

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 288
Week 13
31.03.08
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 22.03.08 until 28.03.08 (both dates inclusive) and covers the revolutions 665 and 666.

2 Summary of Activities

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

The target of these revolutions was the Crab calibration, which consisted of raster dithers and staring observations of the Crab nebula (RA 05:34:31.90, DEC +22:00:52.0).

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.

In preparation for the Summer 2008 eclipse season, the IMU 1-2-3-4 were health checked, the ACC IMUs drifts evaluated and the RMU-B health checked during rev 665.

As results of the periodic IMUs (1-2-3-4) calibration performed on 25/03/2008, the IMUs drift corrections were updated during rev 666.

Six slews were missed from TL, during the observation period, due to problems on IMCS and FDS.

The fuel consumption over the period between 22/03/2008 and 28/03/2008 was 0.1571 Kg. The remaining propellant is in the order of 141.4688 Kg.

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

3.1.2 Power

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

3.1.3 Thermal

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

3.1.4 OBDH

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

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

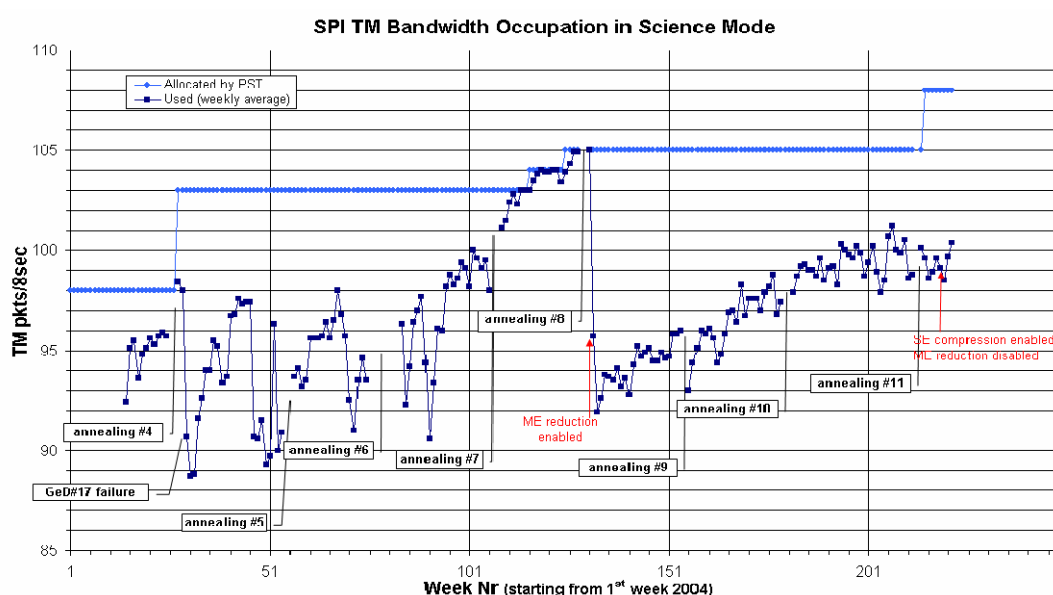
3.2.1 SPI

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.

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, except from 2008-03-28T09:58:25Z to 2008-03-28T12:47:15Z when it was 86 packets/cycle. This allocation is considering that the over-allocated PST with an additional 3 packets/cycle for SPI was being used, however the Broadcast Packet TM allocation was not updated. The average telemetry occupation in the science window was 100.4 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.

During the reporting period, the PST allocation to IBIS above the radiation belts was as follows:

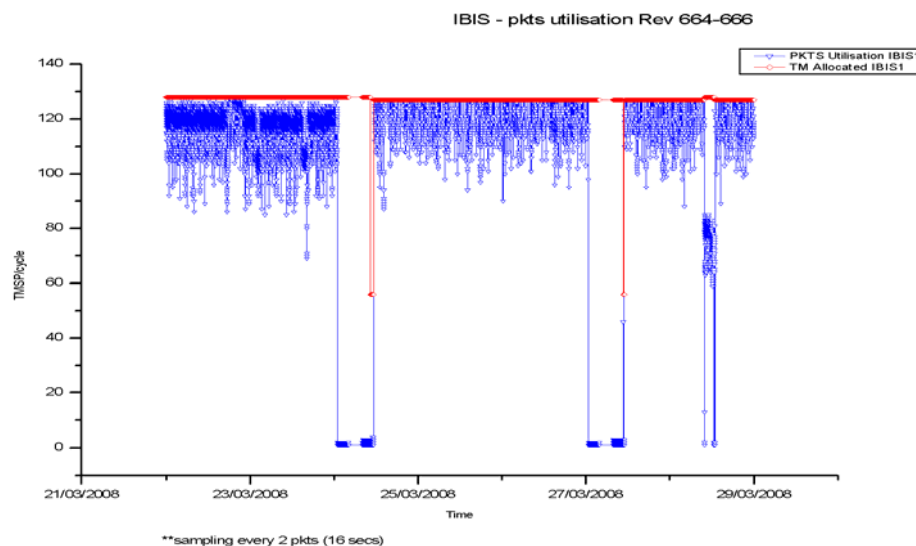
128 packets/cycle in revolution 664

127 packets/cycle in revolution 665

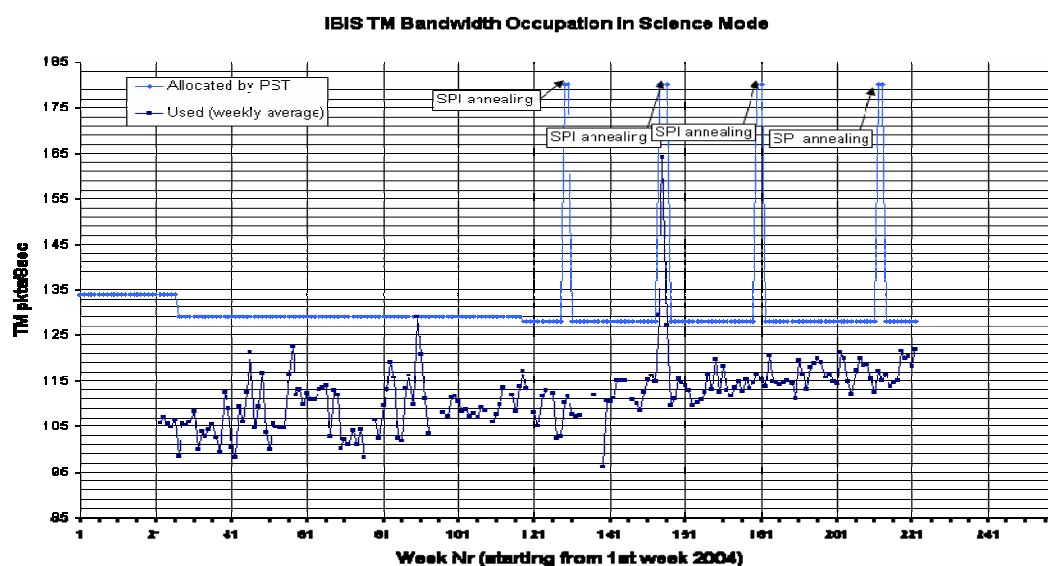
127 packets/cycle in revolution 666, except from 2008-03-28T09:58:25Z to 2008-03-28T12:47:15Z, when it was 128 packets/cycle.

The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 122.07 packets/cycle, up 3.76 on last week.

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 during revolution 664. During revolution 665, the allocation was 10 packets/cycle, and during revolution 666, the allocation was 5 for JEM-X1, and 5 for JEM-X2, except from 2008-03-28T09:59:08Z to 2008-03-28T12:48:13Z, during the JEM-X dedicated part of the Crab calibration, when the allocation was 15 packets/cycle each. During revolutions 664 and 665, JEM-X2 was dormant (DPE OFF) with no TM slots allocated, the re-activation took place at the end of revolution 665.

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 revolution 664. For the remainder of the week, the allocation was 4 packets/cycle, except from 2008-03-28T09:59:08 to 2008-03-28T12:48:13 during the JEM-X/IBIS dedicated part of the Crab calibration in revolution 666, when the allocation was again 5 packets/cycle.

During this reporting period, 199 of the 205 planned science pointings were executed nominally, 6 were lost.

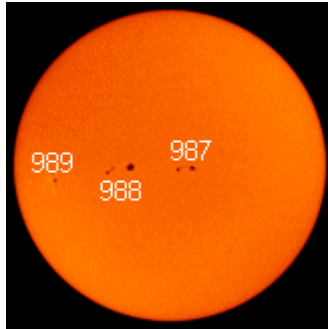
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity. Three sun spots appeared this week, #987 on the 23rd, #988 on the 24th, and #989 on the 26th, all belonging to the previous sun spot cycle (#23), these remained visible through to the end of the week. Sunspot #989 unleashed an M2 class solar flare on the 25th March, but there was no impact on Integral.



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. 6 pointings were lost to ground problems. The overall performance was still over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. There was one occasion where the Command Verifier crashed, the subsequent recovery necessitated a complete restart of the system, leading to the loss of a six pointings.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were, however, five occasions where the links to Redu dropped or bad frames were received. There was no impact.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

No new PSFs have been received.

Observations have been planned and sent up to revolution 669. Revolution 667 and following were re-planned due to TOO observations of the transient X-ray pulsar 4U 0115+63 and the newly detected bursting source XTE J1810-189. Planning for revolution 670ff is pending on decisions for the ongoing TOO.

Two more TOO requests, both for Supernova 2008bk, were received. Their acceptance is pending on the clarification of the Supernova type.

A new TSF has been received for revolution 667.

2. Observation status

No new ECSs have been received.

3. ISOC Science Data Archive

The future inclusion of publication information in the Archive was re-discussed in a meeting on 28 March.

4. ISOC system

Version 19.0 has been released for testing. A CCB meeting on 27 March scoped the next releases up to summer.

5. Problems

No new problems, but the Web application is still under investigation for slow performance.

4.3.2 ISDC

Status of ISDC observation processing on 31/03/2008:

- Latest Standard Analysis completed: observation 05200010020 (Galactic Bulge region, Revolutions 657) on 26/03/2008.
- Latest products archived: observation 05200010021 (Galactic Bulge region, Revolutions 658) on 27/03/2008.
- Latest observation products sent to the observer: observation 04200080003 on 29/03/2008.

5 Special Events

6 Anomalies

The following problems were reported this week that impacted operations.

- On DoY 084, at 11:19:00, a command verifier crash led to the suspension of the Timeline. As part of the recovery, it was necessary to restart the entire imcs, which proved time consuming. After the completion of the recovery, the Timeline was eventually rejoined at 14:57:12. The impact was the loss of pointings 06650003 through to 06650008 inclusive.

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

AR id	Date Created	Subject	Segment	Status
INT-2984	2008-03-27	Incorrect IBIS setting in POS/ICP 0667_05.ICP	ISOC	Open
INT-2985	2008-04-01	VC-0 playbacks not written to frame archive	IMCS	Closed
INT-2986	2008-04-01	The Frame checker produces incorrect gap files for playbacks	IMCS	Pending
INT_SC-221	2008-04-04	IBIS VETO: CDM#1 HV Breakdown	Spacecraft	Pending

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7 Future Milestones

The following activity is foreseen in the next few weeks.

- The Spring eclipse season starts on the 30th March 2008, at the end of revolution 666, and continues until the last eclipse on 26th April.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 665

The observations in revolution 665 consisted of a raster dither, which was devoted to the Crab calibration for SPI (RA 05:34:31.90, DEC +22:00:52.0), lasting ~56.6 hours.

Throughout these observations, all instruments were in their nominal science modes, except JEM-X2, which is switched off. The TM allocation was IBIS 127; SPI 108; JEM-X1 10; JEM-X2 0; OMC 4.

