

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 347
Week 20
18.05.09
Routine Phase

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LIST OF CONTENTS

1	General.....	3
2	Summary of Activities.....	3
3	Satellite Status.....	3
3.1	Platform.....	3
3.1.1	AOCS.....	3
3.1.2	Power.....	3
3.1.3	Thermal.....	3
3.1.4	OBDH.....	4
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	6
3.2.3	JEM-X.....	8
3.2.4	OMC.....	8
3.2.5	IREM.....	8
3.2.6	Radiation Background.....	9
4	Ground Facilities.....	11
4.1	Mission Operations Centre.....	11
4.2	Ground Stations & Network.....	11
4.3	Science Ground Segment.....	11
4.3.1	ISOC.....	11
5	Special Events.....	12
6	Anomalies.....	12
7	Future Milestones.....	12
8	Appendix.....	13
8.1	Consumables.....	13
8.2	Detailed Satellite Information.....	13
8.2.1	AOCS SUMMARY OPERATIONS REPORT, 09/05/2009 – 15/05/2009.....	13
8.2.2	SPI Operations.....	15
8.2.3	IBIS Operations.....	19
8.2.4	JEM-X Operations.....	22
8.2.5	OMC Operations.....	23
8.2.6	IREM Operations.....	24

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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 09.05.09 until 15.05.09 (both dates inclusive) and covers the revolutions 803 and 804.

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 GRS 1915+105 (RA 19:15:11.50, DEC +10:56:44.0), and 2 raster dithers of the Cygnus Region (RA 20:35:53.00, DEC +40:39:49.0).

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.

Ten slews were missed from TL, during the observation period, due to problem on VILSPA station, error during connection to B-chain and problem on selected guide star.

The fuel consumption over the period between 09/05/2009 and 15/05/2009 was 0.0814 Kg. The remaining propellant is in the order of 134.2890 Kg.

Note: Some more information concerning the AOCS operations 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

The 13th Annealing operations started on 19-04-2009 at 23:56Z (radiation belt entry of revolution 795) and were completed on 2009-05-11 at 12:46:21Z (following radiation belt exit of revolution 803). Operations for this annealing progressed nominally. The main activities were as follows:

Date/Time	Activity
2009-04-19 23:56:00Z	Configure SPI for start of Annealing and stop SPI active cooling
2009-04-20 01:00:00Z	Annealing Heater Main ON
2009-04-20 03:00:00Z	Annealing Heater Redundant ON
2009-04-20 15:35:00Z	Heat Pipe Heater Main ON, All Antifreeze Heaters (1A; 2A; 1B; 2B) OFF
2009-04-21 03:35:20Z	Heat Pipe Heater Redundant ON
2009-04-21 12:00:00Z	Cold plate temperature reached 373K (100degC)
2009-05-02 08:00:00Z	Stop SPI Annealing: Annealing Heater Main and Redundant OFF; Heat Pipe Heater Main and Redundant OFF; Antifreeze Heater 1A ON
2009-05-02 08:18:43Z	Start Toggling of Heat Pipe Heater to manage Cold box temperature: Heat Pipe Heater Main and Redundant ON
2009-05-02 08:47:00Z	ACS switch-on and start of ACS calibration (also FEE#57 and FEE#81 ON)
2009-05-02 14:20:10Z	Heat Pipe Heater Redundant OFF
2009-05-03 02:20:10Z	Heat Pipe Heater Main OFF and start toggling of Heat Pipe Heater Main (75% ON then 50% ON then 25% ON cycles)
2009-05-04 22:36:00Z	End of ACS Calibration
2009-05-05 12:52:52Z	Thermal braids temperature TM EU0398A reached 308K

