

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 336
Week 09
02.03.09
Routine Phase

Prepared by: F.Schmidt (OPS-OAI) and INTEGRAL FCT

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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 21.02.09 until 27.02.09 (both dates inclusive) and covers the revolutions 776, 777 and 778.

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 raster dither of “Loop I-Loop IV Super circles” (RA 13:57:10.00, DEC +07:34:37.0), a raster dither of Centaurus A (RA 13:25:27.6, DEC -43:01:08.9), a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), a raster dither of the Galactic Centre (RA 17:45:40.03, DEC -29:00:28.1) and a raster dither of 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.

As results of the periodic IMUs (1-2-3-4) calibration performed on 20/02/2009, the IMUs drift corrections were updated during rev 777.

The Lunar Eclipse occurred on 25/02/2009. The passage was nominal from an AOCS point of view.

As part of the AOCS preparation for the lunar eclipse, the onboard AMD thresholds were set to their eclipse values at the beginning of rev 777. In the same time frame the AMD dead band value, the IMU timers, 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 were verified. After the end of the eclipse the ACC/FDE/FCE Eclipse Timers were stopped and the AMD thresholds were set to their non-eclipse season values.

One slew was missed from TL, during the observation period, due to problem on FDS job scheduler.

The fuel consumption over the period between 21/02/2009 and 27/02/2009 was 0.1029 Kg. The remaining propellant is in the order of 135.6852 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

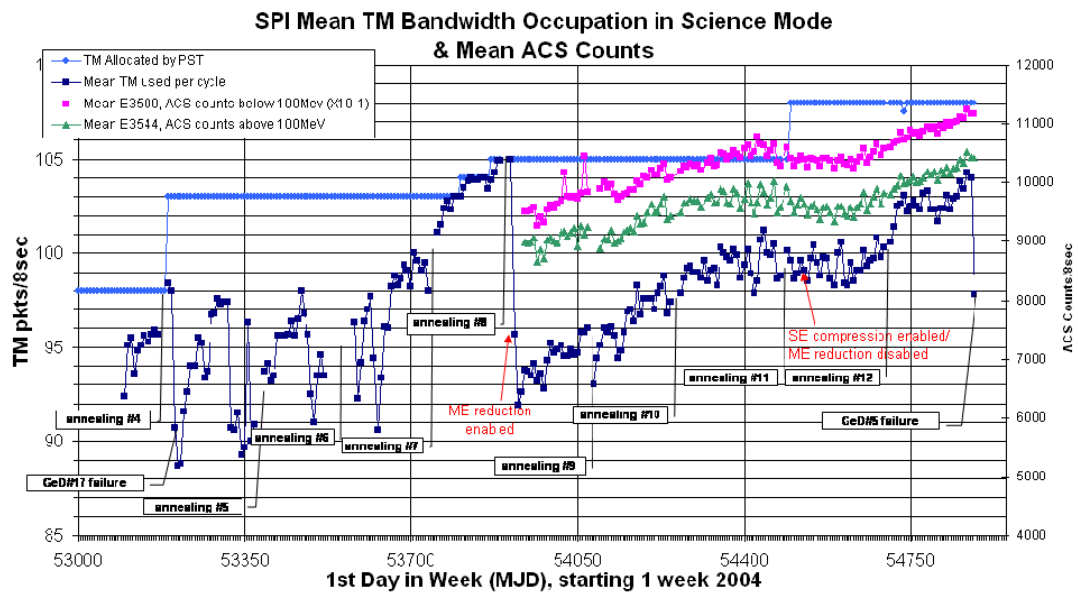
Following the 12th annealing, ended on 04/09/2008 at 23:50Z, the overall status of the gamma-ray spectrometer is nominal, except for detector #2 (failed since 06/12/2003); detector #17 (failed since 17/07/2004) and detector #5 (failed since 19/02/2009). The energy resolution of the previously degraded 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.

A lunar eclipse occurred on 2009-02-25. Eclipse operations for SPI were executed nominally.

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 97.8 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

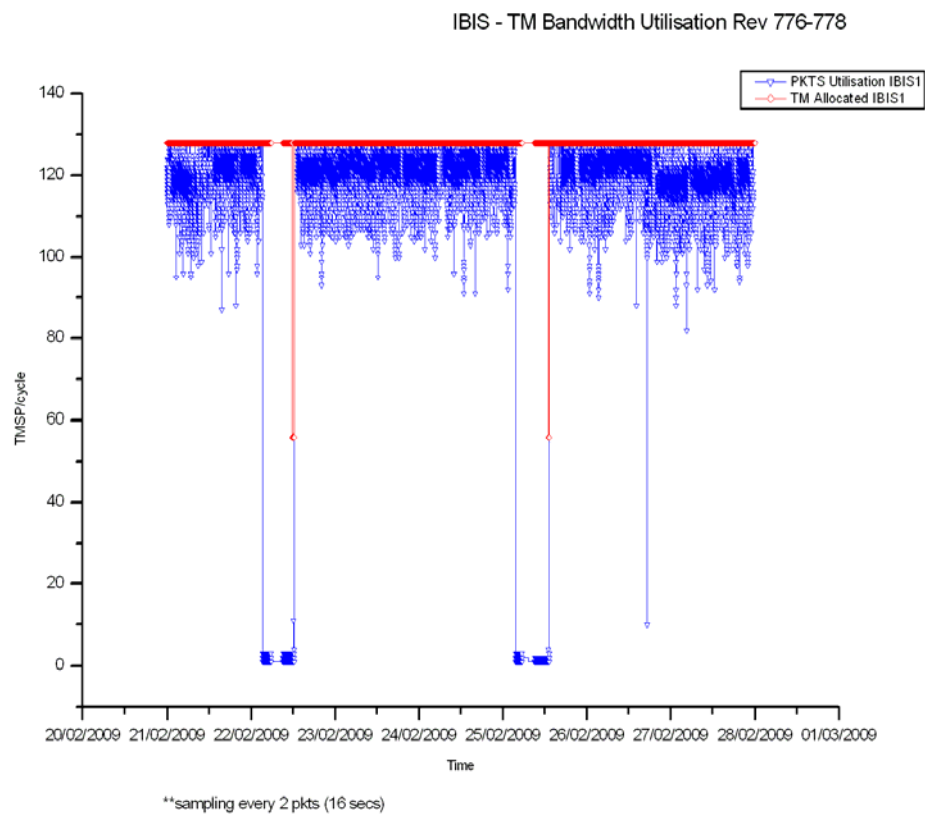
The overall status of the unit is nominal.

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

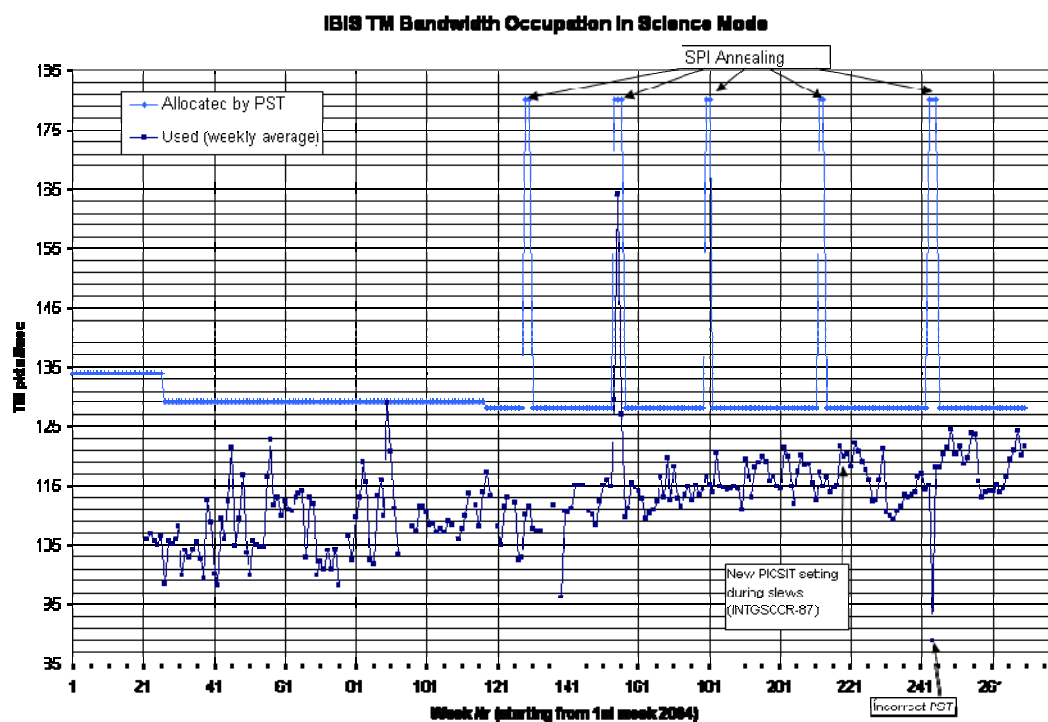
- PST allocation to IBIS above radiation belts: 128 packets/cycle
- IBIS mean bandwidth utilisation in science mode: 121.44 packets/cycle (up 1.42 on previous week)
- Percentage of TM cycles in which full bandwidth (128 packets/cycle) was used: 16.6%

A lunar eclipse occurred on 2009-02-25. Eclipse operations for IBIS were executed nominally.

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



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, 150 of the 151 planned science pointings were executed nominally, 1 was lost.

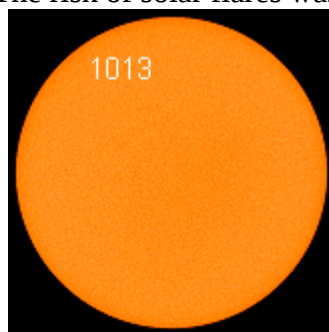
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. Sun spot #1013 emerged on the 24th February, and had disappeared by the 27th. For the remainder of the week, the sun was blank. 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. Four pointings were 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. 1 pointing was lost due to a crash of the FDS job scheduler on DoY 056 because no automatic updates have been generated. 3 pointings were lost when the On Target Flag was not reached.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. On DoY 052 at 20:02Z the Network was unable to connect the TC link to Redu's TMTCS1. Forward session was stopped and restarted and the service recovered. JPL have reported that the antenna s/w upgrade have not been completely deployed at the stations. On DoY 057 at 19:00:00Z a MPLS at VILSPA validation testing was performed with success for TM on NCTRS-B only.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

A new PSF has been received for revolution 786. The PSF for revolution 780 was changed to included an additional SATENG window, forcing a replanning of revolutions 780 and 781.

New observations were planned for revolutions 782-784.

New TSFs have been received for revolutions 779 and 780.

2. Observation status

A new ECS files has been received for revolution 768.

3. ISOC Science Data Archive

Installation of the new INGEST software is on-going. The documentation has been updated. The 3rd ISGRI catalogue data is ready for inclusion, but for a few sources the data products provided by Southampton are incomplete.

4. ISOC system

Work is continuing on V22 (post TAC s/w).

5. Problems

No new problems.

4.3.2 ISDC

Status of ISDC observation processing on 27/02/2009:

- Latest Standard Analysis completed: observation 06200280123 (PKS 1510-089, Revolution 766) on 19/02/2009.
- Latest products archived: observation 06200280123 (PKS 1510-089, Revolution 766) on 20/02/2009.
- Latest observation products sent to the observer: observation 06200280123 (PKS 1510-089, Revolution 763) on 20/02/2009.

5 Special Events

- Eclipse Season starts 12/3/2009

6 Anomalies

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

AR id	Date Created	Subject	Segment	Status
INT-3057	2009-02-27	Timeline Generation: Invalid PST Allocation not Flagged.	IMCS	Pending
INT_SC-247	2009-02-27	IREM Anomaly: Reset of IREM_CSCI S/W #71, 17/02/2009	Payload	Testing

7 Future Milestones

- DPE LOBT Wraparound on 04/03/2009
- New PST ED in use from 06/03/2009 (revolution 781)
- Completion of VIL2 MPLS Validation

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 776

The observations in revolution 776 began with a raster dither of “Loop I-Loop IV Super circles” (RA 13:57:10.00, DEC +07:34:37.0), lasting ~9.6 hours. They continued with a raster dither of Centaurus A (RA 13:25:27.6, DEC -43:01:08.9), lasting ~30.6 hours. This was followed by a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. This was followed by a raster dither of the Galactic Centre (RA 17:45:40.03, DEC -29:00:28.1), lasting ~12.5 hours, until the end of the revolution.

