RTC1) was toggling OOL high. According to P-CNT-1, no action was taken.

At 14:26Z, TM family G2013 (I0E-EVTCNT-MCEi) was reported OOL High due to high radiation at the exit of the belts. According to I-CNT-1, no action was taken.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

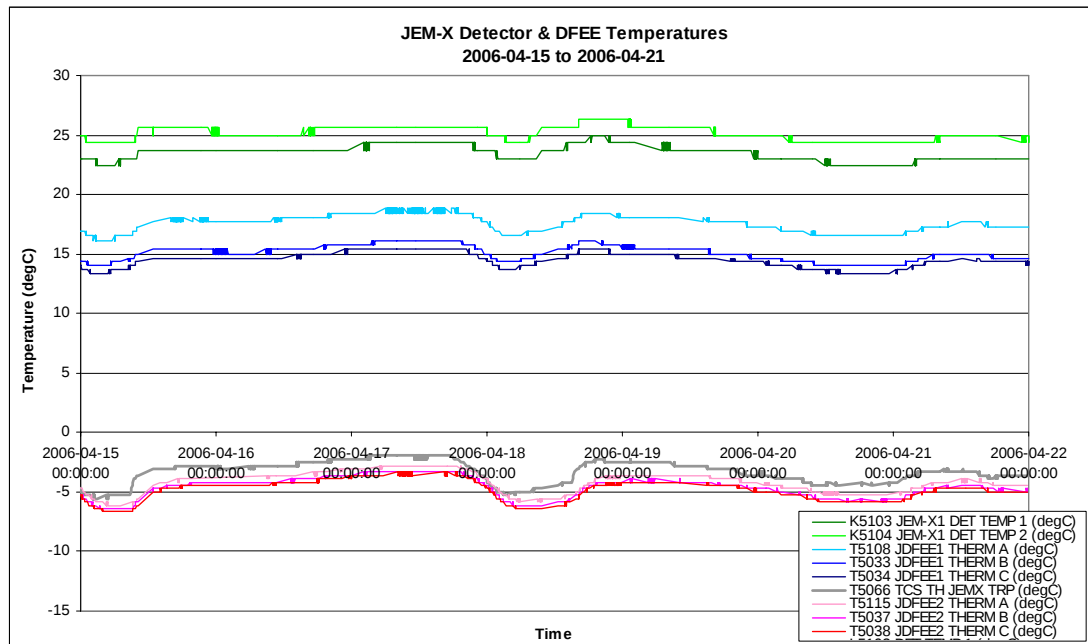
JEM-X count rates over the reporting period are displayed in the following graph¹.



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

8.3.4.2 JEM-X Temperatures

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



8.3.4.3 JEM-X Daily Report

2006-04-15 (DOY 105, Rev 427-428) to 2006-04-21 (DOY 111, Rev 429-430)

Nothing to report

² Data sampled (1 frame in 8)

8.3.5 OMC Operations

2006-04-15 (DOY 105, Rev 428) to 2006-04-19 (DOY 109, Rev 429)

Nothing to report

2006-04-20 (DOY 110, Rev 429)

At 18:54:21, the OMC commands failed to uplink due to the dynamic PTV. This was caused by a data-gap in the VC0 TM from Redu. The impact was the loss of pointing 04290091. It was at this time the following commands were rejected:

2006.110.18.54.21.199	2006.110.18.54.27.524	1792	RealTime	131	TC REJECT
REJECTED TC1				0	0 65535
PR N E E					
2006.110.18.54.15.074	2006.110.18.54.19.531	1792	RealTime	131	TC REJECT
REJECTED TC1				0	0 65535
PR N E E					

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

2006-04-21 (DOY 111, Rev 430)