Revolution 666

The observations in revolution 666 were devoted to the Crab calibration (RA 05:34:31.90, DEC +22:00:52.0). The began with a raster dither for SPI lasting ~21.5 hours, followed by a staring observation for JEM-X and IBIS, lasting ~2.8 hours, and finally a return to the raster dither for ~32.3 hours, 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 127; SPI 108; JEM-X1 5; JEM-X2 5; OMC 4, except from 2008-03-28T09:59:08Z to 2008-03-28T12:48:13Z during the part devoted to JEM-X/IBIS observations, when it was: IBIS 128; SPI 88; JEM-X1 15; JEM-X2 15; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2008-03-09T02:26:21.000Z	141.9295	F	Automatic TM processing.
2008-03-09T09:49:57.000Z	141.9267	F	Automatic TM processing.
2008-03-10T19:31:29.000Z	141.8568	F	Automatic TM processing.
2008-03-12T09:37:33.000Z	141.8451	F	Automatic TM processing.
2008-03-13T18:59:45.000Z	141.8244	F	Automatic TM processing.
2008-03-15T09:20:21.000Z	141.8082	F	Automatic TM processing.
2008-03-15T15:50:38.000Z	141.7553	F	Automatic TM processing.
2008-03-16T18:36:57.000Z	141.7058	F	Automatic TM processing.
2008-03-18T09:08:05.000Z	141.6880	F	Automatic TM processing.
2008-03-19T18:32:25.000Z	141.6682	F	Automatic TM processing.
2008-03-21T08:58:05.000Z	141.6259	F	Automatic TM processing.
2008-03-22T16:21:44.000Z	141.5701	F	Automatic TM processing.
2008-03-24T02:08:04.000Z	141.5587	F	Automatic TM processing.
2008-03-24T08:45:25.000Z	141.5216	F	Automatic TM processing.
2008-03-27T08:44:36.000Z	141.5067	F	Automatic TM processing.

This report was generated Fri Mar 28 08:00:25 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, 22/03/2008 – 28/03/2008

The AOCS operations were executed from the Automatic Timeline.

During this period, 108 Open Loop Slews, 102 Closed Loop Slews and 5 Momentum Biases were executed (as reported by ACC).

Six slews (3 CSL, 3 OSL) were missed from TL, during the observation period due to problem on IMCS Command Verifier Task and FDS recovery schedule task.

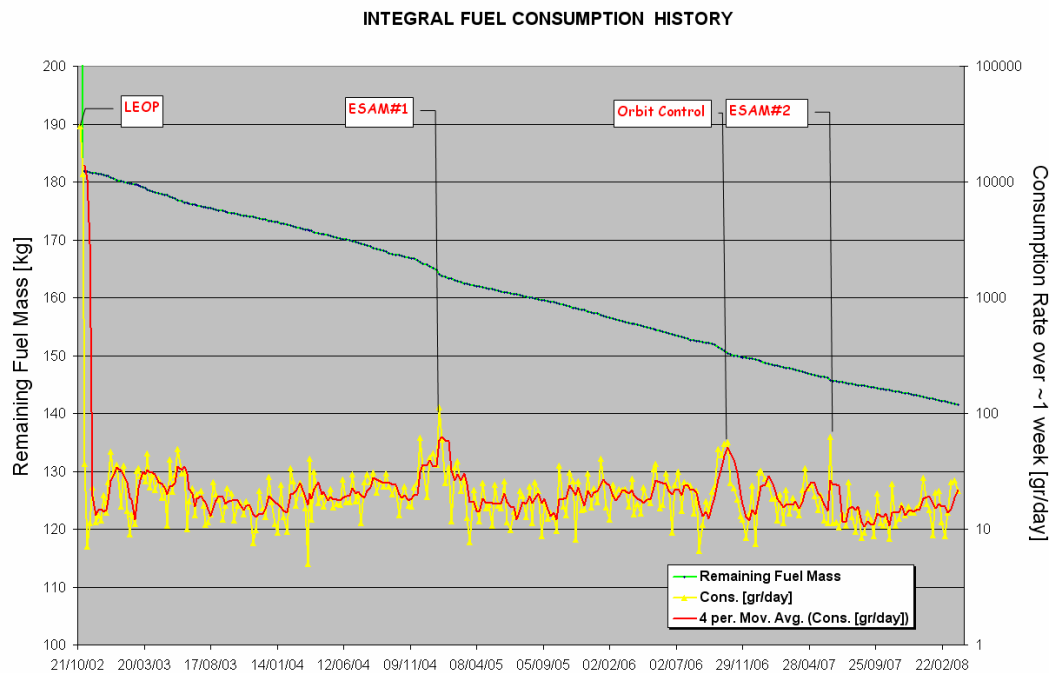
This is equivalent to $\sim 2.8\%$ of the total number of slews planned (215).

Orbit Control

No update

Fuel consumption

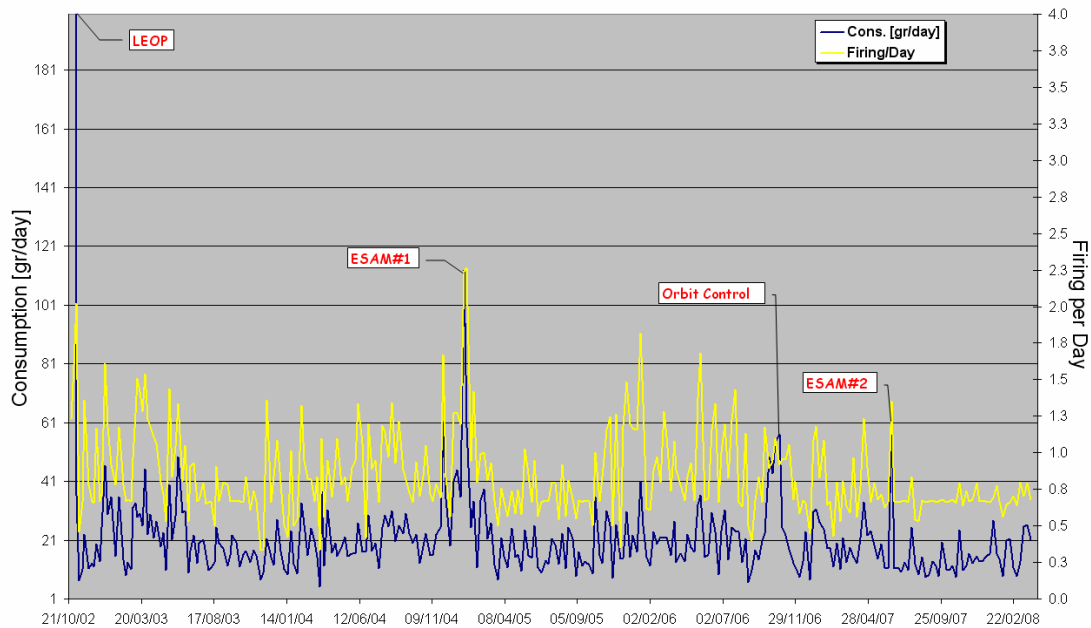
The fuel consumption (total, grams per day) over the period between 01/11/2002 and 28/03/2008 is reported in the plot below.



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 28/03/2008 is reported in the plot below.

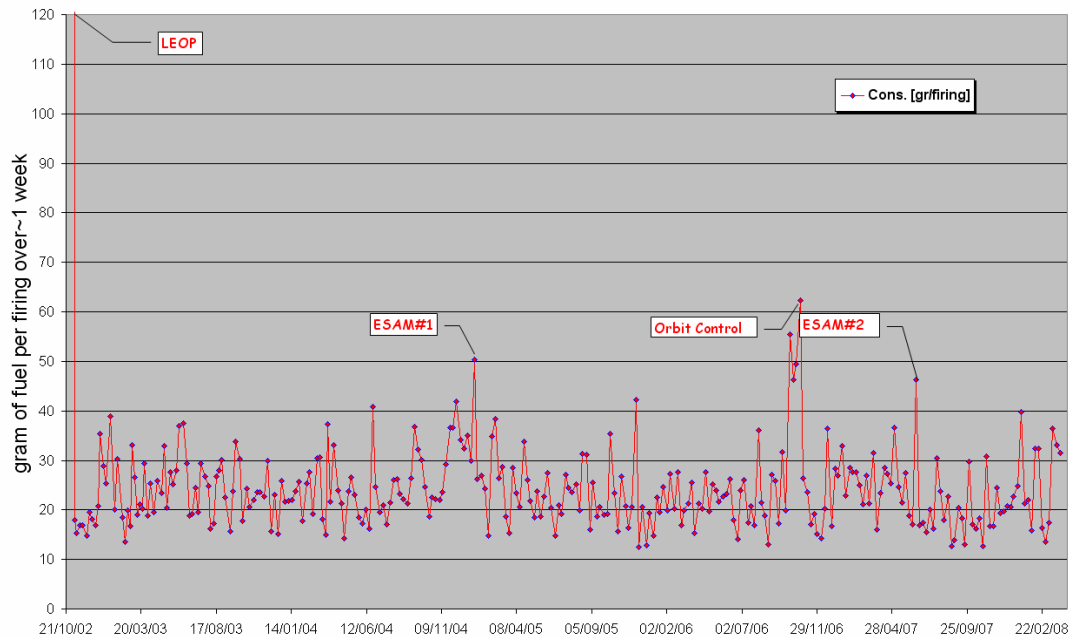
INTEGRAL FIRING PER DAY HISTORY



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

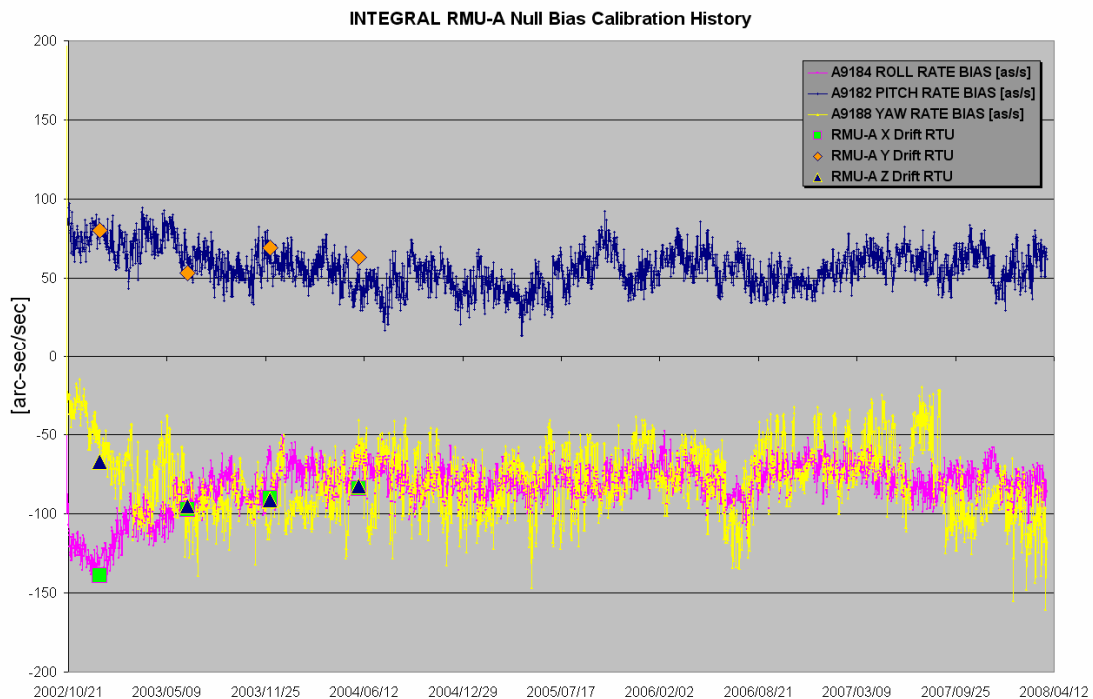
The fuel per firing over the period between 01/11/2002 and 28/03/2008 is shown in the plot below.

INTEGRAL FUEL MASS PER FIRING HISTORY



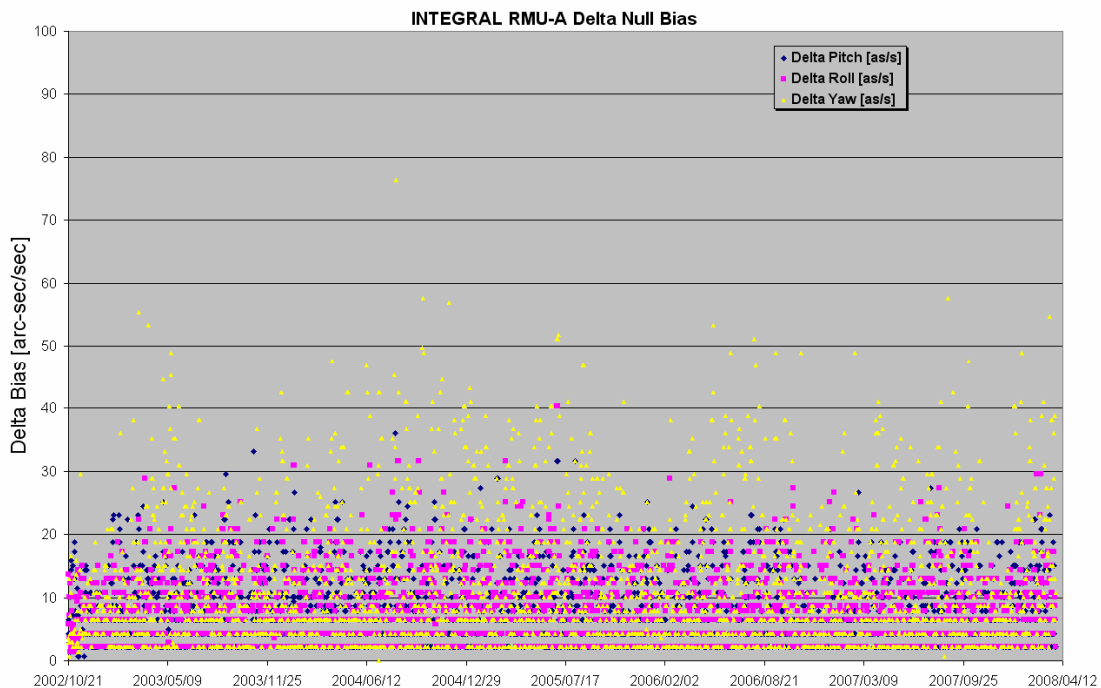
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 28/03/2008 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 28/03/2008 is reported in the plot below.



