

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 333
Week 06
09.02.09
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 31.01.09 until 06.02.09 (both dates inclusive) and covers the revolutions 769, 770 and 771.

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 Target of Opportunity, a hexagonal dither of the anomalous X-ray pulsar 1E1547.0-5408 (RA 15:50:55.30, DEC -54:19:02.0), a hexagonal dither of the radio galaxy Centaurus A (RA 13:25:27.61, DEC -43:01:08.9) and a hexagonal dither of the star Eta Carinae (RA 10:45:03.59, DEC -59:41:04.3).

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.

No slews were missed from TL, during the observation period.

The fuel consumption over the period between 31/01/2009 and 06/02/2009 was 0.1344 Kg. The remaining propellant is in the order of 136.0506 Kg.

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

3.1.2 Power

All the other units of EPS are working nominally; available power from the arrays is of the order of 2100W.

3.1.3 Thermal

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

3.1.4 OBDH

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

The PST was over-subscribed by 3 packets, which were allocated to SPI during the Instrument window for the entire reporting period.

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

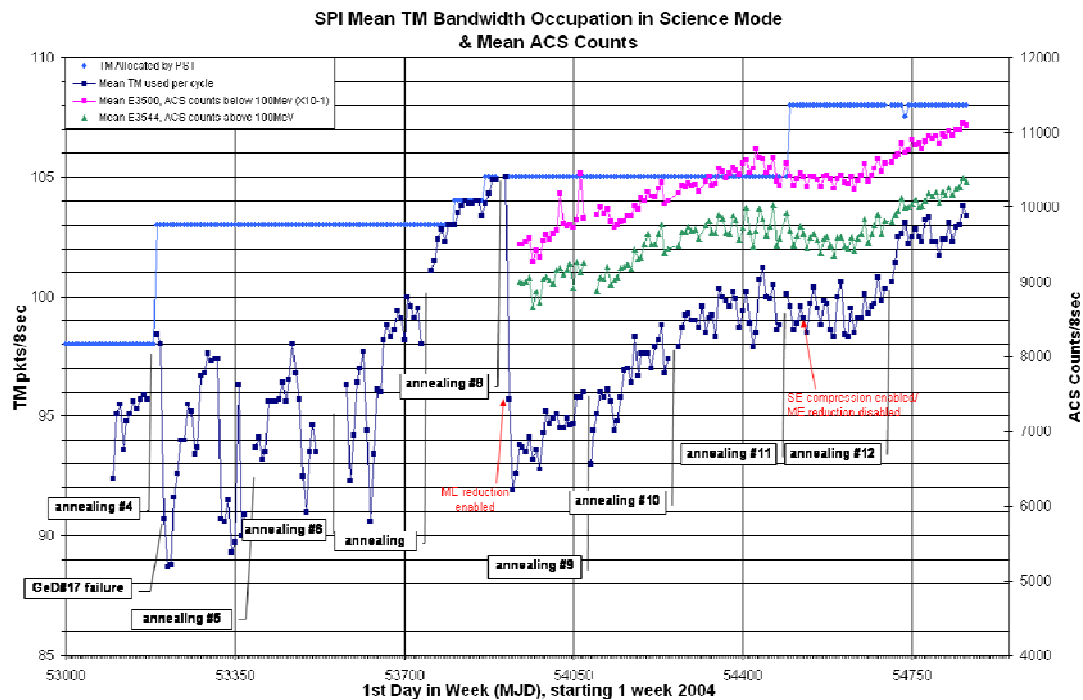
3.2.1 SPI

Following the 12th annealing, ended on 04/09/2008 at 23:50Z, the overall status of the gamma-ray spectrometer is nominal, except for detector #2 (failed since 06/12/2003) and detector #17 (failed since 17/07/2004). The energy resolution of the previously degraded GeD#12 has improved following this annealing and the bias of this detector is now set to 4kV as for the other detectors.

The Stirling compressors are working nominally. The Germanium detectors temperature was kept in the range 80K $\pm$ 1K throughout the week.

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 108 packets/cycle and the average telemetry occupation was 103.4 packets/cycle.

The following plot shows the evolution of the assigned and the average occupation of the SPI TM bandwidth along with the mean ACS count rate evolution (since July 2006). As can be seen, there is a strong correlation between the evolution of the background as measured by the ACS and the overall TM bandwidth usage.



Note: Some more information concerning the SPI operations is provided in the Appendix 8.3.2.

3.2.2 IBIS

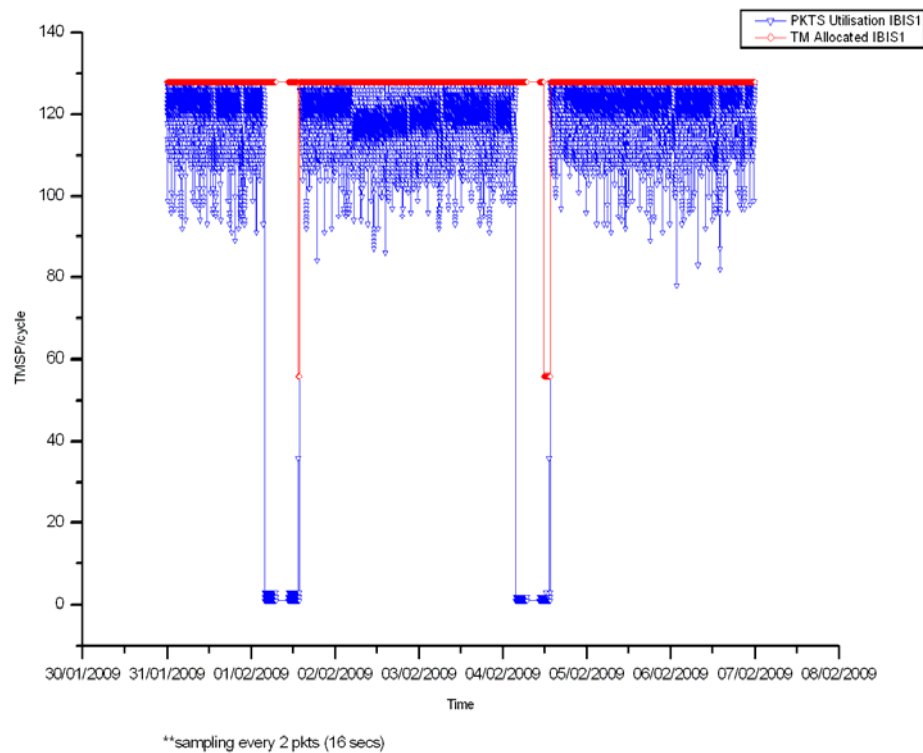
The overall status of the unit is nominal.

During the reporting period, the TM bandwidth statistics were as follows:

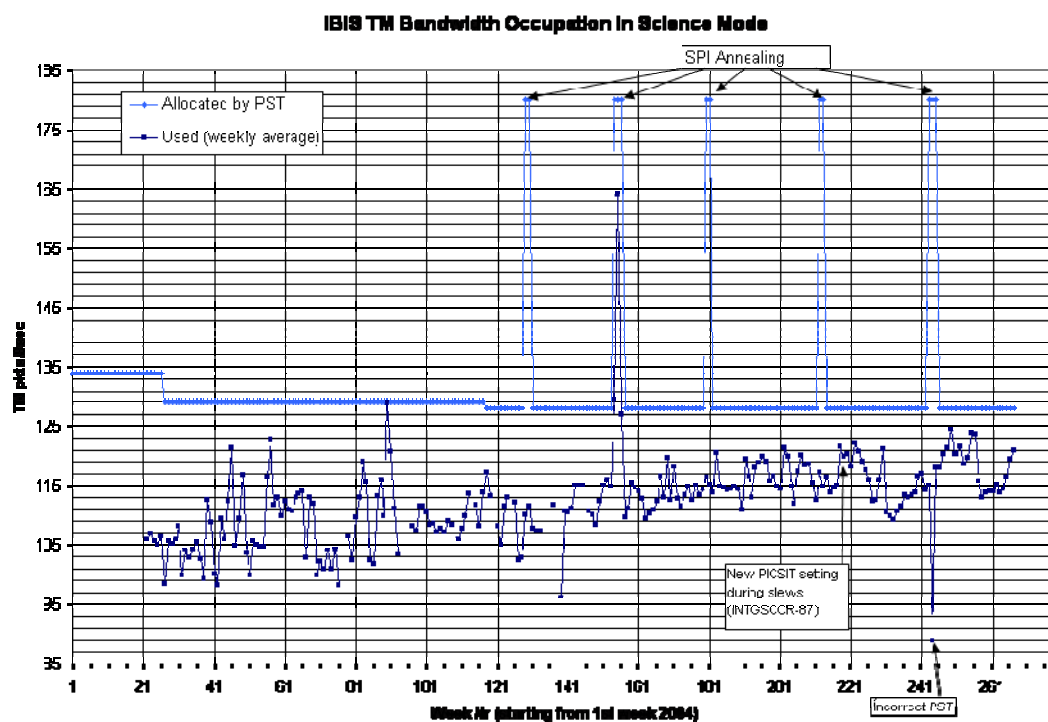
- PST allocation to IBIS above radiation belts: 128 packets/cycle
- IBIS mean bandwidth utilisation in science mode: 120.96 packets/cycle (up 1.38 on previous week)
- Percentage of TM cycles in which full bandwidth was used: 11.31%

The plot below shows the IBIS TM utilisation during the reporting period.

IBIS - TM Bandwidth Utilisation Rev 769-771



A plot of the IBIS weekly bandwidth utilisation since 2004 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. JEM-X2 was dormant (DPE OFF) with no TM slots allocated.

Note: Some more information concerning the JEM-X operations is provided 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 per cycle.

During this reporting period, all of the 143 planned science pointings were executed nominally.

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

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. The sun was blank all week. The risk of solar flares was very low.



Reference: www.spaceweather.com

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

4 Ground Facilities

The Operational ground facilities performance was good this week. No pointing was lost due to ground problems. The overall performance was over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. The FD slew update failed to arrive on 1 occasion due to problems with the job scheduler, there was no impact.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. On DoY 037 a drop in TM occurred from DSS24 for about 30 seconds with no impact.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

An updated PSF has been received for revolution 770 but not used further.

New PSFs have been received for revolutions 775 to 778.

Revolutions 771 to 773 were replanned to accommodate further TOO observations of 1E 1547.0-5408 and changes caused by these. Revolutions 774 to 778 were planned normally. Revolution 774 contains the Crab calibration observations.

New TSFs have been received for revolutions 771 to 773.

2. Observation status

ECS files have been received for revolutions 763 to 765 and processed up to 764.

3. ISOC Science Data Archive

No news.

4. ISOC system

ISOC system V21 has been successfully tested and is to be released on 9 February.

5. Problems

No new problems.

4.3.2 ISDC

Status of ISDC observation processing on 06/02/2009:

- Latest Standard Analysis completed: observation 06200150001 (Centaurus A , Revolution 764) on 06/02/2009.
- Latest products archived: observation 06200150001 (Centaurus A , Revolution 764) on 06/02/2009.
- Latest observation products sent to the observer: observation 06200520002 (PKS 0208-512, Revolution 746) on 24/01/2009.

5 Special Events

6 Anomalies

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

AR id	Date Created	Subject	Segment	Status
INT_SC-245	2009-02-06	IREM counts 2 orders of magnitude too low after SEU recovery.	Payload	Pending
INT_SC-244	2009-02-05	IREM Anomaly: Reset of IREM_CSCI S/W #70, 27/01/2009	Payload	Pending

7 Future Milestones

- 11-02-2009 Switch-over and validation of MPLS line to VIL2. Test will use real data (tracking pass from VIL2).
- 11-02-2009 IOCG meeting
- 13-02-2009 JEM-X2 switch-on for Crab Calibration in revolution 774.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 769

The observation in revolution 769 was a Target of Opportunity, a hexagonal dither of the anomalous X-ray pulsar 1E1547.0-5408 (RA 15:50:55.30, DEC -54:19:02.0), lasting ~58.2 hours.

Revolution 770

The observations in revolution 770 began with a Target of Opportunity, a hexagonal dither of the anomalous X-ray pulsar 1E1547.0-5408 (RA 15:50:55.30, DEC -54:19:02.0), lasting ~14.8 hours. They continued with a hexagonal dither of the radio galaxy Centaurus A (RA 13:25:27.61, DEC -43:01:08.9), lasting ~23.8 hours. This was followed by a hexagonal dither of the star Eta Carinae (RA 10:45:03.59, DEC -59:41:04.3), lasting ~19.4 hours until the end of the revolution.