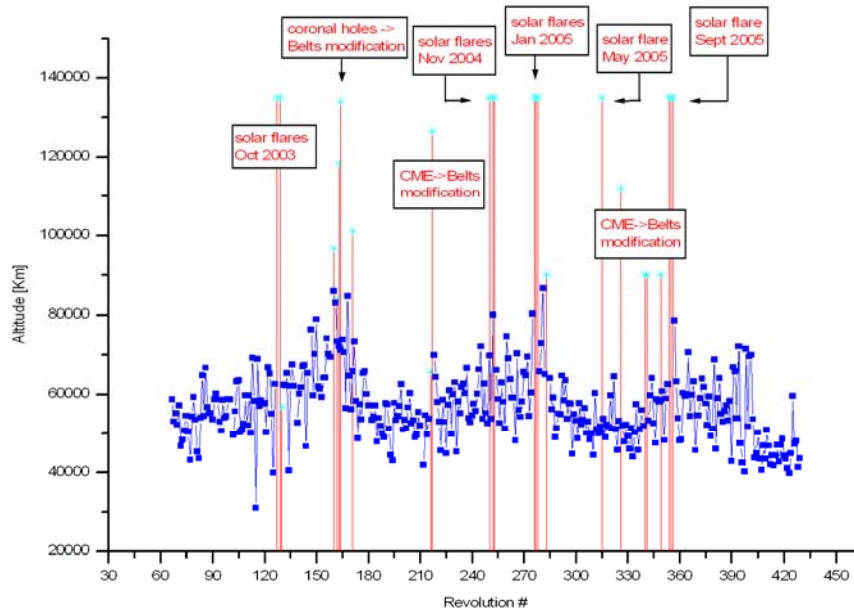
Nothing to report

On DoY 105 at 06:03:14, DoY 108 at 05:45:14 and DoY 111 at 05:28:10 OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry

Evolution of Radiation Belt Entry 2004-2006



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]
427	RAD_ENTR R 2006-04-15T06:03:13Z	2006-04-15 07:33:53	48066.9	2006-04-15 07:34:21	47788
428	RAD_EXIT R 2006-04-15T15:21:53Z	2006-04-15 15:13:45	<<42307.7	2006-04-15 14:54:21	35953
428	RAD_ENTR R 2006-04-18T05:45:10Z	2006-04-18 08:02:33	41425.1	2006-04-18 07:08:21	49025
429	RAD_EXIT R 2006-04-18T15:03:35Z	2006-04-18 14:38:25	36123.8	2006-04-18 14:38:21	36163
429	RAD_ENTR R 2006-04-21T05:28:07Z	2006-04-21 07:28:01	43648.2	2006-04-21 06:58:21	48512
430	RAD_EXIT R 2006-04-21T14:46:12Z	2006-04-21 15:21:37	45360.1	2006-04-21 14:18:21	35224

