

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 292
Week 17
28.04.08
Routine Phase

Prepared by: M.J.H. Walker (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 19.04.08 until 25.04.08 (both dates inclusive) and covers the revolutions 674 and 675.

2 Summary of Activities

The operations were performed according to the planning inputs from ISOC combined with some manual commanding by MOC.

The targets of these revolutions consisted of a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), a custom pointing of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), a short 'Dummy Pointing' at attitude (RA 04:00:00.00, DEC -70:00:00.0), two raster dithers, of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), a short 'Dummy Pointing' at attitude (RA 16:40:00.00, DEC +70:00:00.0), a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), and a hexagonal dither, of 4U0115+63 (RA 01:18:31.90, DEC +65:44:24.0).

Note: Some further information concerning the activities is provided in the Appendix.

3 Satellite Status

3.1 Platform

The performance of the platform was good. No new unexpected behaviour / malfunction was identified.

3.1.1 AOCS

The AOCS operations were performed from the timeline during this period.

The Eclipse season started on 30/03/2008. The eighth and ninth eclipse passages were nominal from an AOCS point of view.

As part of the AOCS preparation for the summer eclipse season were verified for revolutions 673-674 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.

Five slews were missed from TL, during the observation period due to problem on Search and Track process and on DSS27 station.

The fuel consumption over the period between 19/04/2008 and 24/04/2008 was 0.1746 Kg. The remaining propellant is in the order of 140.8029 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.

The 8th and 9th eclipses of the 12th eclipse season took place on 20th and 23rd April, the relevant details are given below:

Date	Penumbra Entry	Umbra Entry	Umbra Exit	Penumbra Exit	Total Eclipse Duration	Umbra duration Only	Observed DOD 1	Observed DOD 2	Recharge Duration Battery 1	Recharge Duration Battery 2
20/04/2008	02:20:29	02:22:02	03:04:16	03:05:28	0:44:59	0:42:14	4.27	4.23	2:32:47	2:31:19
23/04/2008	02:18:24	02:20:14	02:51:53	02:53:22	0:34:58	0:31:39	3.17	3.13	1:52:13	1:51:09

From the EPS point of view the eclipse passage was entirely nominal.

3.1.3 Thermal

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

3.1.4 OBDH

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

On DoY 2008.113 at 04:37z the FCE LCL A-B currents (TM P1039=0.0 A, TM P1018=0.15 A) reported values in OOL.

The unit design foresees that both LCLs (A and B) feed the FCE unit and nominally the current are in equilibrium (~ 0.08 A on both). During the event an OOL SOFT LOW occurred on the FCE B LCL current while the FCE A current went in OOL SOFT HIGH (~ 0.15 A). This was likely determined by a spurious FCE B LCL switch OFF. The FCE remained powered and healthy thanks to the FCE A LCL but the status of the FCE B LCL reported CLOSE even if OPEN, because the monitor for A and B are ORed.

Apart the mentioned problem on the currents the unit was healthy, secondary voltages inside limits and no other anomaly condition reported.

According to the AOCS cross reference document and with the agreement of Thales-Alenia space was performed the following recovery:

- Disable ARO/ESAM relay on FCE FCP_AOC_1258
- Power ON FCE LCL B FCP_AOC_1251 (only step 3.2 and TM verification)
- Enable ARO/ESAM relay on FCE FCP_AOC_1257

The recovery was successful and no further problem reported by the unit.

The PST Allocation was over-subscribed by 3 packets to SPI for 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

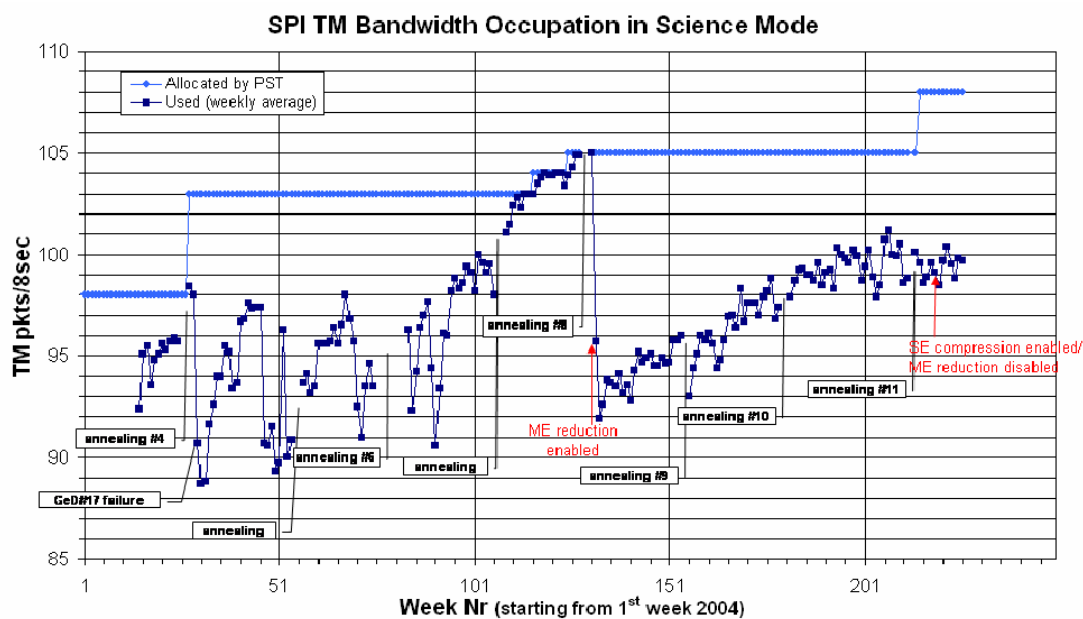
Following the 11th annealing, which ended on 30th January, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #12 which, although its energy resolution improved since the previous annealing, is still showing a slightly degraded energy resolution compared to the other detectors and is therefore operating at a lower HV setting of 3.5kV (instead of 4kV). Detector #2 is failed since 06/12/2003 and detector #17 since 17/07/2004.

The Stirling compressors are working nominally, maintaining the Germanium detectors at 80 +/-1K.

The first eclipse in the 12th eclipse season occurred on 30/03/2008. Eclipse operations for SPI have been progressing 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. The over-allocated PST with an additional 3 packets/cycle for SPI was used however the Broadcast Packet TM allocation was not updated. The average telemetry occupation in the science window was 99.7 packets/cycle.

The following plot shows the assigned and the average occupation of the SPI TM bandwidth.



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

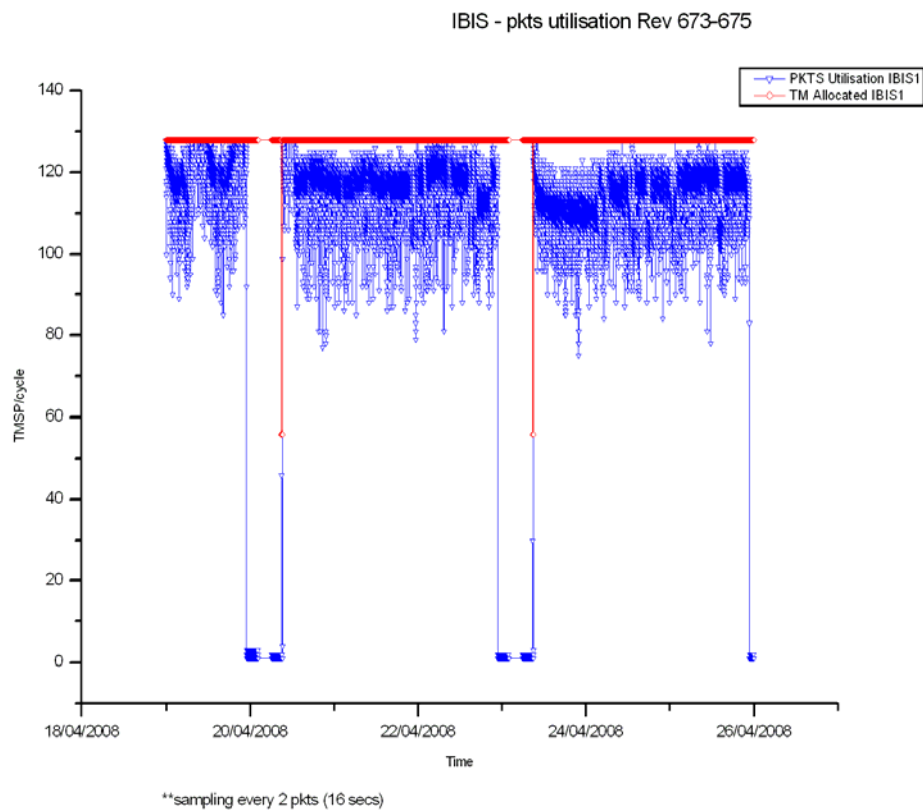
3.2.2 IBIS

The overall status of the unit is nominal.

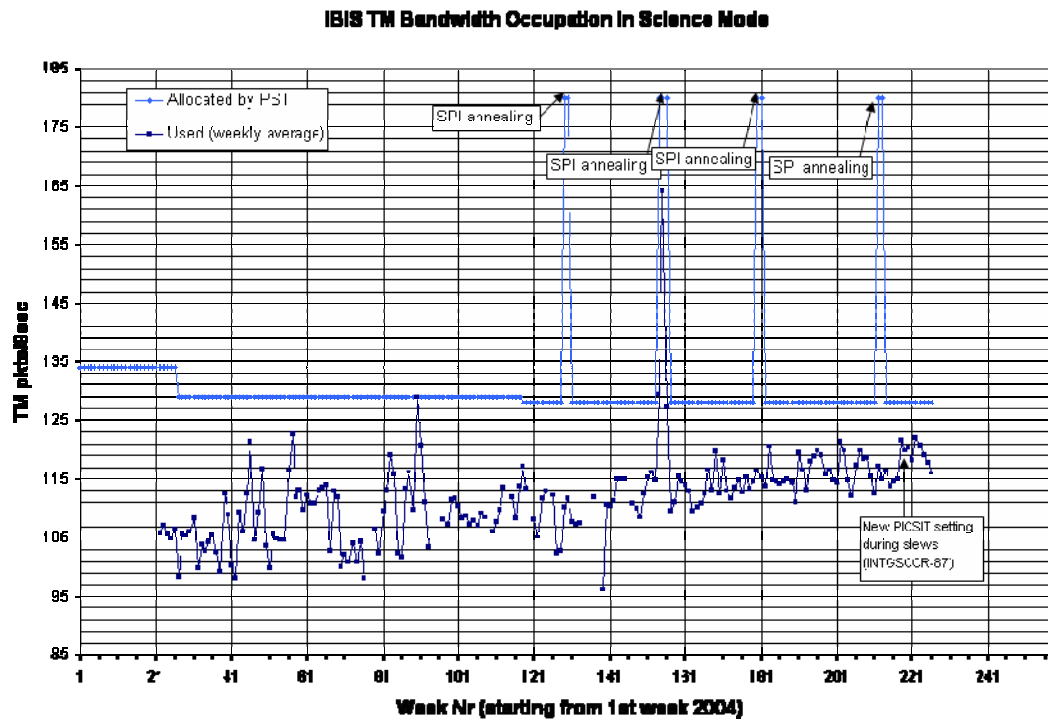
The first eclipse in the 12th eclipse season occurred on 30/03/2008. Eclipse operations for IBIS have been progressing nominally.

During the reporting period, the PST allocation to IBIS above the radiation belts was 128 packets/cycle. During the observation period, when IBIS was in science mode, the IBIS mean bandwidth utilisation was 115.92 packets/cycle (down 1.83 on last week) and the percentage of TM cycles in which the full bandwidth of 128 packets was used was 7.32%.

A plot of the IBIS TM utilisation during the observation period is shown below:



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.

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, 181 of the 186 planned science pointings were executed nominally, 2 were lost, and 3 shortened.

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

3.2.5 IREM

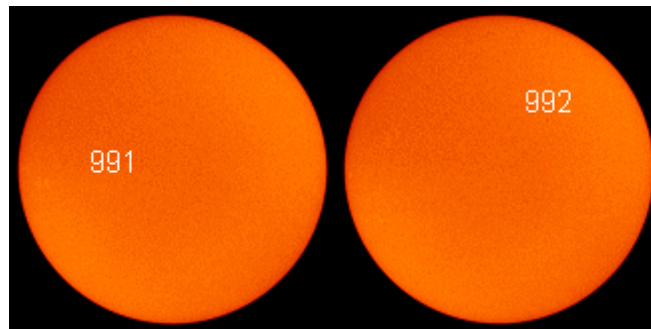
The overall status of the unit is nominal.