Revolution 771

The observation in revolution 771 was a Target of Opportunity, a hexagonal dither of the anomalous X-ray pulsar 1E1547.0-5408 (RA 15:50:55.30, DEC -54:19:02.0), lasting ~58.3 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 108; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2009-01-21T21:33:56.000Z	136.4213	F	Automatic TM processing.
2009-01-23T12:09:45.000Z	136.3858	F	Automatic TM processing.
2009-01-24T21:29:32.000Z	136.3616	F	Automatic TM processing.
2009-01-26T11:40:41.000Z	136.3508	F	Automatic TM processing.
2009-01-27T06:54:59.000Z	136.3322	F	Automatic TM processing.
2009-01-27T21:36:53.000Z	136.3206	F	Automatic TM processing.
2009-01-28T13:37:35.000Z	136.3016	F	Automatic TM processing.
2009-01-29T05:37:29.000Z	136.2670	F	Automatic TM processing.
2009-01-29T06:53:21.000Z	136.2523	F	Automatic TM processing.
2009-01-29T11:31:53.000Z	136.2040	F	Automatic TM processing.
2009-01-30T20:48:21.000Z	136.1850	F	Automatic TM processing.
2009-02-01T11:18:49.000Z	136.1510	F	Automatic TM processing.
2009-02-02T21:25:08.000Z	136.0877	F	Automatic TM processing.
2009-02-04T11:04:25.000Z	136.0671	F	Automatic TM processing.
2009-02-05T21:24:36.000Z	136.0506	F	Automatic TM processing.

This report was generated Fri Feb 6 08:00:36 GMT 2009

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, 31/01/2009 – 06/02/2009

The AOCS operations were executed from the Automatic Timeline.

During this period, 101 Open Loop Slews, 54 Closed Loop Slews and 4 Momentum Biases were executed (as reported by ACC OEM).

No slews were missed from TL, during the observation period.

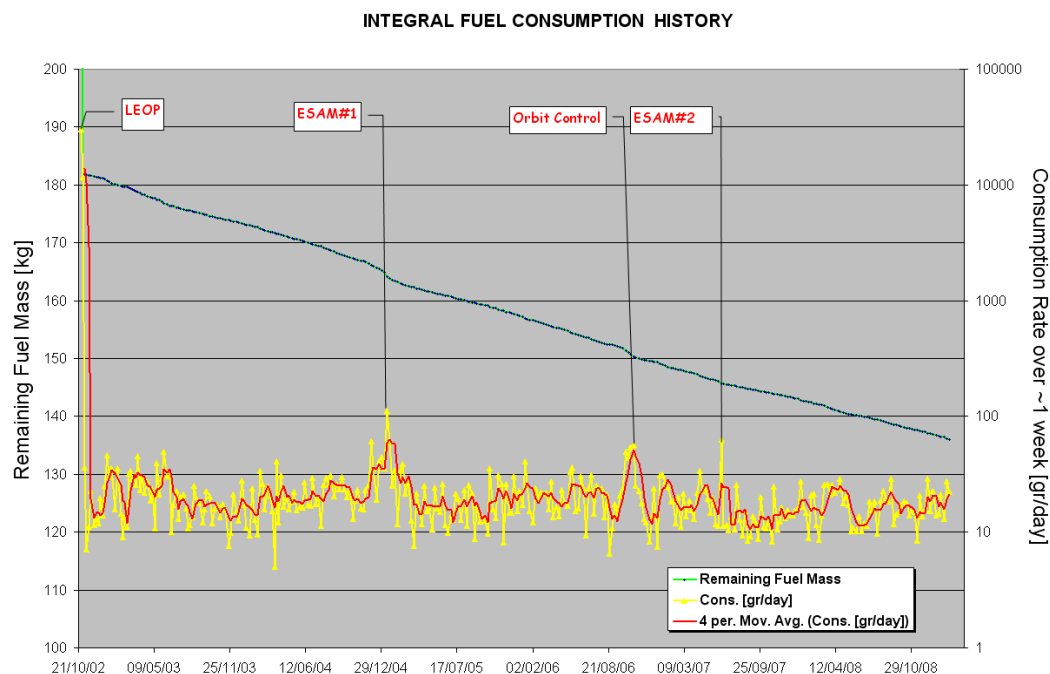
The OTF was not reached during part of PID 07710009, 07710037, due to loss of guide star.

Orbit Control

The present perigee altitude is <8800 km and Redu coverage is from altitude 25000 km after perigee to 20400 km before perigee.

Fuel consumption

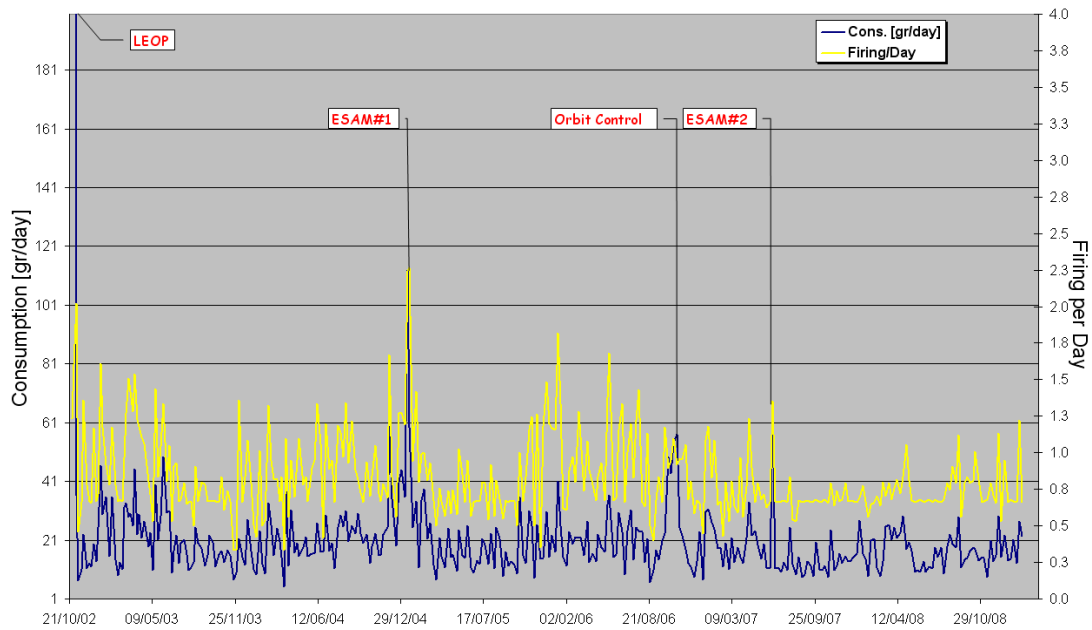
The fuel consumption (total, grams per day) over the period between 01/11/2002 and 06/02/2009 is reported in the plot below.



The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 06/02/2009 is reported in the plot below.

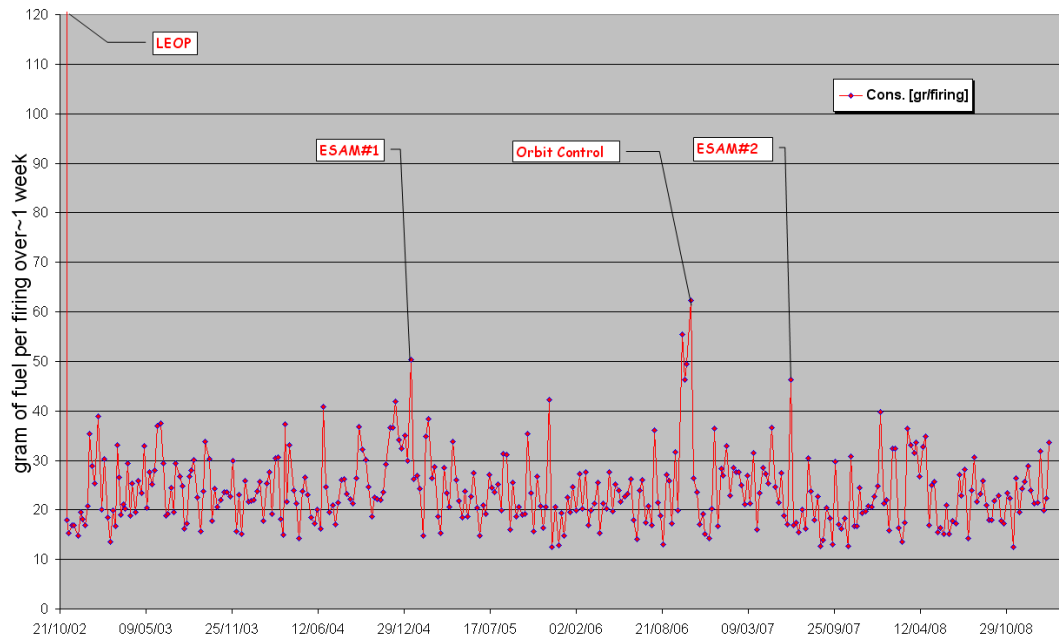
INTEGRAL FIRING PER DAY HISTORY



The above plot considers the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 06/02/2009 is shown in the plot below.

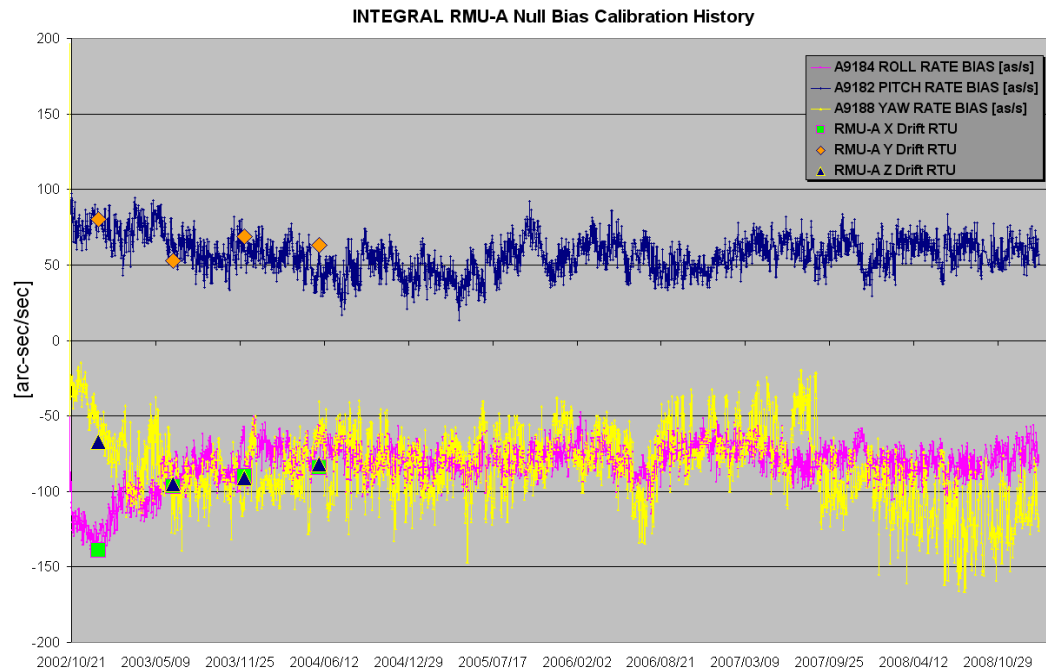
INTEGRAL FUEL MASS PER FIRING HISTORY



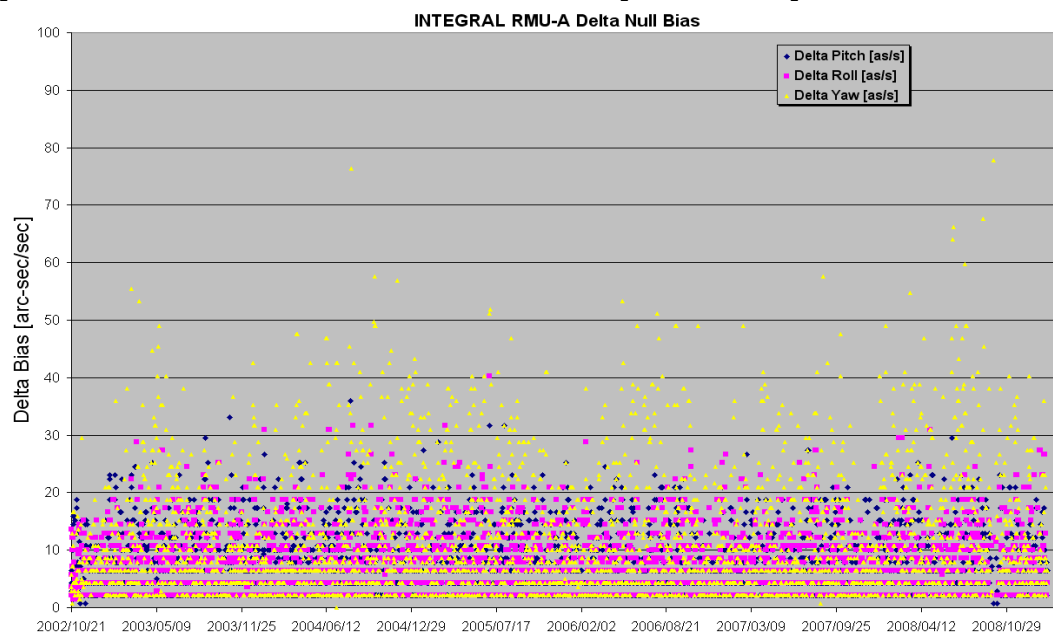
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 06/02/2009 is reported in the plot below.