Reference

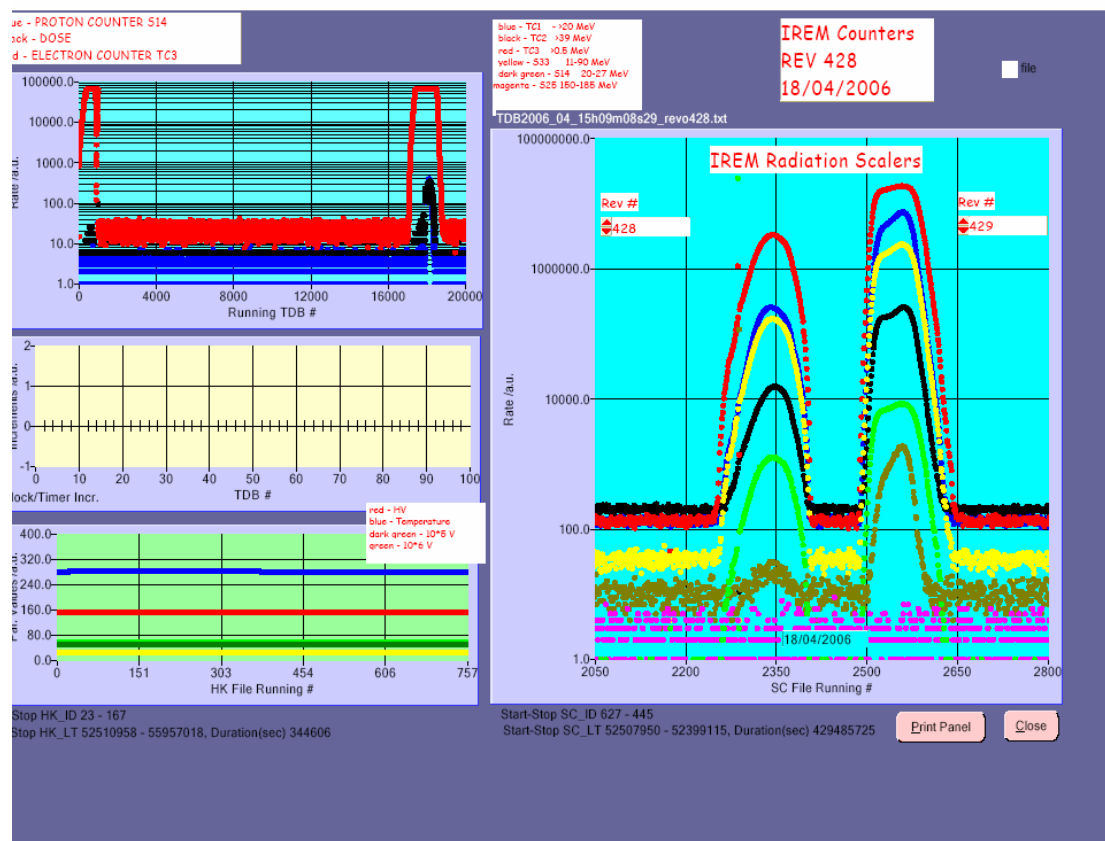
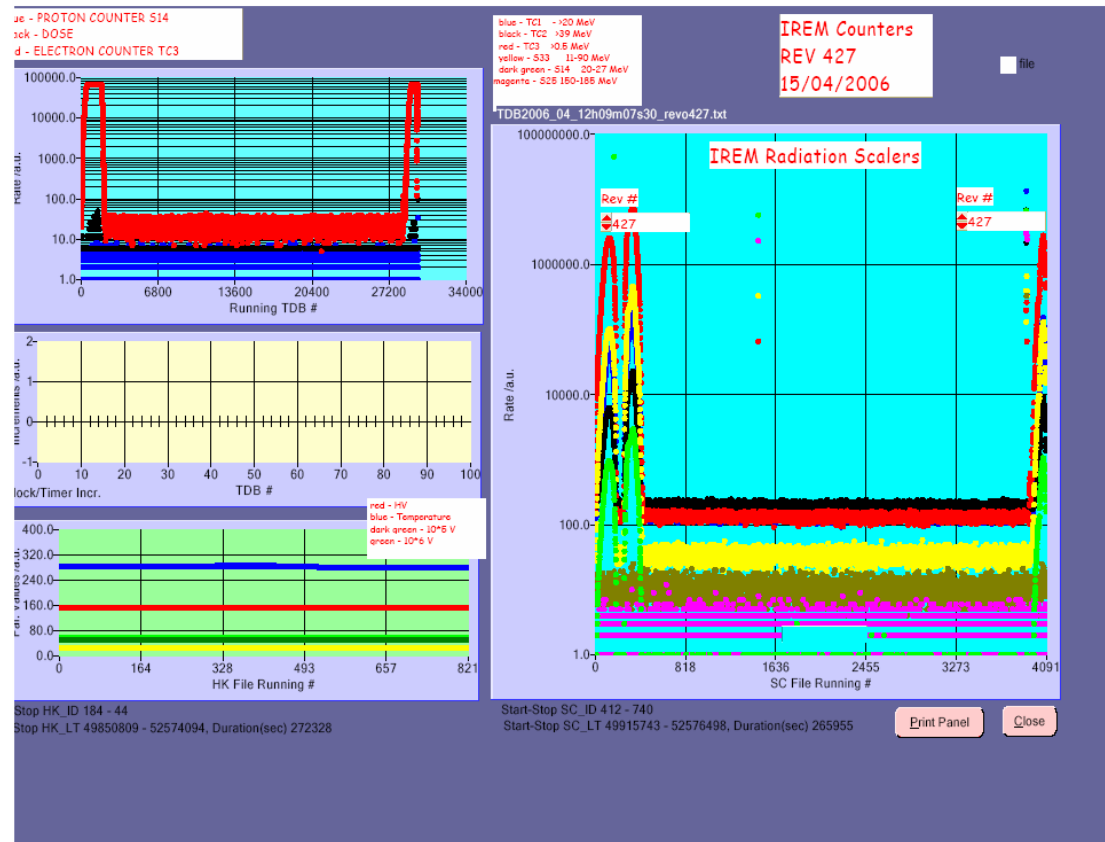
Very small error vs reference (less than 10 minutes)