Revolution 777

The observation in revolution 777 was a raster dither of the Galactic Centre (RA 17:45:40.03, DEC -29:00:28.1), lasting ~59.9 hours.

Revolution 778

The observations in revolution 778 began with a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. This was followed by a raster dither of the Galactic Centre (RA 17:45:40.03, DEC -29:00:28.1), lasting ~25.1 hours. They continued with a raster dither of Eta Carinae (RA 10:45:03.59, DEC -59:41:04.3), lasting ~27.8 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

2009-02-11T20:38:44.000Z	135.9616	F	Automatic TM processing.
2009-02-13T10:24:41.000Z	135.9562	F	Automatic TM processing.
2009-02-14T19:50:45.000Z	135.9170	F	Automatic TM processing.
2009-02-16T10:10:33.000Z	135.9051	F	Automatic TM processing.
2009-02-17T20:13:33.000Z	135.8569	F	Automatic TM processing.
2009-02-19T05:28:09.000Z	135.8338	F	Automatic TM processing.
2009-02-19T10:00:09.000Z	135.8280	F	Automatic TM processing.
2009-02-19T22:39:22.000Z	135.7881	F	Automatic TM processing.
2009-02-22T10:05:21.000Z	135.7735	F	Automatic TM processing.
2009-02-23T19:25:16.000Z	135.7596	F	Automatic TM processing.
2009-02-25T11:42:41.000Z	135.7449	F	Automatic TM processing.
2009-02-26T19:25:24.000Z	135.6852	F	Automatic TM processing.

This report was generated Fri Feb 27 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, 21/02/2009 – 27/02/2009

The AOCS operations were executed from the Automatic Timeline.

During this period, 124 Open Loop Slews, 37 Closed Loop Slews and 4 Momentum Biases were executed (as reported by ACC OEM).

1 slew (CSL) was missed from TL, during the observation period, due to problem on FDS job scheduler.

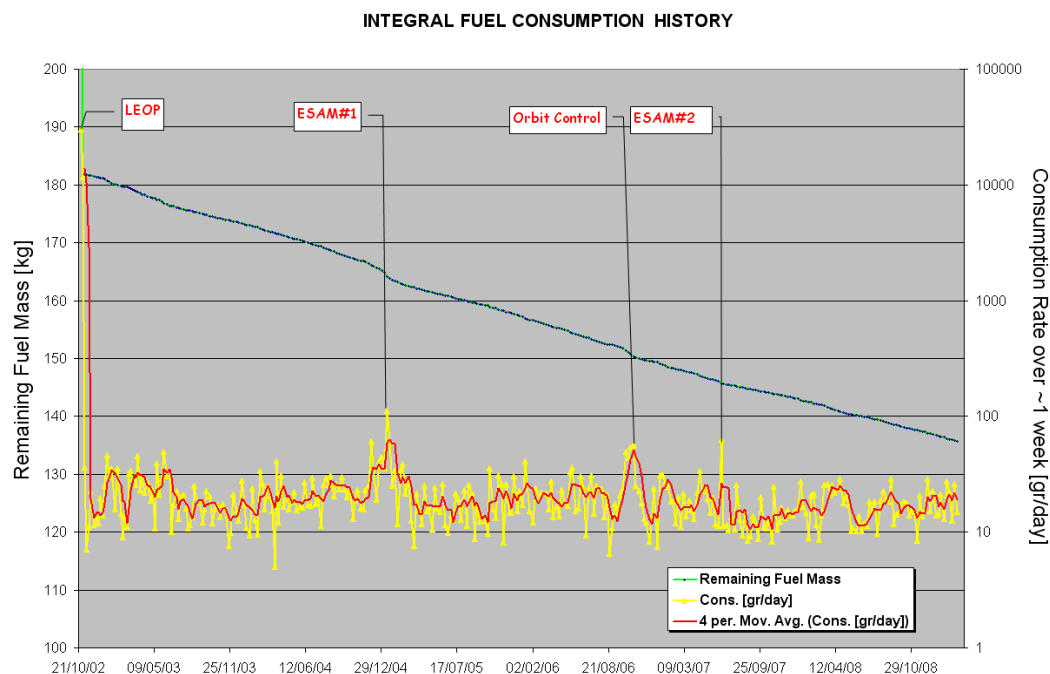
The OTF was not reached during part of PIDs 07770043 - 07780043 - 07780065, due to loss of guide star.

Orbit Control

No update.

Fuel consumption

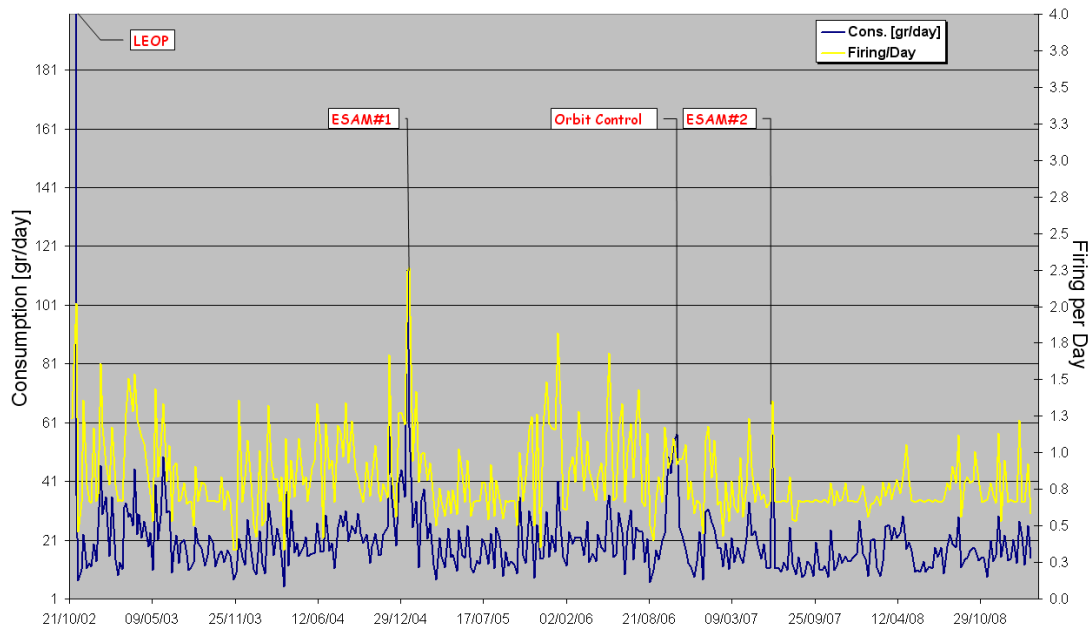
The fuel consumption (total, grams per day) over the period between 01/11/2002 and 27/02/2009 is reported in the plot below.



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 27/02/2009 is reported in the plot below.

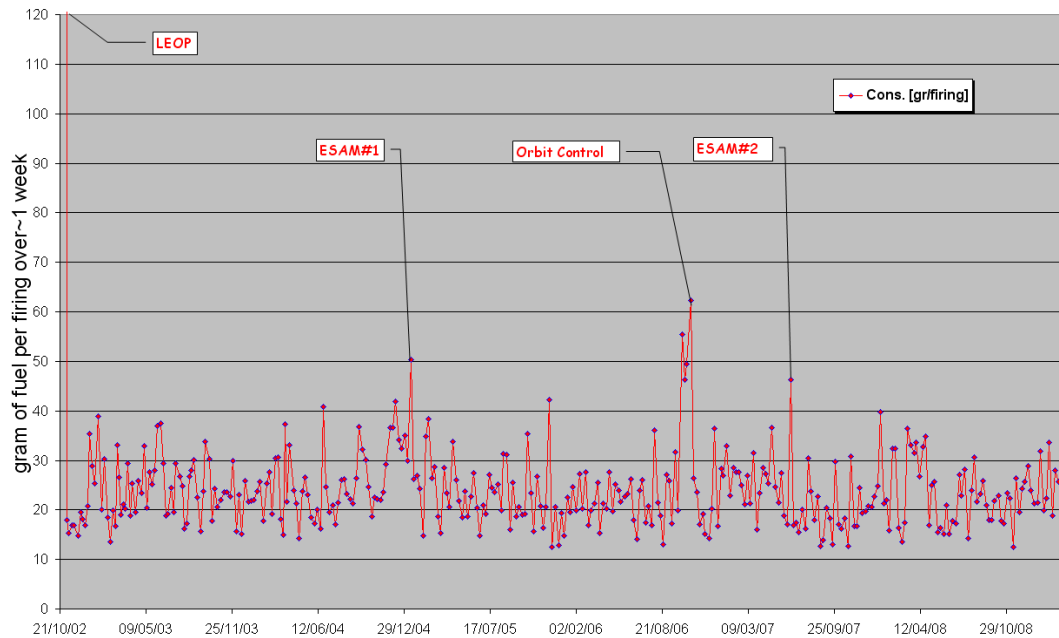
INTEGRAL FIRING PER DAY HISTORY



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 27/02/2009 is shown in the plot below.