The evolution of the drift on yaw channel is under constant monitoring but the values are still well within the specs. At moment the current constraints (for drift update generation) on the FDS have been relaxed to cope with the current situation.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 06/02/2009 is reported in the plot below.



31/01/2009 (Day of Year 031, Revolution 769)

Nothing to report.

01/02/2009 (Day of Year 032, Revolution 769-770)

Nothing to report.

02/02/2009 (Day of Year 033, Revolution 770)

Nothing to report.

03/02/2009 (Day of Year 034, Revolution 770)

Nothing to report.

04/02/2009 (Day of Year 035, Revolution 770-771)

Loss of guide star: at 19:12:16z a loss of the selected guide star occurred during PID 07710009. The origin of the event is not clear, likely due to SEU affecting the STR caused by the low Perigee altitude the mission is reaching ($\sim < 9000$ Km), due to natural orbit evolution.

As foreseen by the IPS logic, the ACC switched ON the IMU 1, a new automatic mapping was commanded and a new guide star picked. The next slew 07710010 was manually updated in TL.

No impact on TL.

The OTF was not reached during the part of PID 07710009.

05/02/2009 (Day of Year 036, Revolution 771)

Loss of guide star: at 23:59:55z a loss of the selected guide star occurred during PID 07710037. The origin of the event is not clear, likely due to SEU affecting the STR.

As foreseen by the IPS logic, the ACC switched ON the IMU 1, a new automatic mapping was commanded and a new guide star picked. The next slew 07710038 was manually updated in TL.

No impact on TL.

The OTF was not reached during the part of PID 07710037.

06/02/2009 (Day of Year 037, Revolution 771)

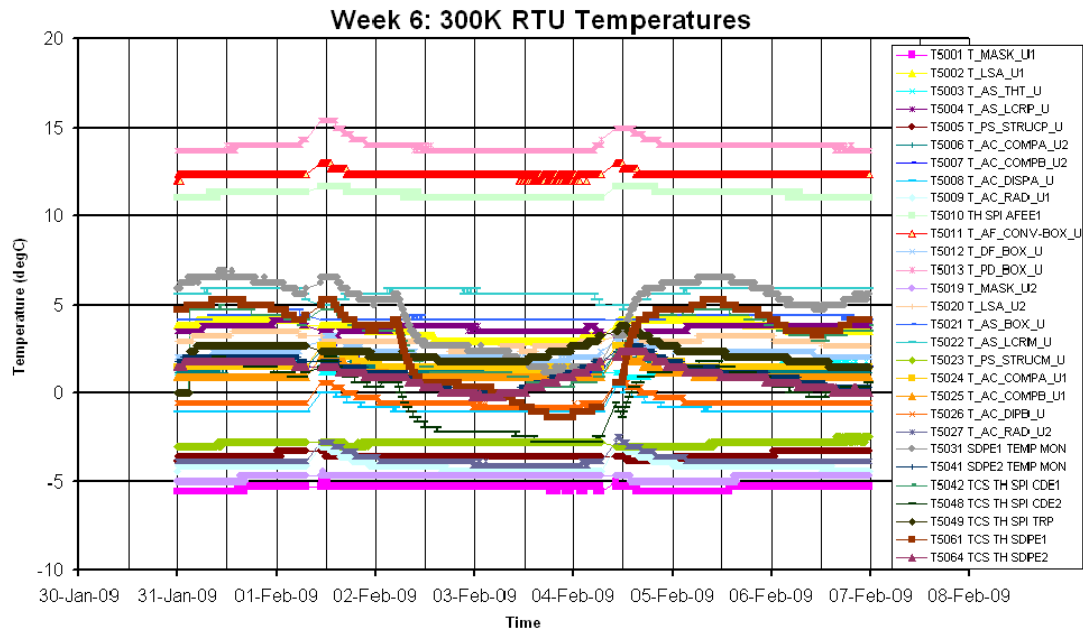
FDS problem during slew update: at 10:20z a problem (job scheduler) on FDS caused the slew update not to be generated for slews ID 07710048.

A quick manual recovery by SPACON and FD Team was then performed, the job scheduler restarted and the slew ID 07710048 updated in TL.

No impact on TL.

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.



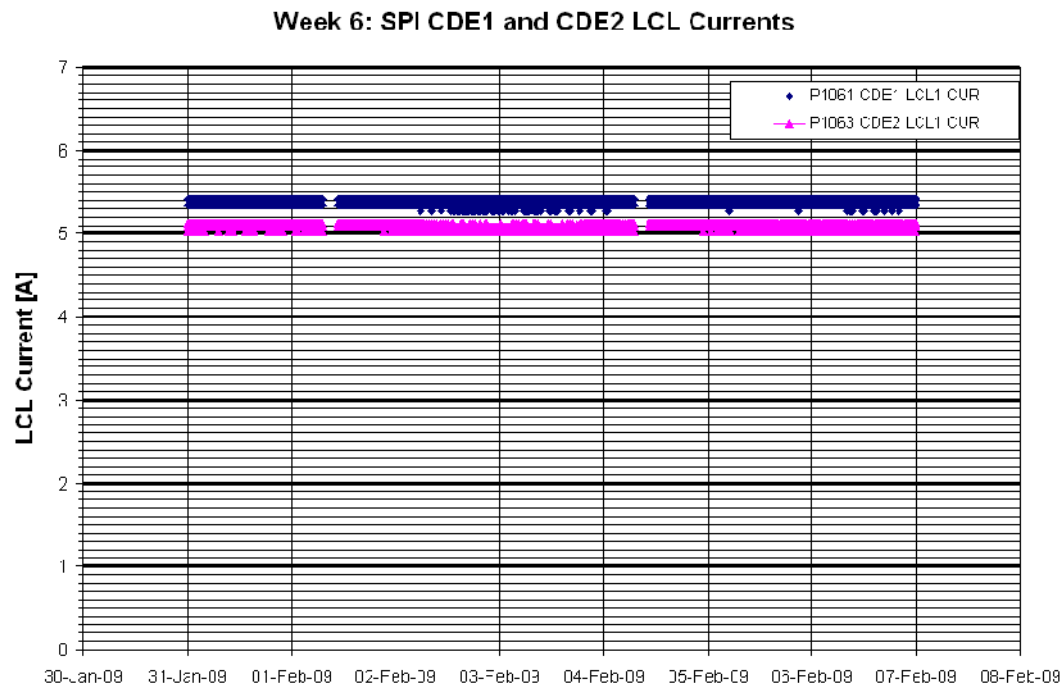
Stirling Compressors and Cryostat: The performance of the compressors is nominal.

The cold plate temperature was maintained in the range 80K +/-1K.

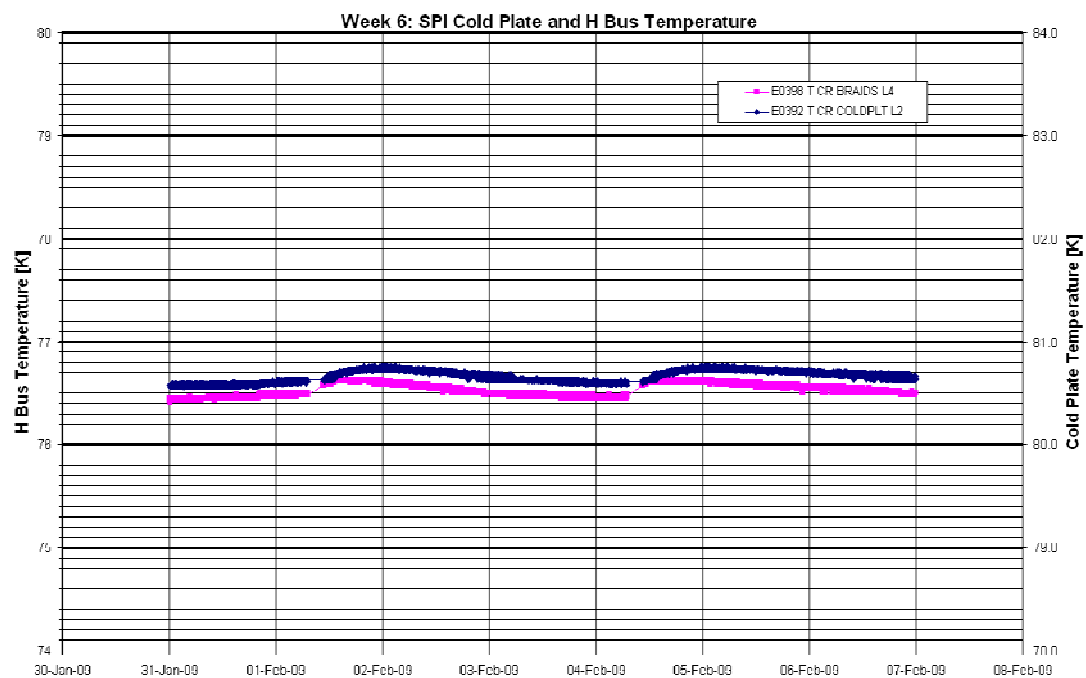
The stroke of all four compressors was set to 42 throughout the week and the average CDE LCL currents were as follows:

- CDE1 LCL Current = 5.36A
- CDE2 LCL Current = 5.08A

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



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

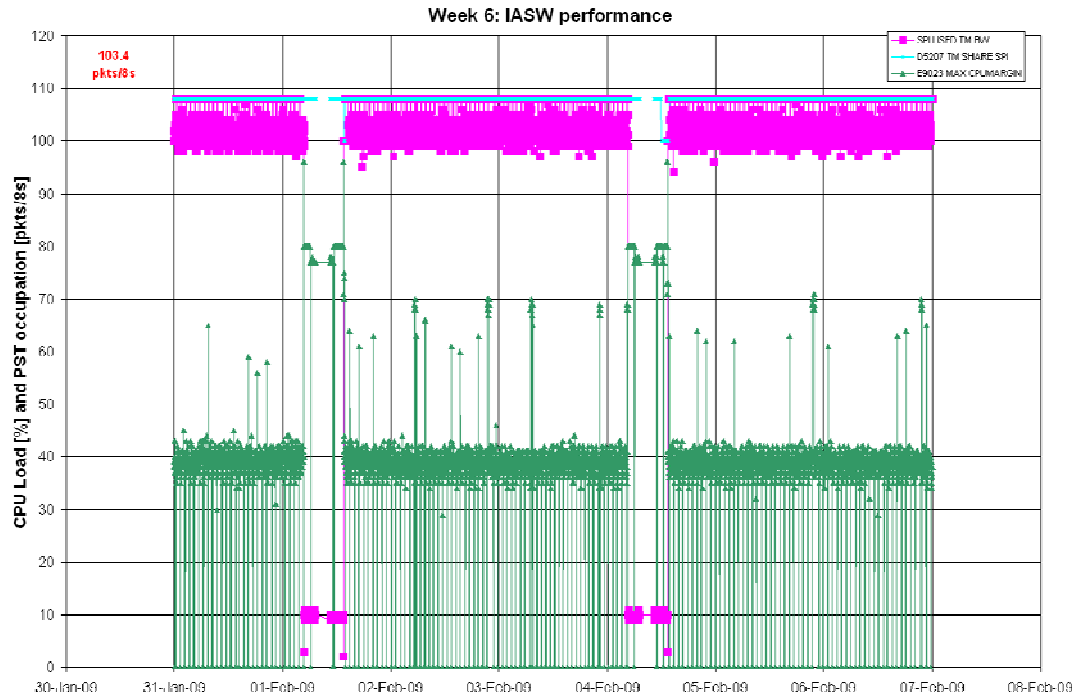


DPE & IASW: The DPE health and IASW performance are nominal.