Solar Activity

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. The week started with a blank sun. A new tiny sunspot #991 appeared on the 21st April, but had faded away by the following day. Another sunspot #992 appeared on the 22nd April, and by the 24th was fading away quickly. The sun was blank on the 25th. There was a very low risk of solar flares.



Reference: www.spaceweather.com

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

4 Ground Facilities

The Operational ground facilities performance was good this week. One pointing was lost and three shortened due to ground problems. The overall performance was still over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was very good this week. No problems were reported..

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were however 1 occasion when the TM dropped from Redu, 6 occasions where the TM dropped from DSS-27, leading to the loss of a pointing and the shortening of 3 others, 1 occasion when the voice loop was not working, and the links to ISDC dropped 6 times.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSFs have been received for revolutions 681 and 682.

Revolutions 675 to 677 were re-planned due to a change in the TOO observations for 4U0115+634.

New TSFs have been received for revolutions 675 and 676.

2. Observation status

New ECS files have been received for revolutions 665 and 666.

3. ISOC Science Data Archive

No news.

4. ISOC system

V19.1 is in preparation with a special emphasis on improved stability for the Web Application.

5. Problems

Again, numerical problems have been found in the Flight Dynamics software delivered to ISOC.

4.3.2 ISDC

Status of ISDC observation processing on 28/04/2008:

- Latest Standard Analysis completed: observation 05200260005 (mid-latitude 1, Revolutions 664) on 23/04/2008.
- Latest products archived: observation 05200680001 (4U0115+63, Revolutions 664) on 24/04/2008.
- Latest observation products sent to the observer: observation 05200320002 (X Per, Revolutions 662) on 25/04/2008.

5 Special Events

6 Anomalies

The following problems were reported this week that impacted operations.

- On DoY 110, at 09:15:28, an change of guide star command failed release as there was no star in slot #2. A manual recovery was performed to the attitude of pointing 06730069 and the Timeline rejoined at 09:46:39. The impact was the loss of pointing 06730069.
- On DoY 112, at 23:04:10, a TM drop from DSS-27 forced a suspension of the Timeline. A manual recovery was performed, but another drop at 23:36:52 interrupted the Timeline again, forcing a second recovery. The Timeline was eventually recovered at 00:10:01. The impact was the loss of pointing 06740068 and 06740069.

- On DoY 113, at 02:01:39, another TM drop from DSS-27 caused the Timeline to stop. A swap to Redu was executed, and a manual recovery performed. The Timeline was rejoined at 03:03:13. The impact was the loss of pointing 06740074.
- At 04:37:26, a SEU caused the LCL for FCE B to trip. As there are 2 independent sources of power for the FCE, no further effects were seen. The LCL was switched back at 09:37, after first disabling the ARO, there was no impact.

The following anomaly report was entered into the ARTS system this week.

AR id	Date Created	Subject	Segment	Status
INT-2993	2008-04-22	Inefficient use of PST during revolution 674	ISOC	Pending
INT_SC-224	2008-04-22	AOCS: FCE spurious LCL B (PDU-B) switch OFF	Spacecraft	Pending

.

7 Future Milestones

The following activity is foreseen in the next few weeks.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 674

The observations in revolution 674 began with a hexagonal dither of the Galactic bulge region (RA 17:45:36.00, DEC -28:56:00.0), lasting ~3.5 hours. They continued with a custom pointing of the Galactic disk (RA 19:04:22.00, DEC +06:17:13.0), lasting ~44.0 hours. An intermediate 'Dummy Pointing' followed at attitude (RA 04:00:00.00, DEC -70:00:00.0), for ~0.1 hours. Finally, a raster dither, of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), lasting ~4.8 hours was performed until the end of the revolution.

Revolution 675

The observations in revolution 675 began with a raster dither of the Galactic Plane Region 2 (RA 07:13:42.62, DEC -10:43:25.4), lasting ~18.3 hours. They continued with an intermediate 'Dummy Pointing' at attitude (RA 16:40:00.00, DEC +70:00:00.0), for ~0.2 hours. This was followed by a hexagonal dither of the Gamma Ray Source 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), lasting ~5.6 hours. Finally, a hexagonal dither, of 4U0115+63 (RA 01:18:31.90, DEC +65:44:24.0), lasting ~27.8 hours was performed until the end of the revolution.

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

2008-04-07T08:24:49.000Z	141.2664	F	Automatic TM processing.
2008-04-08T08:28:28.000Z	141.2308	F	Automatic TM processing.
2008-04-10T07:50:41.000Z	141.1975	F	Automatic TM processing.
2008-04-10T09:05:37.000Z	141.1737	F	Automatic TM processing.
2008-04-11T08:15:07.000Z	141.1430	F	Automatic TM processing.
2008-04-14T07:58:19.000Z	141.1238	F	Automatic TM processing.
2008-04-15T16:23:42.000Z	141.1047	F	Automatic TM processing.
2008-04-17T00:54:42.000Z	141.0942	F	Automatic TM processing.
2008-04-17T07:49:23.000Z	141.0347	F	Automatic TM processing.
2008-04-18T16:12:22.000Z	140.9775	F	Automatic TM processing.
2008-04-20T07:35:22.000Z	140.9390	F	Automatic TM processing.
2008-04-21T15:58:55.000Z	140.9168	F	Automatic TM processing.
2008-04-23T07:21:47.000Z	140.9010	F	Automatic TM processing.
2008-04-24T04:12:13.000Z	140.8562	F	Automatic TM processing.
2008-04-24T16:10:06.000Z	140.8029	F	Automatic TM processing.

This report was generated Fri Apr 25 08:00:20 GMT 2008

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, 19/04/2008 – 25/04/2008

The AOCS operations were executed from the Automatic Timeline.

During this period, 85 Open Loop Slews, 118 Closed Loop Slews and 5 Momentum Biases were executed (as reported by ACC).

5 slews (CSL) were missed from TL, during the observation period due to problem on Search and Track process and on TC/TM links at DSS27 station.

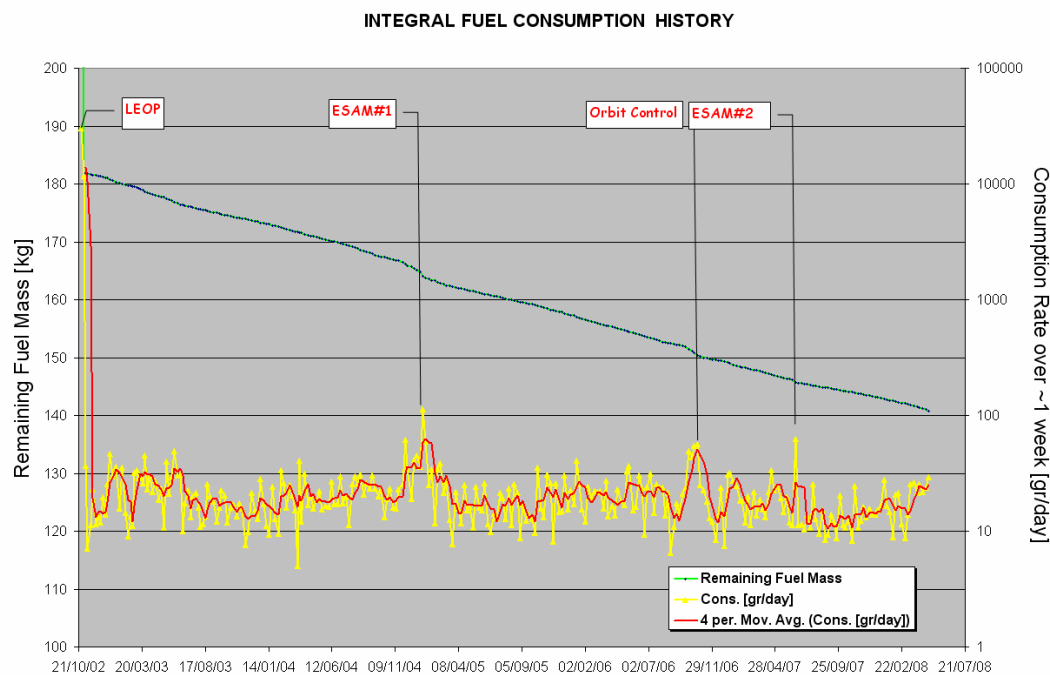
This is equivalent to ~ 2.5 % of the total number of slews planned (203).

Orbit Control

No update

Fuel consumption

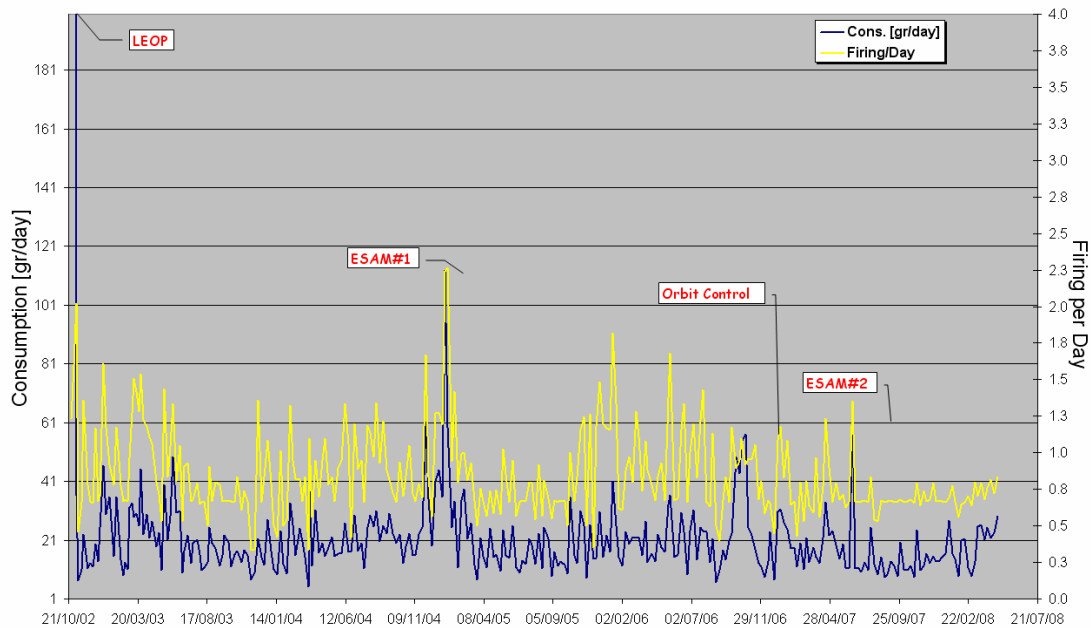
The fuel consumption (total, grams per day) over the period between 01/11/2002 and 24/04/2008 is reported in the plot below.



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 24/04/2008 is reported in the plot below.