22/03/2008 (Day of Year 082, Revolution 664)

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Nothing to report.

23/03/2008 (Day of Year 083, Revolution 664)

Nothing to report.

24/03/2008 (Day of Year 084, Revolution 664-665)

Several problems on IMCS and FDS: at 11:19z a problem on the MCS Command Verifier task caused the slew ID 06650003 to fail release. Due to the persistency of problems, affecting also the PDS servers, it was decide to restart all the tasks of the IMCS-A server.

A long manual recovery was performed from the attitude of PID 06650002 to the attitude of PID 06650008. During the recovery an additional problem occurred on the FDS when running the recovery schedule tool. At 14:41z the next slew ID 06650009 was manually updated in TL.

The AOCS s/s was enabled in TL at 14:57z.

The following slews were missed in TL: 06650003(OSL)-04(CSL)-05(CSL)-06(CSL)-07(OSL)-08(OSL).

25/03/2008 (Day of Year 085, Revolution 665)

Summer 2008 Eclipse Season preparation: in preparation for the summer 2008 eclipse season the ACC IMU 1-2-3-4 drifts were evaluated and the RMU-B health checked during rev 665.

The calculated FD drifts (**below in red**) resulted consistent with the evaluation performed in parallel by FCT (**below in blue**) and with the drifts history.

Time z	Complete IMU Health-Check / Calibration and RMU-B Health Check 25/03/2008 (DoY 085)	
09:03:00	<i>Verify the end of AOCS TL commanding</i> Disable ACC Autonomous IMU Switch Off, FCP-AOC-1051 <i>Remark for procedure AOC_1051:</i> <i>Step 2.2 the correct TC-parameters setting is A1379=INHIBIT, A1380=ENABLE, A1381=ENABLE</i> <i>Load GRD to visualize the IMUs temperatures</i>	<u>Step 1</u> , IMU1 and IMU3 PID 06650038 Start at 08:57:00Z End at 09:27:00Z Altitude > 145516.0 Km
09:09:00	IMU1 Switch On, FCP-AOC-1600 <i>Remark for procedure AOC_1600:</i> <i>Step 4.2 for the SOE: remember to log the IMU time of activation in the IMU lifetime log</i>	T6009=5.0 degC T6010=3.82 degC T6011=24.58 degC T0052=6.25 degC T0028=7.50 degC
09:13:14	IMU3 Switch On, FCP-AOC-1604 <i>Remark for procedure AOC_1604:</i> <i>Step 4.2 for the SOE: remember to log the IMU time of activation in the IMU lifetime log</i>	
09:15:42	RMU-B switch On, FCP-AOC-1902	

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	IMUs warm-up time (>30 minutes)	
09:44:00 09:54:00	Set IMU Selection ACC: Set IMU1 on Roll, IMU1 on Yaw, FCP-AOC-1050 FDE: Set IMU1-X on Roll(X), IMU3-Y on Pitch(Y), IMU3-Z on Yaw(Z), FCP-AOC-1218	PID 06650039 Start at 09:37:00Z End at 10:03:38Z (AOCS TL commanding start)
10:49:00 10:51:00	Verify the end of AOCS TL commanding Reset IAAD Accumulators, FCP-AOC-1210 Reset FCE RMU Integrators, FCP-AOC-1254 Perform IMU-1 Drift and Noise evaluation, FCP-AOC-1623	PID 06650041 Start at 10:49:00Z End at 11:15:53Z (AOCS TL commanding start)
10:49:00 to 11:15:53	~26 minutes of data collection Calculated by FCT: IMU1 Noise Roll = 0.2823as/s IMU1 Drift Roll = 0.2150as/s IMU1 Noise Yaw = 0.0994as/s IMU1 Drift Yaw = 0.2756as/s Calculated by FD: => 0.2387 as/s => 0.2732 as/s	Stable pointing: PID 06650041 T6009=12.67 degC T6010=10.67 degC T6011=28.50 degC T0052=11.67 degC T0028=18.46 degC Altitude > 146894.7Km
11:31:00 11:34:00	Verify the end of AOCS TL commanding Set IMU Selection ACC: Set IMU1 on Roll, IMU3 on Yaw, FCP-AOC-1050 FDE: Set IMU1-X on Roll(X), IMU3-Y on Pitch(Y), IMU1-Z on Yaw(Z), FCP-AOC-1218	PID 06650042 Start at 11:25:00Z End at 11:52:57Z (AOCS TL commanding start)
12:01:00 12:03:00	Reset IAAD Accumulators, FCP-AOC-1210 Reset FCE RMU Integrators, FCP-AOC-1254 Perform IMU-3 Drift and Noise evaluation, FCP-AOC-1623 <i>Remark for the SOE: compare with values of the previous IMU drift reported in the specific IMU drift file</i>	
12:01:00 to 12:31:42	~30 minutes of data collection Calculated by FCT: IMU1 Noise Roll = 0.2546as/s IMU1 Drift Roll = 0.2433as/s IMU3 Noise Yaw = 0.0577as/s IMU3 Drift Yaw = 0.096 as/s Calculated by FD: => 0.2387 as/s => 0.0969 as/s	Stable pointing: PID 06650043 Start at 12:01:00Z End at 12:31:42Z Altitude > 148253.8 Km
12:39:00	Verify the end of AOCS TL commanding Deselect IMU1 and IMU3 from ACC Word B, FCP-AOC-1050	PID 06650044 Start at 12:37:00Z

		End at 13:04:41Z (AOCS TL commanding start)
12:41	Deselect IMU1 and IMU3 from FDE, FCP-AOC-1218	
12:47:49	Switch Off IMU1, FCP-AOC-1601 <i>Remark: report the IMU1 on-time in the log</i>	T6009=16.54 degC T6010=14.0 degC T6011=27.50 degC
12:50:12	Switch Off IMU3, FCP-AOC-1605 <i>Remark: report the IMU3 on-time in the log</i>	
12:53:00	Re-enable ACC Autonomous IMU Switch Off, FCP-AOC-0526 <i>Remark for procedure AOC-0526 Step 4.1 use AND A1004 (not A1005)</i>	
12:56:36	RMU-B switch Off, FCP-AOC-1903	T0052=13.67 degC T0028=24.25 degC
Thermal stabilisation after IMU1 and IMU3 Switch Off (> 2 hours) PID 06650045-PID 06650047 12:44:00 – 15:03:00		
15:10:00	<i>Verify the end of AOCS TL commanding</i> Disable ACC Autonomous IMU Switch Off, FCP-AOC-1051 <i>Remark for procedure AOC_1051: Step 2.2.1 do not requested to check if IMU1 is selected for YAW. If for any reason during the calibration, the guide star is lost the controller will switch ON the IMU1: the contingency reaction foresees to switch OFF the IMU2 to avoid thermal problem Step 4.2 remember to log the IMU time of activation in the IMU lifetime log</i>	<u>Step 2</u> , IMU2 and IMU4 PID 06650048 Start at 15:00:00Z End at 15:28:09Z
15:14:27	IMU2 Switch On, FCP-AOC-1602 <i>Remark for procedure AOC-1602: Step 2.2.1 do not requested to check if IMU1 is selected for YAW. If for any reason during the calibration, the guide star is lost the controller will switch ON the IMU1: the contingency reaction foresees to switch OFF the IMU2 to avoid thermal problem Step 4.2 remember to log the IMU time of activation in the IMU lifetime log</i>	T6009=10.33 degC T6010=8.44 degC T6011=27.50 degC
15:18:25	IMU4 Switch On, FCP-AOC-1606 <i>Remark for procedure AOC-1606: Step 4.2 remember to log the IMU time of activation in the IMU lifetime log</i>	
15:21:00	Set IMU Selection ACC: Set IMU2 on Roll, IMU2 on Yaw, FCP-AOC-1050	(AOCS TL commanding start at 15:28:09Z)
15:26:00	FDE: Set IMU2-X on Roll(X), IMU4-Y on Pitch(Y), IMU2-Z on Yaw(Z), FCP-AOC-1218	
	IMUs warm-up time (>30 minutes)	
15:36:00	Reset IAAD Accumulators, FCP-AOC-1210 Perform IMU-2 Drift and Noise evaluation, FCP-AOC-1623 <i>Remark: compare with values of the previous IMU drift reported in the specific IMU drift file</i>	PID 06650049 Start at 15:36:00Z End at 16:04:01Z (AOCS TL commanding start)
15:36:00 to 16:04:01	~28 minutes of data collection Calculated by FCT: IMU2 Noise Roll = 0.2067as/s IMU2 Drift Roll = 0.1415 as/s => 0.1402 as/s IMU2 Noise Yaw = NA as/s IMU2 Drift Yaw = NA as/s => 0.0288 as/s	Calculated by FD: Stable pointing: PID 06650049 T6009=13.67 degC T6010=12.33 degC T6011=29.0 degC Altitude > 150855.8 Km

16:16:00 16:20:00	<i>Verify the end of AOCs TL commanding</i> Set IMU Selection ACC: Set IMU4 on Roll, IMU2 on Yaw, FCP-AOC-1050 FDE: Set IMU4-X on Roll(X), IMU4-Y on Pitch(Y), IMU2-Z on Yaw(Z), FCP-AOC-1218	PID 06650050 Start at 16:12:00Z End at 16:39:53Z (AOCs TL commanding start)
16:48:00	Reset IAAD Accumulators, FCP-AOC-1210 Perform IMU-4 Drift and Noise evaluation, FCP-AOC-1623 <i>Remark: compare with values of the previous IMU drift reported in the specific IMU drift file</i>	PID 06650051 Start at 16:48:00Z End at 17:14:48Z (AOCs TL commanding start)
16:48:00 to 17:14:48	~26 minutes of data collection Calculated by FCT: IMU4 Noise Roll =0.2418 as/s IMU4 Drift Roll =0.0058 as/s IMU2 Noise Yaw =0.0468 as/s IMU2 Drift Yaw =0.0292 as/s Calculated by FD: => 0.0079 as/s => 0.0288 as/s	Stable pointing: PID 06650051 T6009=16.54 degC T6010=14.67 degC T6011=25.00 degC Altitude > 151243.4 Km
17:23:00	Deselect IMU2 and IMU4 from ACC Word B, FCP-AOC-1050	PID 06650052 Start at 17:23:00Z End at 17:48:26Z
17:27:00	Deselect IMU2 and IMU4 from FDE, FCP-AOC-1218	
17:39:19	Switch Off IMU2, FCP-AOC-1603 <i>Remark for the SOE: report the IMU2 on-time in the log</i>	T6009=17.69 degC T6010=15.38 degC T6011=27.50 degC
17:40:44	Switch Off IMU4, FCP-AOC-1607 <i>Remark for the SOE: report the IMU4 on-time in the log</i>	
17:45:00	Re-enable ACC Autonomous IMU Switch Off, FCP-AOC-0526 <i>Remark for procedure AOC-0526 Step 4.1 use AND A1004 (not A1005)</i>	

Problem on FDS: at 13:15z a problem on the FDS (<<fatal error>>) caused the update for slew ID 06650046 to fail.

After consultation with FD on-call was decide to let the slew running with the default parameters from TL.

No impact on TL

26/03/2008 (Day of Year 086, Revolution 665)

Nothing to report.

27/03/2008 (Day of Year 087, Revolution 665-666)

Loss of guide star: at 07:53:45z a loss of the current guide star occurred. As foreseen by the IPS logic, the IMU1 went on until a new guide star picked.