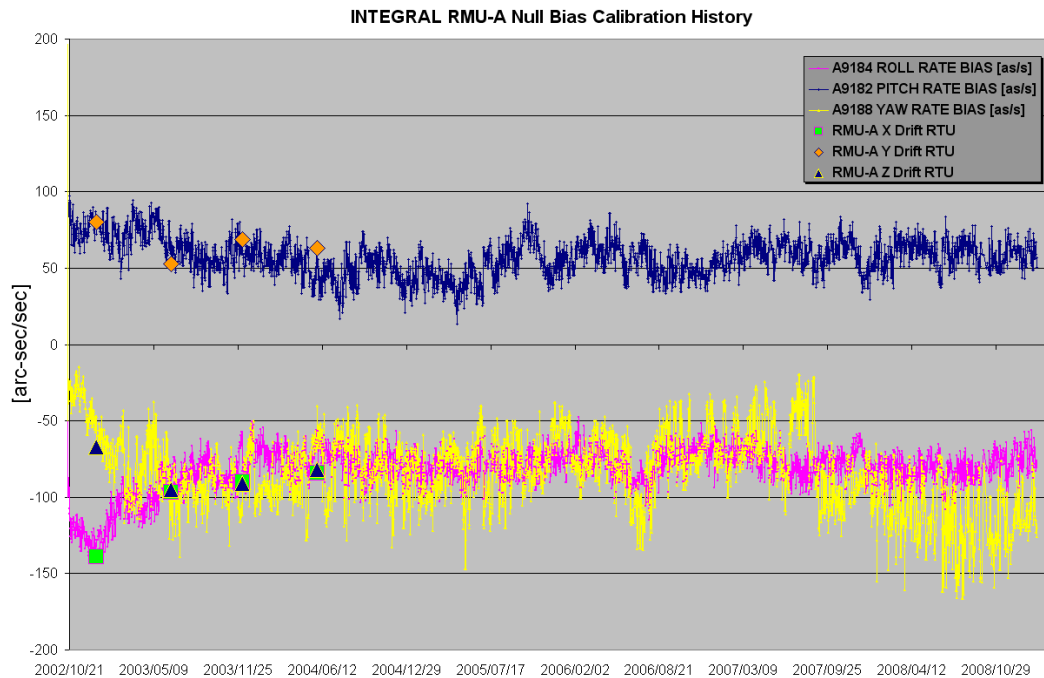
INTEGRAL FUEL MASS PER FIRING HISTORY



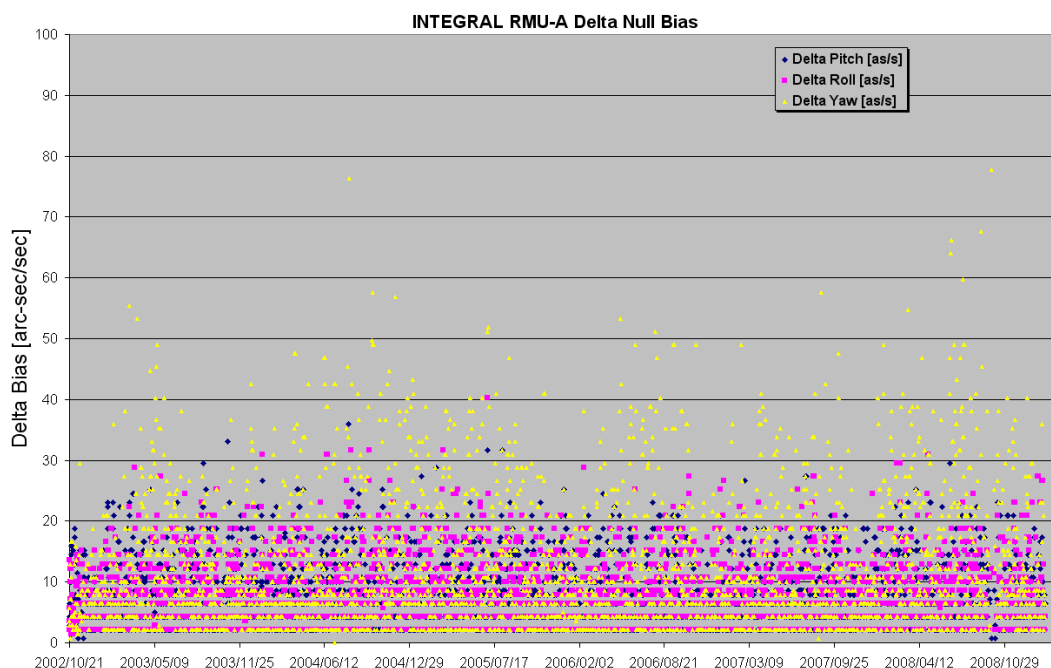
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 27/02/2009 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 the 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 27/02/2009 is reported in the plot below.



21/02/2009 (Day of Year 052, Revolution 776)

Nothing to report.

22/02/2009 (Day of Year 053, Revolution 776-777)

Nothing to report.

23/02/2009 (Day of Year 054, Revolution 777)

IMUs drifts update: following the IMU 1-2-3-4 calibration, in preparation of the lunar + summer 2009 eclipse season, the ACC IMUs drift corrections were updated during rev 777.

The calculated drifts from FD resulted consistent with the quick evaluation performed in parallel by FCT and with the drifts history. The IMUs drift corrections were updated accordingly to the following table (source FD Team, TPF 0777_0001_M.DRA):

IMU-1-X=	0.3323	arcsec/sec
IMU-1-Z=	0.3275	arcsec/sec
IMU-2-X=	0.2249	arcsec/sec
IMU-2-Z=	0.0033	arcsec/sec
IMU-3-Z=	0.0447	arcsec/sec
IMU-4-X=	-0.0059	arcsec/sec

24/02/2009 (Day of Year 055, Revolution 777)

Loss of guide star: at 05:46z a loss of the selected guide star occurred at the end of slew ID 07770043. The origin of the event is likely due to false event affecting the STR.

As foreseen by the IPS logic, the ACC did not switch ON the IMU 1, being the event occurred within 1 minute from the slew end. A new automatic mapping was commanded and a new guide star picked.

The OTF was not reached during part of PID 07770043.

25/02/2009 (Day of Year 056, Revolution 777-778)

The Lunar eclipse operations were nominal from the AOCS point of view. Hereafter is reported a summary of the eclipse passage during rev 778:

Issue : 1
Rev. : 0
Page : 15

AACS ECLIPSE MONITORING						Revolution:	778
Lunar Eclipse 25/02/2009						Date:	25/02/2009
						DoY:	56
INPUT		Penumbra Start:	25/02/2009 10:28:17	LOS:	25/02/2009 06:33		
Penumbra Start	25/02/2009 10:28	Umbra Start:	00/01/1900 00:00:00	AOS:	25/02/2009 09:04		
Penumbra End	25/02/2009 11:07	Umbra End:	00/01/1900 00:00:00				
Umbra Start		Penumbra End:	25/02/2009 11:07:39				
Umbra End							
		Eclipse Duration:	0:39:22				
ACC Sample Time:	23/02/2009 15:50:44	Eclipse Duration [sec]:	2362				
FDE Sample Time:	23/02/2009 15:50:44						
FCE Sample Time:	23/02/2009 15:50:44						
		IMU Health Check Start	25/02/2009 02:28				
		Eclipse Imminent Flag	25/02/2009 09:28:37				
ACC Eclipse Counter:	107680	ACC IMU AutoCal Start	25/02/2009 09:43:03				
ACC Eclipse Start:	260047	ACC IMU AutoCal End	25/02/2009 10:03:03				
ACC Eclipse End:	264053						
		Sun out of FSS FoV	na				
FDE Eclipse Start:	260466	Sun back in FSS FoV	na				
FDE Left to Eclipse Start:	152930						
FDE Eclipse Duration:	3136						
		Eclipse Timers					
			From Loaded Timers		Actual From Telemetry	UM [sec]	LSB [sec]
			Absolute	WRT Pen. Start [sec]	Absolute	WRT Pen. Start [sec]	
FCE Eclipse Start:	260510	ACC Eclipse Start	25/02/2009 10:10:11	-1086.00	25/02/2009 10:10	-1082.00	.1064
FCE Left to Eclipse Start:	152974	FDE Eclipse Start	25/02/2009 10:19:34	-523.00			.404 176
FCE Eclipse Duration:	3092	FCE Eclipse Start	25/02/2009 10:20:18	-479.00			.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	25/02/2009 11:11:50	251			360 176
		FDE Eclipse End	25/02/2009 11:11:50	251			360 176
		ACC Eclipse End	25/02/2009 11:16:57	558	25/02/2009 11:17	562.00	578
		IMU	Uplink	Execution	WRT Penumbra End [sec]		
		IMU Auto Off Enable	22/02/2009 09:48:02	25/02/2009 11:19:12	693		
		IMU On	25/02/2009 02:31	IMU H/C Noise Roll [as/s]	0.2254		
		IMU Off	25/02/2009 11:19	IMU H/C Drift Roll [as/s]	0.2094		
		IMU On Time	8:48:05	IMU Auto Cal Drift Roll [as/s]	0.2187		

FDS problem on job scheduler task: at 11:55z the FDS did not perform the update of the slew ID 07780001. Likely an overload on the machine where running the job scheduler; caused the task to die. A manual recovery was performed and the slew updated in TL.

At 13:14z, the FDS reported again a problem when updating the slew ID 07780002.

A manual recovery was performed from attitude of PID 07780001 to the attitude of PID 07780002. The next slew 07780003 was manually updated in TL.

At 13:55z, the FDS reported again a problem when updating the slew ID 07780004. The slew 07780004 was manually updated in TL.

The following slew was missed in TL: 07780002 (CSL)

Loss of guide star: at 21:20:14z a loss of the selected guide star occurred during PID 07780043. The origin of the event is likely due to false event affecting the STR.

As foreseen by the IPS logic, the ACC did switch ON the IMU 1, a new automatic mapping was commanded and a new guide star picked. The next slew 07780044 was manually updated in TL.

The OTF was not reached during part of PID 07780043.

26/02/2009 (Day of Year 057, Revolution 778)

Nothing to report.

27/02/2009 (Day of Year 058, Revolution 778)

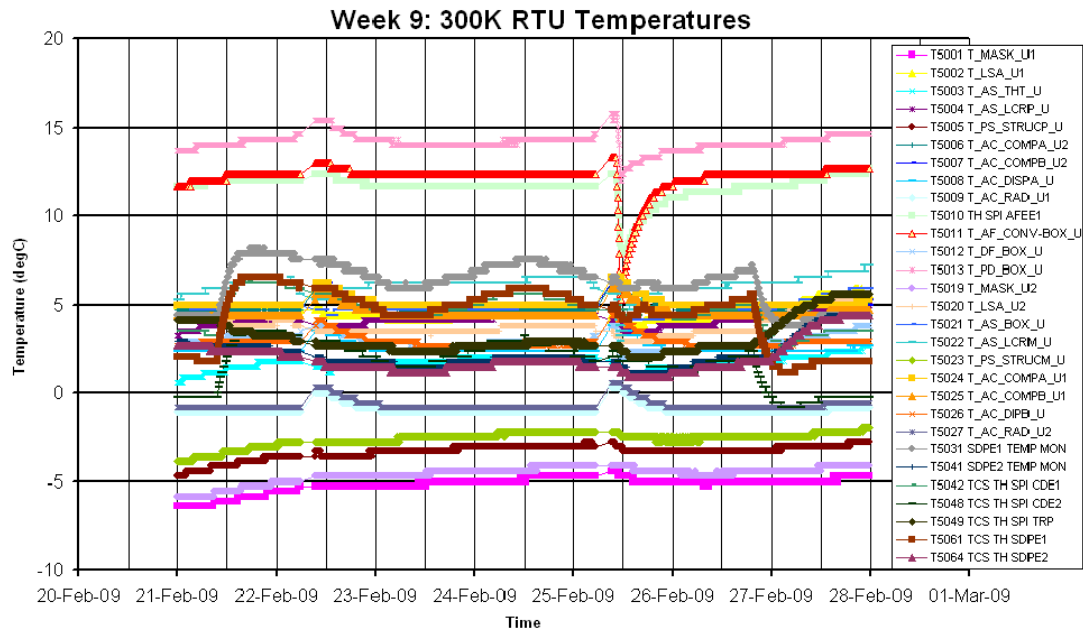
Loss of guide star: at 22:58z a loss of the selected guide star occurred at the end of slew ID 07780065. The origin of the event is likely due to false event affecting the STR.

As foreseen by the IPS logic, the ACC did not switch ON the IMU 1, being the event occurred within 1 minute from the slew end. A new automatic mapping was commanded and a new guide star picked.

The OTF was not reached during part of PID 07780065.

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.



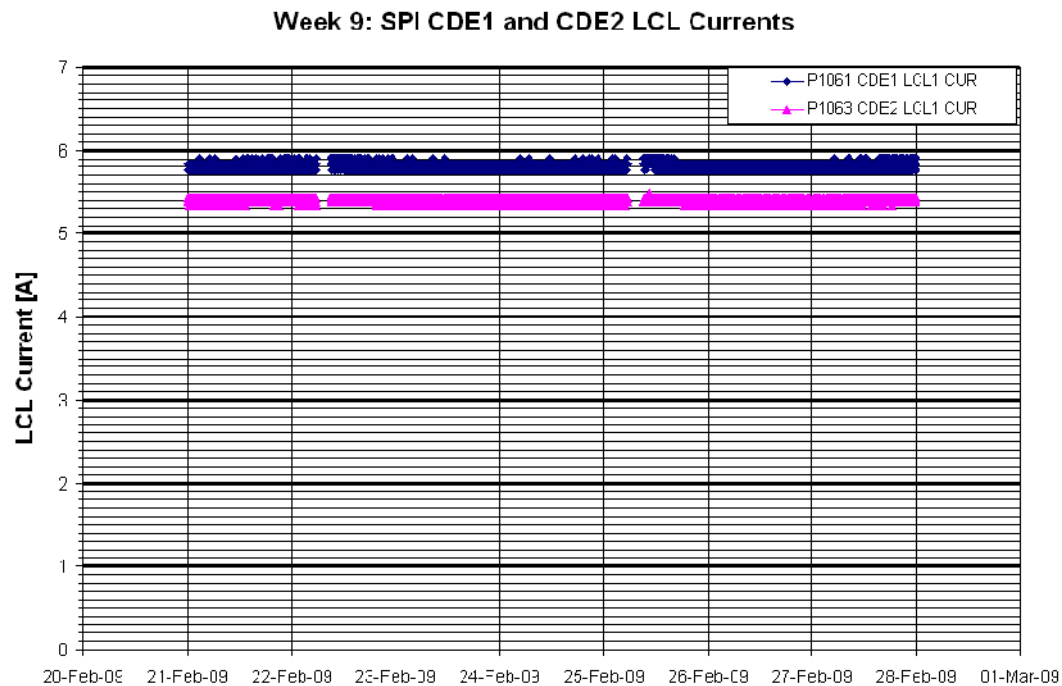
Stirling Compressors and Cryostat: The performance of the compressors is nominal.