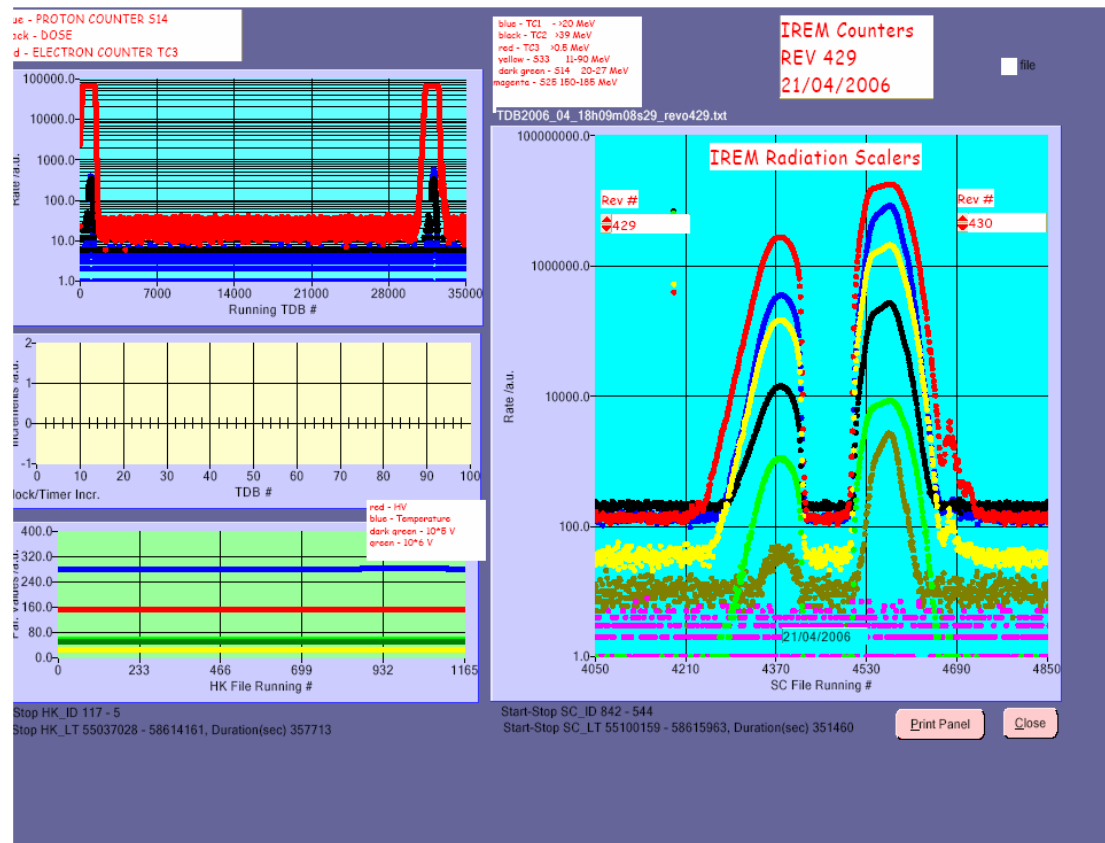
Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