The operator performed a manual mapping and change of guide star to a suitable star for the next RWB activity.

No impact on TL.

28/03/2008 (Day of Year 088, Revolution 666)

IMUs drifts update: following the IMU 1-2-3-4 calibration, in preparation of the summer 2008 eclipse, the ACC IMUs drift corrections were updated during rev 666 at 17:42z.

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, TPF 0666_0003_M.DRA):

IMU-1-X= 0.2387 arcsec/sec
 IMU-1-Z= 0.2732 arcsec/sec

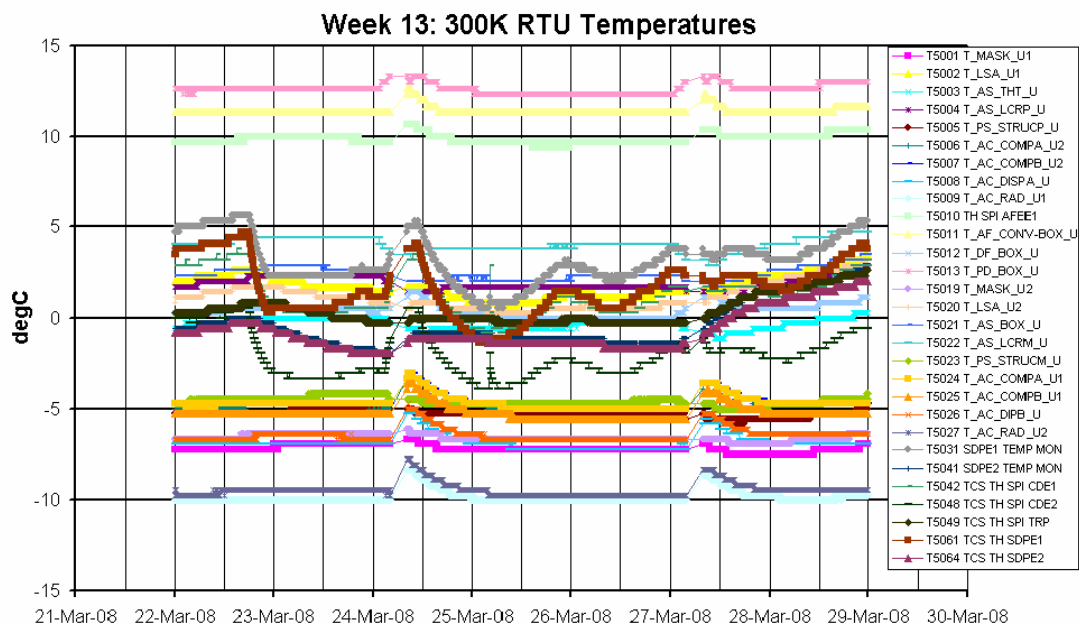
IMU-2-X= 0.1402 arcsec/sec
 IMU-2-Z= 0.0288 arcsec/sec

IMU-3-Z= 0.0.0969 arcsec/sec

IMU-4-X= 0.0079 arcsec/sec

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.

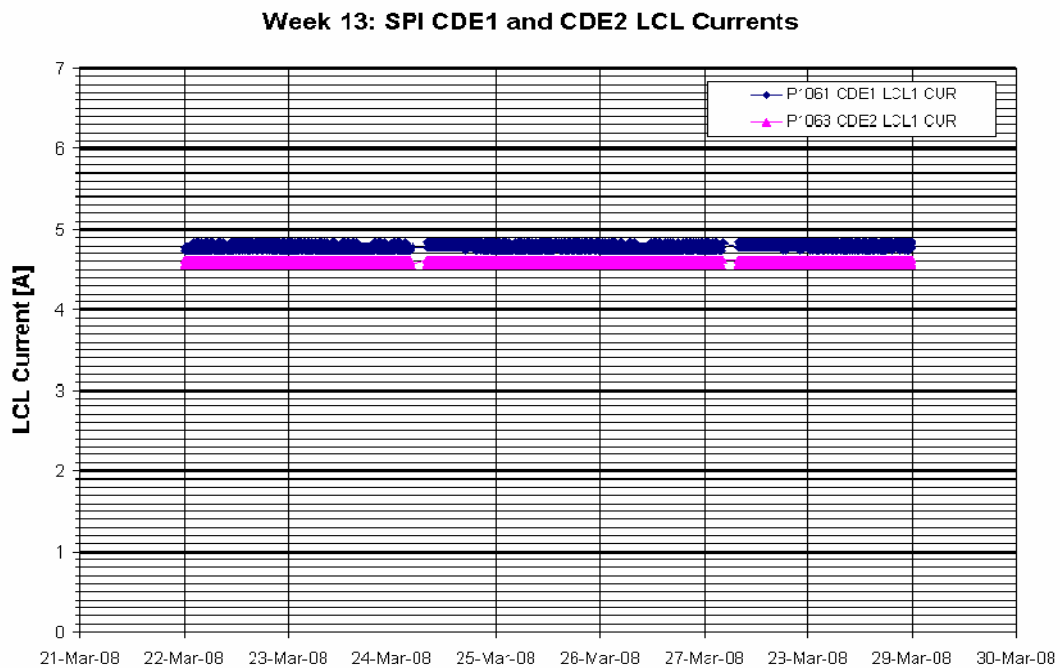


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

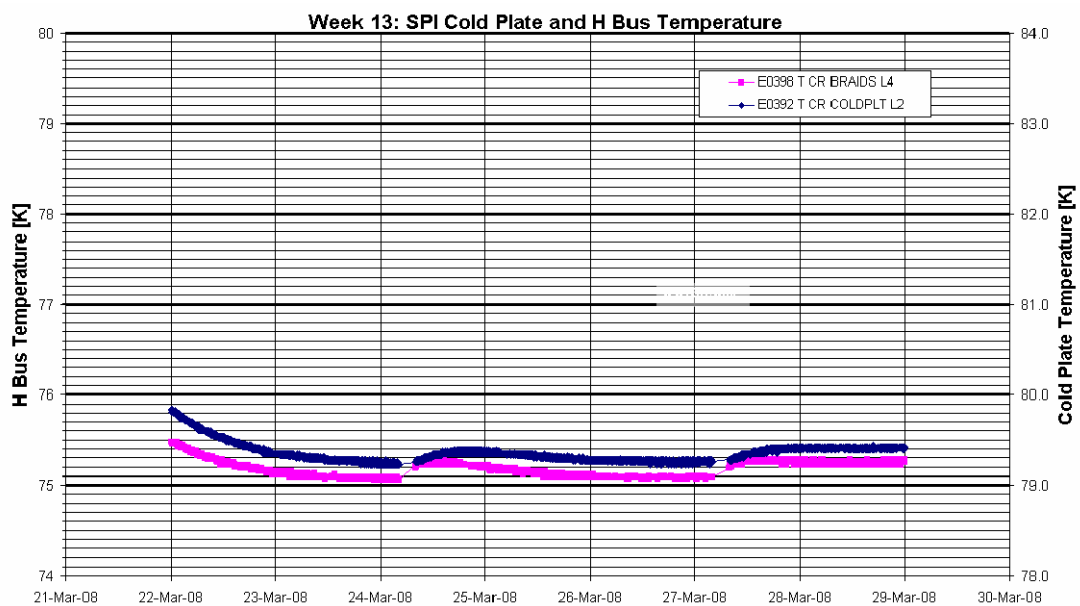
The stroke of all four compressors was set to 40 throughout the week. The average CDE LCL currents were as follows:

- CDE1 LCL Current = 4.79A
- 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.

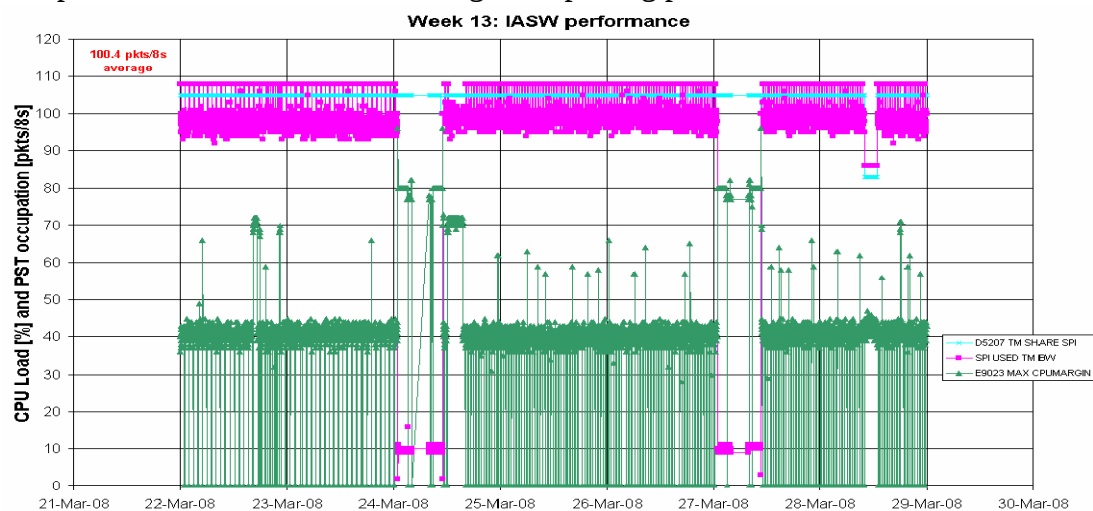


DPE & IASW: The DPE health and IASW performance is nominal.

The IASW version installed is v4.3.4 with SE compression only enabled and the spectra scaling factor set to 8/19 SE.

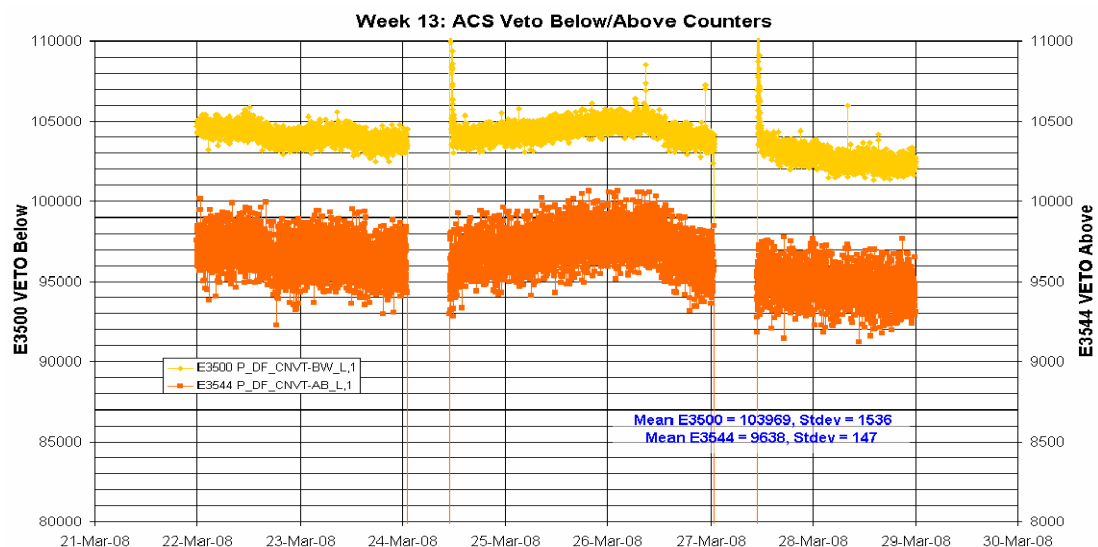
The average TM bandwidth occupation of SPI was 100.4 packets/cycle over the science window. The TM allocation in the science window was 108 packets/cycle, except from 2008-03-28T09:58:25Z to 2008-03-28T12:47:15Z when it was 86 packets/cycle (JEM-X Crab calibration observation). This allocation is considering 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.