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

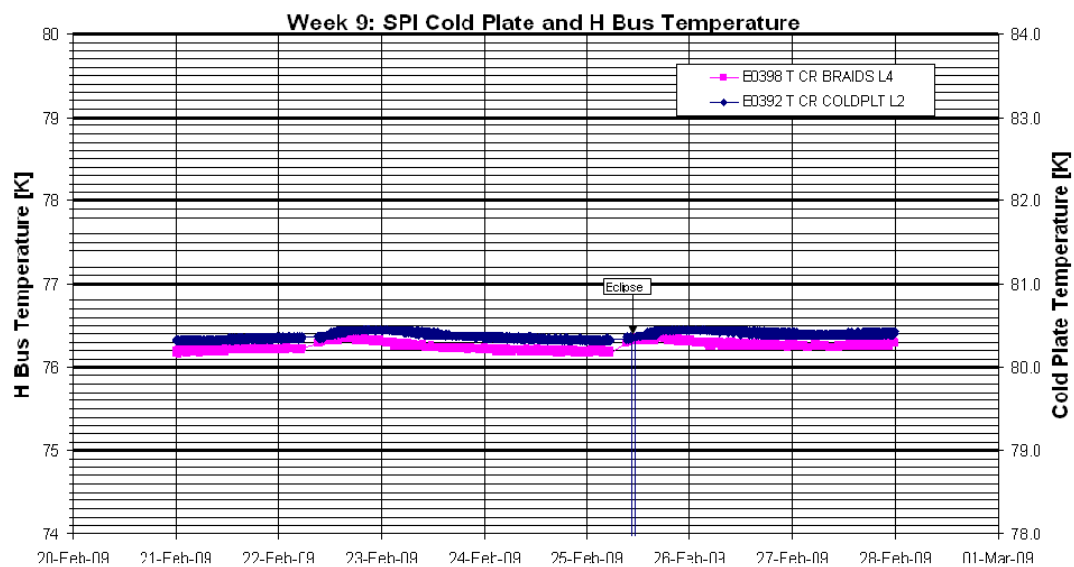
The stroke of all four compressors was set to 43 throughout the week and the average CDE LCL currents were as follows:

- CDE1 LCL Current = 5.82A
- CDE2 LCL Current = 5.39A

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



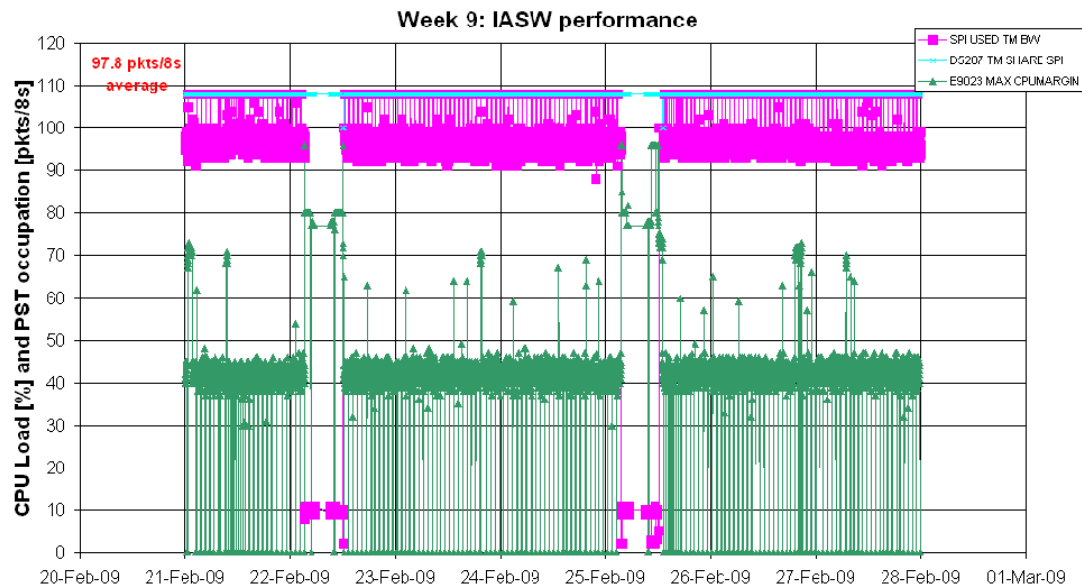
The following plot shows the evolution of the cold plate and H bus temperatures during the reporting period.



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

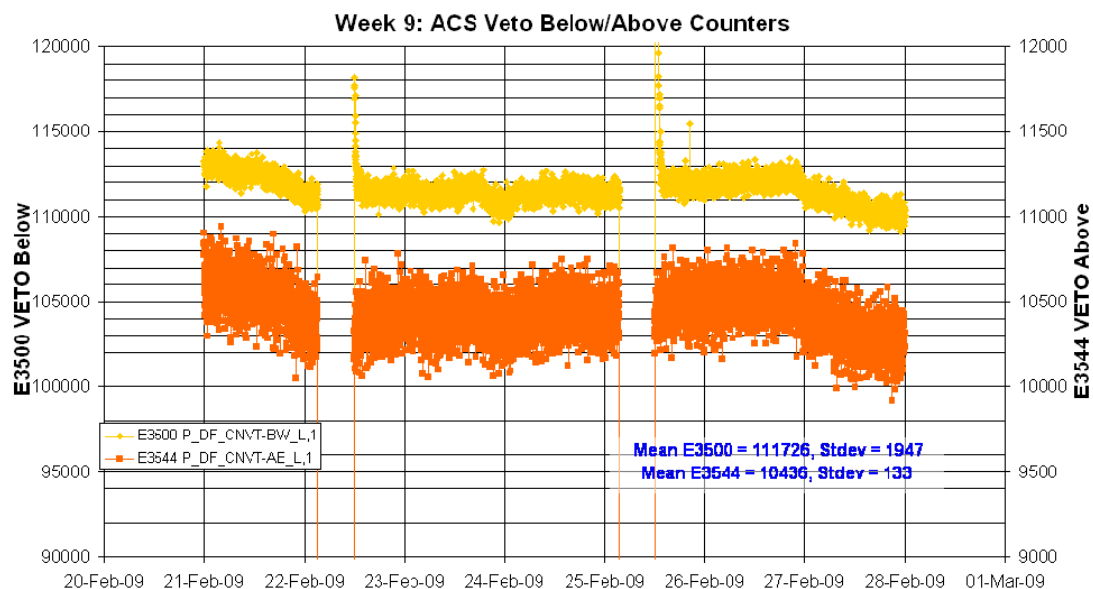
The IASW version installed is v4.3.4 with SE compression only enabled and the spectra scaling factor set to 8/19 SE. The average TM bandwidth occupation of SPI was 97.8 packets/cycle over the science window when the TM allocation was 108 packets/cycle.

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

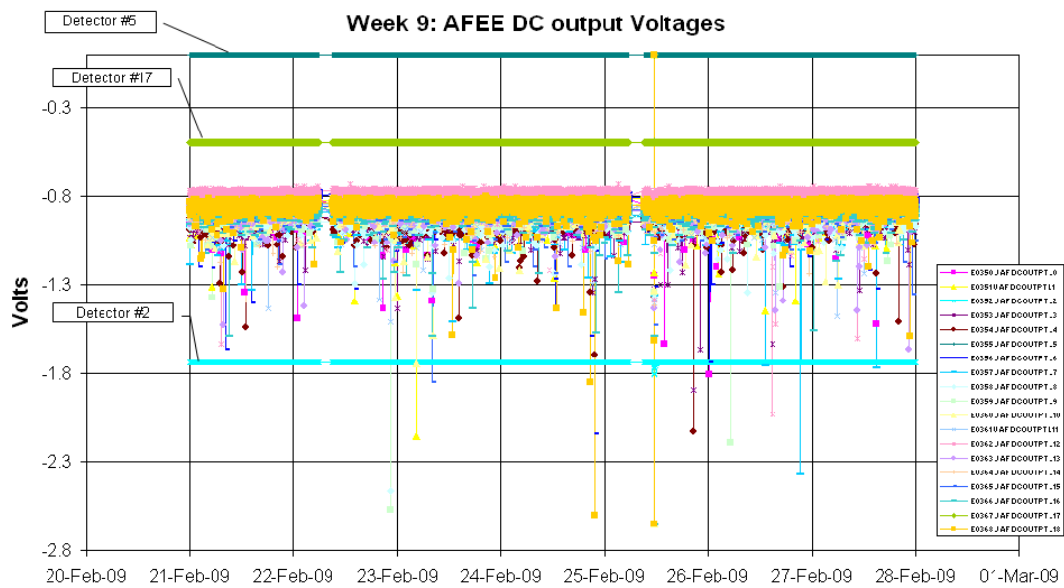


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

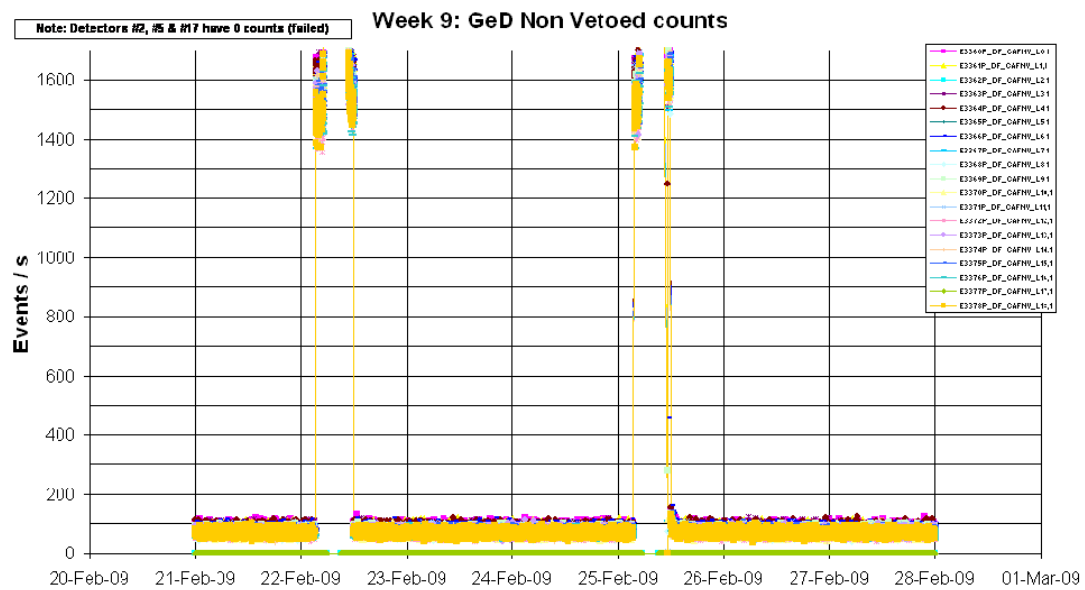
The following plot shows the ACS overall count rate evolution during the reporting period:

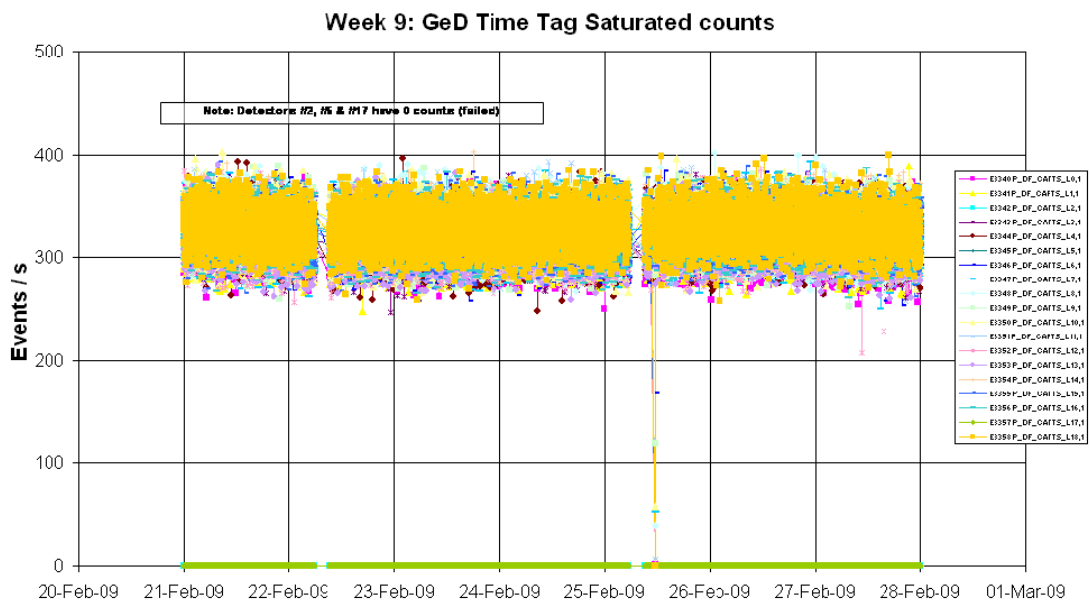
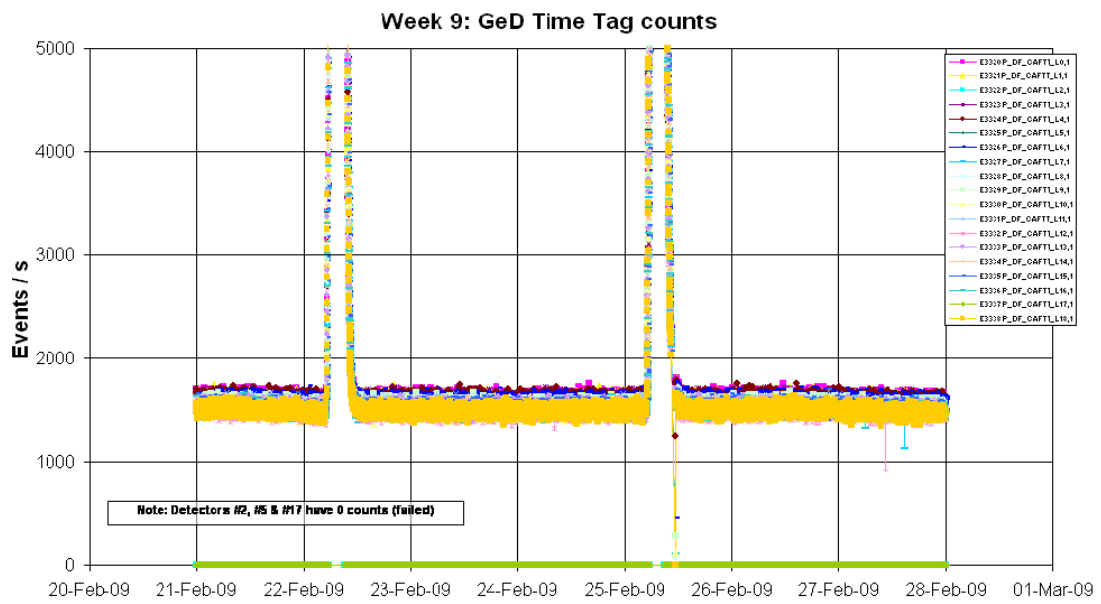


AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003; detector #17 is failed since 17/07/2004 and detector #5 is failed since 19/02/2009.

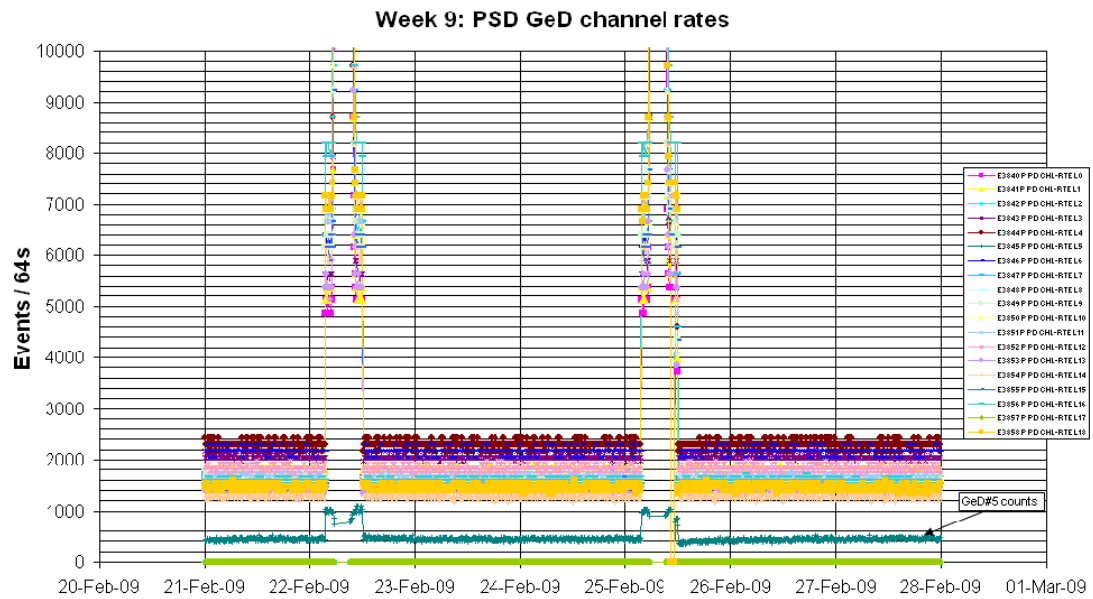


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event count rates during the reporting period.





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



Event Log:

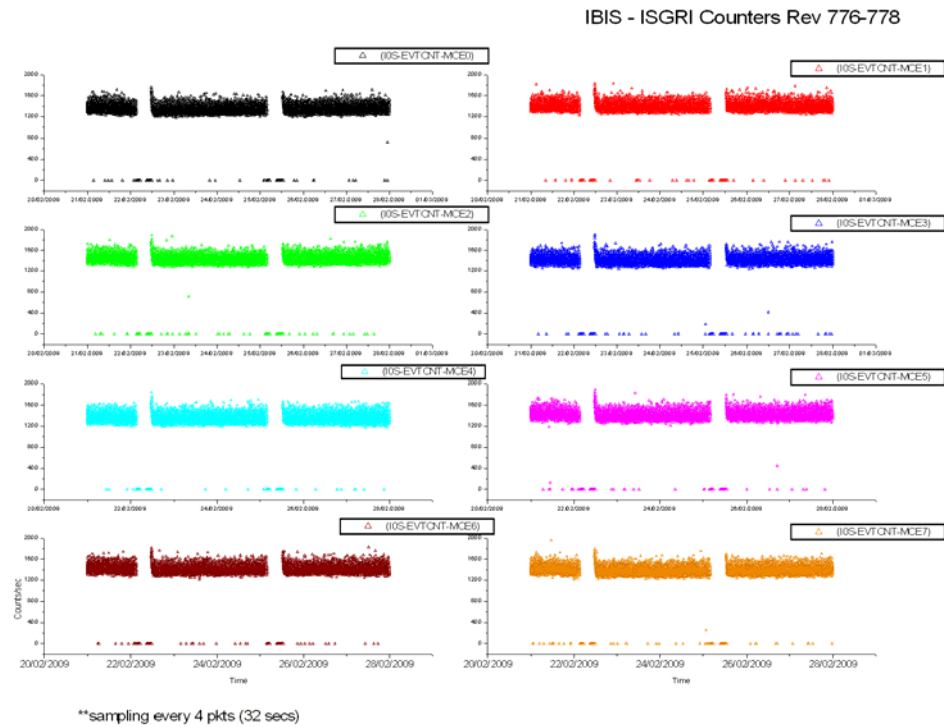
The following non-nominal events occurred with SPI during the reporting period:

- Due to continuing high radiation after the expected radiation belt exit of revolution 778, TM parameter E3500 (ACS CntVetoBelow) went OOL High on 2009-02-25 at 12:05:06Z. As it returned within limits of its own accord at 13:03:38Z, no action was taken.

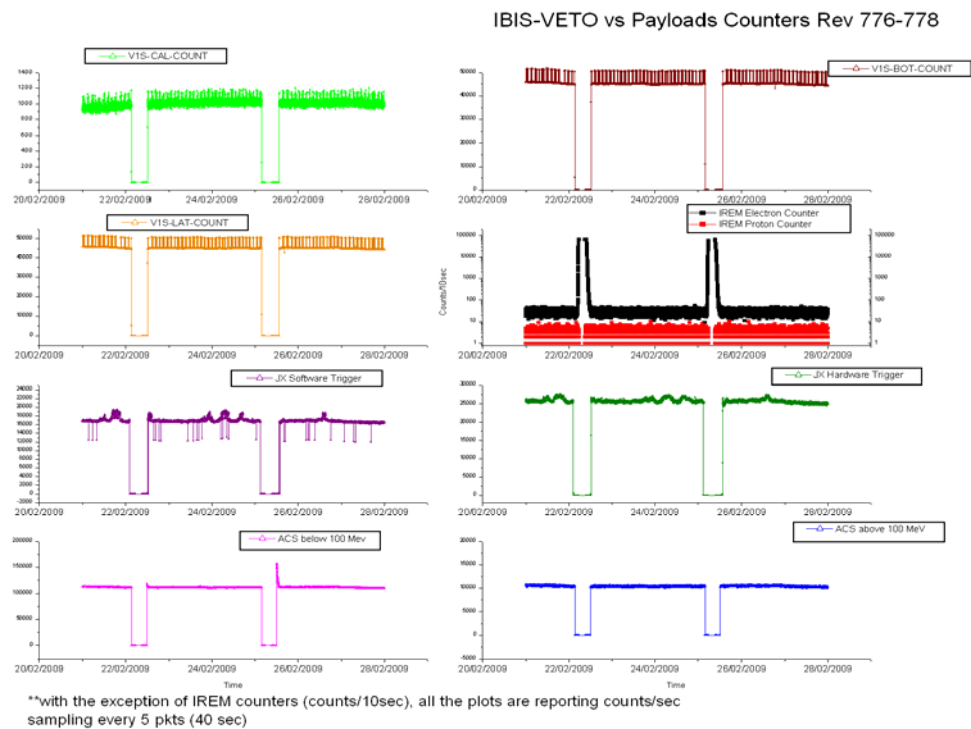
8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