The IASW version installed is v4.3.4 with SE compression only enabled and the spectra scaling factor set to 8/19 SE. The average TM bandwidth occupation of SPI

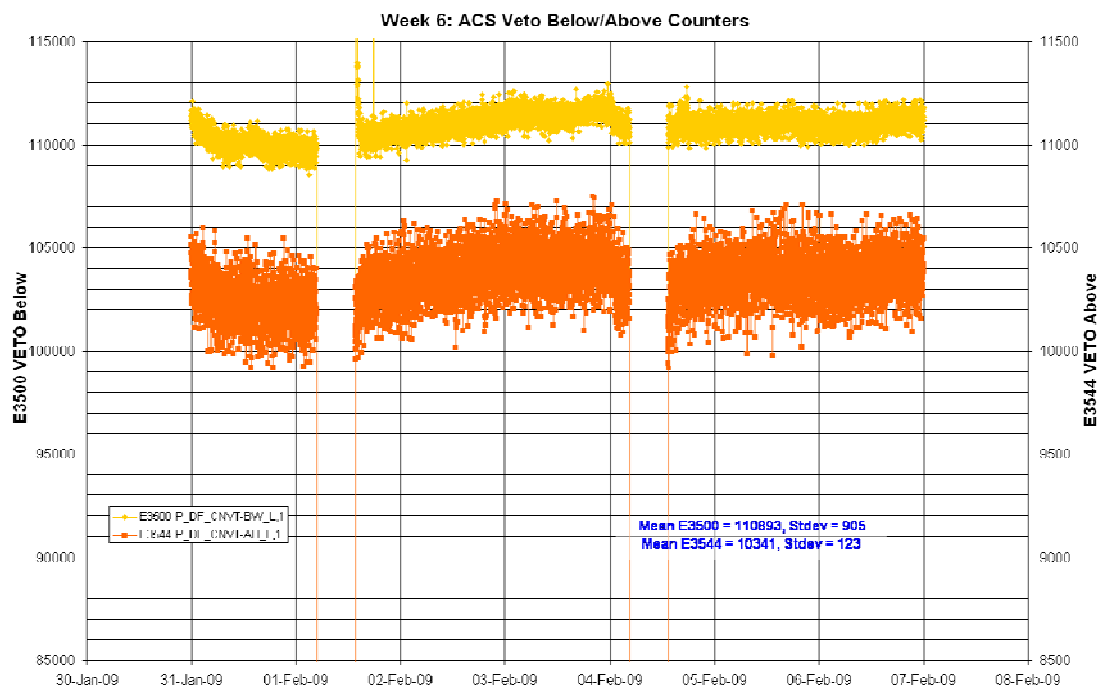
was 103.4 packets/cycle over the science window when the TM allocation was 108 packets/cycle.

The following plot shows the IASW performance in terms of TM bandwidth occupation and DPE CPU load during the reporting period.

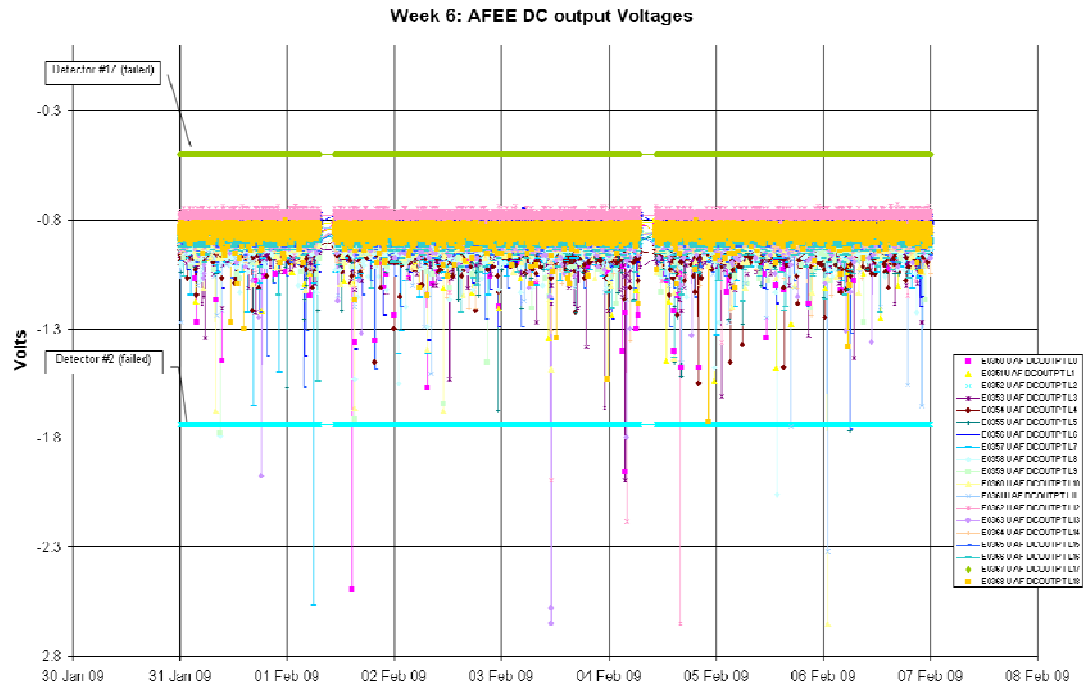


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

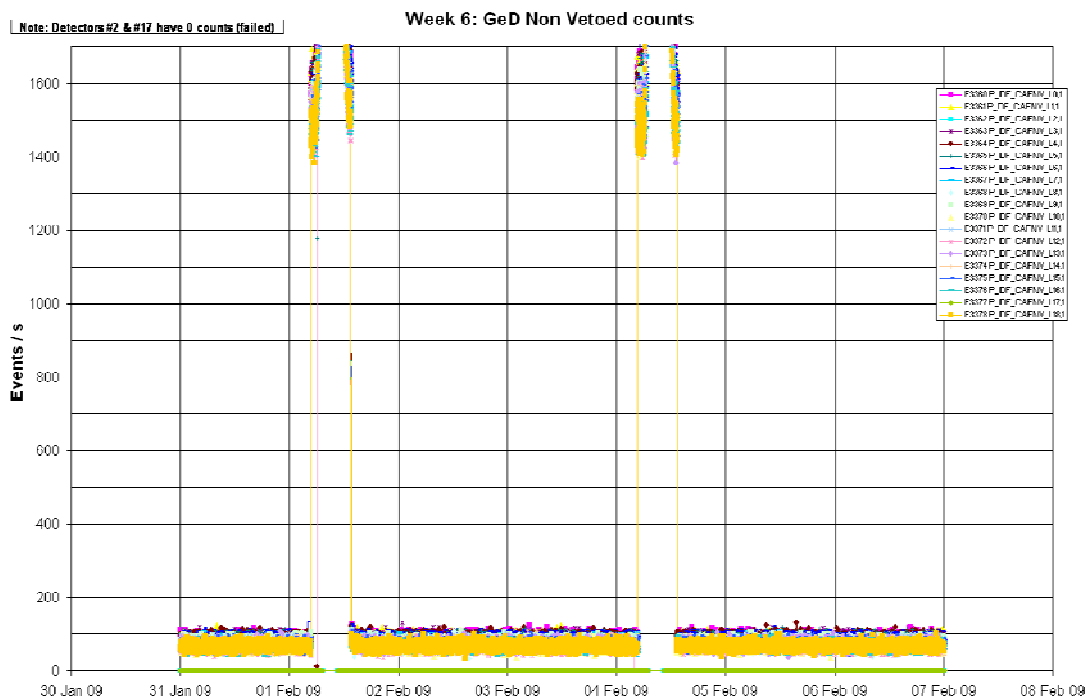
The following plot shows the ACS overall count rate evolution during the reporting period:

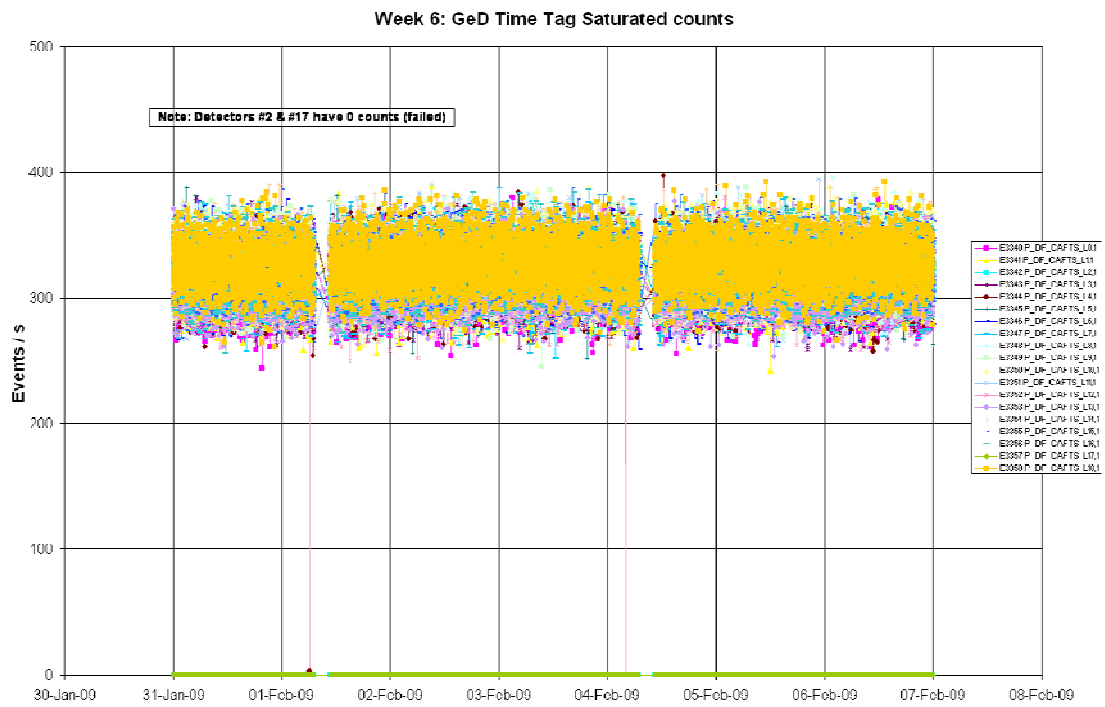
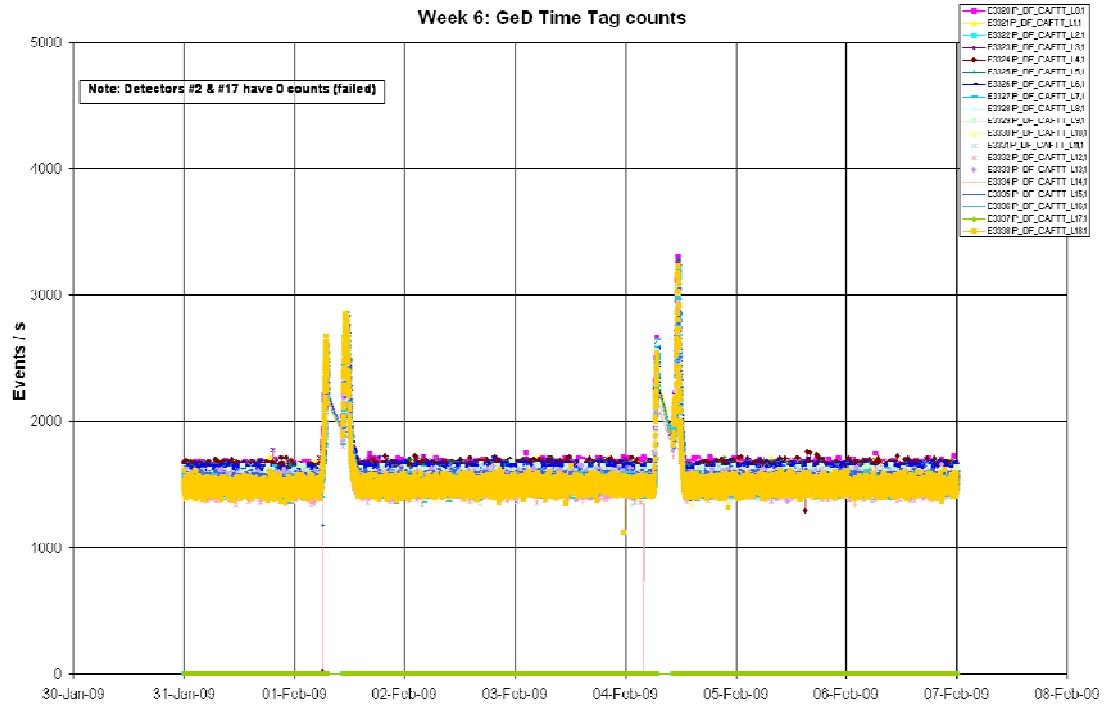


AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.