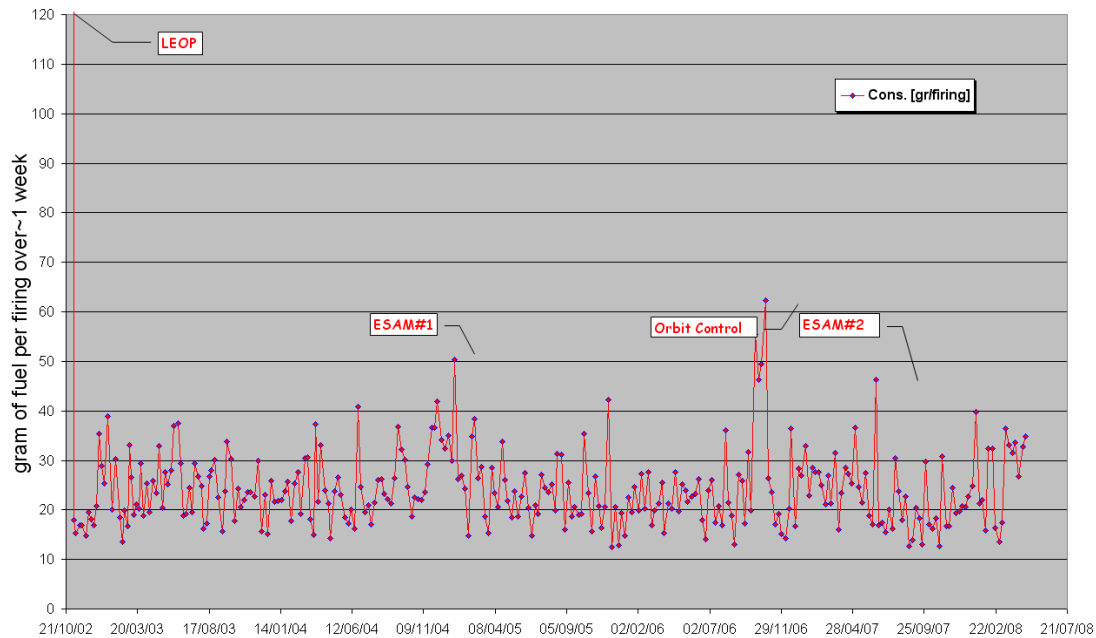
INTEGRAL FIRING PER DAY HISTORY



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

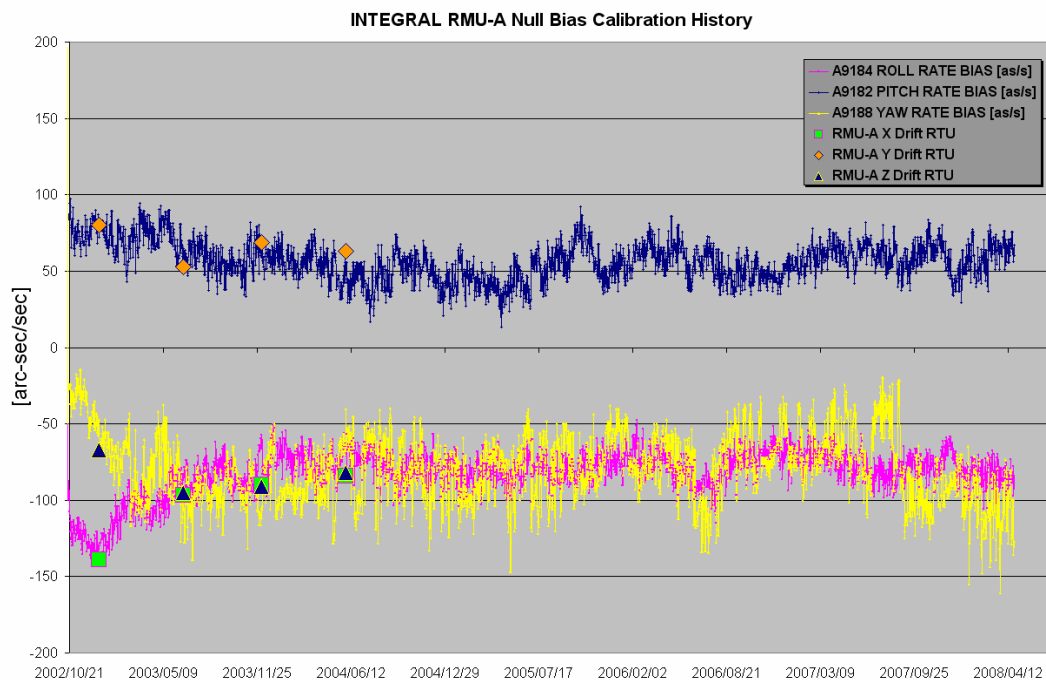
The fuel per firing over the period between 01/11/2002 and 24/04/2008 is shown in the plot below.

INTEGRAL FUEL MASS PER FIRING HISTORY



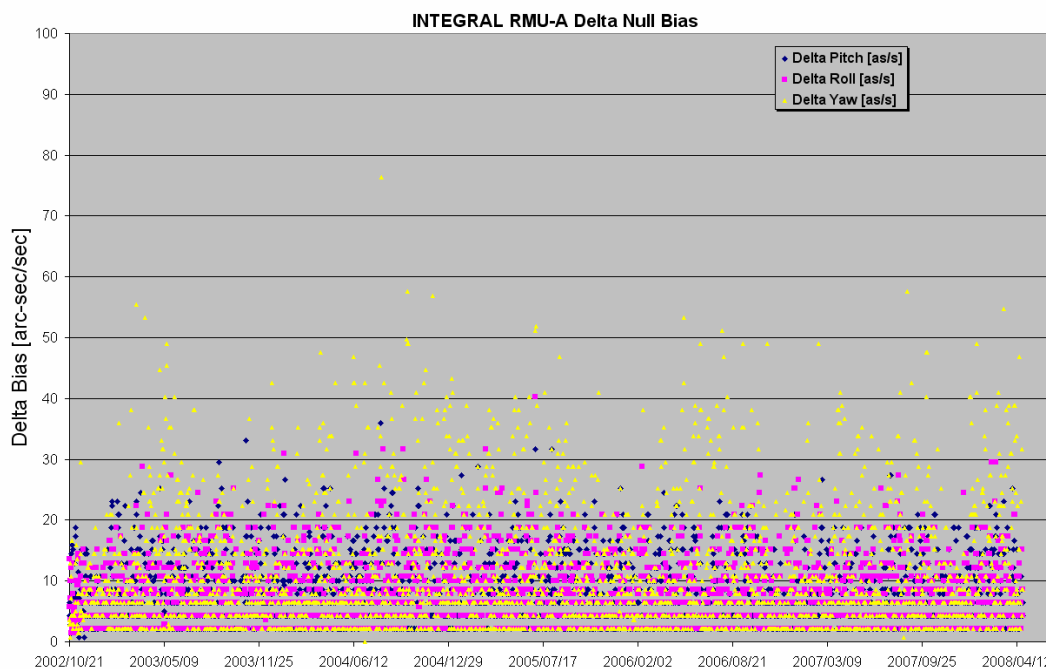
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 25/04/2008 is reported in the plot below.



Problems have been reported during the last period on FDS when generating the drift update for the RMU-A Yaw channel: the limits set on FDS have been violated few times. 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 25/04/2008 is reported in the plot below.



19/04/2008 (Day of Year 110, Revolution 673)

Issue : 1
Rev. : 0
Page : 15

The following slew ID was not executed in TL: 06730069 (CSL)

ACCS Eclipse Monitoring		Revolution: 673 Date: 2004/2008 Day: 111	
INPUT Penumbra Start 20/04/2008 02:20 Penumbra End 20/04/2008 03:05 Umbra Start 20/04/2008 02:22 Umbra End 20/04/2008 03:04 ACC Sample Time 17/04/2008 09:23:23 FDE Sample Time 17/04/2008 09:23:23 FCE Sample Time 17/04/2008 09:23:23 ACC Eclipse Counter 2885 ACC Eclipse Start 239279 ACC Eclipse End 243630 FDE Eclipse Start 239606 FDE Left to Eclipse Start 237066 FDE Eclipse Duration 3444 FCE Eclipse Start 239742 FCE Left to Eclipse Start 237102 FCE Eclipse Duration 3400		ACCS Eclipse Monitoring Summer 2008 Penumbra Start: 20/04/2008 02:20:39 Umbra Start: 20/04/2008 02:22:12 Umbra End: 20/04/2008 03:04:28 Penumbra End: 20/04/2008 03:05:38 Eclipse Duration: 0.4459 Eclipse Duration [sec]: 2699 IMU Health Check Start 19/04/2008 20:05:00 Eclipse Imminent Flag 20/04/2008 01:20:59 ACC IMU AutoCal Start 20/04/2008 01:26:26 ACC IMU AutoCal End 20/04/2008 01:56:26 Sun out of FSS FoV 20/04/2008 03:21:40 Sun back in FSS FoV 20/04/2008 03:04:37 Eclipse Timers Absolute WRT Pen. Start [sec] -1048.00 ACC Eclipse Start 20/04/2008 02:03:13 FDE Eclipse Start 20/04/2008 02:14:21 FCE Eclipse Start 20/04/2008 02:15:05 Actual From Telemetry Absolute WRT Pen. Start [sec] -1040.00 ACC Eclipse Start 20/04/2008 02:03:13 FDE Eclipse Start 20/04/2008 02:14:21 FCE Eclipse Start 20/04/2008 02:15:05 IMU IMU Auto Off Enable 17/04/2008 07:28:40 IMU On 19/04/2008 23:08:00 IMU Off 20/04/2008 03:17:34 IMU On Time 4:09:54 IMU H/C Motion Roll [sec] 0.2348 IMU H/C Drift Roll [sec] 0.1562 IMU Auto Cal Drift Roll [sec]	
		From Loaded Timers Absolute WRT Pen. Start [sec] -1048.00 ACC Eclipse Start 20/04/2008 02:03:13 FDE Eclipse Start 20/04/2008 02:14:21 FCE Eclipse Start 20/04/2008 02:15:05 Actual From Telemetry Absolute WRT Pen. Start [sec] -1040.00 ACC Eclipse Start 20/04/2008 02:03:13 FDE Eclipse Start 20/04/2008 02:14:21 FCE Eclipse Start 20/04/2008 02:15:05 IMU IMU Auto Off Enable 17/04/2008 07:28:40 IMU On 19/04/2008 23:08:00 IMU Off 20/04/2008 03:17:34 IMU On Time 4:09:54 IMU H/C Motion Roll [sec] 0.2348 IMU H/C Drift Roll [sec] 0.1562 IMU Auto Cal Drift Roll [sec]	
		From Loaded Timers Absolute WRT Pen. End [sec] 367 FCE Eclipse End 20/04/2008 03:11:45 FDE Eclipse End 20/04/2008 03:11:45 ACC Eclipse End 20/04/2008 03:15:34 Actual From Telemetry Absolute WRT Pen. End [sec] 602.00 FCE Eclipse End 20/04/2008 03:15:40 FDE Eclipse End 20/04/2008 03:15:40 ACC Eclipse End 20/04/2008 03:15:34 IMU IMU Auto Off Enable 17/04/2008 07:28:40 IMU On 19/04/2008 23:08:00 IMU Off 20/04/2008 03:17:34 IMU On Time 4:09:54 IMU H/C Motion Roll [sec] 0.2348 IMU H/C Drift Roll [sec] 0.1562 IMU Auto Cal Drift Roll [sec]	
		From Loaded Timers Absolute WRT Pen. End [sec] 367 FCE Eclipse End 20/04/2008 03:11:45 FDE Eclipse End 20/04/2008 03:11:45 ACC Eclipse End 20/04/2008 03:15:34 Actual From Telemetry Absolute WRT Pen. End [sec] 602.00 FCE Eclipse End 20/04/2008 03:15:40 FDE Eclipse End 20/04/2008 03:15:40 ACC Eclipse End 20/04/2008 03:15:34 IMU IMU Auto Off Enable 17/04/2008 07:28:40 IMU On 19/04/2008 23:08:00 IMU Off 20/04/2008 03:17:34 IMU On Time 4:09:54 IMU H/C Motion Roll [sec] 0.2348 IMU H/C Drift Roll [sec] 0.1562 IMU Auto Cal Drift Roll [sec]	

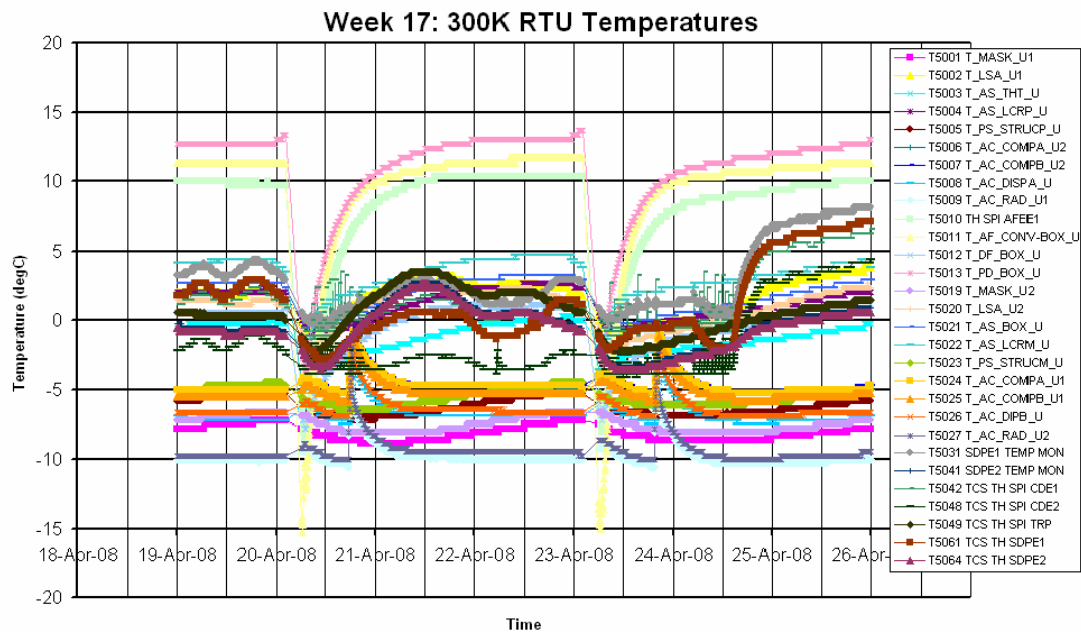
The following slews were missed in TL: 06740073 (CSL) – 06740074 (CSL)

25/04/2008 (Day of Year 116, Revolution 675)

Nothing to report.