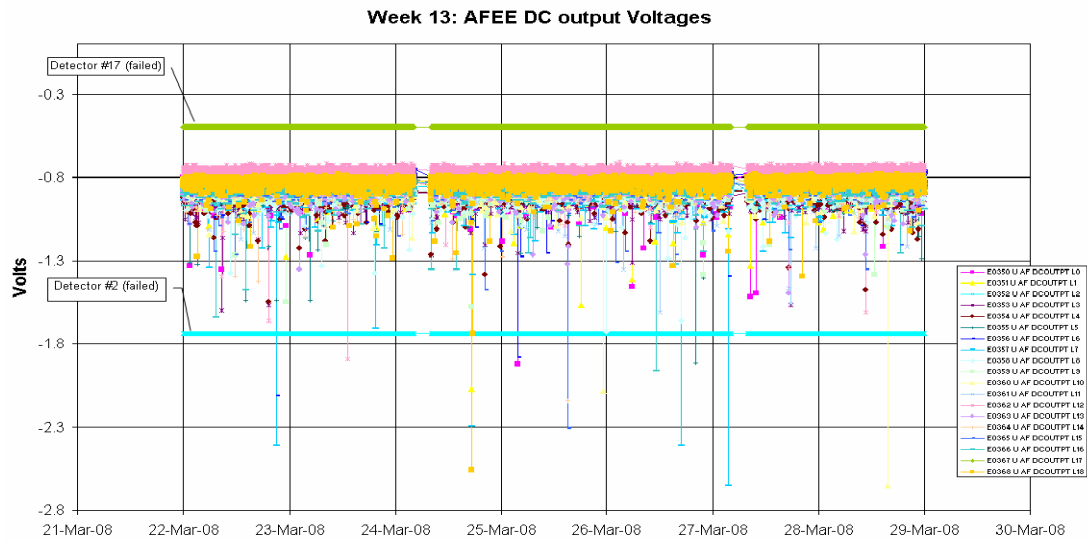


ACS: The performance of the ACS is nominal, except for FEE #81 which remains nominally switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is nominally OFF due to the anomaly on 5/8/2003 (INT_SC-61).

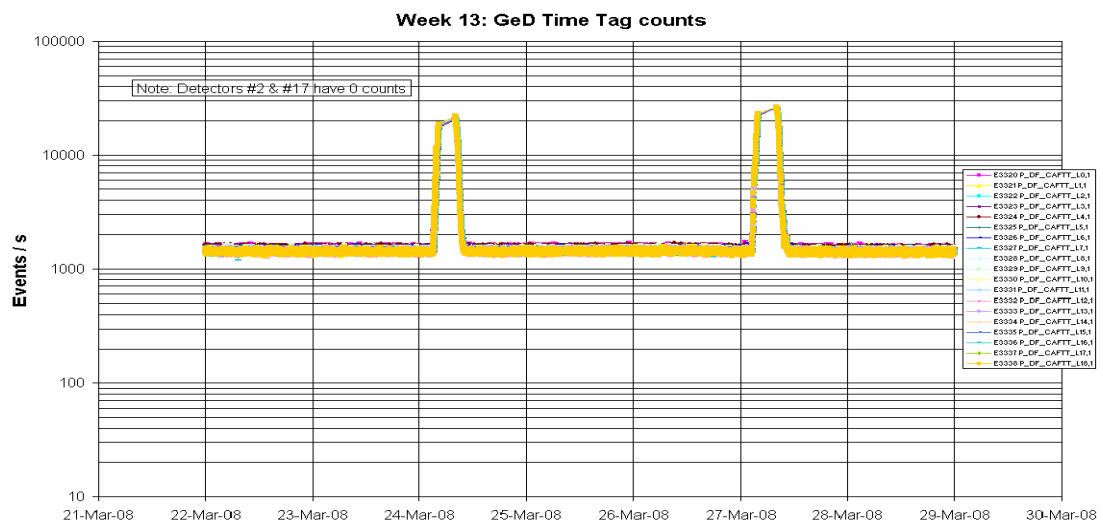
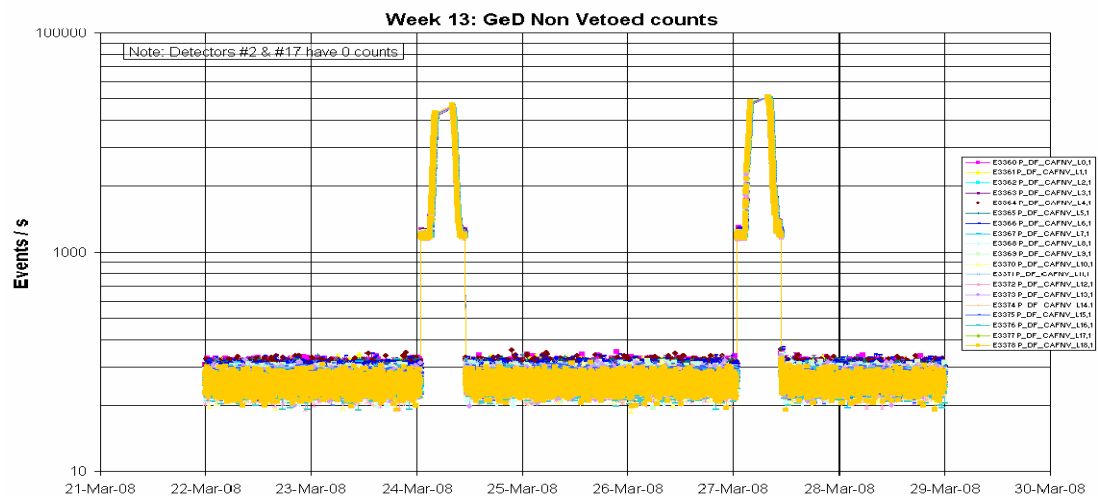
The following plot shows the ACS overall count rate evolution during the reporting period:

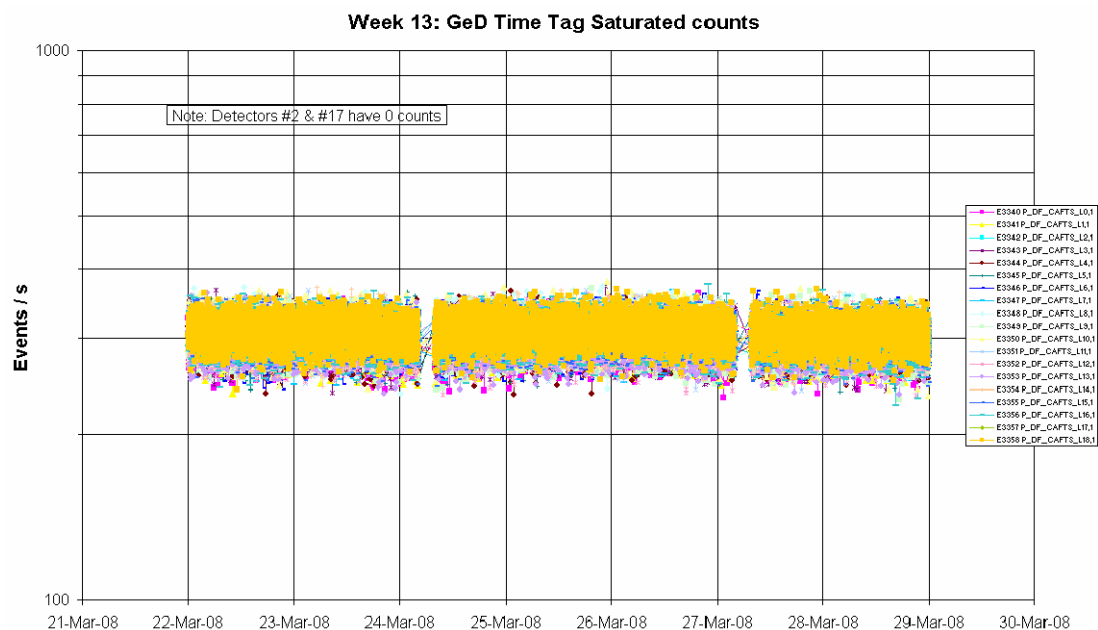


AFEE: The health of the AFEE is nominal. The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003 and detector #17 is failed since 17/07/2004.

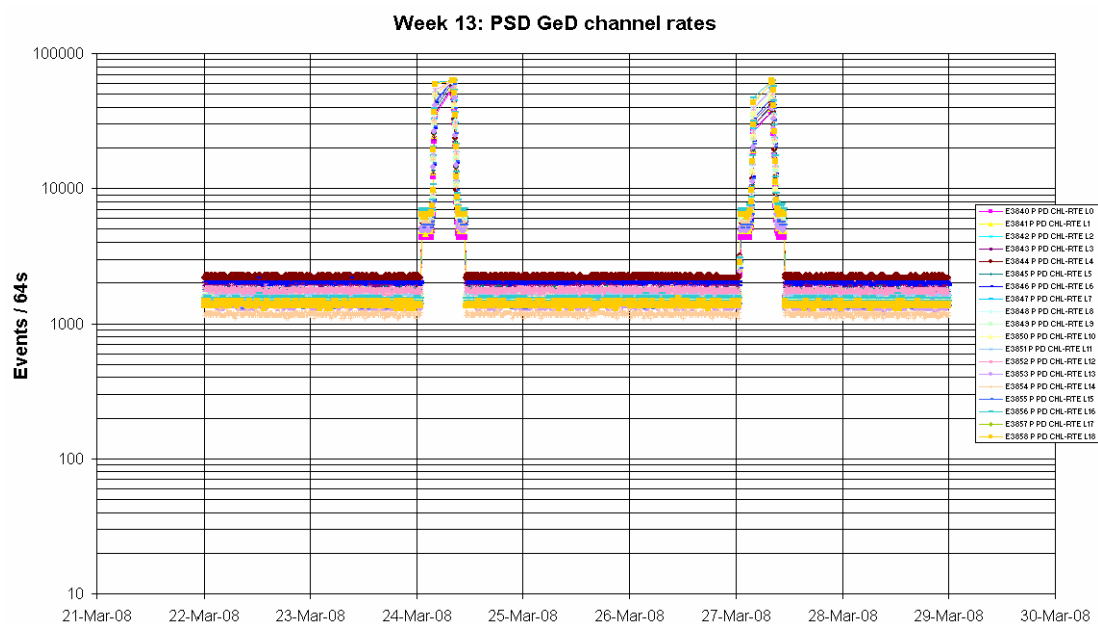


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event count rates during the reporting period.





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 on SPI over the reporting period:

- On 2008-03-24 at 03:56:46Z OEM APID 1024 ID 1 EXCEPTION SPI1 FIXED POINT OVERFLOW was received. This was during the LOS_CHK window of revolution 664, when the time verification TC was sent. This OEM is often received when this TC is sent and no action was taken.
- On 2008-03-28 between 13:02:50Z and 13:09:20Z, 17 occurrences of OEM APID 1024 ID 245 EXCEPTION SPI1 SPECTRA COMPRESSION OVERFLOW were received (one for each GeD), followed at 13:09:20Z by OEM APID 1024 ID 244 EXCEPTION SPI1 SPECTRA

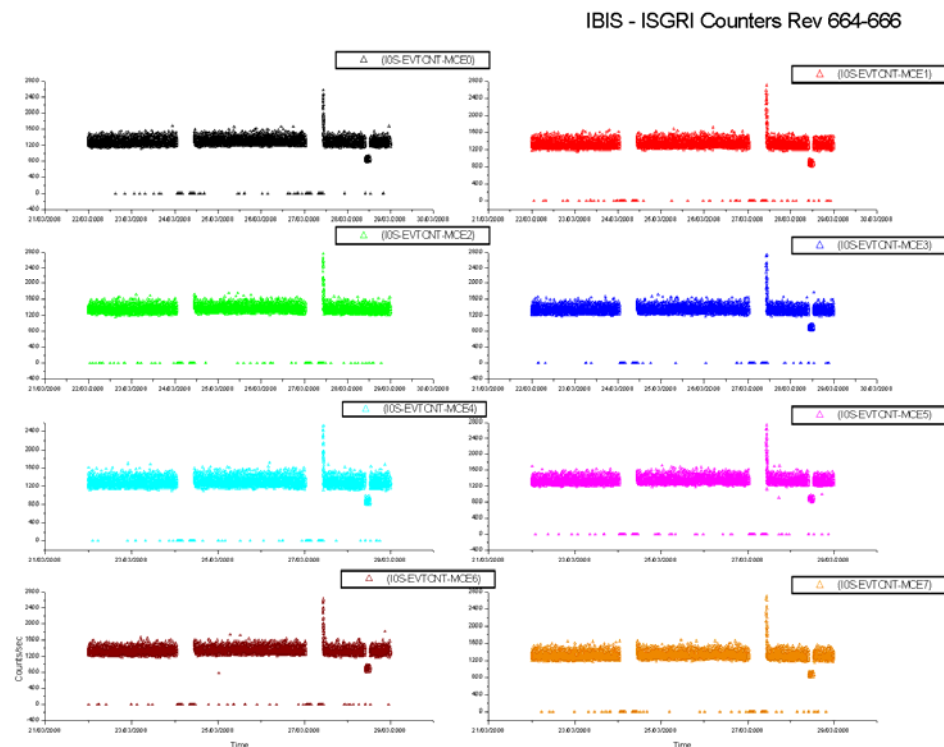
COMPRESSION NOT COMPLETED. This was about 20 minutes after the TM allocation to SPI was increased from 86 packets/cycle back to 108 packets/cycle. As these OEMs are normal following a period of low TM allocation and stopped of their own accord, no action was taken.