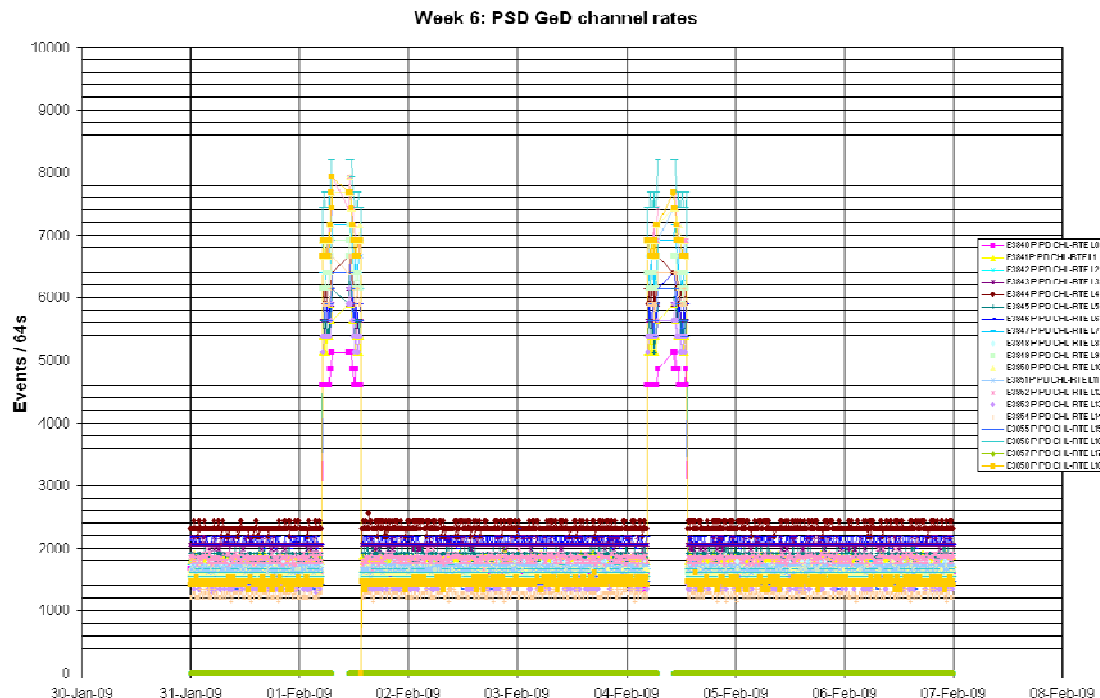


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoes, Time Tag and Time Tag Saturated Event count rates during the reporting period.





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



Event Log:

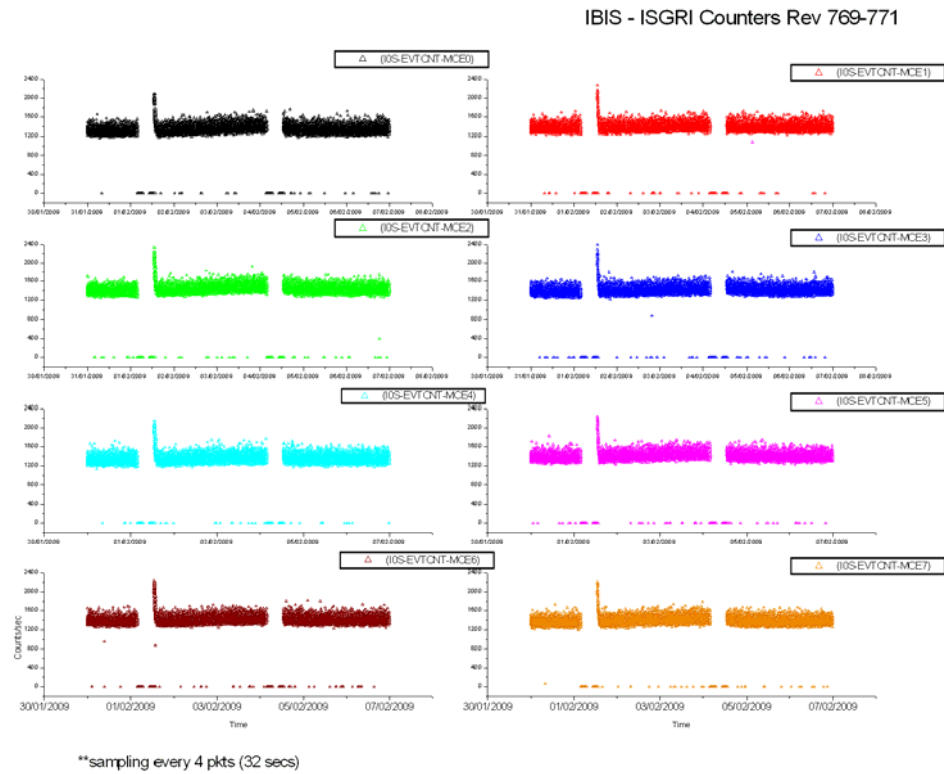
The following non-nominal events occurred with SPI during the reporting period:

- On 2009-01-31 at 23:45:22Z TM parameter E3235 went OOL (value = NO EXIST VAL). This is the ACS FEE temperature status #71. The ED EEORTM01 was sent at 23:53:28Z to refresh the TM, after which this parameter returned within limits.
- Due to continuing high radiation after the expected radiation belt exit of revolution 770, TM parameter E3500 (ACS CntVetoBelow) went OOL High on 2009-02-01 at 13:41:05Z. As it returned within limits of its own accord at 13:57:05Z, no action was taken.
- On 2009-02-04 at 20:27:30Z four occurrences of OEM APID 1024 ID 229 EXCEPTION SPI1 PARTIAL FLAG OVERFLOW were received with parameter E9783 (SUBBLOCK ID) as follows:
 E9783 SUBBLOCK ID SP16
 E9783 SUBBLOCK ID SP18
 E9783 SUBBLOCK ID SP10
 E9783 SUBBLOCK ID SE
 As these OEMs stopped of their own accord, no action was taken.
- On 2009-02-05 at 20:35:33Z TM parameters E1296 and E1297 went OOL (Value = ERROR STATE), indicating an ISB response parity error and an ACS FEE Configuration error. As they returned within limits of their own accord at 20:35:41Z, no action was taken.

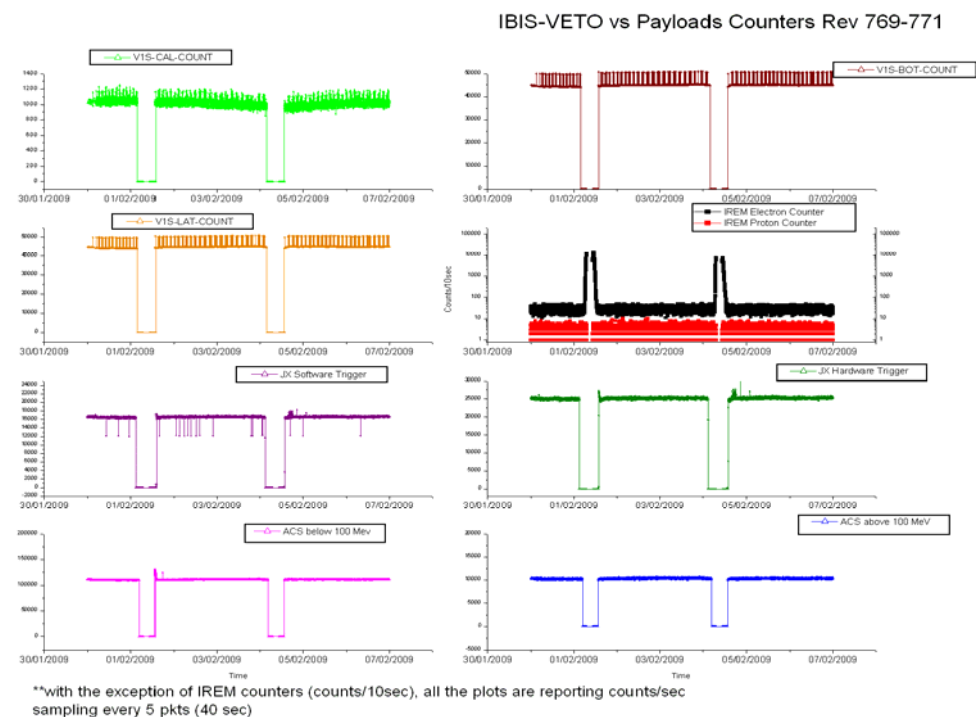
8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

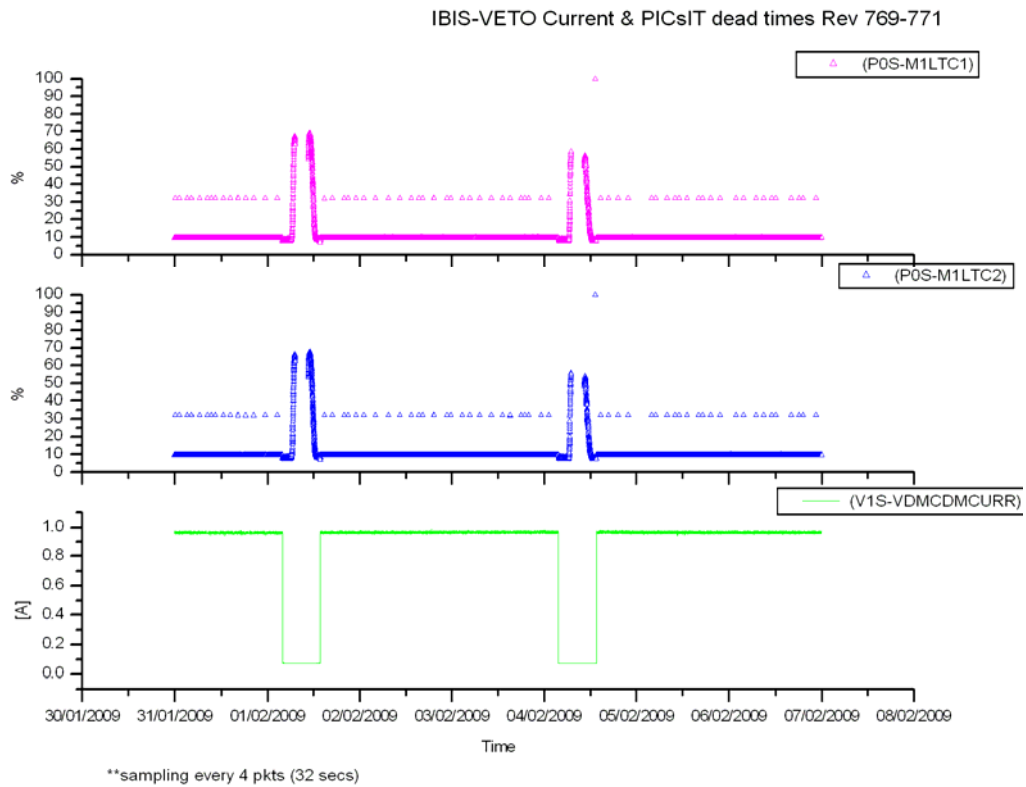


VETO vs Payload Counters:

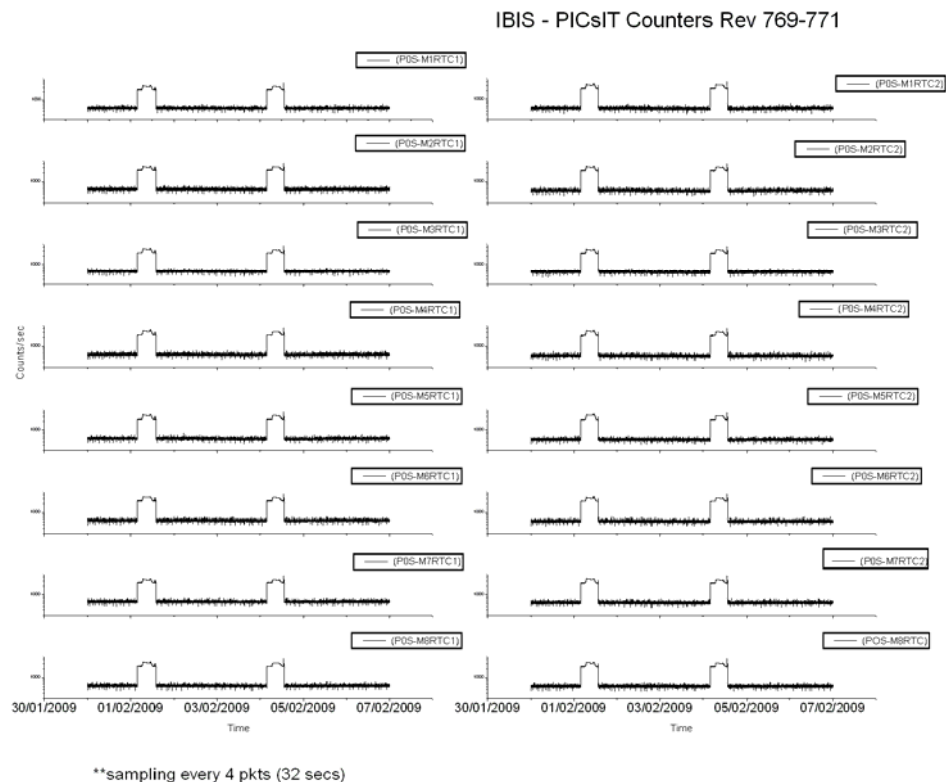


The week was characterised by slightly high radiation after the expected radiation belt exit of revolution 770 as reported by the payload.

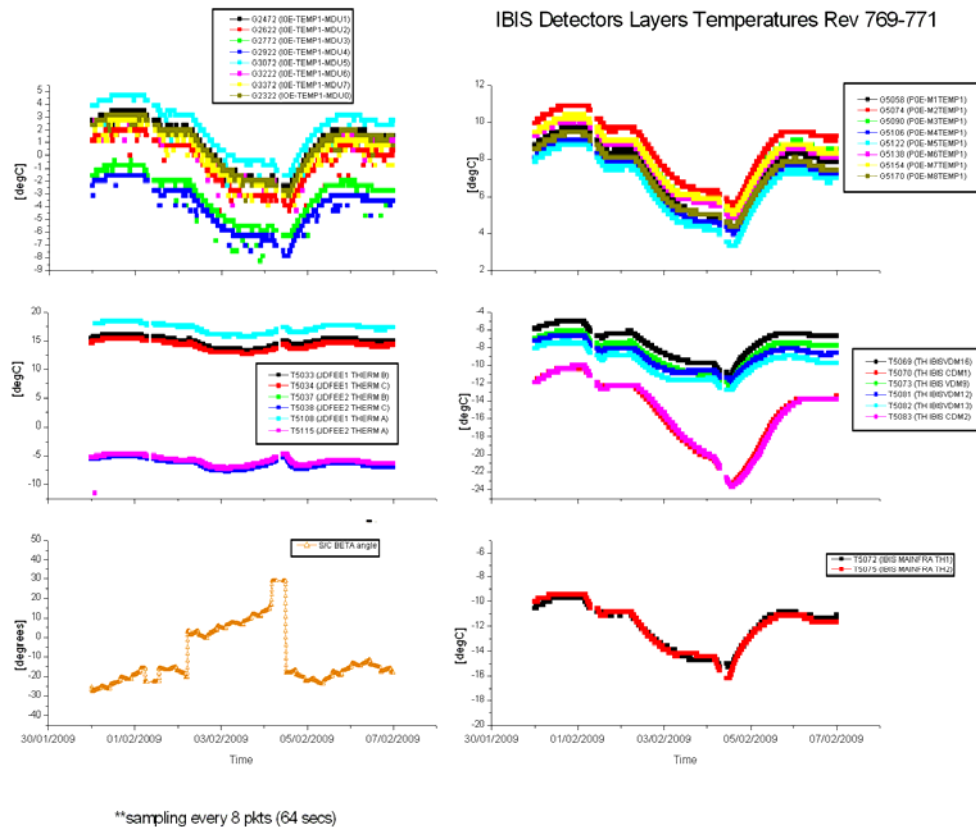
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report:

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), G5002 (POS-Mi_RTC1) and G5003 (POS-Mi_RTC2) families and G2000 family (IOE-OVFWPXADD-Mi) were received during the radiation belt passages.

2009-01-31 (DOY 031, Rev 769)

At 10:11:40Z TM parameter G2070 went OOL, indicating an overflow of the noisy pixel address buffer in MCE5. As it returned within limits of its own accord at 10:11:56Z, no action was taken.

2009-02-01 (DOY 032, Rev 769-770)

At 06:57:06Z, during the radiation belt passage of revolution 769-770, TM parameter G5079 (PDM2 +2.5 V) went OOL High (value = 2.60509804V), returning within limits of its accord at 06:57:37Z. It went OOL again at 11:26:57Z, returning within limits at 11:27:29Z and therefore no action was taken.

At 13:20:36Z, during the execution of the ED GEISCL03 before radiation belt exit, TM parameters G2041 and G2055 went OOL Warning High. These are the number of events triggering the MCE2 and MCE3 per second respectively. As they had both returned within limits of their own accord by 13:23:16Z, no action was taken.

2009-02-02 (DOY 033, Rev 770) to 2009-02-03 (DOY 034, Rev 770)

IBIS operations executed nominally.

2009-02-04 (DOY 035, Rev 770-771)

At 22:48:29Z TM parameter G2070 went OOL, indicating an overflow of the noisy pixel address buffer in MCE5. As it returned within limits of its own accord at 22:48:45Z, no action was taken.

2009-02-05 (DOY 036, Rev 771)

TM parameter G2070 went OOL on several occasions between 01:06:29Z and 07:29:57Z, indicating an overflow of the noisy pixel address buffer in MCE5. As in each case it returned within limits at the next TM cycle, no action was taken.

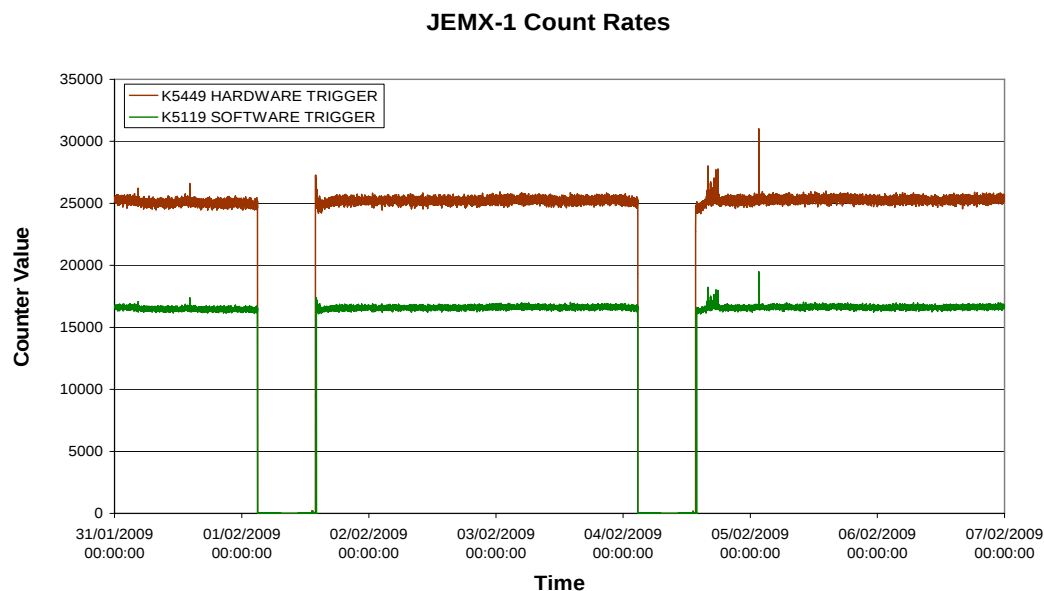
2009-02-06 (DOY 037, Rev 771)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

JEM-X Count Rates

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



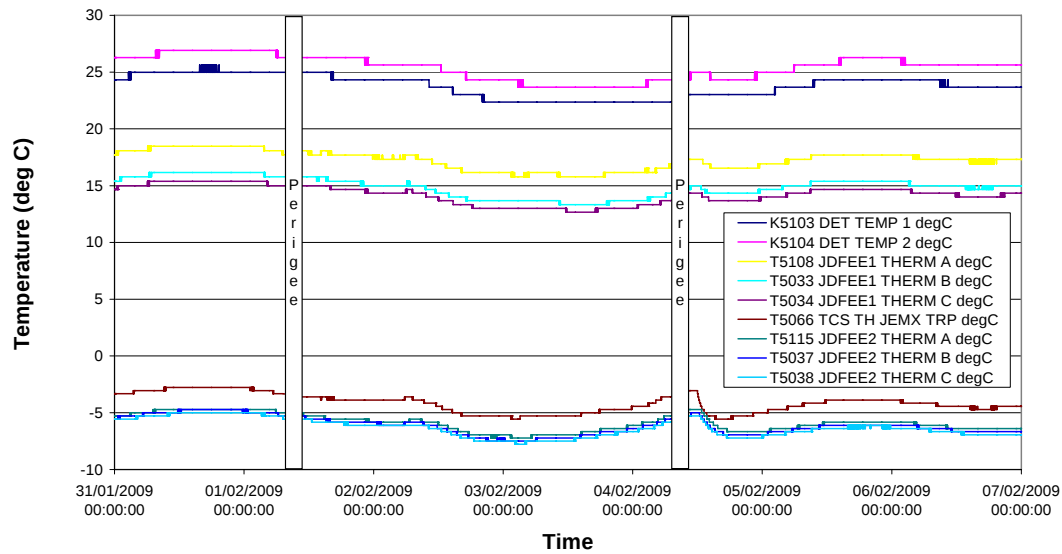
JEM-X Temperatures

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

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

² Data sampled (1 frame in 8)

JEM-X Detector & DFEE Temperatures



JEM-X Daily Report

2009-01-31 (DoY 031, Rev 769) to 2009-02-03 (DoY 034, Rev 770)

JEM-X 1 operations executed nominally.

2009-02-04 (DoY 035, Rev 770-771)

The following OEMs were received at the indicated times:

2009.035.20.19.26.058	2009.035.20.19.28.910	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E	E					
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS					4989
2009.035.20.19.26.058	2009.035.20.19.28.967	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E	E					
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS					4989
2009.035.20.19.26.058	2009.035.20.19.28.968	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E	E					
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS					4989
2009.035.20.19.26.058	2009.035.20.19.28.969	1536	RealTime	5		ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535	PR N
E	E					
FIX6		0				
K9079	MESS CLASS	2				
K9080	MESS ID	5				
K9074	TASK ID 16	12				
K9067	LOGICAL ADDRESS					4989

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2009.035.20.19.26.058	2009.035.20.19.28.970	1536	RealTime	5	ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535 PR N
E E					
FIX6		0			
K9079	MESS CLASS	2			
K9080	MESS ID	5			
K9074	TASK ID 16	12			
K9067	LOGICAL ADDRESS	4989			
2009.035.20.19.26.058	2009.035.20.19.28.971	1536	RealTime	5	ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535 PR N
E E					
FIX6		0			
K9079	MESS CLASS	2			
K9080	MESS ID	5			
K9074	TASK ID 16	12			
K9067	LOGICAL ADDRESS	4989			
2009.035.20.19.26.058	2009.035.20.19.28.971	1536	RealTime	5	ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO			0	0	65535 PR N
E E					
FIX6		0			
K9079	MESS CLASS	2			
K9080	MESS ID	5			
K9074	TASK ID 16	12			
K9067	LOGICAL ADDRESS	5336			

No action was taken and there was no impact.