8.3.2 SPI Operations

Unit Temperatures: All the equipment temperatures are inside the operational limits. The following plot shows their evolution during the reporting period.

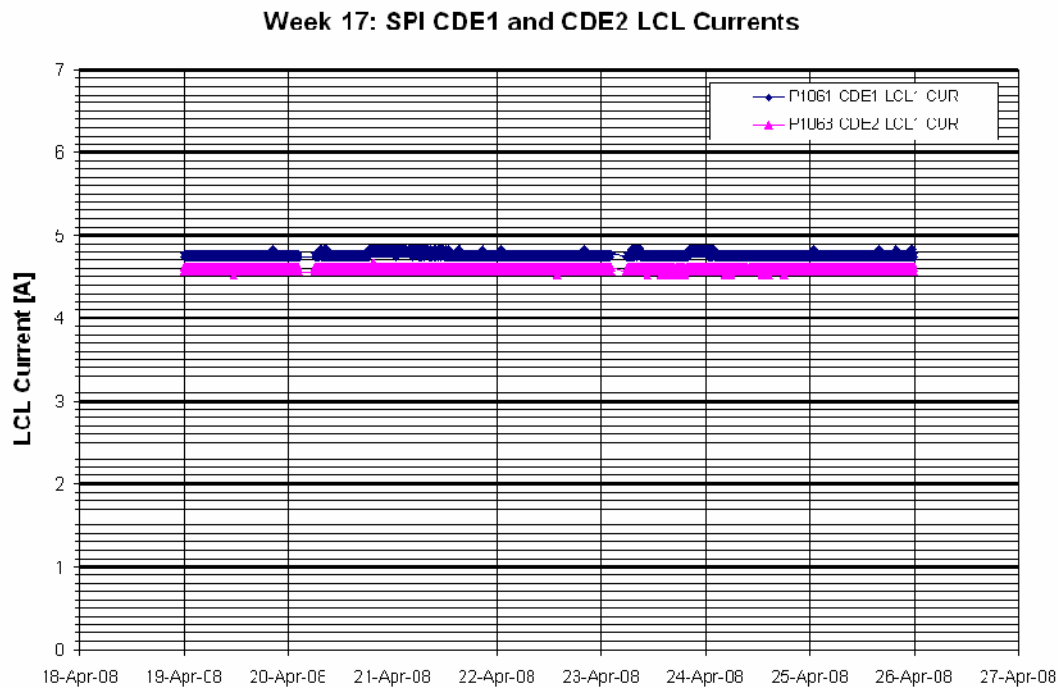


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

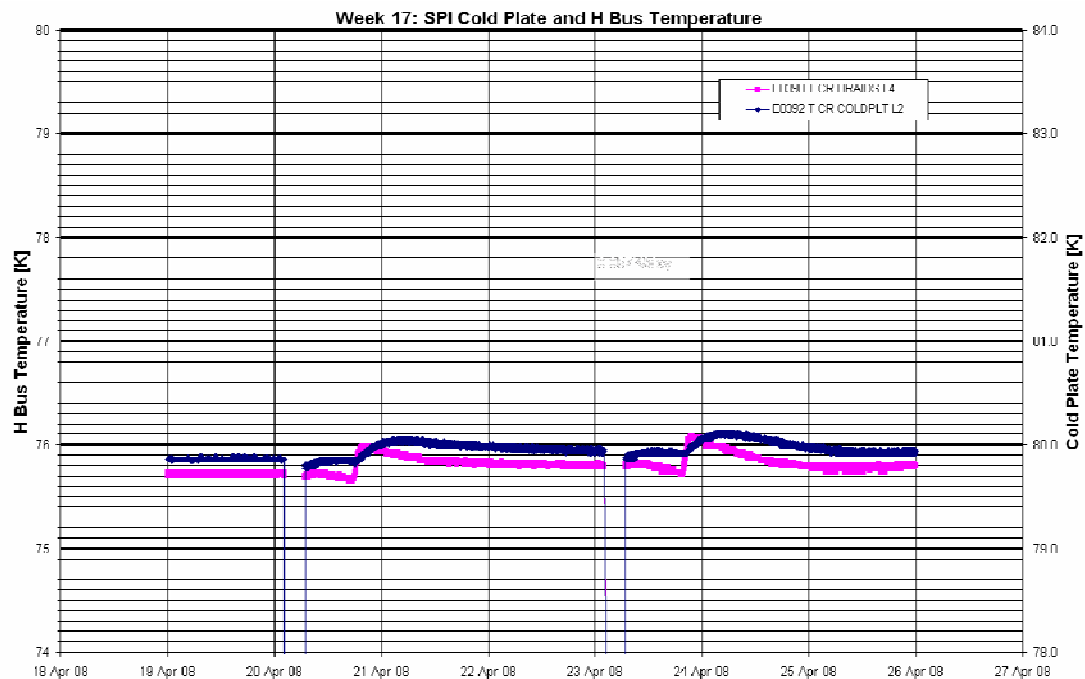
The stroke of all four compressors was set to 40 throughout the week. The average CDE LCL currents were as follows:

- CDE1 LCL Current = 4.77A
- CDE2 LCL Current = 4.58A

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 is 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 99.7 packets/cycle over the science window. The TM allocation in the science window was 108 packets/cycle.

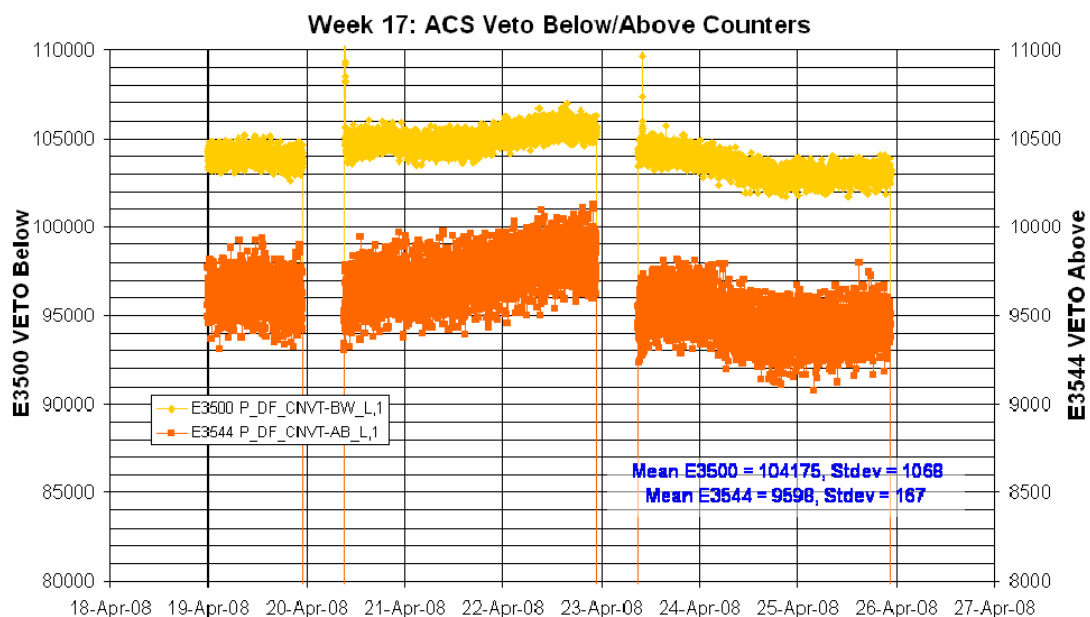
This allocation is considering that the over-allocated PST with the additional 3 packets/cycle for SPI was being used, however the Broadcast Packet TM allocation was not updated (see plot below).

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

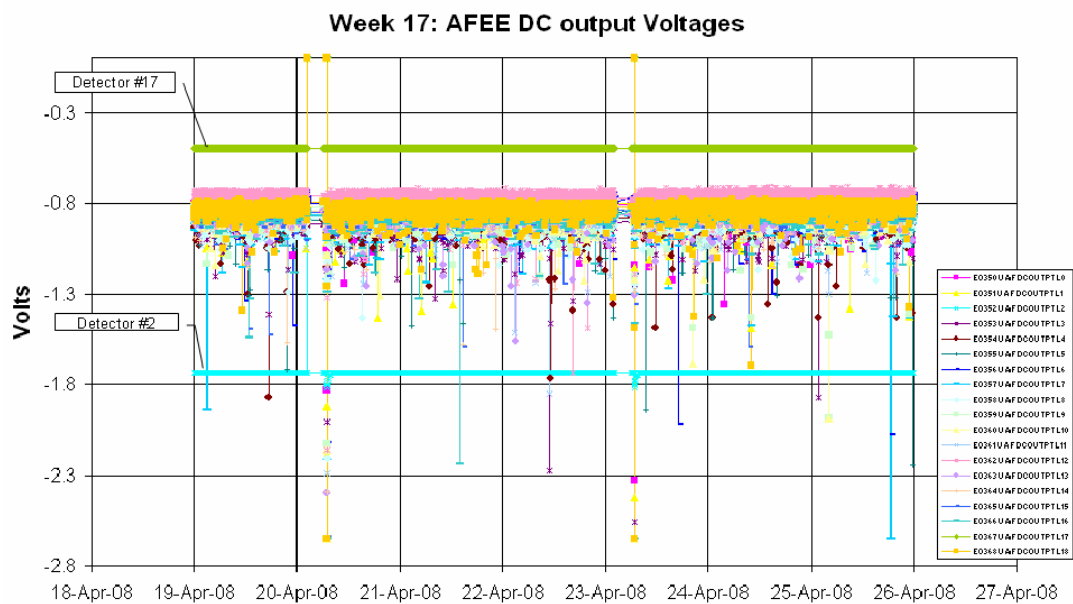


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

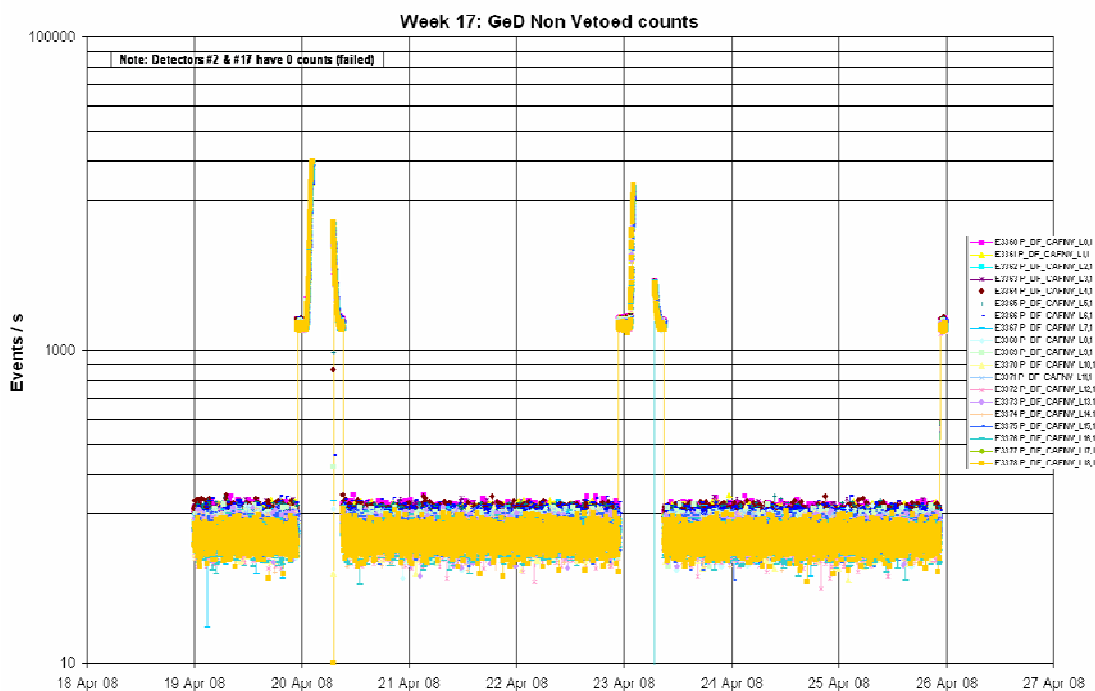
The following plot shows the ACS overall count rate evolution during the reporting period:

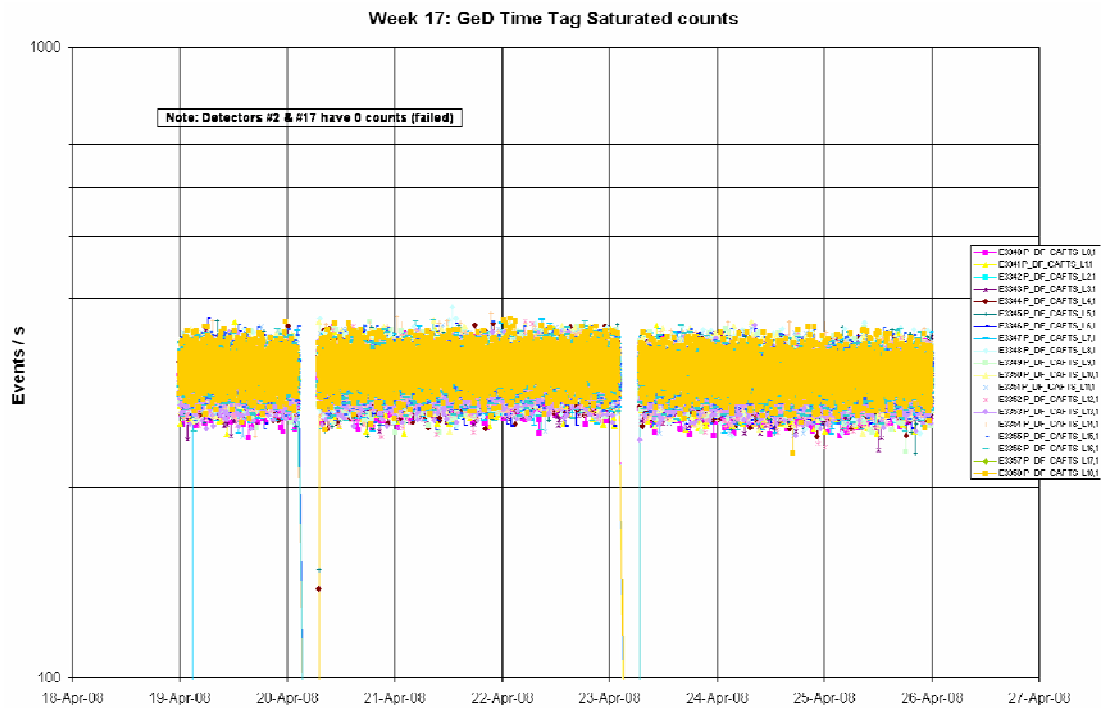
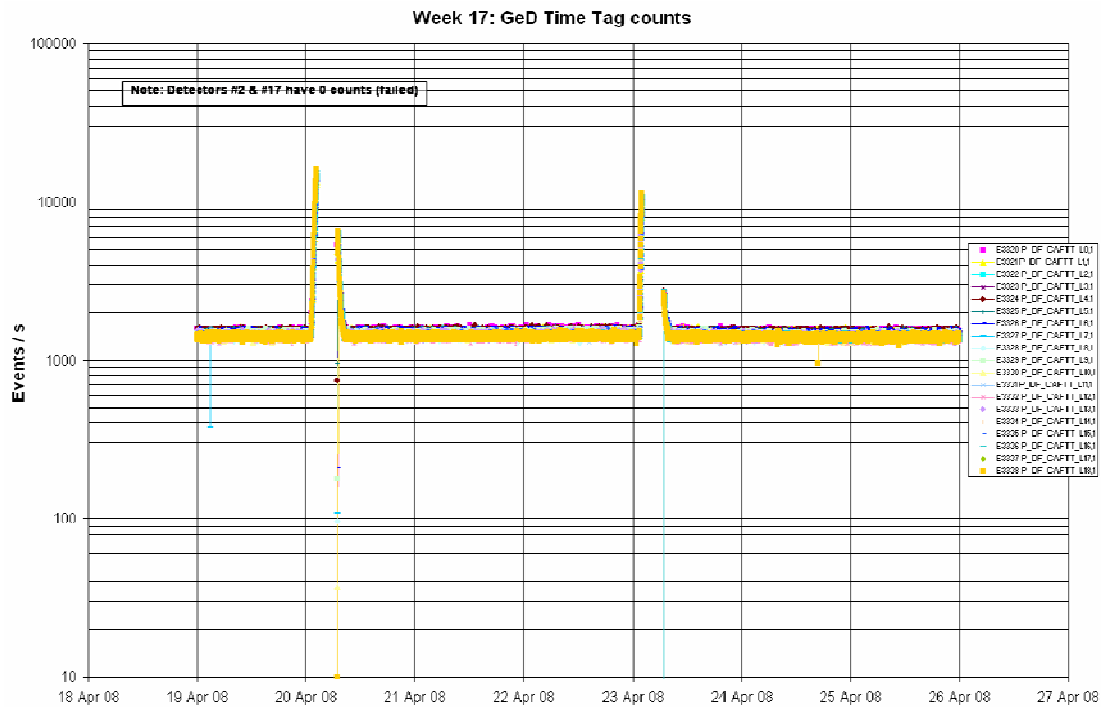


AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.

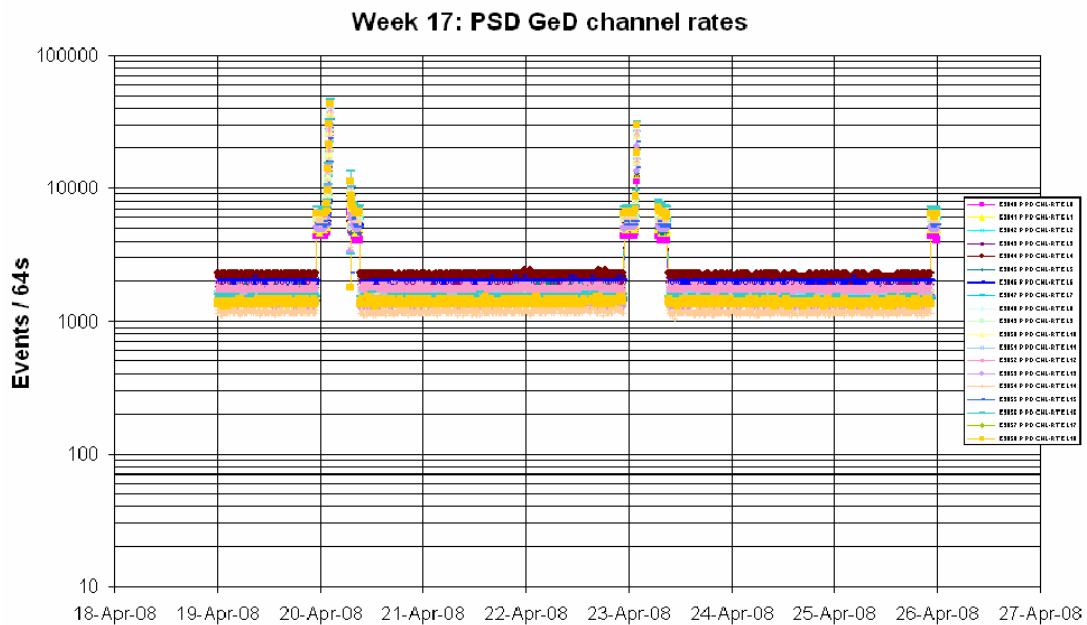


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoes, Time Tag and Time Tag Saturated Event count rates during the reporting period.





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 on SPI over the reporting period:

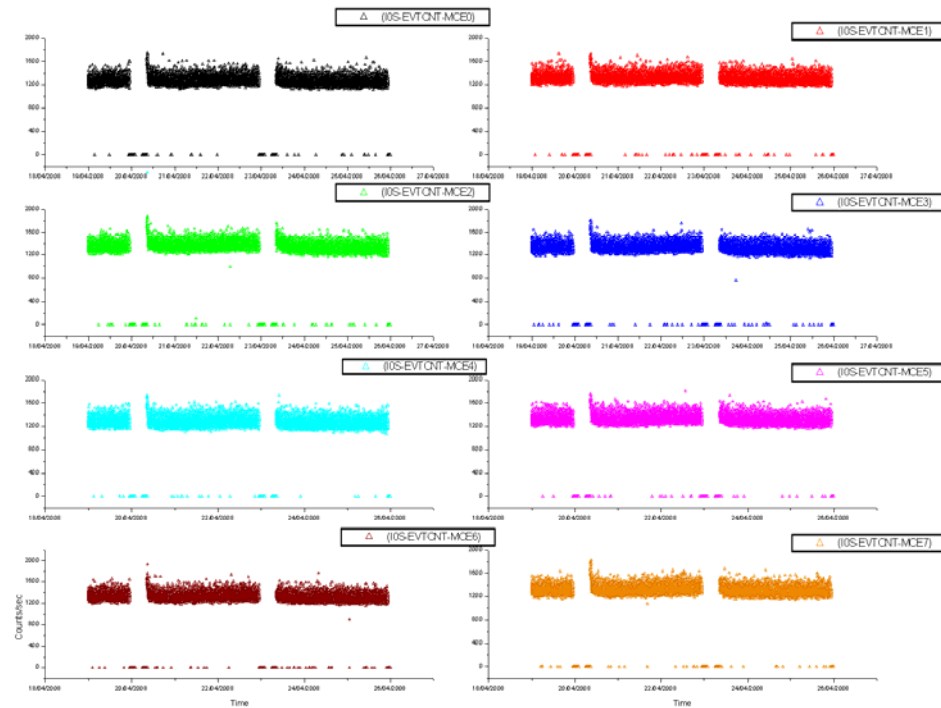
- On 2008-04-23 at 07:46:40Z (about 1 hour after the subassemblies' switch-on after eclipse) OEM APID 1024 ID 145 EXCEPTION SPI1 LSL ERROR was received, with parameters indicating a NACK from the PSD. As it was a single occurrence, no action was taken.
- TM parameter E2115 went OOL warning low on several occasions during the week. As in each case it returned within limits of its own accord, no action was taken.

8.3.3 IBIS Operations

IBIS Event Counters Plots

ISGRI Counters:

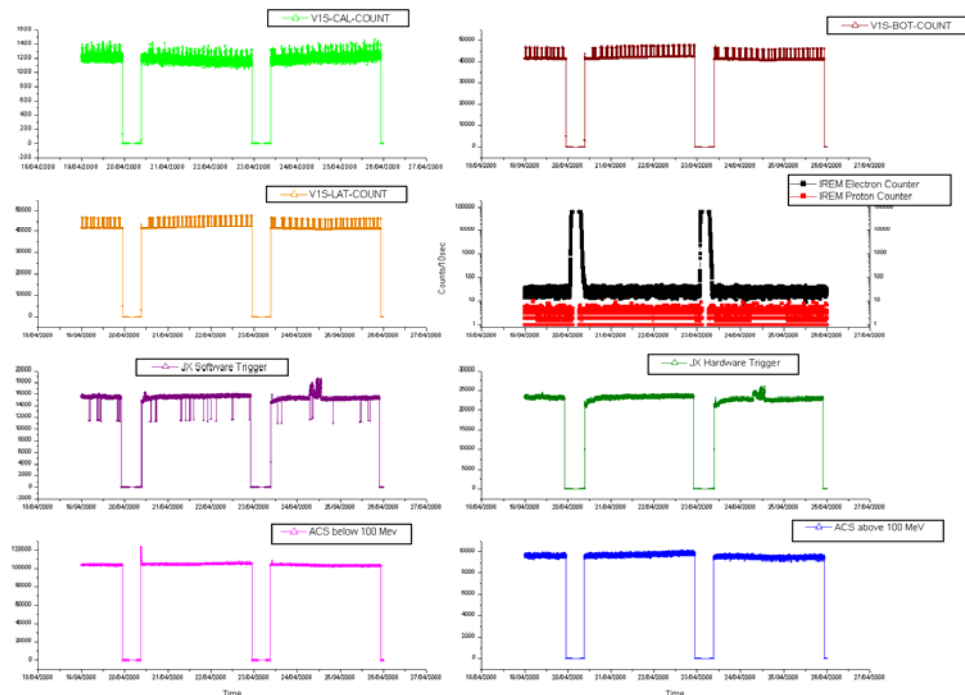
IBIS - ISGRI Counters Rev 673-675



**sampling every 4 pkts (32 secs)

VETO vs Payload Counters:

IBIS-VETO vs Payloads Counters Rev 673-675

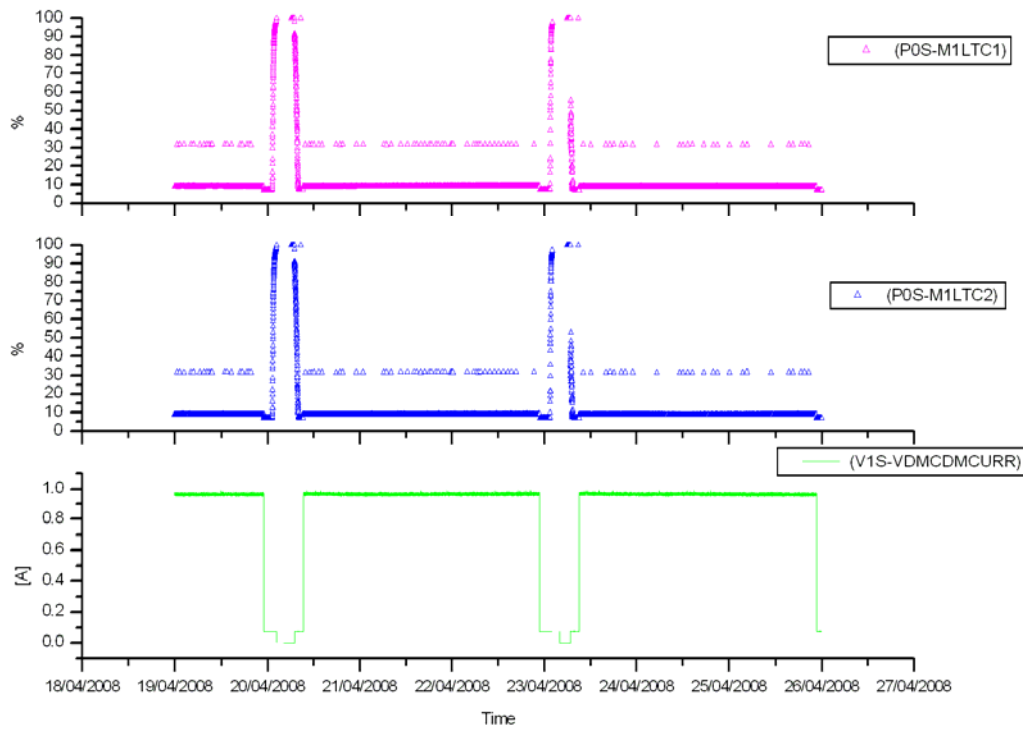


**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

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

VETO Current:

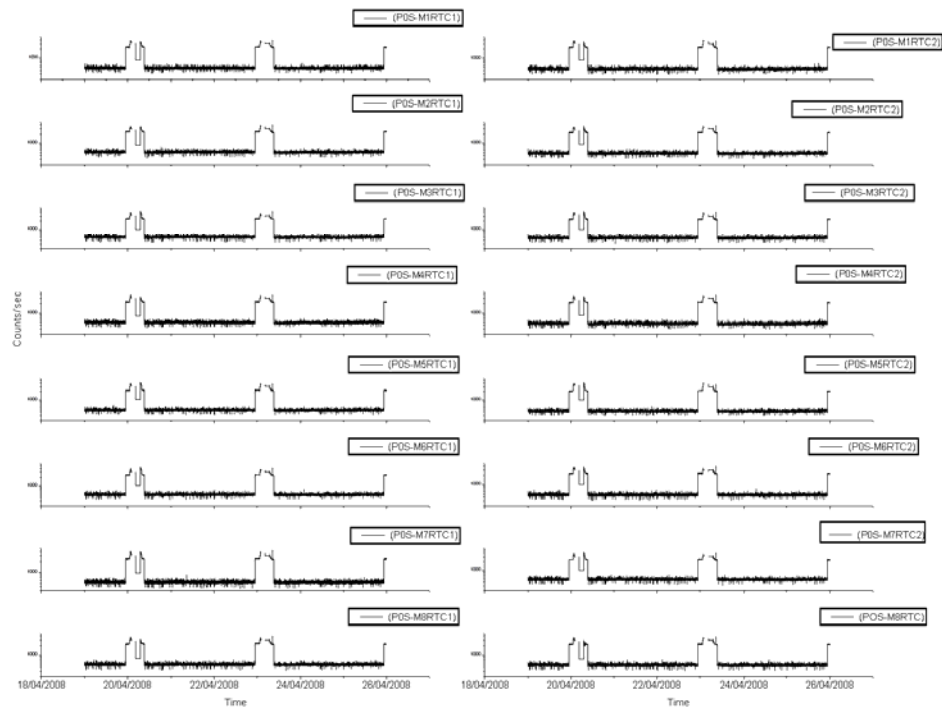
IBIS-VETO Current & PICsIT dead times Rev 673-675



**sampling every 4 pkts (32 secs)

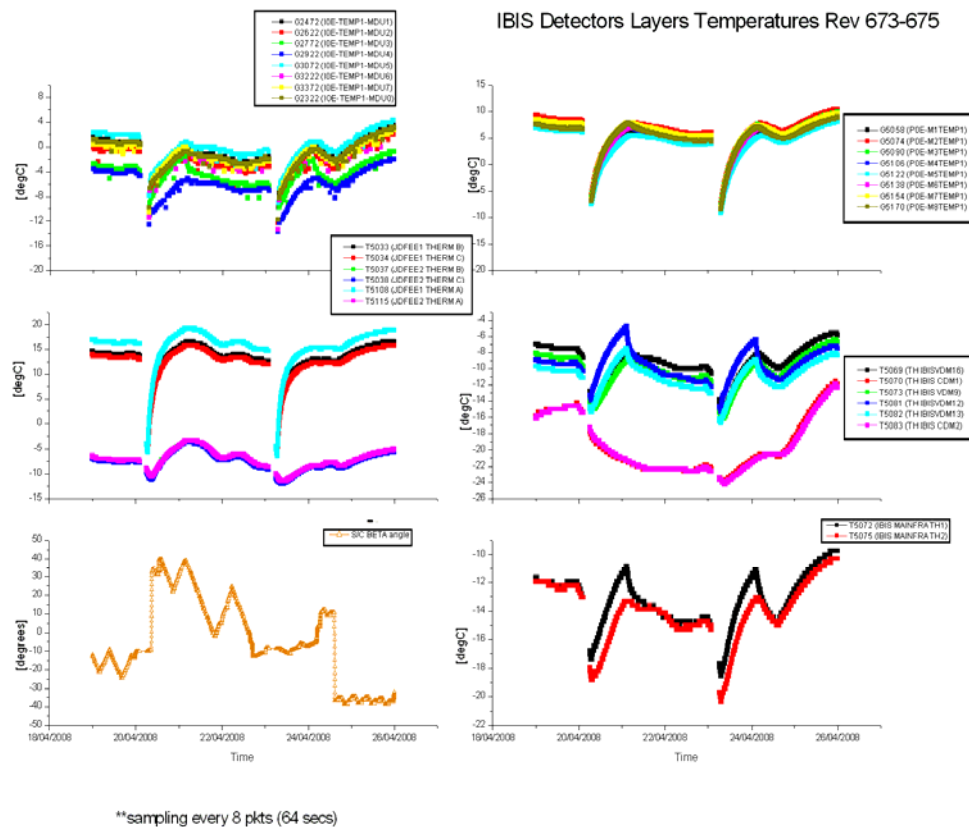
PICsIT Counters:

IBIS - PICsIT Counters Rev 673-675



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:



IBIS daily report:

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), G5002 (P0S-Mi_RTC1) and G5003 (P0S-Mi_RTC2) families and G2000 family (I0E-OVFWPXADD-Mi) were received during the radiation belt passages.

In addition the TM parameter G6061 toggled OOL Warning Low several times during the reporting period. This is the Veto calibration source counter and the OOL is due to the decreasing value of the counter resulting from the nominal radioactive decay of the calibration source. The lower limits for this parameter will be updated in the next IODB release.

2008-04-19 (DOY 110, Rev 673)

IBIS operations executed nominally.

2008-04-20 (DOY 111, Rev 673-674)

Following a request from the IBIS PI, the Module Counter Maximum of the Noisy Pixel Handling System was changed from 10000 to 20000 at the start of revolution 674. This was done by disabling the Timeline such that the ED GEISCL03 for the ISGRI calibration scheduled at 08:40:10Z was not released and a manually edited GEISCL03 sequence with the new parameter value was uplinked instead.

2008-04-21 (DOY 112, Rev 674) to 2008-04-22 (DOY 113, Rev 674)

IBIS operations executed nominally.

2008-04-23 (DOY 114, Rev 674-675)

The PI request to change the Module Counter Maximum of the Noisy Pixel Handling System from 10000 to 20000 was overlooked at the start of revolution 675. Therefore the MCM setting remained at 10000 for this revolution.

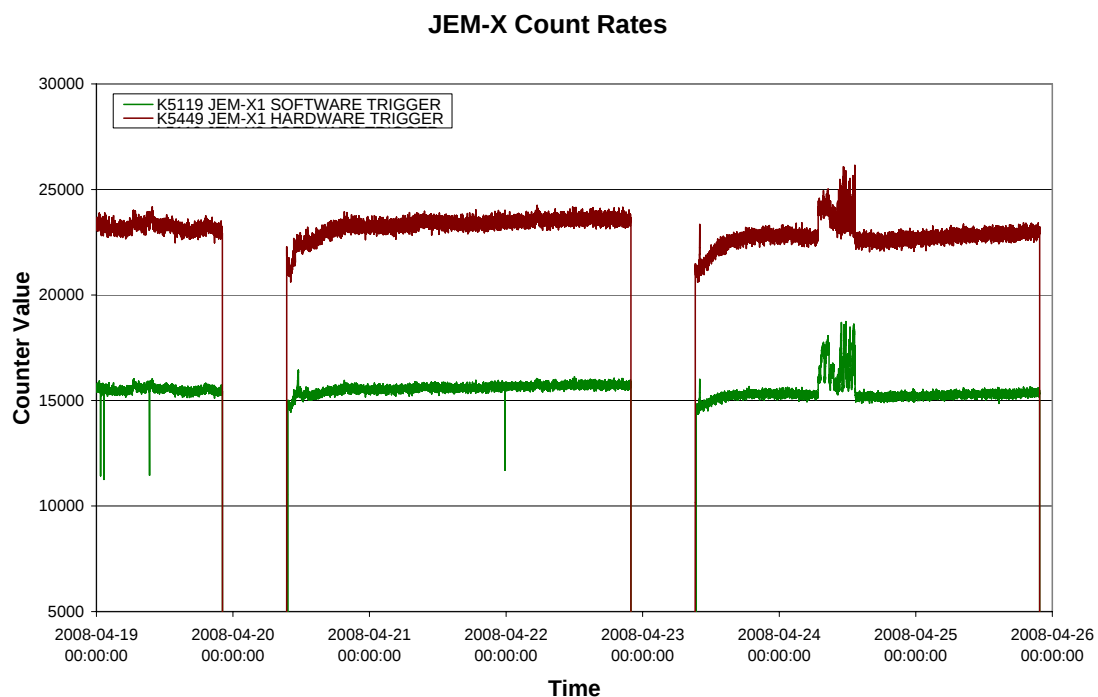
2008-04-24 (DOY 115, Rev 675) to 2008-04-25 (DOY 116, Rev 675)

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.

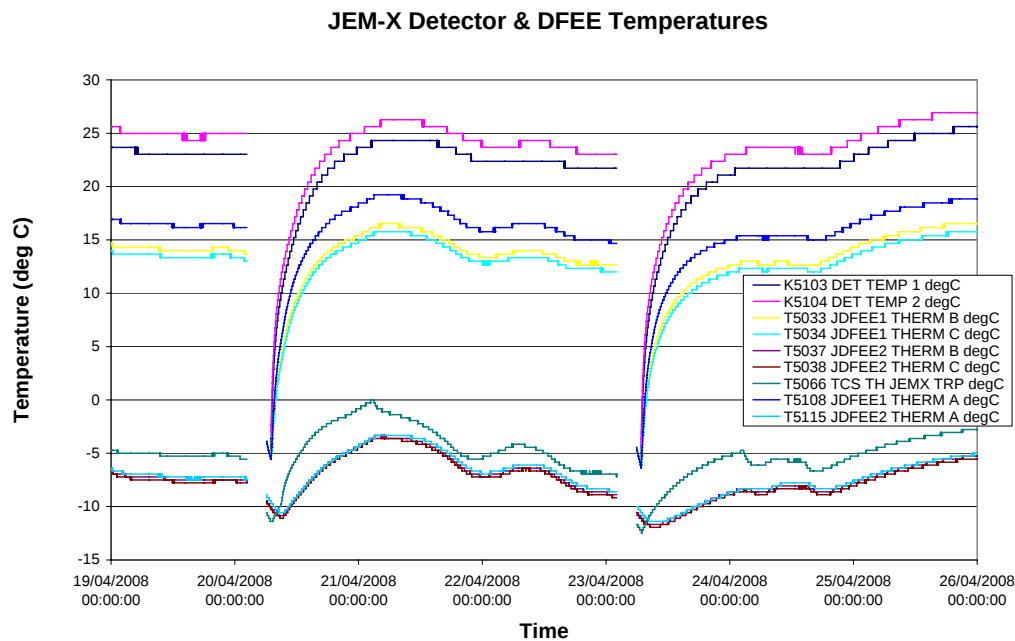


JEM-X Temperatures

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 Daily Report

2008-04-19 (DoY 110, Rev 673)