- On 200-03-28 at 19:29:07Z TM parameter E2190 went OOL (value = PARAM > SPEC). This is the ACS FEE#40 5V digital status. After the TC sequence ES1831 was sent to report the ACS HK data, it returned within limits at 19:39:59Z and no action was taken.

8.3.3 IBIS Operations

IBIS Event Counters Plots

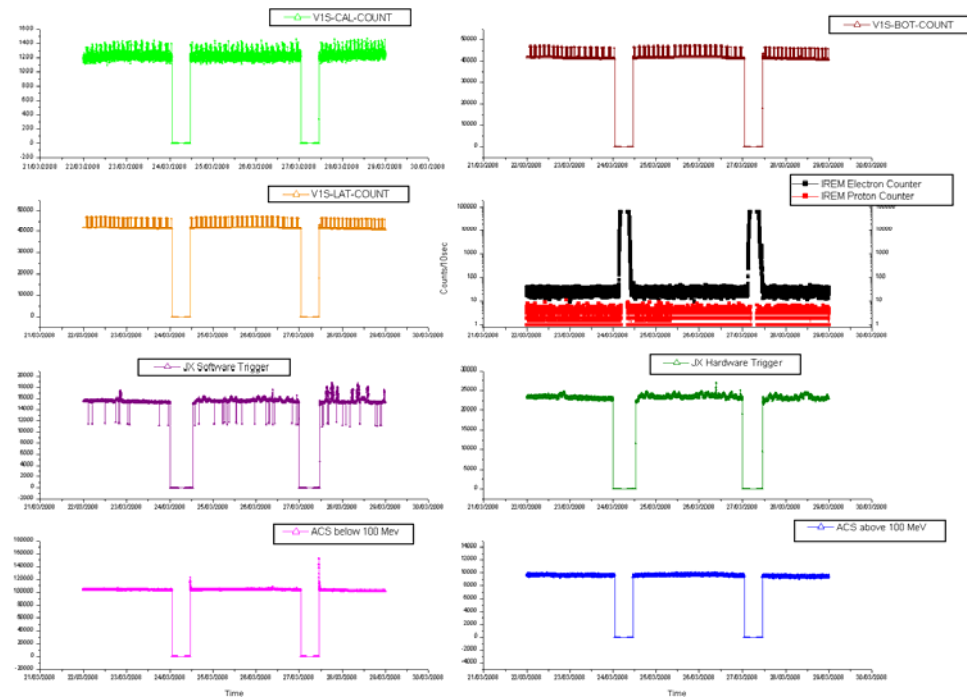
ISGRI Counters:



*sampling every 4 pkts (32 secs)

VETO vs Payload Counters:

IBIS-VETO vs Payloads Counters Rev 664-666

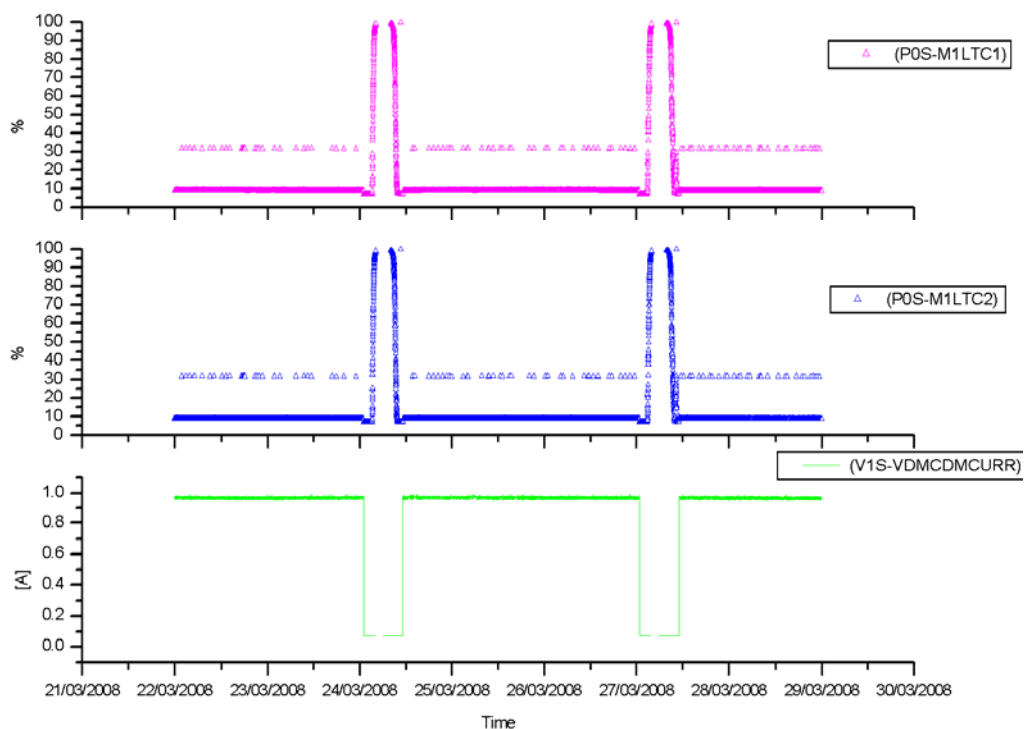


**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

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

VETO Current:

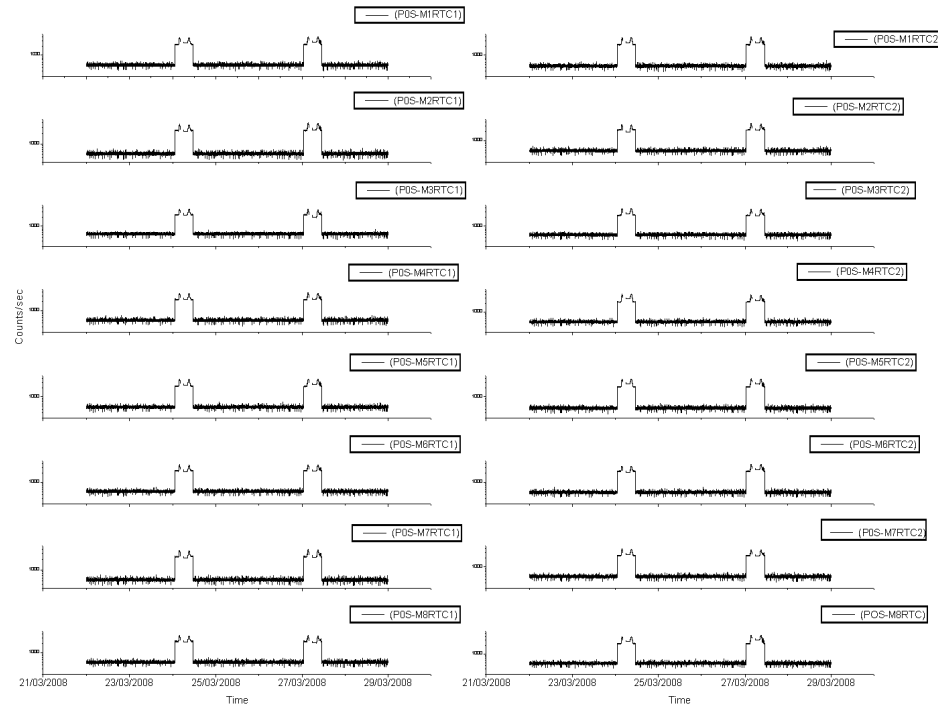
IBIS-VETO Current & PICsIT dead times Rev 664-666



**sampling every 4 pkts (32 secs)

PICsIT Counters:

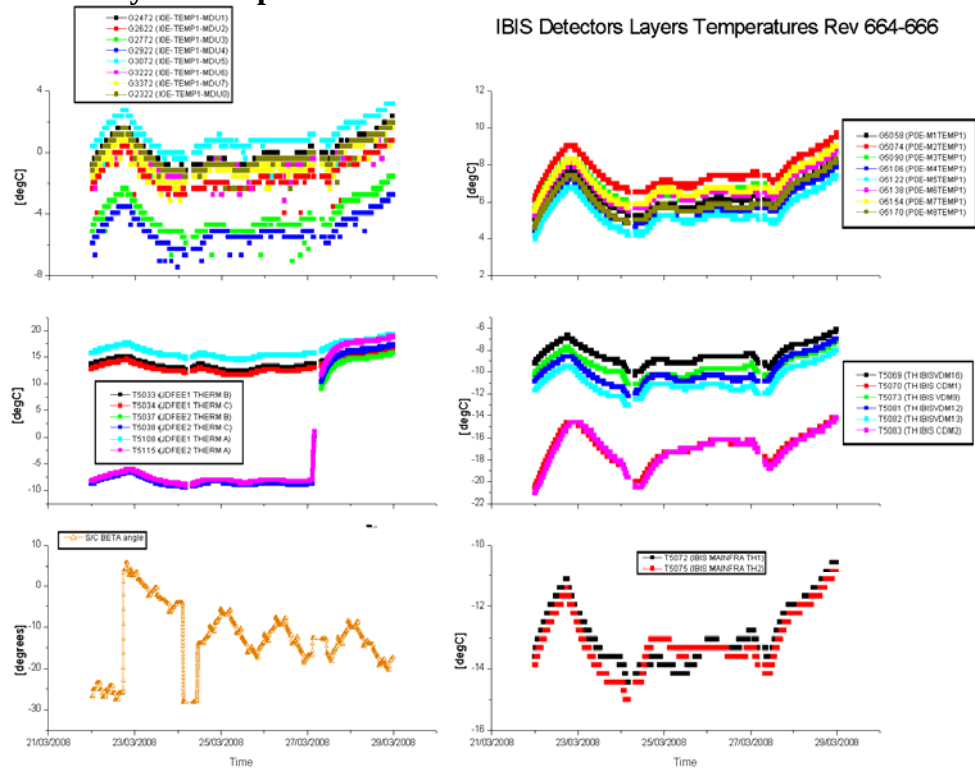
IBIS - PICsIT Counters Rev 664-666



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:

IBIS Detectors Layers Temperatures Rev 664-666



**sampling every 8 pkts (64 secs)

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.

2008-03-22 (DOY 082, Rev 664) to 2008-03-23 (DOY 083, Rev 664)

IBIS operations executed nominally.

2008-03-24 (DOY 084, Rev 664-665)

Following a request from the IBIS PI, the Module Counter Maximum of the Noisy Pixel Handling System was changed from 10000 to 20000 for the Crab calibration, at the start of revolution 665. This was done by disabling the Timeline such that the ED GEISCL03 for the ISGRI calibration scheduled at 2008-03-24T10:38:15Z was not released and a manually edited GEISCL03 sequence with the new parameter value was uplinked instead.

2008-03-25 (DOY 085, Rev 665) to 2008-03-26 (DOY 086, Rev 665)

IBIS operations executed nominally.

2008-03-27 (DOY 087, Rev 665-666)

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 666 (Crab calibration). This was done by disabling the Timeline such that the ED GEISCL03 for the ISGRI calibration scheduled at 2008-03-27T10:24:46Z was not released and a manually edited GEISCL03 sequence with the new parameter value was uplinked instead.