2009-02-05 (DoY 036, Rev 771)

At 01:36:03, parameters K5136 & K5449 briefly exceeded soft limits, no action was taken and there was no impact.

2009-02-06 (DoY 037, Rev 771)

JEM-X 1 operations executed nominally.

8.3.5 OMC Operations

2009-01-31 (DoY 031, Rev 769) to 2009-02-06 (DoY 037, Rev 771)

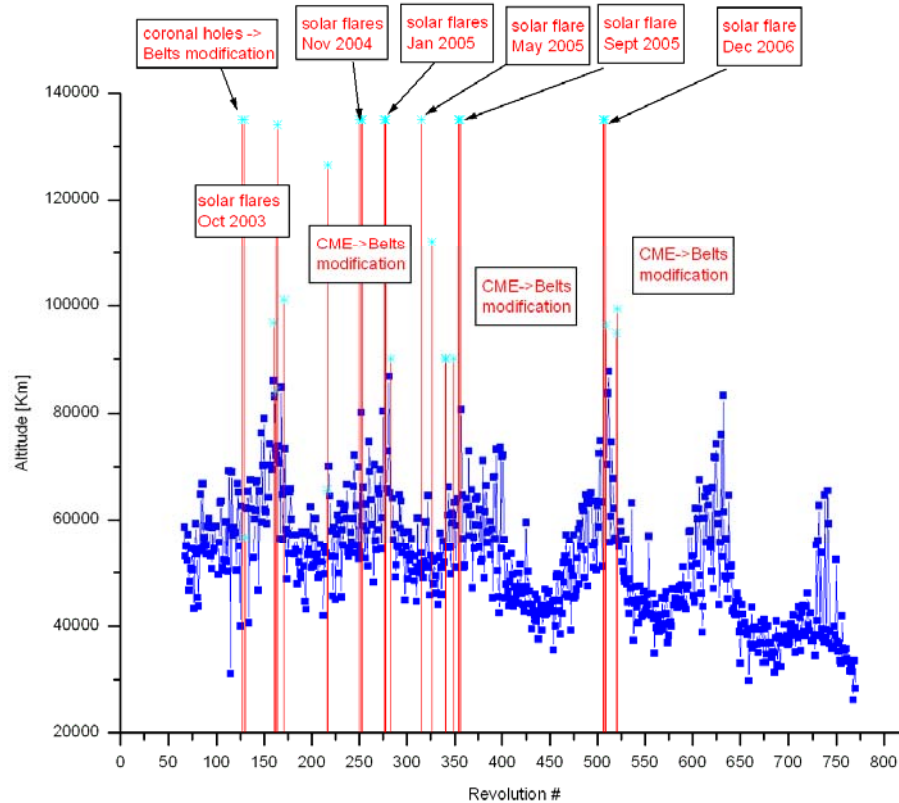
Nothing to report.

On DoY 032 at 04:45:51 and DoY 035 at 04:32:39 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

Evolution of Radiation Belt Entry 2003-2008



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]
769	RAD_ENTR R 2009-02-01T04:45:45Z	01/02/2009 06:12:54	33502.1	01-Feb-2009 06:06:29	34994.37
770	RAD_EXIT R 2009-02-01T13:32:30Z	01/02/2009 12:44:22	>>33978.3	01-Feb-2009 12:46:29	46089.21
770	RAD_ENTR R 2009-02-04T04:32:31Z	04/02/2009 06:26:30	28301.1	04-Feb-2009 05:53:38	34895.46
771	RAD_EXIT R 2009-02-04T13:18:48Z	04/02/2009 12:26:54	45728.6	04-Feb-2009 12:33:38	46267.37

Reference

High radiation

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)

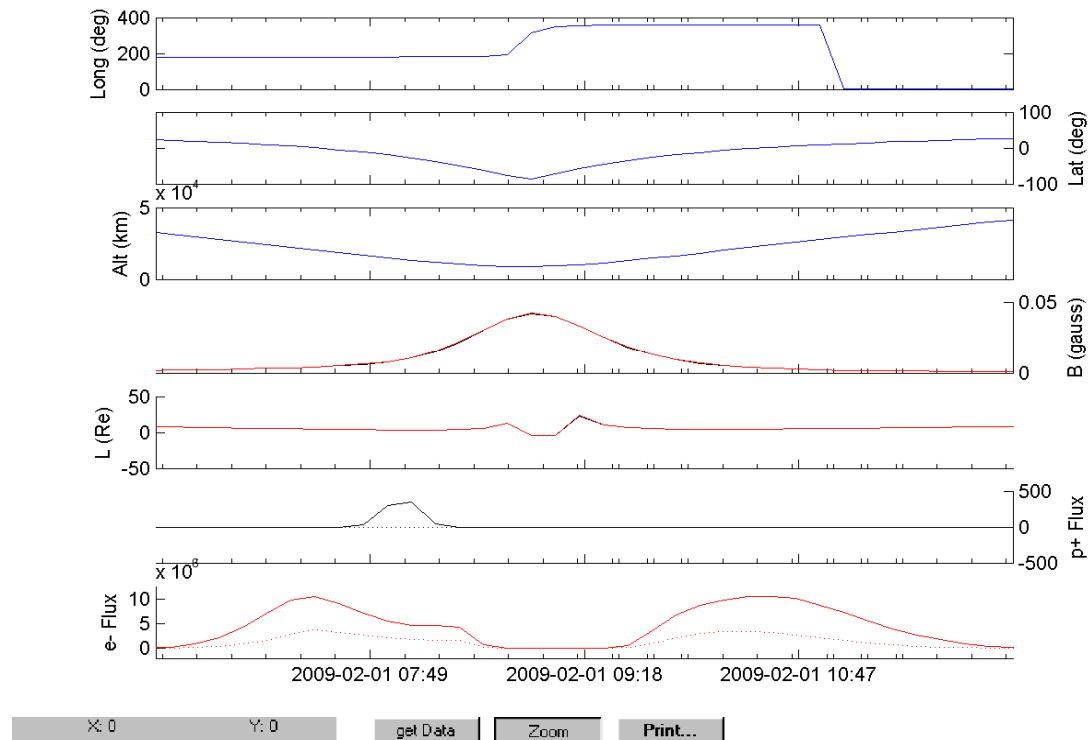
* Rad belt entry time ignoring previous threshold crossings where a gap of more than 30 minutes is present.

IREM radiation counters:

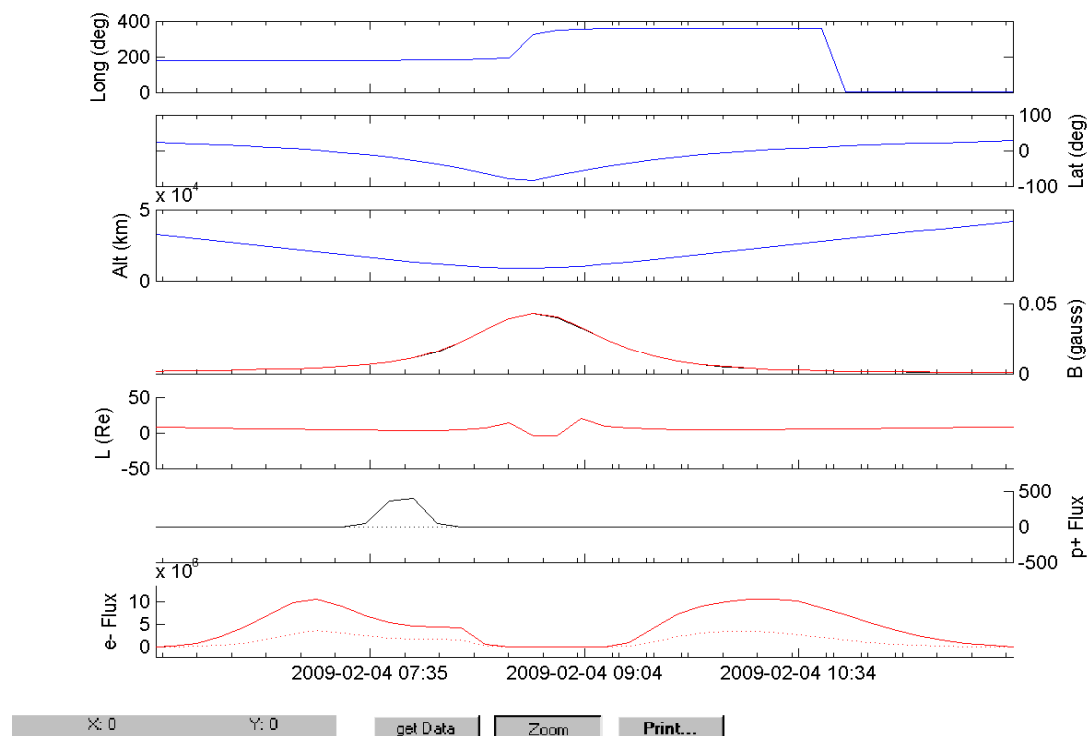
The IREM radiation counter plots are not available this week.

IREM Predicted Radiation Belt Passages

Rev 769



Rev 770



Radiation Assessment

Generated with SEIS Report and Analysis tool.

INTRODUCTION

This note summarises the space weather status over the observation period

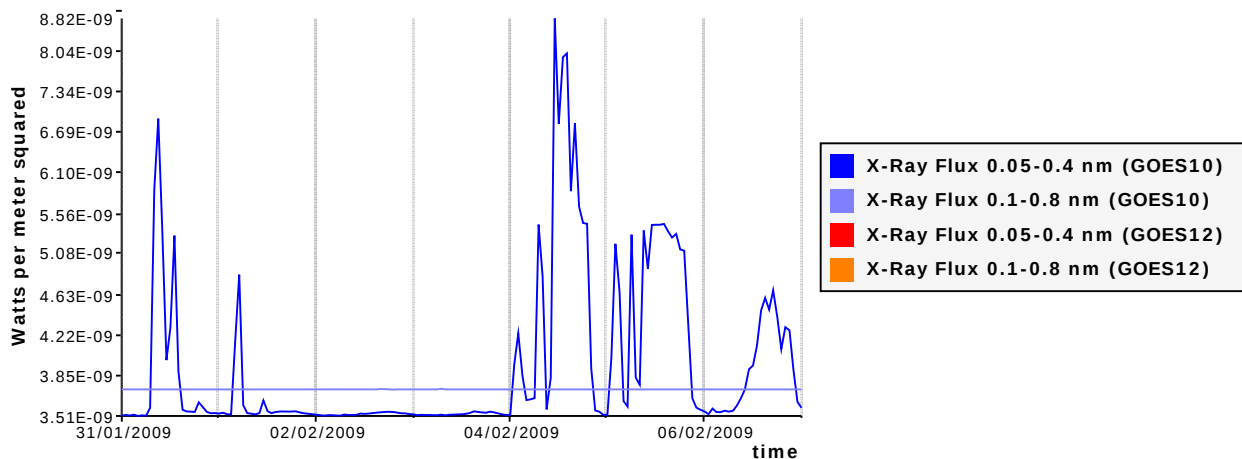
DAILY SUN

see in WR section 3.2.5

RADIATION FLUXES

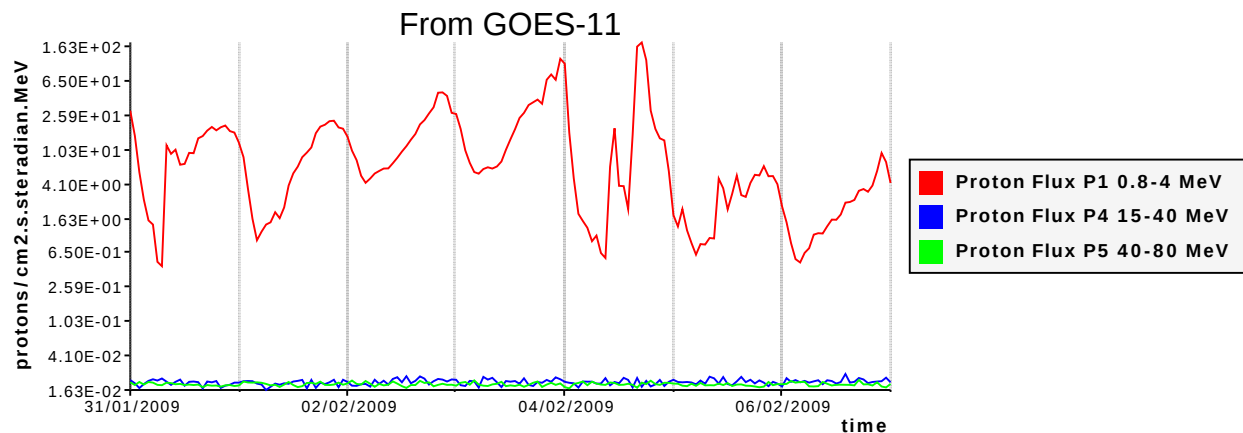
X-ray fluxes

X-ray fluxes for different energies are presented below as reported by GOES satellites. From $1\text{E-}5$ W/m², they start featuring significant radiation activity corresponding to M-class solar flares from $1\text{E-}5$ to $1\text{E-}4$ W/m², and to X-class solar flares from $1\text{E-}4$ and onwards.