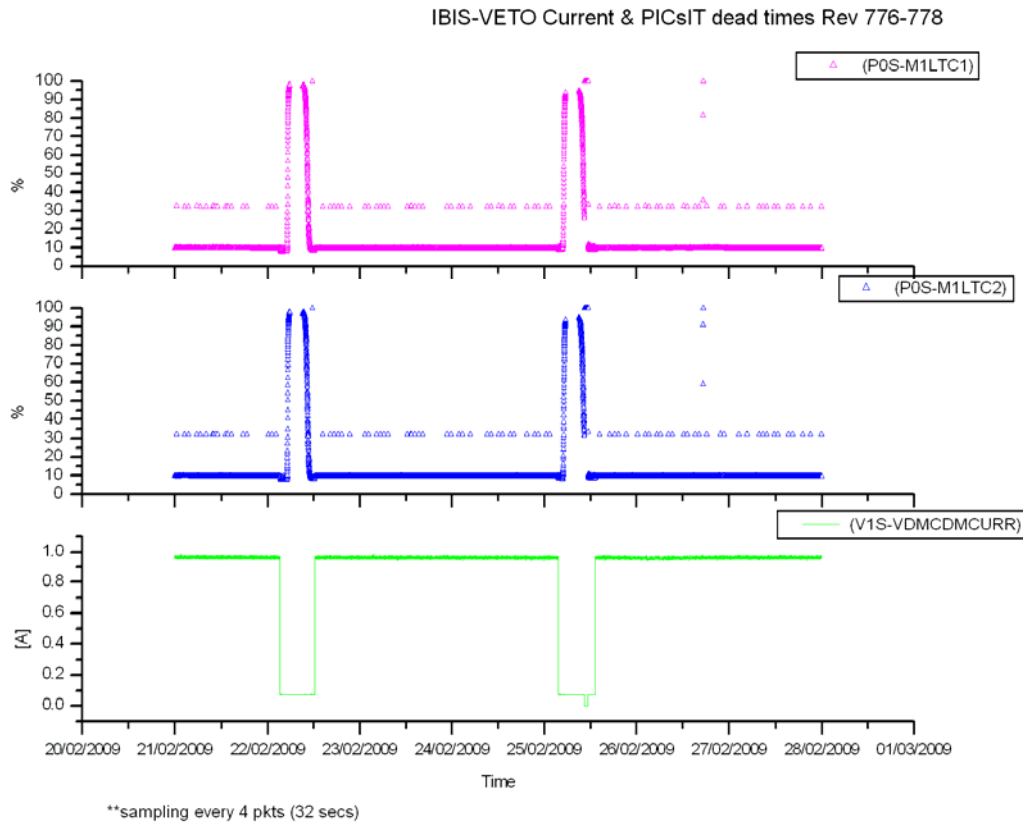


VETO vs Payload Counters:

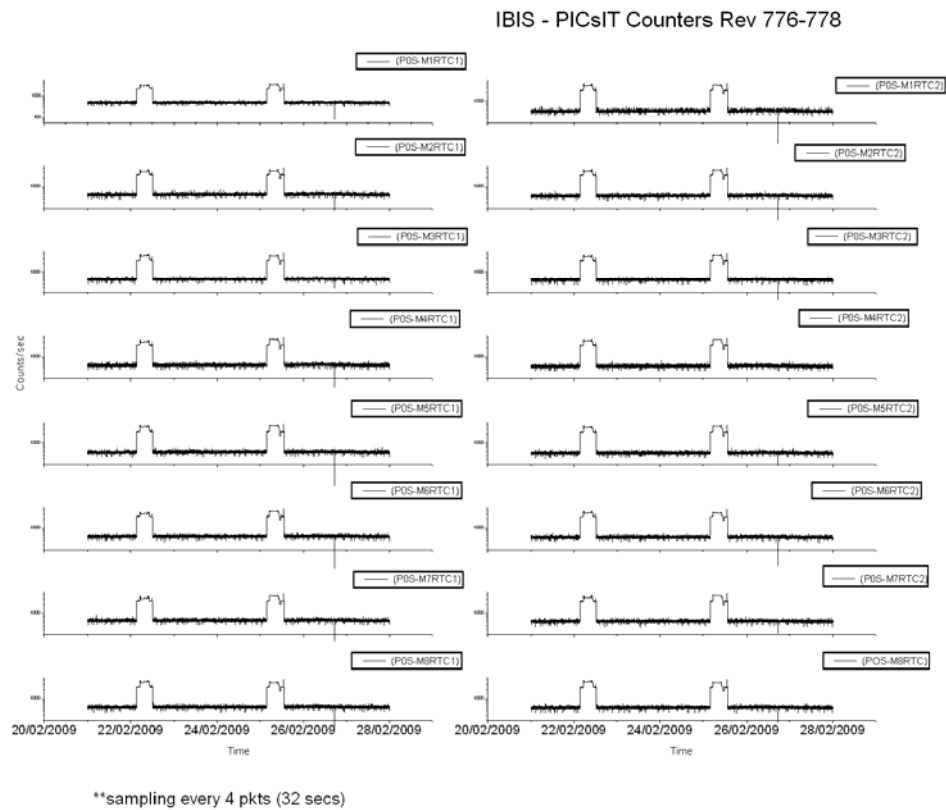


The week was characterised by low radiation as reported by the payload.

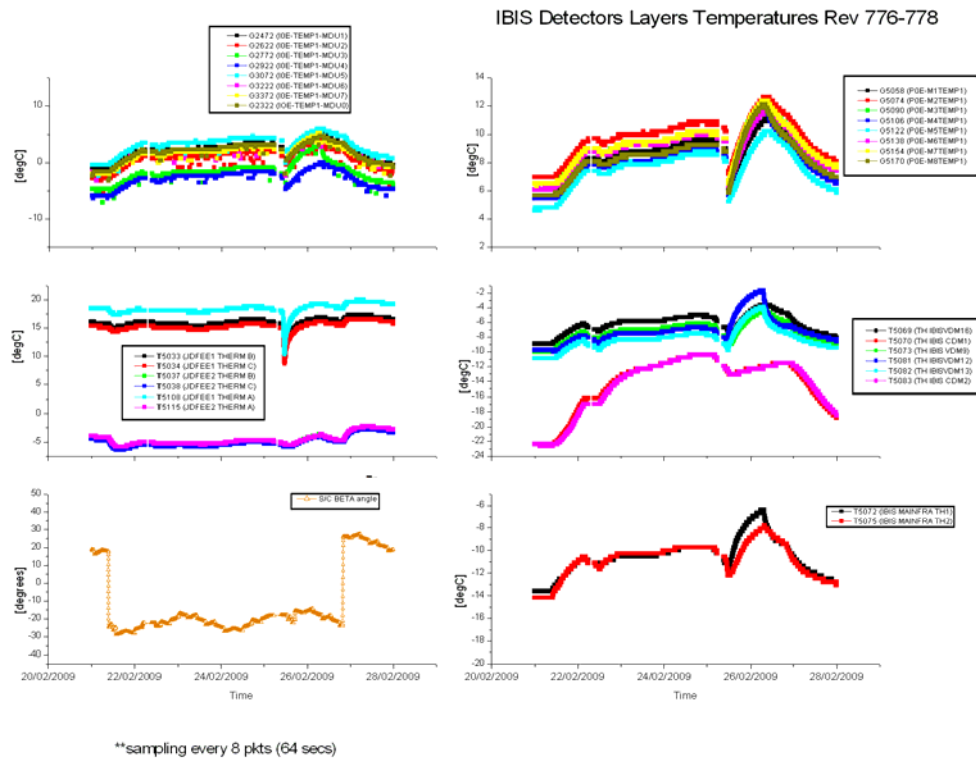
VETO Current:



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.

TM parameter G2070 went OOL several times during the week, indicating an overflow of the noisy pixel address buffer in MCE5. As in each case it returned within limits of its own accord after a few TM cycles, no action was taken.

2009-02-21 (DOY 052, Rev 776) to 2009-02-25 (DOY 056, Rev 777-778)

IBIS operations executed nominally.

2009-02-26 (DOY 057, Rev 778)

At 17:18:27Z the TM parameters families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semi-module FIFO error flags. At 17:19:02Z the TM parameter families G5002 and G5003 for the PDM semi-module counters started going OOL Low. As these were followed at 17:22:16Z by OEM APID 1280 ID 132 EVENT IBIS1 IASW HEPI RESYNCHRONIZED, indicating that HEPI resynchronised autonomously, by which time all the above parameters had returned within limits, no action was taken.

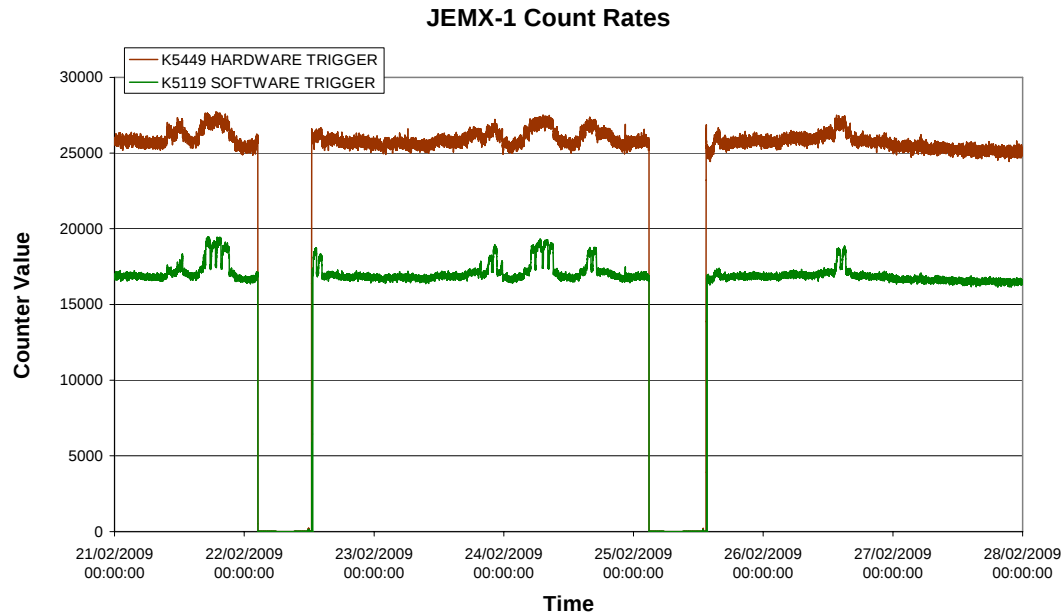
2009-02-27 (DOY 058, Rev 778)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

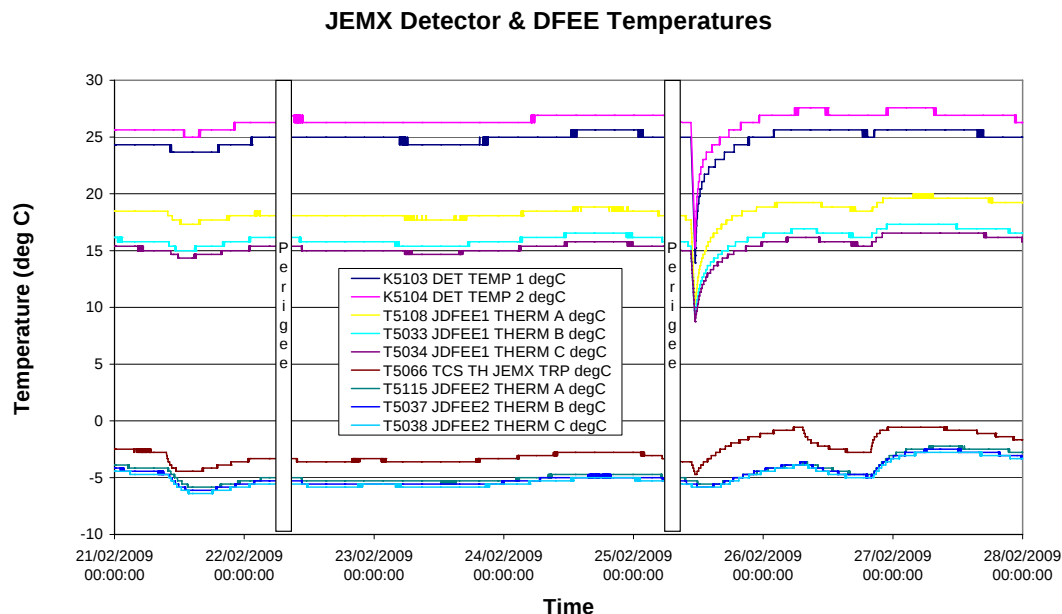
JEM-X Count Rates

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.



JEM-X Daily Report

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)

2009-02-21 (DoY 052, Rev 776) to 2009-02-24 (DoY 055, Rev 777)

JEM-X 1 operations executed nominally.