2008-03-28 (DOY 088, Rev 666)

In line with a request from the IBIS PI (CR_IBIS_2008_01), a test of a special configuration of ISGRI that could be used for IBIS in case of a bright source was performed starting at 09:58:18Z. This was during the Crab on-axis staring observation. The operations performed were as follows:

- 09:58:18Z IBIS to Standby and all MCEs except MCE2 [0-7 scheme] to Standby
- 09:59:26Z Save MCEs context in DPE
- 10:00:30Z Set NPHS configuration for all MCEs except MCE2 [0-7] such that Switch On Period (SOP) = 12800sec [50raw] and LTM = 62 RAW
- 10:03:14Z Set Low Threshold for all MCEs except MCE2 [0-7] to 62 RAW
- 10:04:56Z All MCEs back to Nominal mode
- 10:05:37Z IBIS to Science Standard

IBIS was returned to the nominal configuration at the end of the observation as follows:

- 12:47:21Z IBIS to Standby and all MCEs except MCE2 [0-7] to Standby

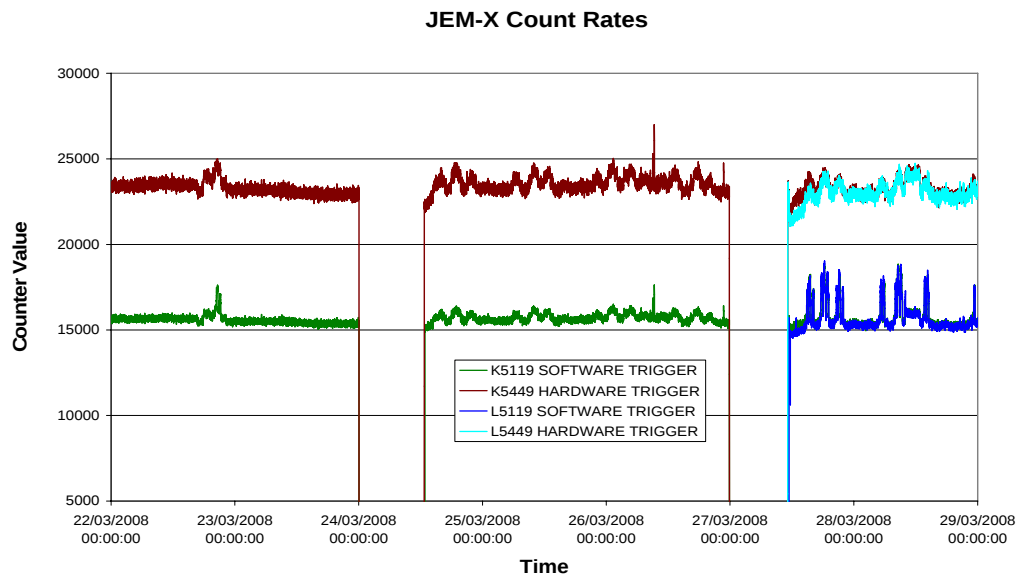
- 12:48:43Z Restore and apply context from DPE to MCEs
- 12:50:58Z All MCEs back to Nominal mode
- 12:51:35Z IBIS to Science Standard

IBIS operations continued nominally.

8.3.4 JEM-X Operations

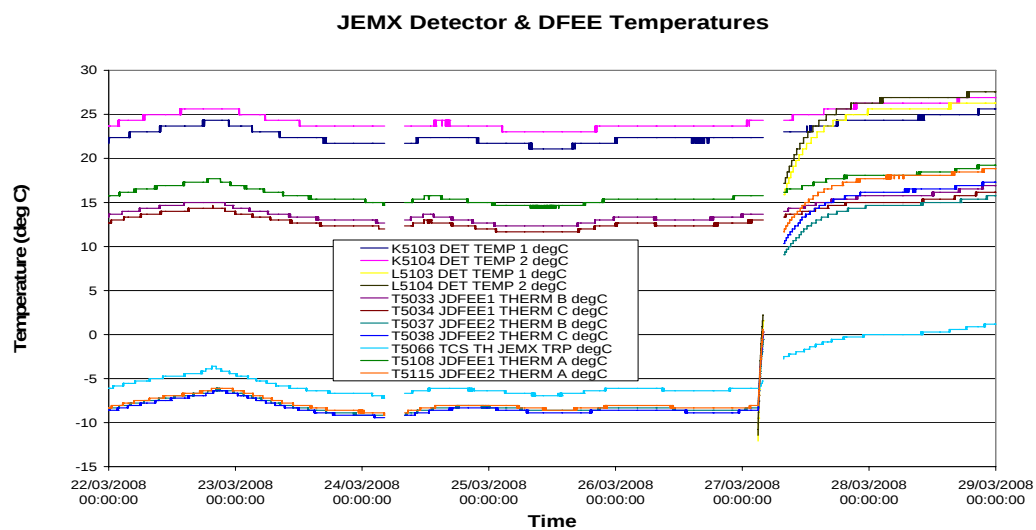
JEM-X Count Rates

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

2008-03-22 (DoY 082, Rev 664) to 2008-03-23 (DoY 083, Rev 664)

JEM-X1 operations executed nominally.

2008-03-24 (DoY 084, Rev 664-665)

At 11:19:00, a problem with the Command Verifier (it crashed) led to the suspension of the Timeline. As part of the recovery the following was executed:

11:50:00 FCP_JEM1_0040 Goto Safe.
12:34:00 FCP_JEM1_0041 Goto Set-up.
12:39:00 High Voltage activation (ED KEHVAC01)
13:07:00 JEMX reactivated in the Timeline.

The impact was the loss of 1½ hours science data.

2008-03-25 (DoY 085, Rev 665) to 2008-03-26 (DoY 086, Rev 665)

JEM-X1 operations executed nominally.

2008-03-27 (DoY 087, Rev 665-666)

At 00:59:20, according to OCR 233, the re-activation of JEMX-2 was commenced. The procedures followed were:

- DEBWHI00 to assign bandwidth to JEM-X2
- FCP_JEM2_0010 JEMX2 DPE AND CSSW ACTIVATION
- FCP_JEM2_0011 JEMX2 IASW DPE PATCH FOR BCP PID INTERPRETATION
- FCP_JEM2_0015 JEMX2 IASW ACTIVATION
- FCP_JEM2_0016 JEMX2 ENABLE BCP DISTRIBUTION
- FCP_JEM2_0017 JEMX IASW EXTENDED TM CHECK
- FCP_JEM2_0020 JEMX2 DFEE 1ST ACTIVATION AFTER DPE SWITCH ON.
- FCP_JEM2_0040 JEMX2 TRANSITION TO SAFE

The activity was completed shortly before LOS at 03:59.

At 07:50:40, parameters L5101 & L5102 briefly exceeded soft limits, no action was taken, and there was no impact. There were further repeated soft out-of-limits for parameter L5101, no action was taken as this is normal after switch-on. There was no impact.

At 10:35:16, 10:36:17, 10:41:23, 10:43:220, 10:55:12 and 11:00:15, parameter K5317 exceeded hard limits. No action was taken, and there was no impact.

2008-03-28 (DoY 088, Rev 666)

JEM-X1 & X2 operations executed nominally, apart from the above mentioned parameter L5101.

8.3.5 OMC Operations

2008-03-22 (DoY 082, Rev 664) to 2008-03-23 (DoY 083, Rev 664)

Nothing to Report.

2008-03-24 (DoY 084, Rev 665)

At 11.19, a problem with the imcs prevented commanding, see anomalies for details. The impact was the loss of pointings 06650003 to 06650008 inclusive. It was at this time the following OEMs were received:

2008.084.11.56.30.387	2008.084.11.56.39.825	1792	RealTime	131	TC REJECT
REJECTED TC1		0	0	65535	PR N
E E					
2008.084.11.56.35.699	2008.084.11.56.39.859	1792	RealTime	131	TC REJECT
REJECTED TC1		0	0	65535	PR N
E E					
2008.084.12.32.22.388	2008.084.12.32.32.730	1792	RealTime	131	TC REJECT
REJECTED TC1		0	0	65535	PR N
E E					
2008.084.12.32.27.701	2008.084.12.32.32.770	1792	RealTime	131	TC REJECT
REJECTED TC1		0	0	65535	PR N
E E					
2008.084.13.08.30.389	2008.084.13.08.40.783	1792	RealTime	131	TC REJECT
REJECTED TC1		0	0	65535	PR N
E E					
2008.084.13.08.35.952	2008.084.13.08.40.819	1792	RealTime	131	TC REJECT
REJECTED TC1		0	0	65535	PR N
E E					
2008.084.13.44.38.391	2008.084.13.44.50.486	1792	RealTime	131	TC REJECT
REJECTED TC1		0	0	65535	PR N
E E					
2008.084.13.44.43.703	2008.084.13.44.50.497	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 pointings 06650003, 06650004, 06650005 & 06650006.

2008-03-25 (DoY 085, Rev 665) to 2008-03-28 (DoY 088, Rev 666)

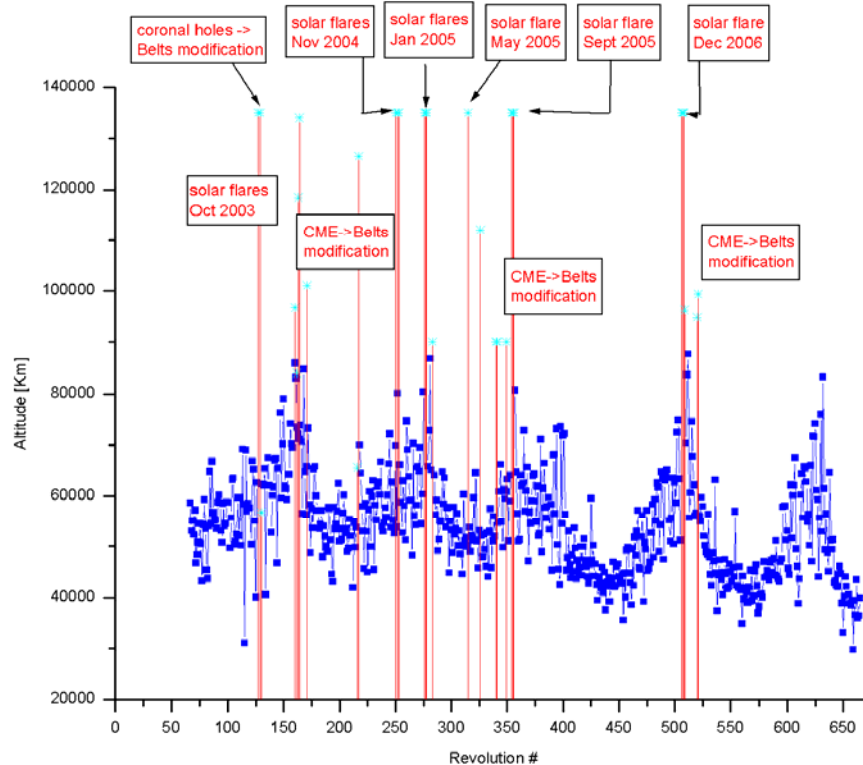
Nothing to Report.

On DoY 084 at 00:59:03 and DoY 087 at 00:47:11 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]
664	RAD_ENTR R 2008-03-24T00:58:56Z	24/03/2008 03:11:58	36463.2	24-Mar-2008 02:31:47	42343.71
665	RAD_EXIT R 2008-03-24T11:02:52Z	24/03/2008 09:56:06	>>33222.5	24-Mar-2008 10:11:47	46109.63
665	RAD_ENTR R 2008-03-27T00:47:04Z	27/03/2008 02:42:46	39877.2	27-Mar-2008 02:19:46	42673.47
666	RAD_EXIT R 2008-03-27T10:50:23Z	27/03/2008 11:17:02	56506.4	27-Mar-2008 09:59:46	45858.22