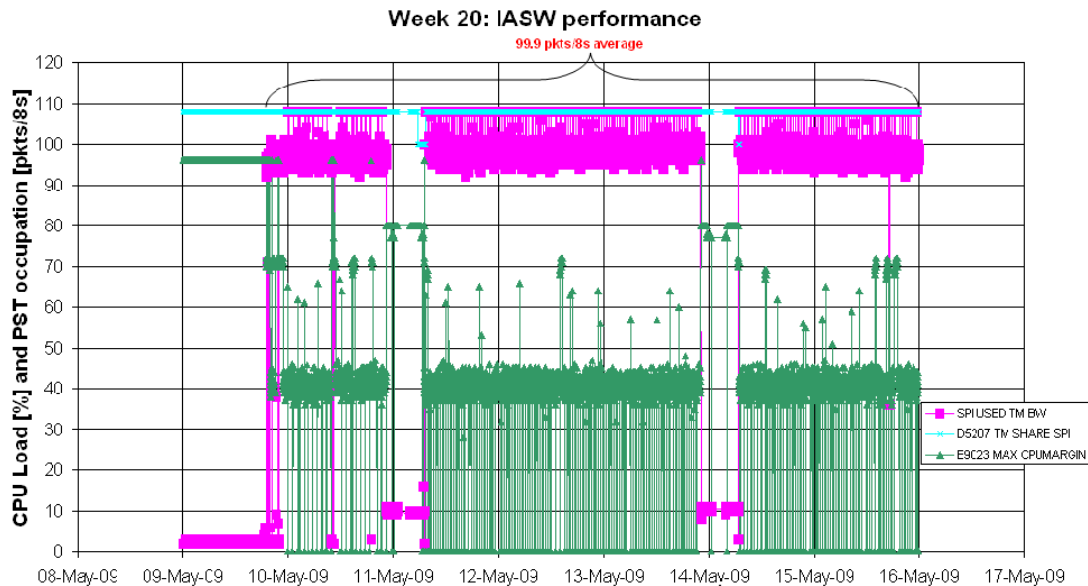
2009-05-05 12:57:12Z	Start of cryocooler switch-on
2009-05-05 14:15:00Z	Cryocooler switch-on complete and stroke set to 4x45
2009-05-06 08:20:10Z	End toggling of Heat Pipe Heater Main: Heat Pipe Heater Main OFF
2009-05-08 22:15:56Z	Cold plate temperature TM EU0392A reached 127K
2009-05-08 22:23:00Z	Selected narrow range cold plate temperature acquisition and restored PSD nominal threshold
2009-05-09 18:15:56Z	Cold plate temperature TM EU0392 reached 100K
2009-05-09 18:17:00Z	Camera switch-on start; HV of all GeD increased in steps to 0.5kV; 1kV; 1.5kV; 2kV; 2.5kV; 3kV; 3.5kV, 4kV with acquisitions in PHOTON mode in between
2009-05-09 21:23:40Z	Thermal braid temperature TM E0398 reached 86K
2009-05-09 21:40:00Z	Start of reduction of cryocooler stroke for 80K target (FCP_SPI1_0072)
2009-05-09 21:55:54Z	Camera switch-on end: SPI in PHOTON mode with all GeD HV at 4kV except for GeD#2 (0.5kV), GeD#5 (0.5kV), GeD#17 (0.5kV) and GeD#12 (3kV). At end of camera switch-on, restored nominal ACS configuration (FEE#57 and FEE#81 OFF)
2009-05-10 17:29:00Z	End of reduction of cryocooler stroke for 80K target: Stroke set to 4x37
2009-05-10 09:50:00Z	Restore HV of GeD#12 to 4kV. Also: - Disabled GeD#5 events acquisition in DFEE. - Disabled GeD#5 in PSD - Test of increase of PSD ULD (first block set to 511)
2009-05-10 19:01:00Z	End of test of PSD ULD: Restore nominal PSD ULD. Also disabled acquisition of events from other failed detectors (GeD#2 and GeD#17) in DFEE
2009-05-11 11:04:07Z	Set nominal IASW parameters (including Cold Plate Monitoring temperature)
2009-05-11 12:46:21Z	Cold plate temperature TM EU0392 reached 80.9K

Following this annealing, 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).