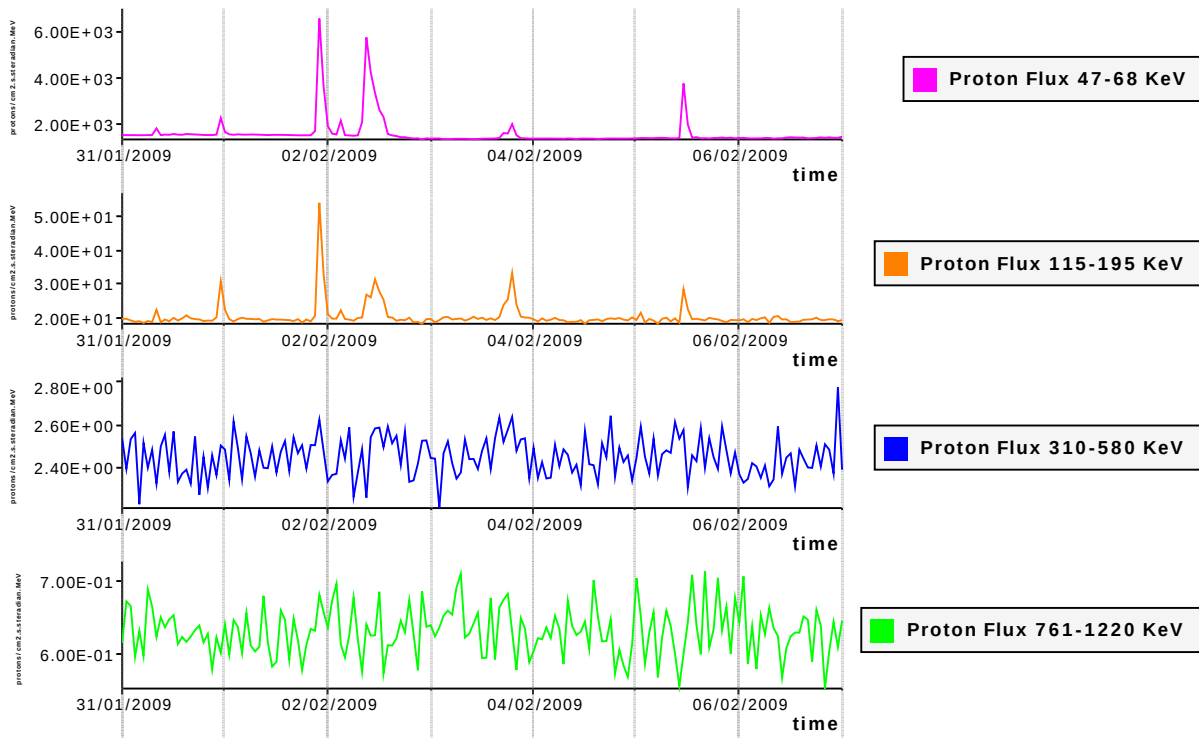
Proton fluxes (GOES-11)

Proton fluxes as measured by GOES satellites are presented in the following plot. Usually P1 oscillates between $1\text{E}+1$ and $1\text{E}+2$, while P2 and P3 evolve around $1\text{E-}2$.



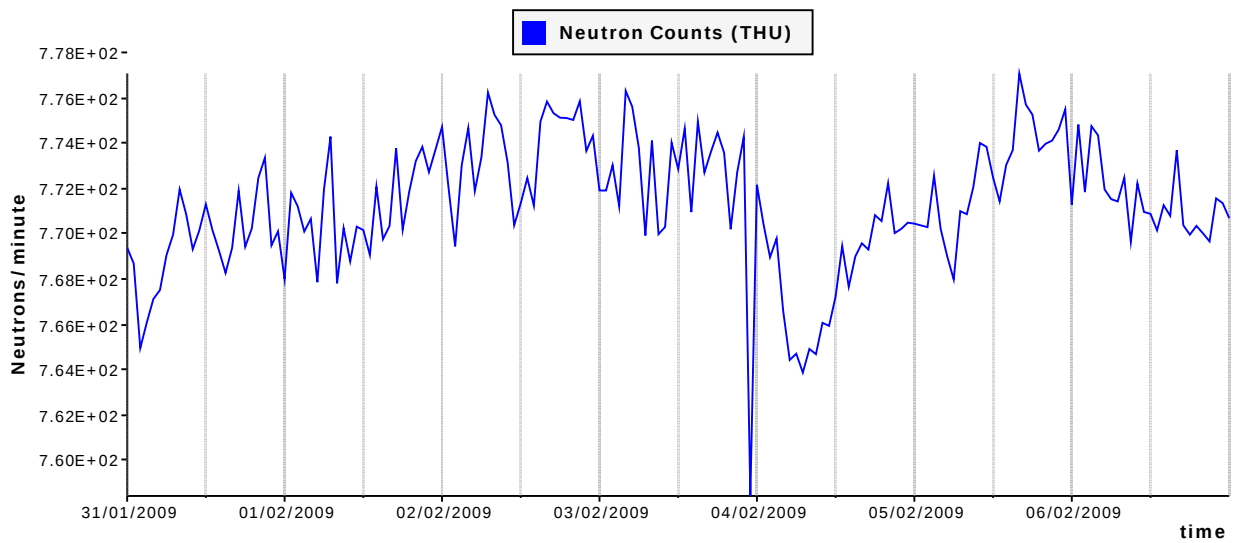
Proton fluxes (ACE)

Proton fluxes as measured by ACE satellite are presented in the following plot.



Neutron counts

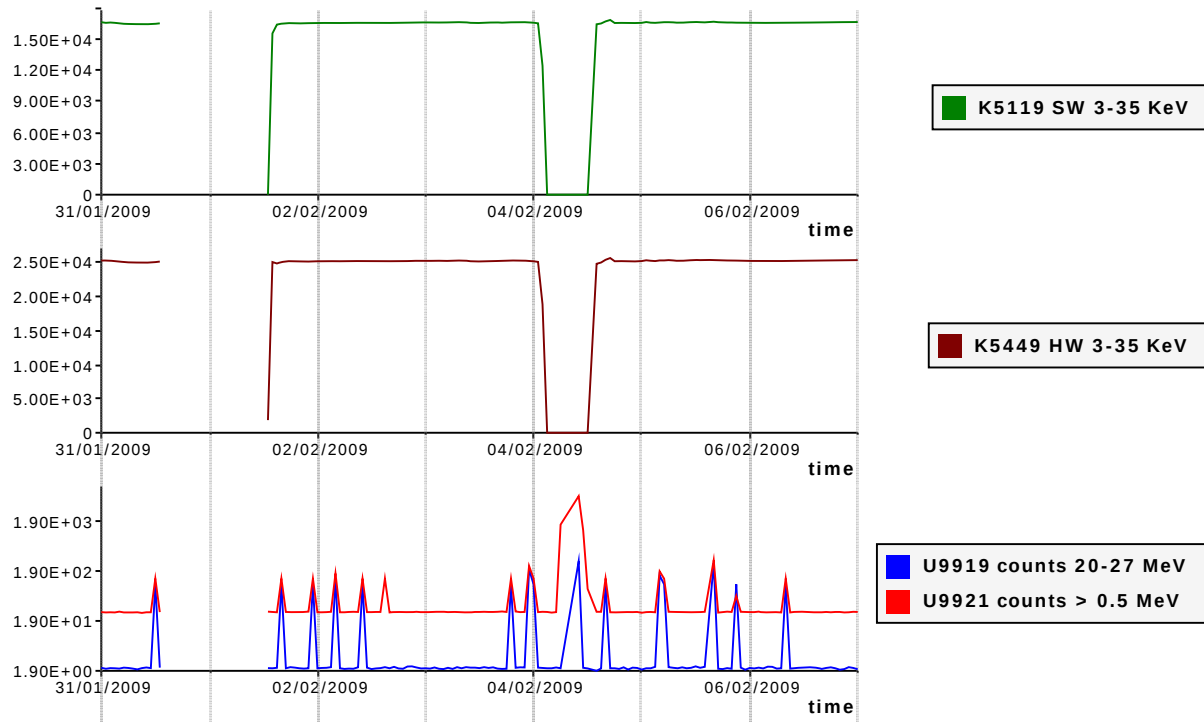
The neutron counts for the last 3 days are presented in the following plot. Nominally they remain stable around $7.2\text{E}+2$.



IREM and JEM-X (INTEGRAL)

IREM proton and electron fluxes as well as JEM-X1 software and hardware triggers are presented in the following plots.

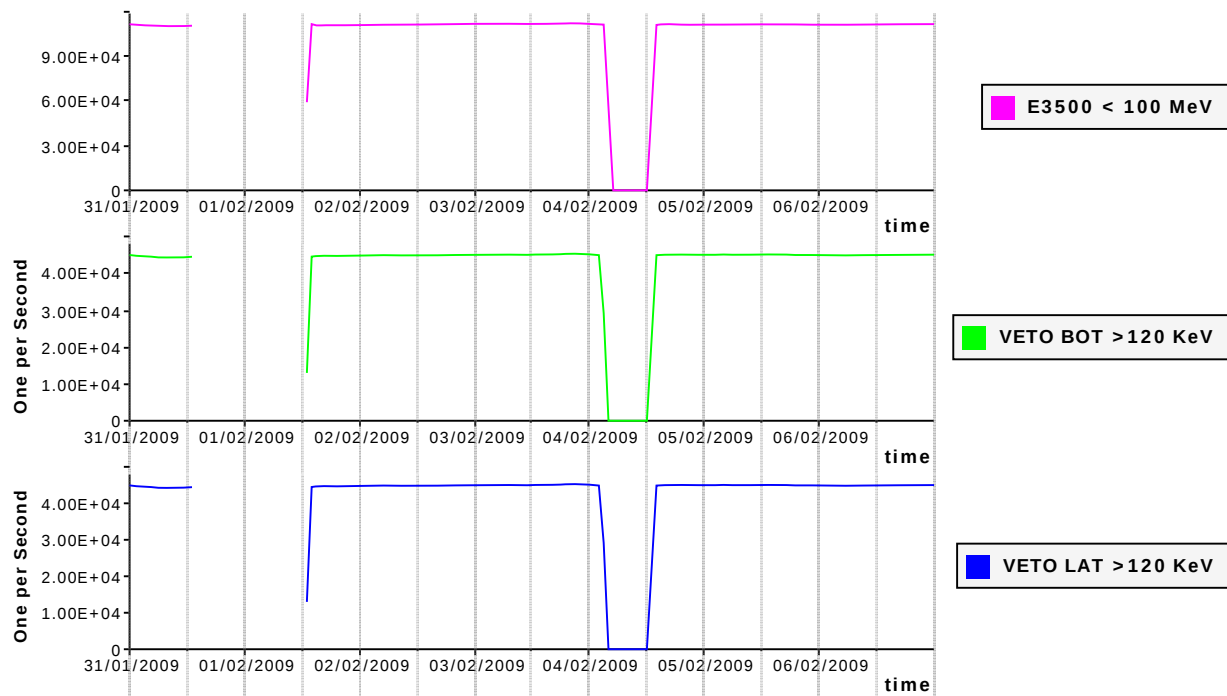
Nominal values are respectively about 1 and 18 for IREM counts, and, 13000 and 19000 for JEM-X ones.



SPI and IBIS (INTEGRAL)

SPI-ACS counters below 100MeV as well as IBIS-VETO bottom and lateral counters are presented in the following plots.

Nominal values are respectively about 90000 for SPI counts, and 36000 for IBIS ones.



SOLAR FLARES FORECAST

The probabilities of M and X-class solar flares during the last month are presented below. Chances of solar flare start to be meaningful from 15%.