Reference

High radiation

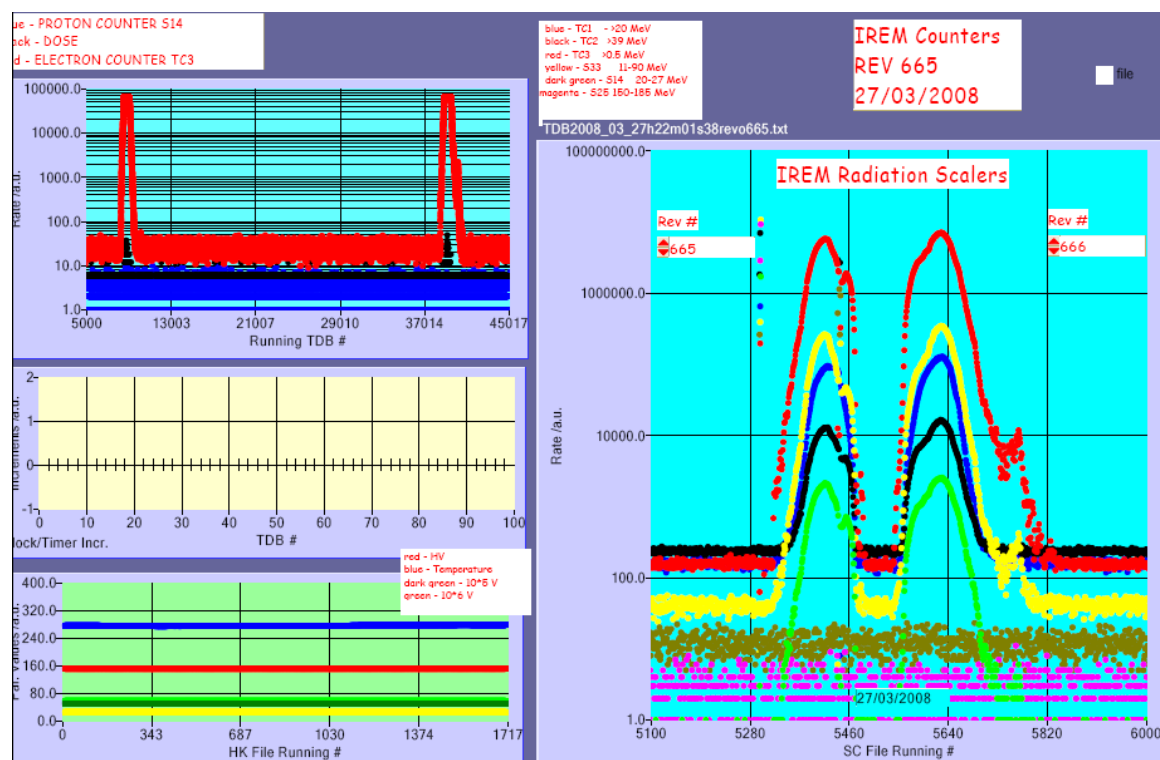
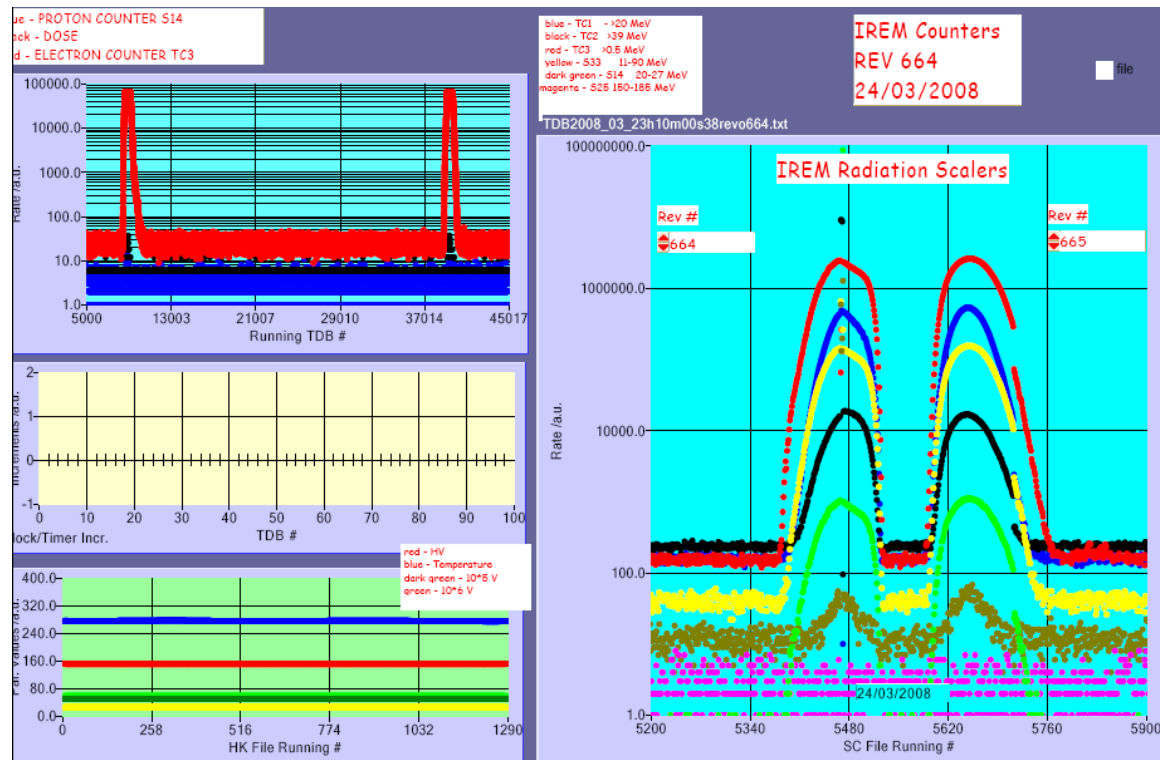
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

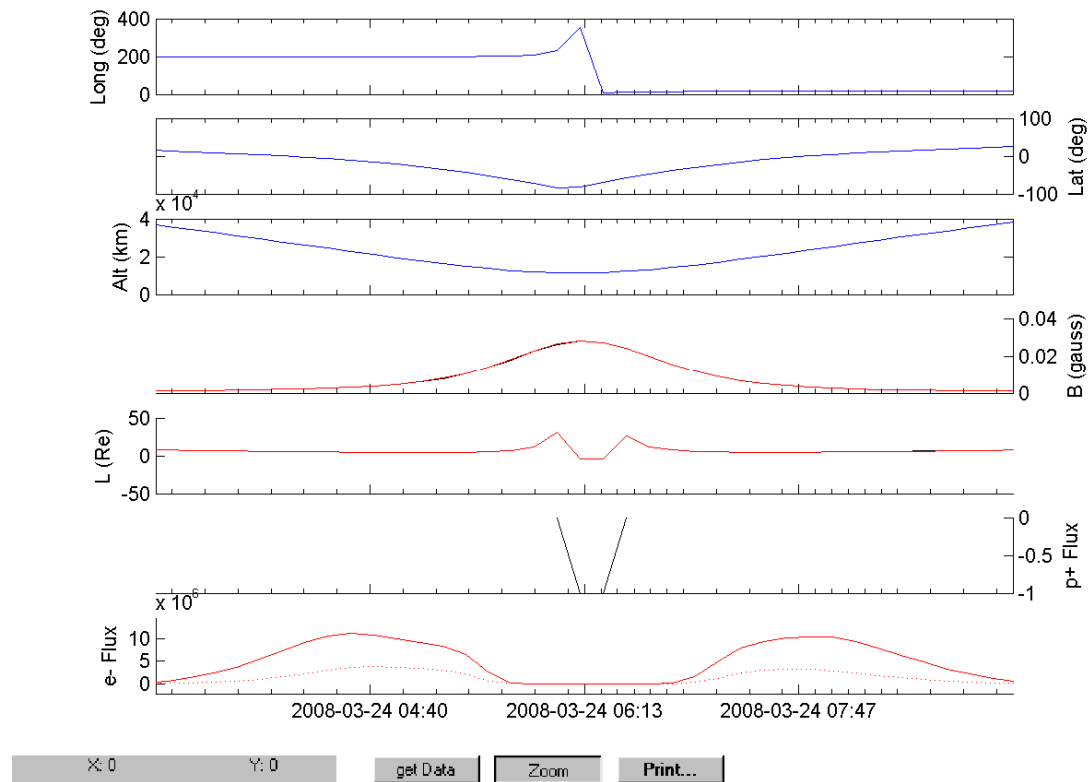
* Rad belt entry time ignoring previous threshold crossings where a gap of more than 30 minutes is present.

IREM radiation counters:

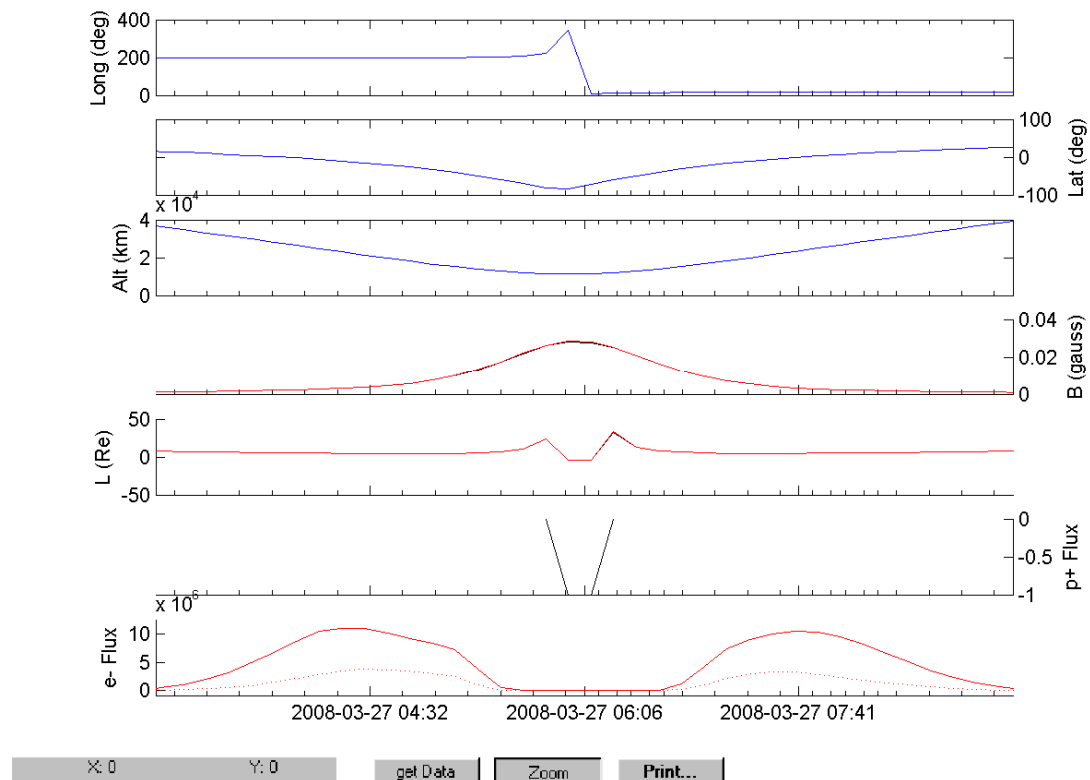


IREM Predicted Radiation Belt Passages

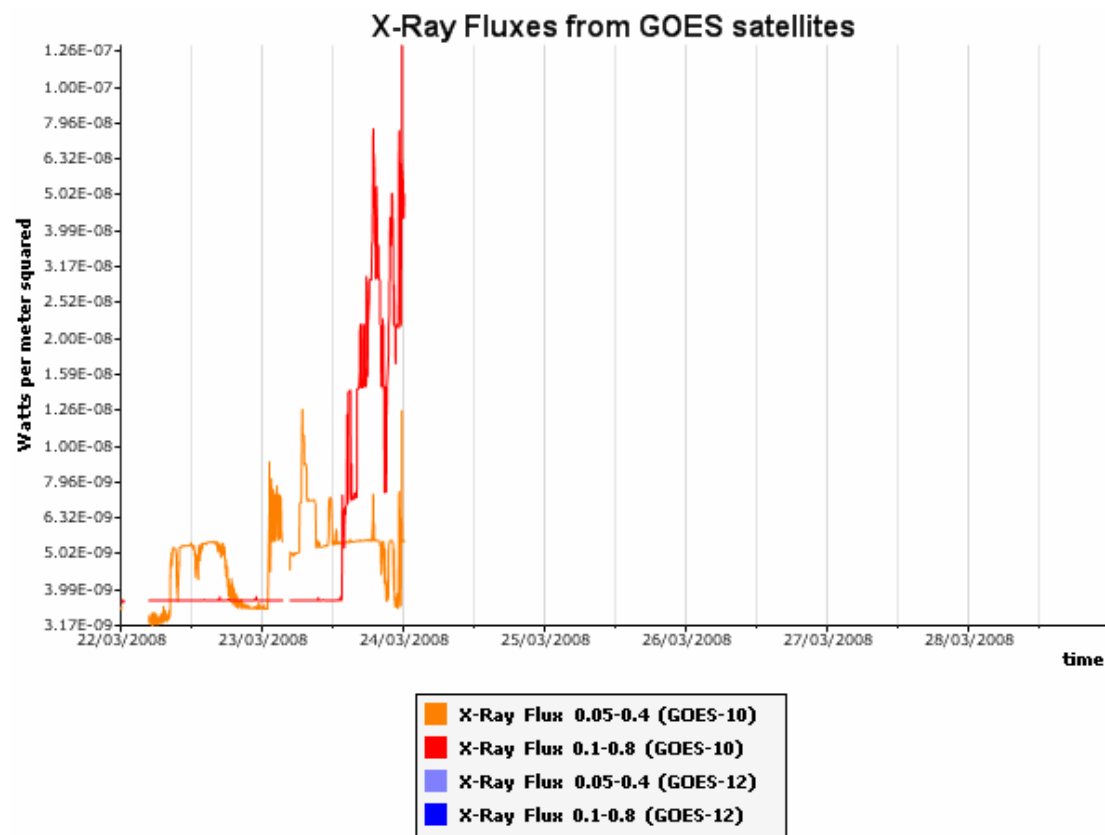
Rev 664



Rev 665



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.

For the particle fluxes, no data was available this week.