Radiation Spike

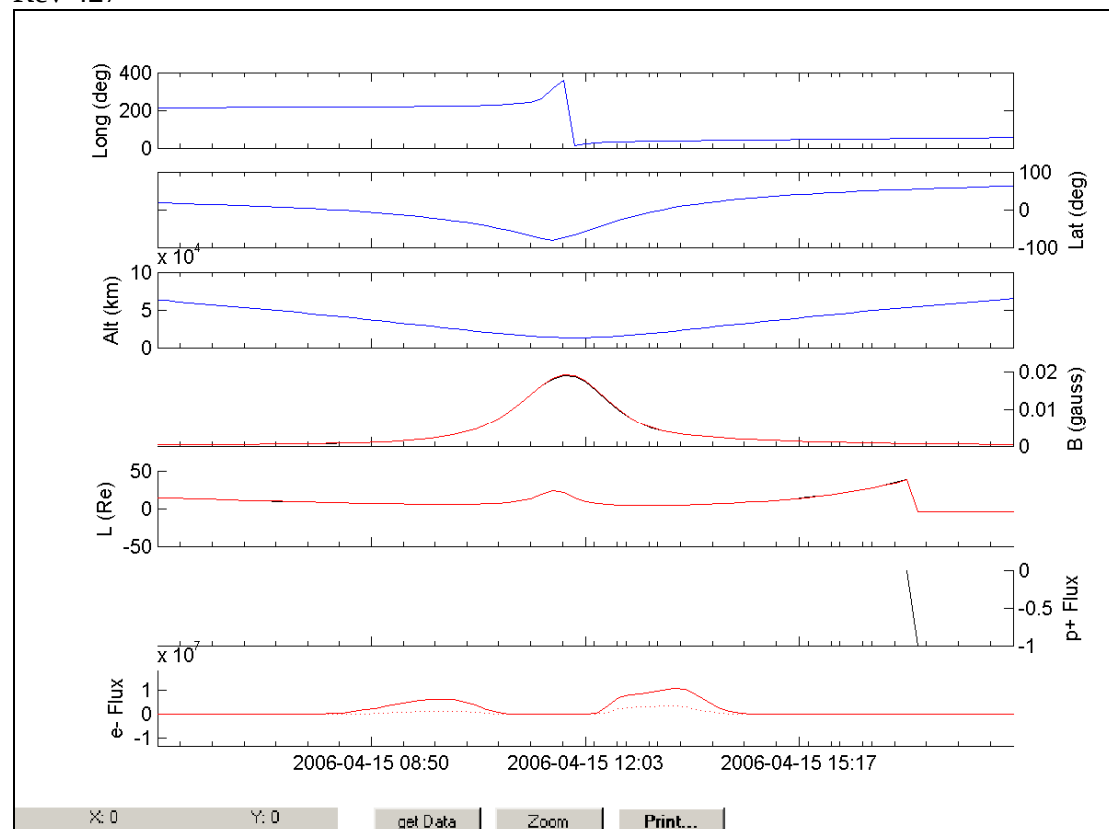
IREM radiation counters:



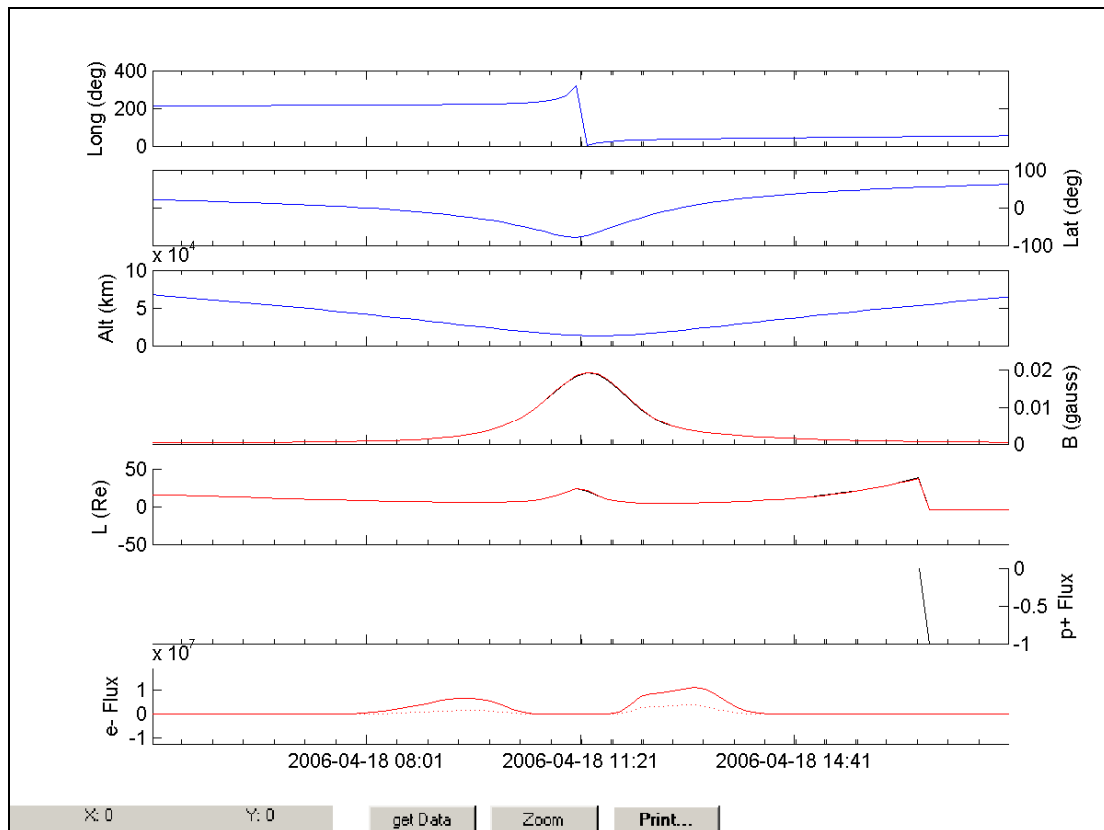


IREM Predicted Radiation Belt Passages:

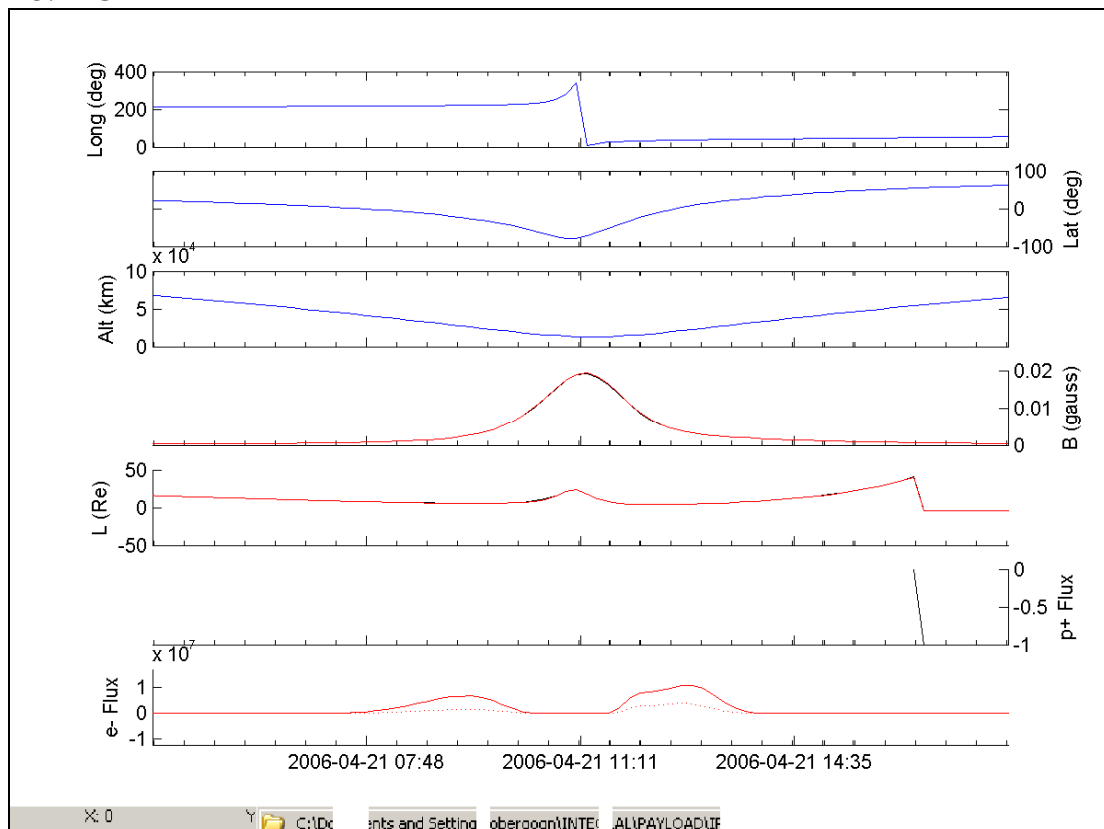
Rev 427



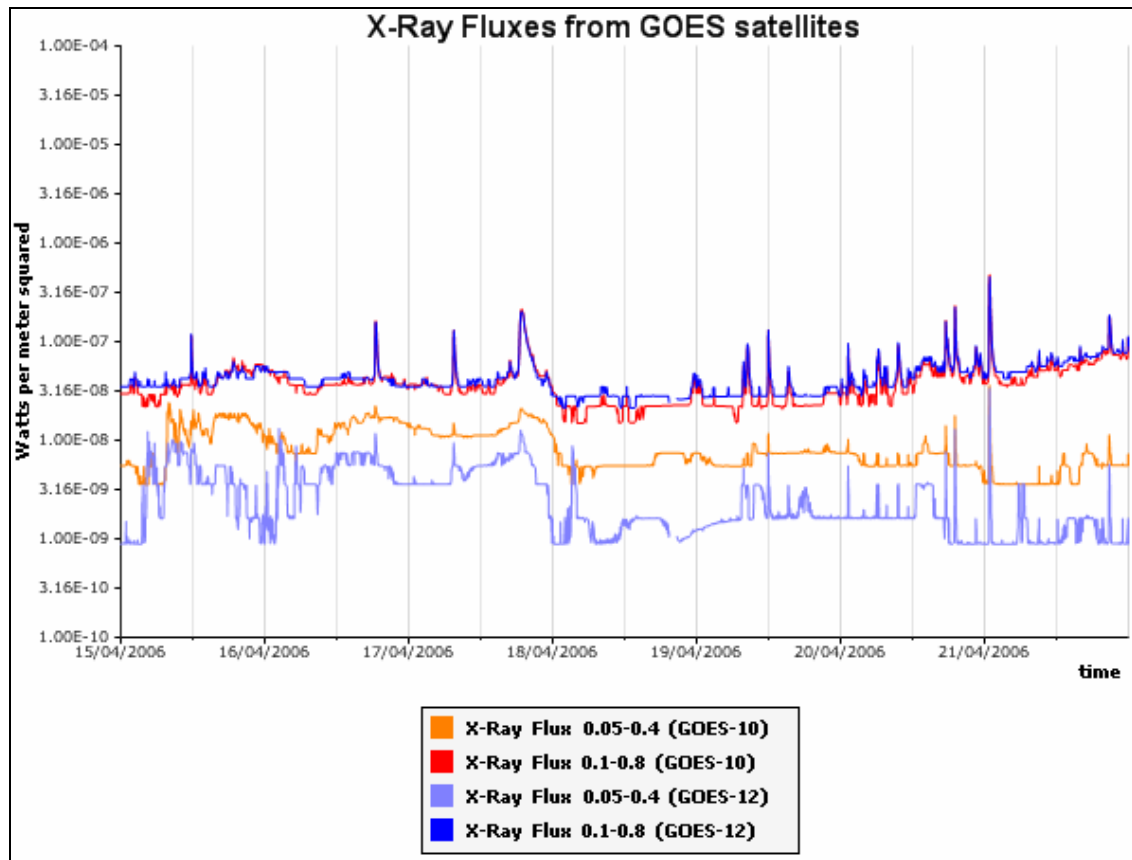
Rev 428



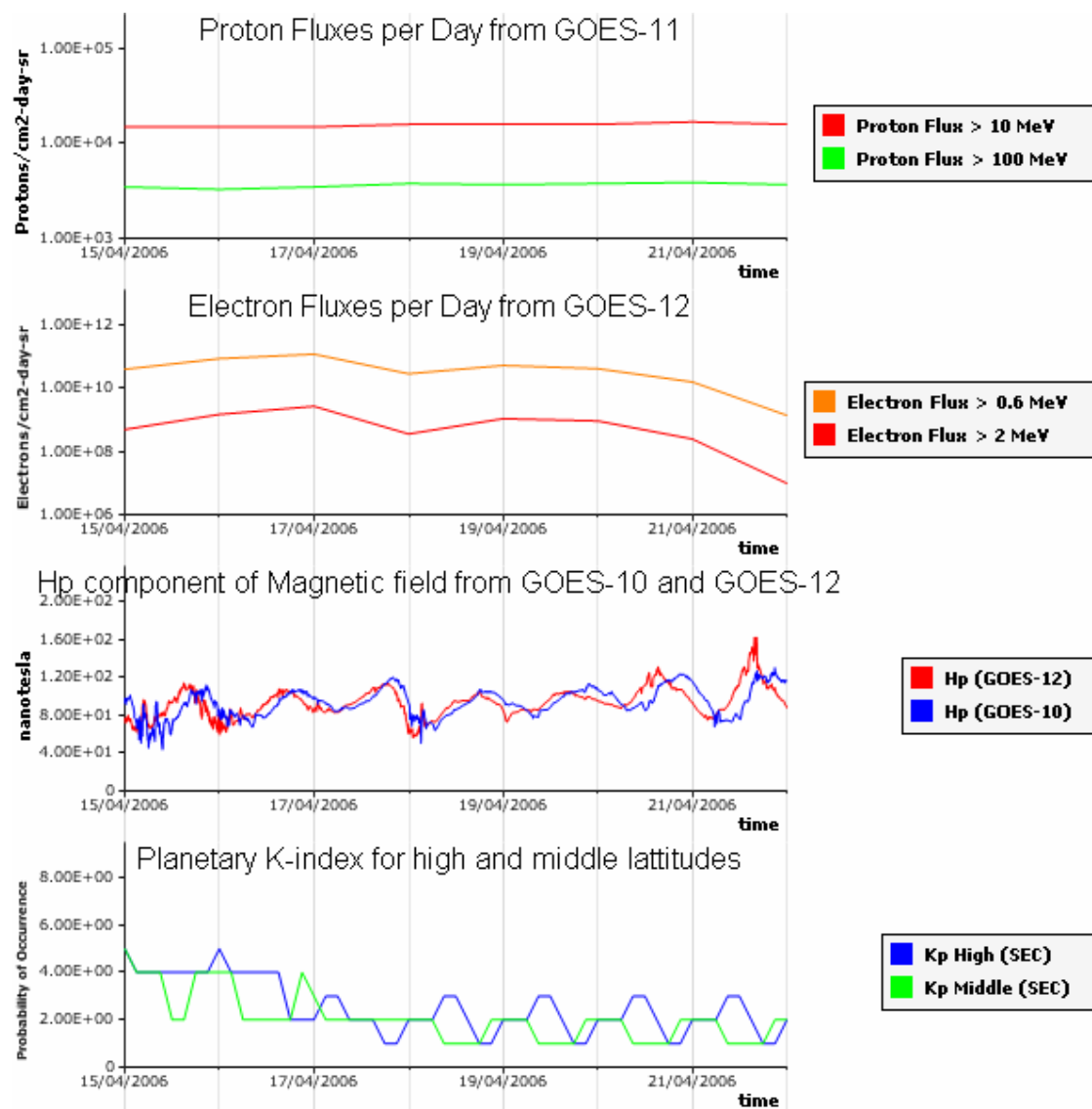
Rev 429



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. $Kp \geq 5$ features storm-level geomagnetic activity.