On this day, the following anomalous OEMs were received, at the indicated times:

```
2008.110.01.38.07.364 2008.110.01.38.08.485 1536 RealTime 5 ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO 0 0 65535 PR N
E
FIX6 0
K9079 MESS CLASS 2
K9080 MESS ID 5
K9074 TASK ID 16 12
K9067 LOGICAL ADDRESS 4989
2008.110.01.38.07.364 2008.110.01.38.08.520 1536 RealTime 5 ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO 0 0 65535 PR N
E
FIX6 0
K9079 MESS CLASS 2
K9080 MESS ID 5
K9074 TASK ID 16 12
K9067 LOGICAL ADDRESS 4989
2008.110.01.38.07.364 2008.110.01.38.08.522 1536 RealTime 5 ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO 0 0 65535 PR N
E
FIX6 0
K9079 MESS CLASS 2
K9080 MESS ID 5
K9074 TASK ID 16 12
K9067 LOGICAL ADDRESS 4989
2008.110.01.38.07.364 2008.110.01.38.08.522 1536 RealTime 5 ANOMALY
JEM-X1 CSSW INT ER EXCEPTIO 0 0 65535 PR N
E
FIX6 0
K9079 MESS CLASS 2
K9080 MESS ID 5
K9074 TASK ID 16 12
```

Doc. Title : INTEGRAL Mission Report #292
 Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
 Date : 28/04/08

Issue : 1
 Rev. : 0
 Page : 28

```

    K9067          LOGICAL ADDRESS          4989
2008.110.01.38.07.364  2008.110.01.38.08.524  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
2008.110.01.38.07.364  2008.110.01.38.08.524  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 the messages did not reappear. There was no impact.

2008-04-20 (DoY 111, Rev 674)

From 07:01:24 to 07:01:45, parameter KD5380D was briefly out of hard limits. From 07:37:08 to 09:44:08, parameter K5102 was intermittently outside soft limits. At 08:50:42, parameter K5317 briefly exceeded hard limits. No action was taken on any of the above events, and there was no impact.

2008-04-21 (DoY 112, Rev 674) to 2008-04-22 (DoY 113, Rev 674)

JEM-X1 operations executed nominally.

2008-04-23 (DoY 114, Rev 675)

From 06:48:51 to 06:49:13, parameter KD5380D was briefly out of hard limits. From 07:17:15 to 10:09:53, parameter K5102 was intermittently outside soft limits. From 07:46:28 to 08:24:41, parameter K5101 was intermittently outside soft limits. No action was taken on any of the above events, and there was no impact.

2008-04-24 (DoY 115, Rev 675) to 2008-04-25 (DoY 116, Rev 675)

JEM-X1 operations executed nominally.

8.3.5 OMC Operations

2008-04-19 (DoY 110, Rev 673)

At 09:15:12, an FD problem prevented a slew being performed. A recovery was performed, and the Timeline rejoined at 09:46:39. The impact was the loss of pointing 06730069. It was at this time the following OEMs were received:

```

2008.110.09.19.13.247  2008.110.09.19.21.806  1792 RealTime  131      TC REJECT
REJECTED TC1          0      0      65535 PR      N
E      E
2008.110.09.19.19.809  2008.110.09.19.30.350  1792 RealTime  131      TC REJECT
REJECTED TC1          0      0      65535 PR      N
E      E
  
```

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

2008-04-20 (DoY 111, Rev 674)

Nothing to Report.

2008-04-21 (DoY 112, Rev 674)

At 23:04:10, lost TM from DSS-27 led to the suspension of the Timeline. A manual recovery was performed and the S/C manoeuvred to the attitude for pointing 06740068. At 23:34:57, the OMC commands for that pointing were manually sent. At 23:36:52, further TM drops caused the suspension of the Timeline again. At 23:57, the OMC commands were again sent manually for the next pointing. The impact was pointing 06740068 and 06740069 were both shortened from a planned 1955 to 1425 and 1217 seconds respectively.

2008-04-22 (DoY 113, Rev 674)

At 02:01:39, another drop of TM from DSS-27 led to the suspension of the Timeline. A swap to Redu was executed, and a manual recovery performed. The Timeline was rejoined at 03:03:13. The impact was the loss of pointing 06740073, and the shortening of 06740074 from a planned 1955 to 1617 seconds.

2008-04-23 (DoY 114, Rev 675) to 2008-04-25 (DoY 116, Rev 675)

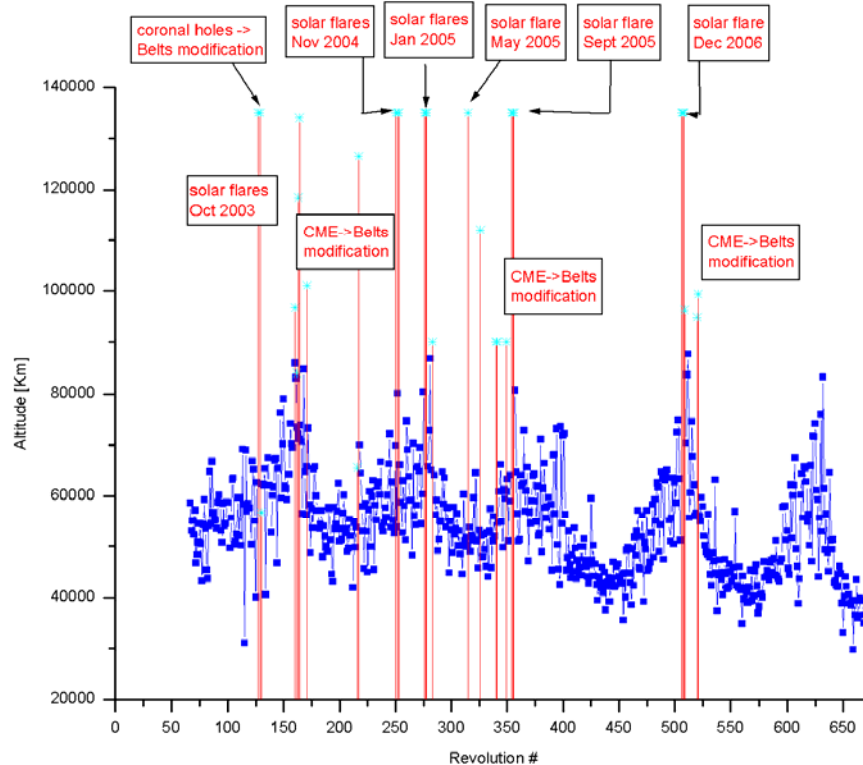
Nothing to Report.

On DoY 110 at 23:03:05, DoY 113 at 22:51:13 and DoY 116 at 22:40:17 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]
673	RAD_ENTR R 2008-04-19T23:02:59Z	20/01/2008 01:09:19	36722.2	20-Apr-2008 00:41:56	41636.86
674	RAD_EXIT R 2008-04-20T09:05:32Z	20/01/2008 09:12:15	53620.3	20-Apr-2008 08:11:56	45429.53
674	RAD_ENTR R 2008-04-22T22:51:12Z	23/04/2008 01:28:08	33156.1	23-Apr-2008 00:28:09	41953.98
675	RAD_EXIT R 2008-04-23T08:52:53Z	23/04/2008 07:57:32	>>41299.9	23-Apr-2008 07:58:09	45251.26

Reference

High radiation

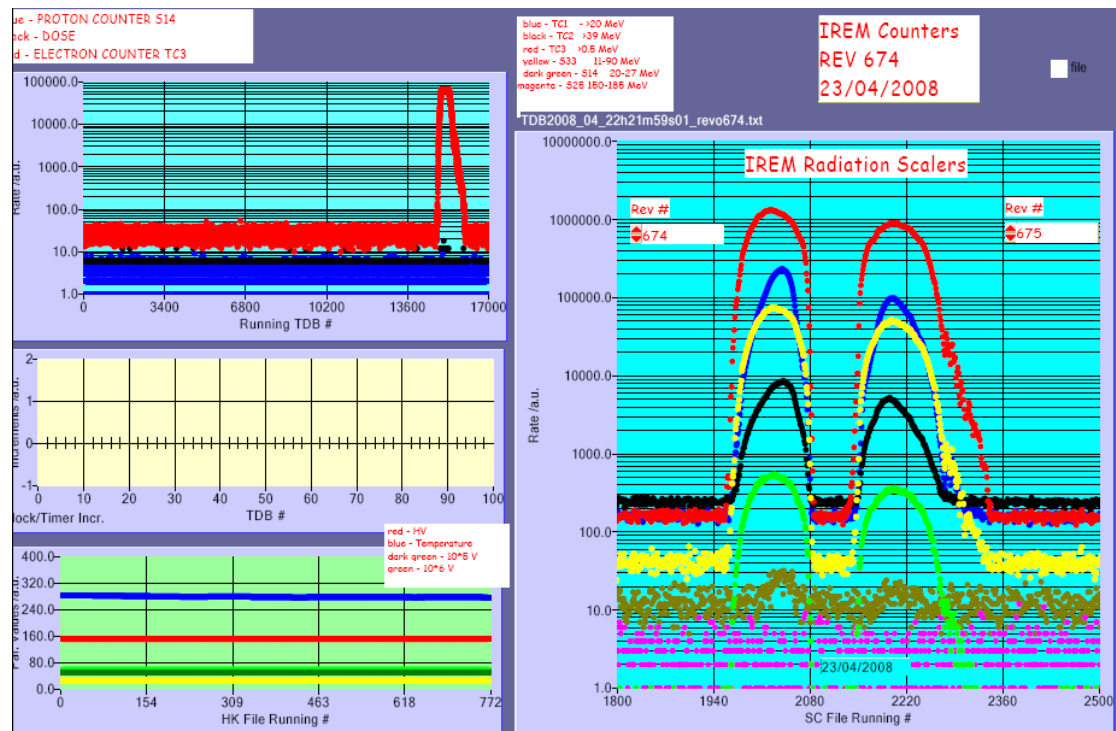
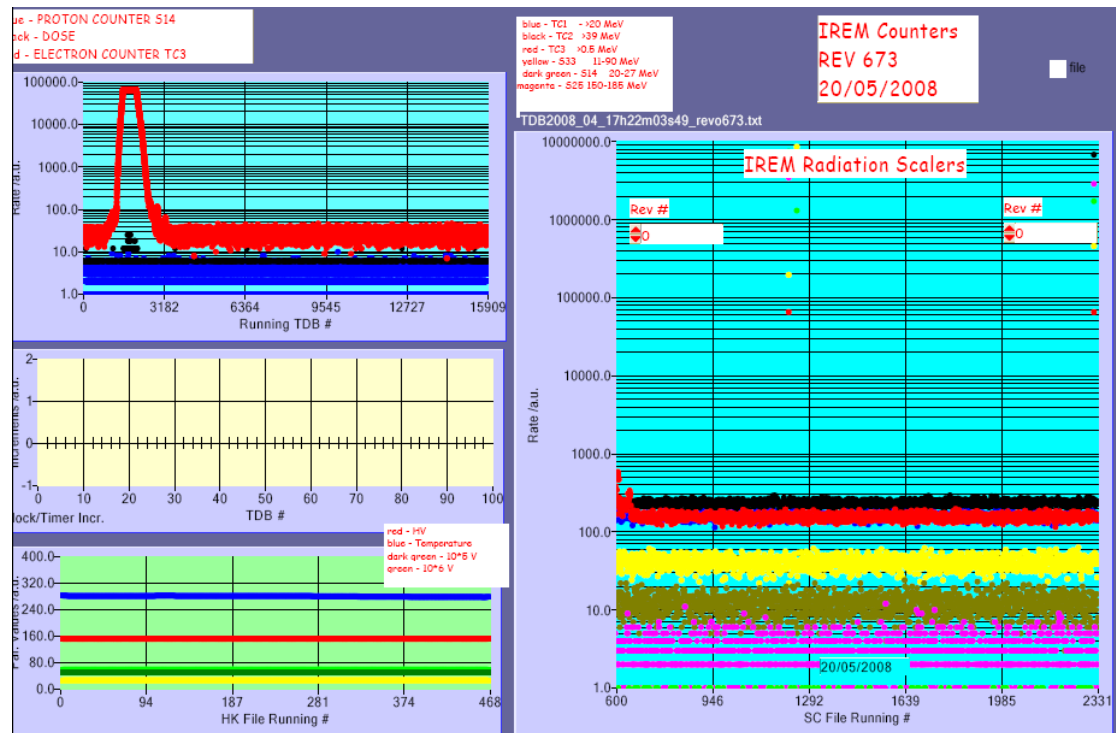
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

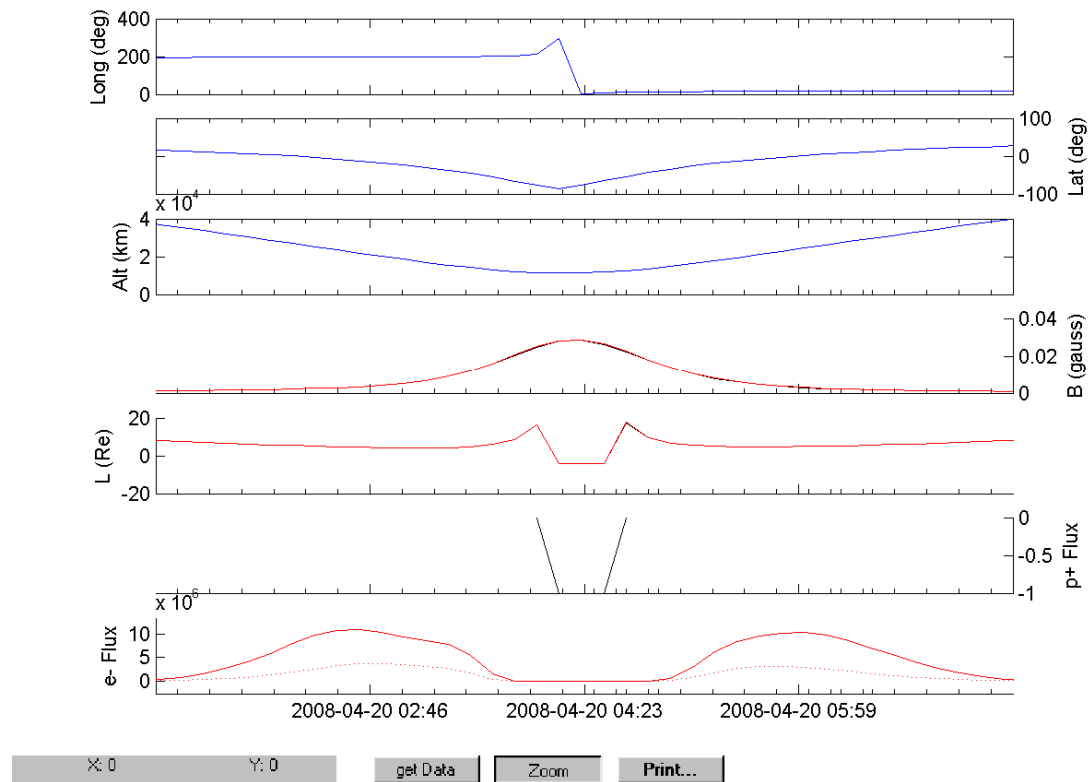
* Rad belt entry time ignoring previous threshold crossings where a gap of more than 30 minutes is present.

IREM radiation counters:

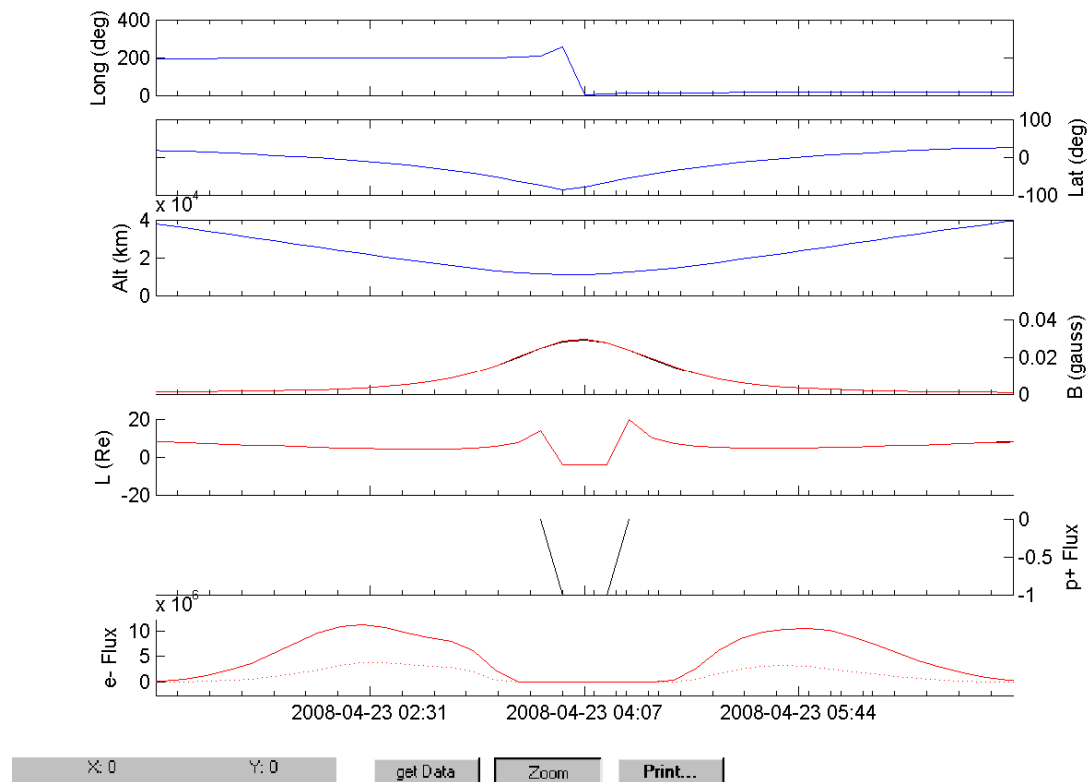


IREM Predicted Radiation Belt Passages

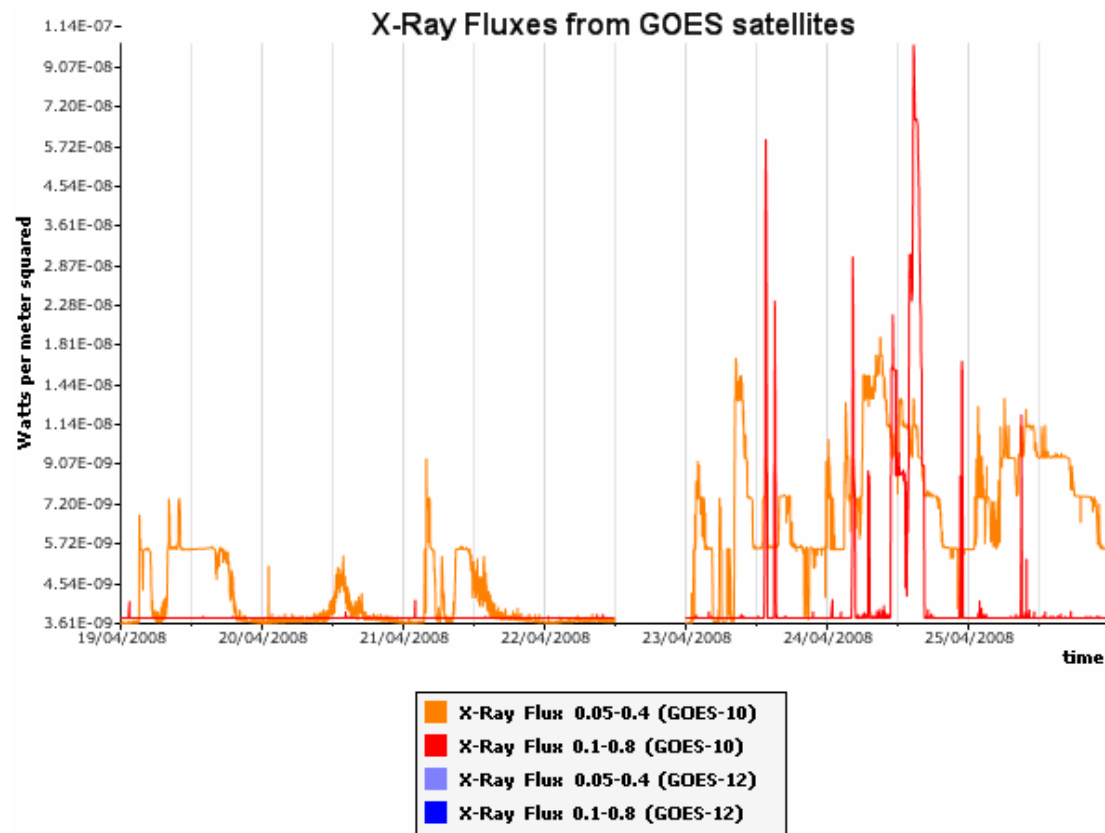
Rev 673



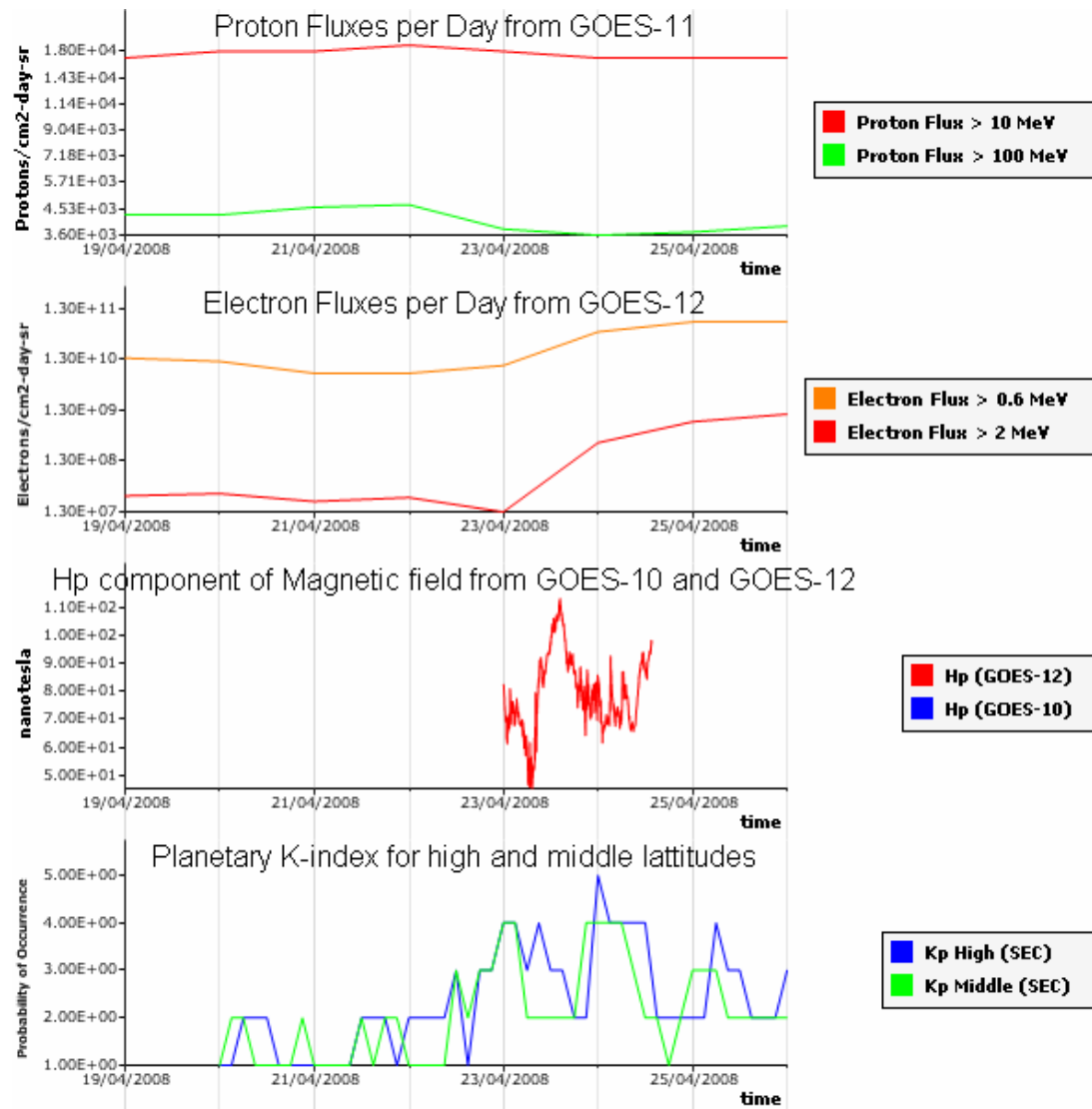
Rev 674



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 report low radiation background.

Hp component of the Geomagnetic Field is essentially parallel to the Earth's rotation axis. A drop near 0 nT is associated with a significant variation in the magnetic field. Kp index is based on ground magnetometers. Kp ≥ 5 features storm-level geomagnetic activity.