2009-02-25 (DoY 056, Rev 777-778)

At 02:54:14, TC KU0014 terminated with status unknown.

At 11:24:45, parameter KD5380D exceeded hard limits for 20 seconds.

At 13:35:40, TC KU0014 terminated with status affected, which updated to unverified.

No action was taken and there was no impact on any of the above events.

From 10:27 to 11:07, there was a lunar eclipse. As this occurred when the spacecraft was within the Van Allen belts, it was handled as a nominal eclipse, which proceeded without incident.

2009-02-26 (DoY 057, Rev 778) to 2009-02-27 (DoY 058, Rev 778)

JEM-X 1 operations executed nominally.

8.3.5 OMC Operations

2009-02-21 (DoY 052, Rev 776)

At 00:36:41, for unknown reasons pointing 07760040 was lost.

2009-02-22 (DoY 053, Rev 776) to 2009-02-27 (DoY 058, Rev 778)

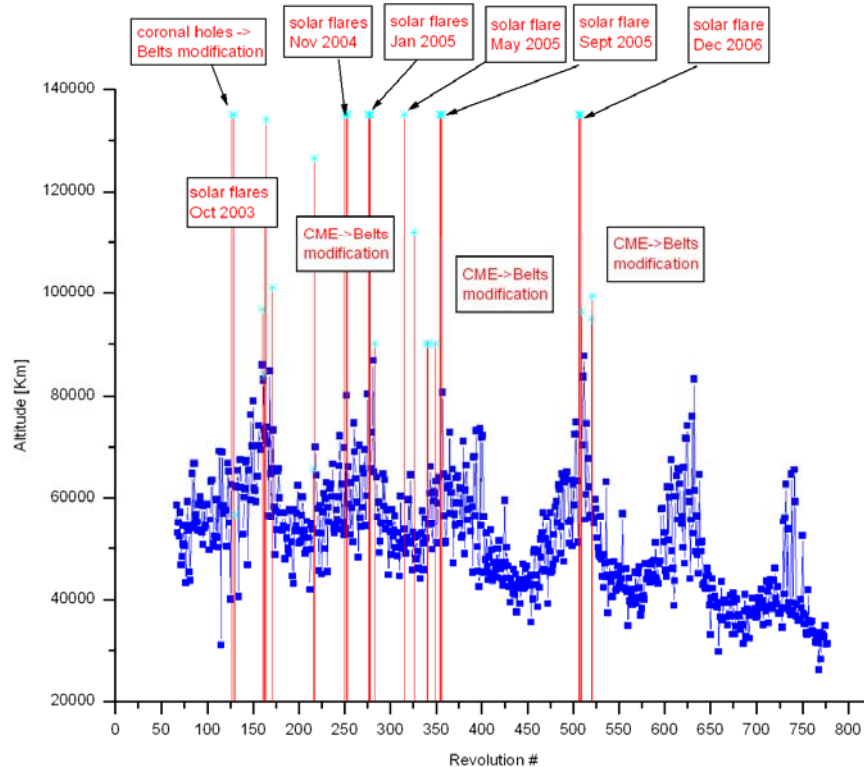
Nothing to report.

On DoY 053 at 03:19:04 and DoY 056 at 03:38:40 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]
776	RAD_ENTR R 2009-02-22T03:19:00Z	22/02/2009 05:07:43	31238.7	22-Feb-2009 04:44:46	34568.05
777	RAD_EXIT R 2009-02-22T12:05:07Z	22/02/2009 11:42:47	>>35731.3	22-Feb-2009 11:24:46	46547.1
777	RAD_ENTR R 2009-02-25T03:38:36Z	25/02/2009 04:51:43	31317.3	25-Feb-2009 04:31:34	34874.87
778	RAD_EXIT R 2009-02-25T11:53:10Z	25/02/2009 11:25:27	48537.7	25-Feb-2009 11:11:34	46174.31

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)

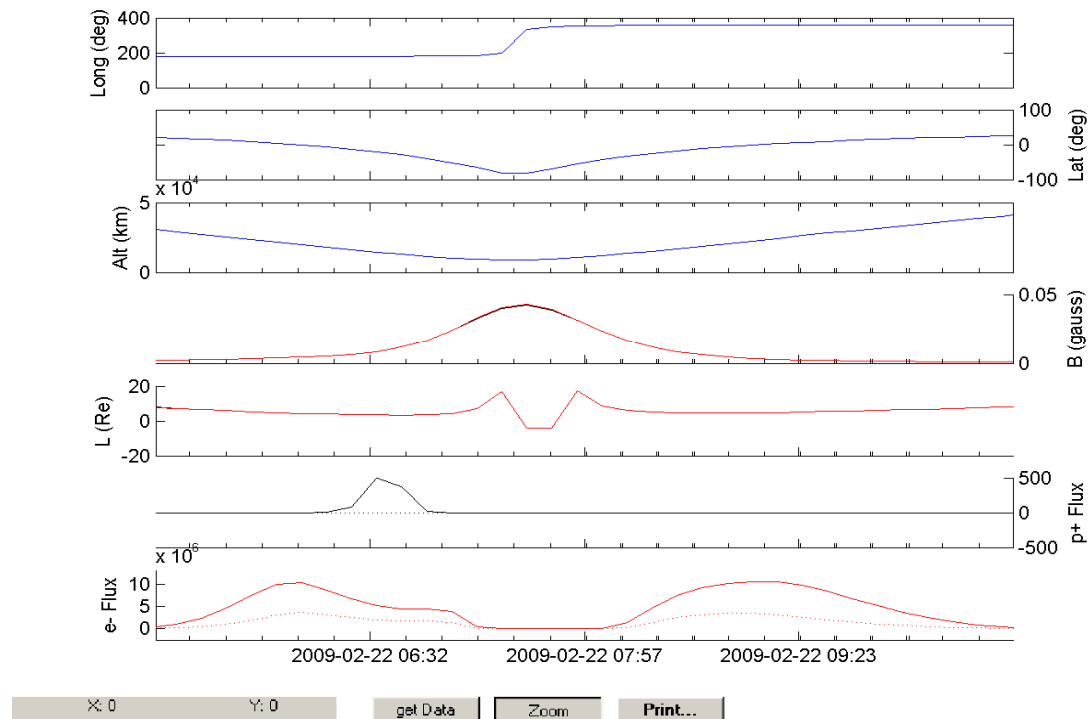
* Rad belt entry time ignoring previous threshold crossings where a gap of more than 30 minutes is present.

IREM radiation counters:

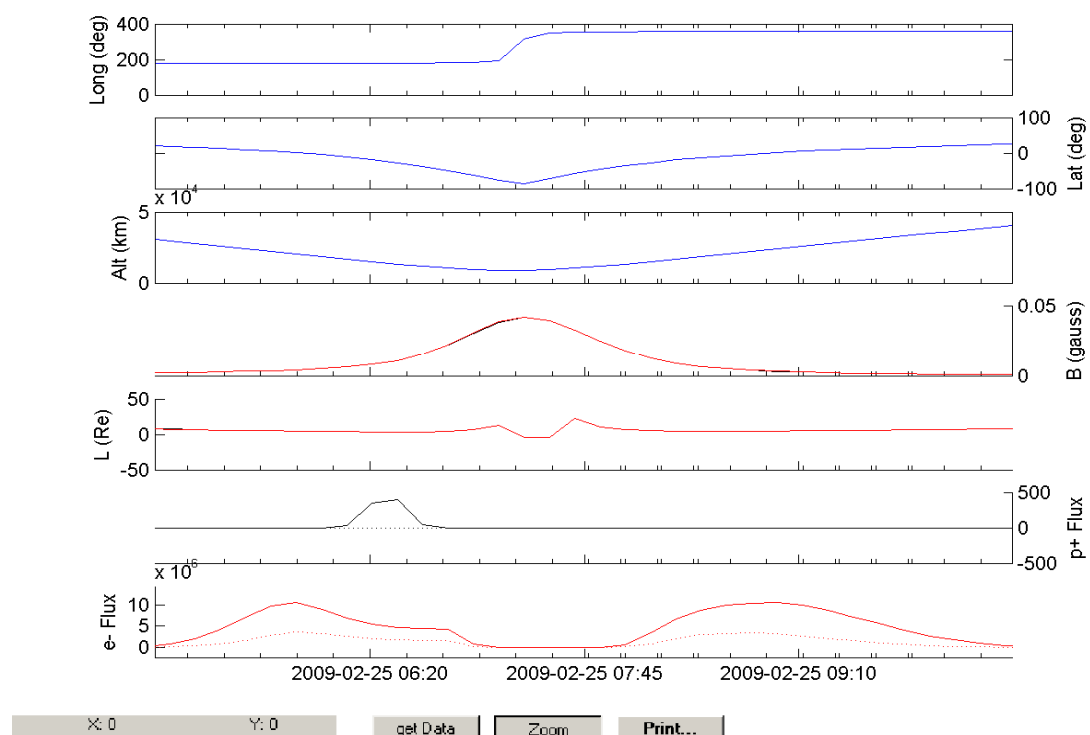
The IREM radiation counter plots are not available this week.

IREM Predicted Radiation Belt Passages

Rev 776



Rev 777



Radiation Assessment

Generated with SEIS Report and Analysis tool.

INTRODUCTION

This note summarises the space weather status over the observation period

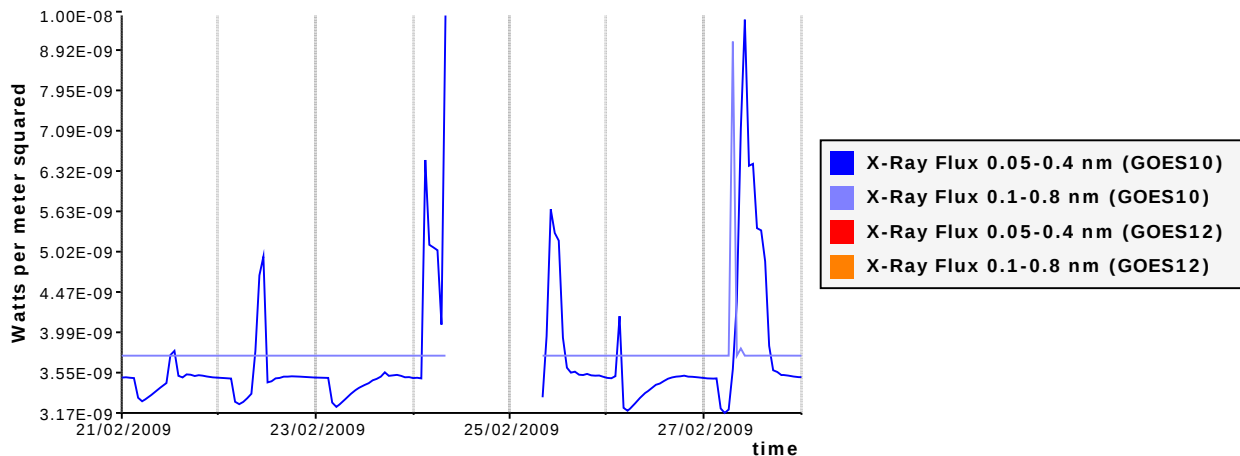
DAILY SUN

see in WR section 3.2.5

RADIATION FLUXES

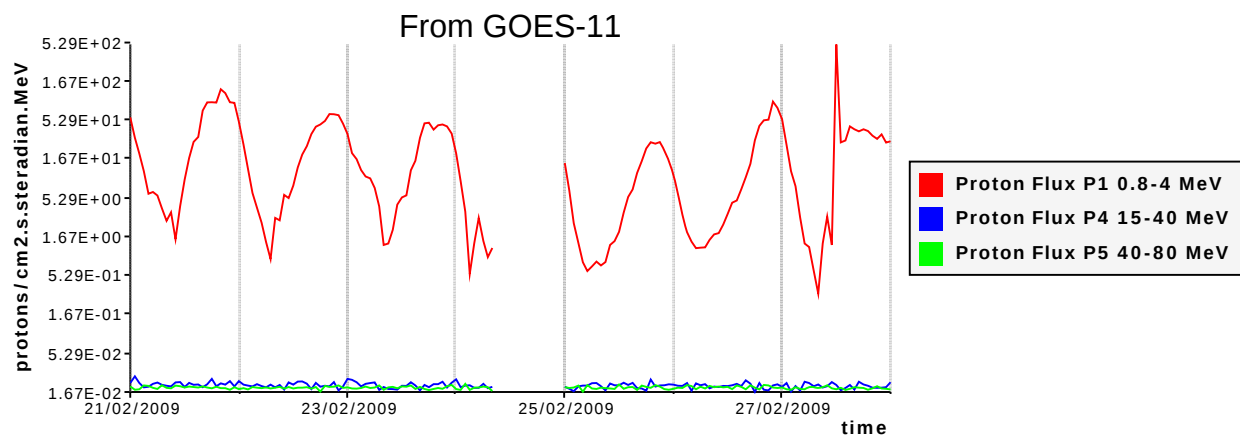
X-ray fluxes

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.



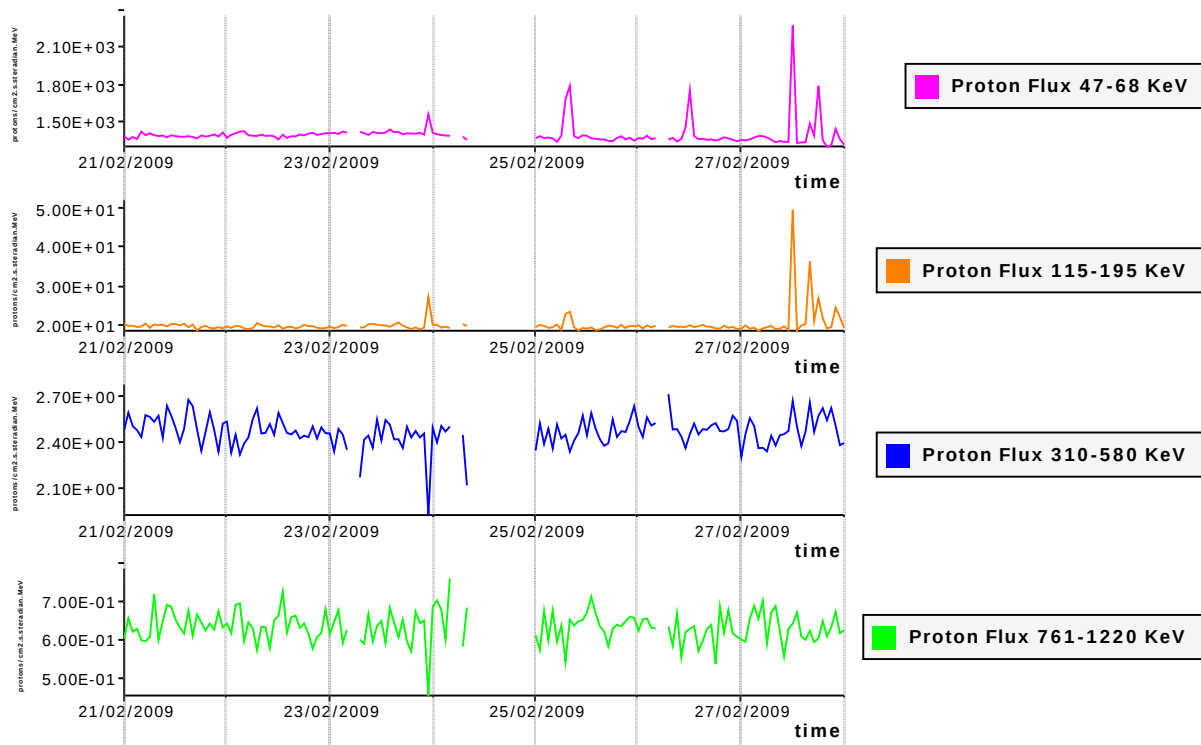
Proton fluxes (GOES-11)

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 $1\text{E-}2$.



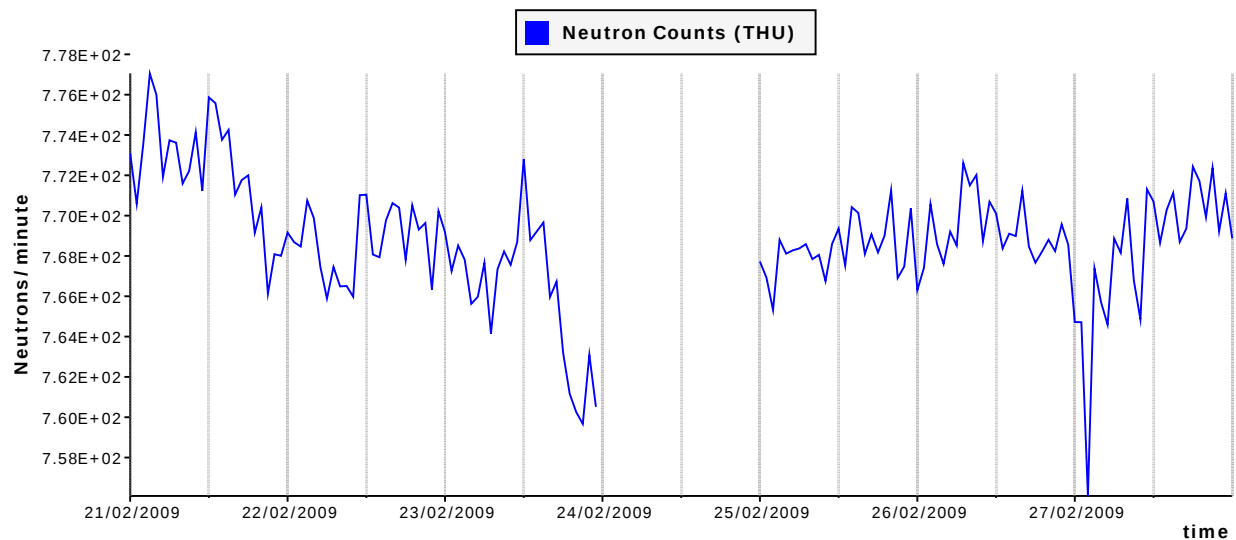
Proton fluxes (ACE)

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



Neutron counts

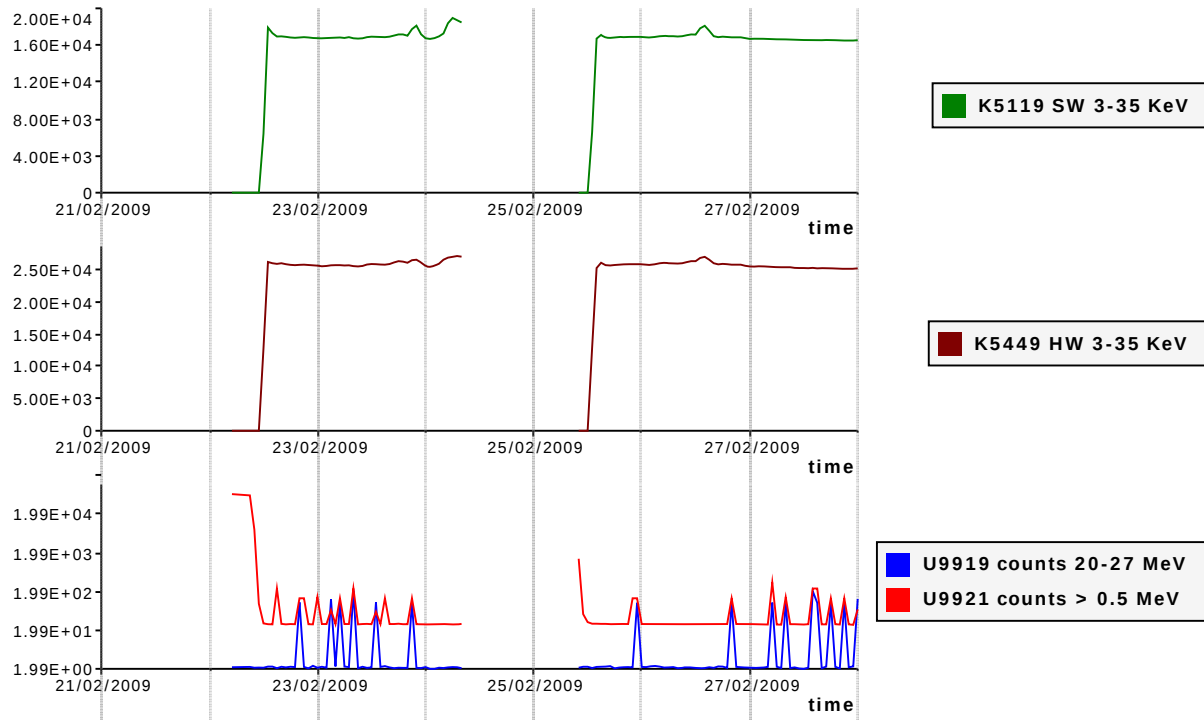
The neutron counts for the last 3 days are presented in the following plot. Nominally they remain stable around $7.2\text{E}+2$.



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.

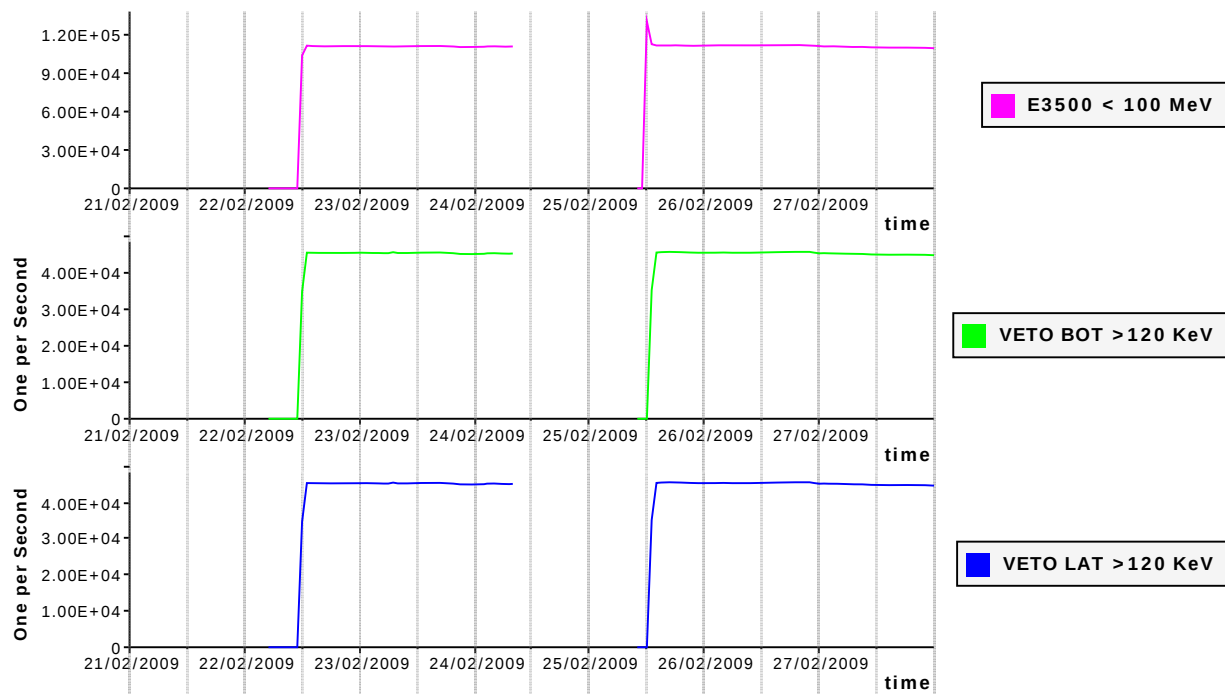
Nominal values are respectively about 1 and 18 for IREM counts, and, 13000 and 19000 for JEM-X ones.



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%.