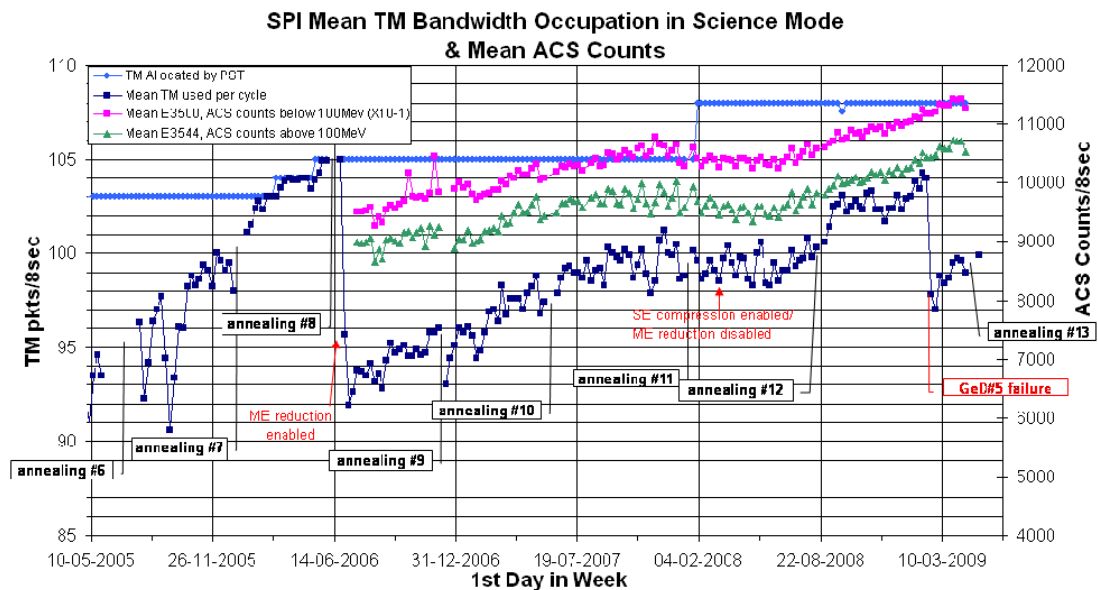
The Stirling compressors are working nominally. The Germanium detectors' temperature was kept in the range 80K $\pm$ 1K since entering the 80K range on 11/05/2009 at 12:46:21Z.

SPI was in CONF mode until the camera switch-on on 09/05/2009, after which it was in photon-by-photon mode with spectra TM enabled during science observations. The assigned TM bandwidth in the science observation windows was 108 packets/cycle and the average telemetry occupation was 99.9 packets/cycle.

The following plot shows the TM bandwidth allocation, occupation and DPE CPU load during the reporting period:



The following plot shows the evolution of the assigned and the average occupation of the SPI TM bandwidth since May 2005 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.

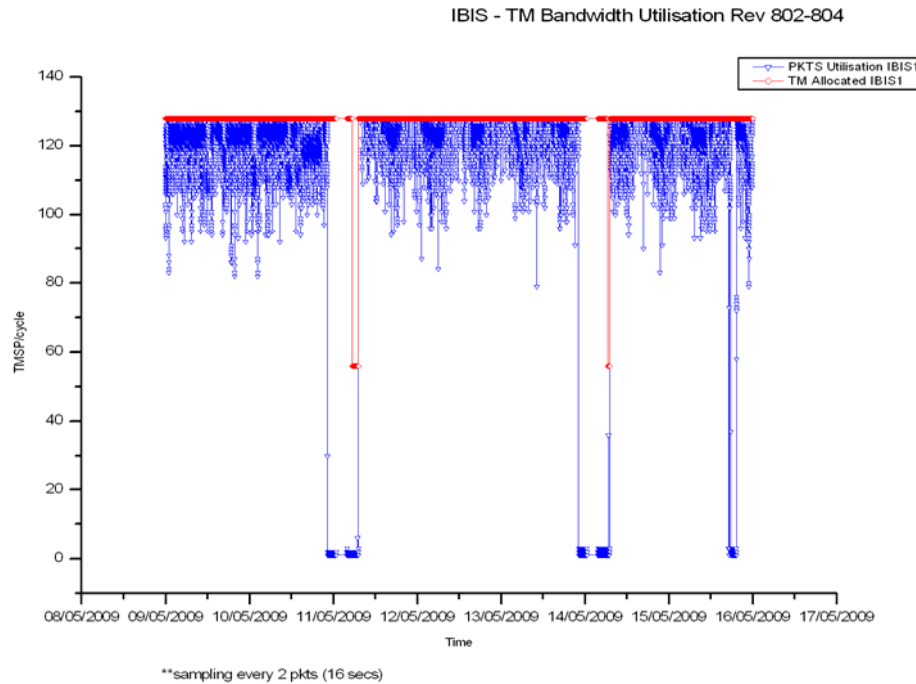
3.2.2 IBIS

The overall status of IBIS is nominal.

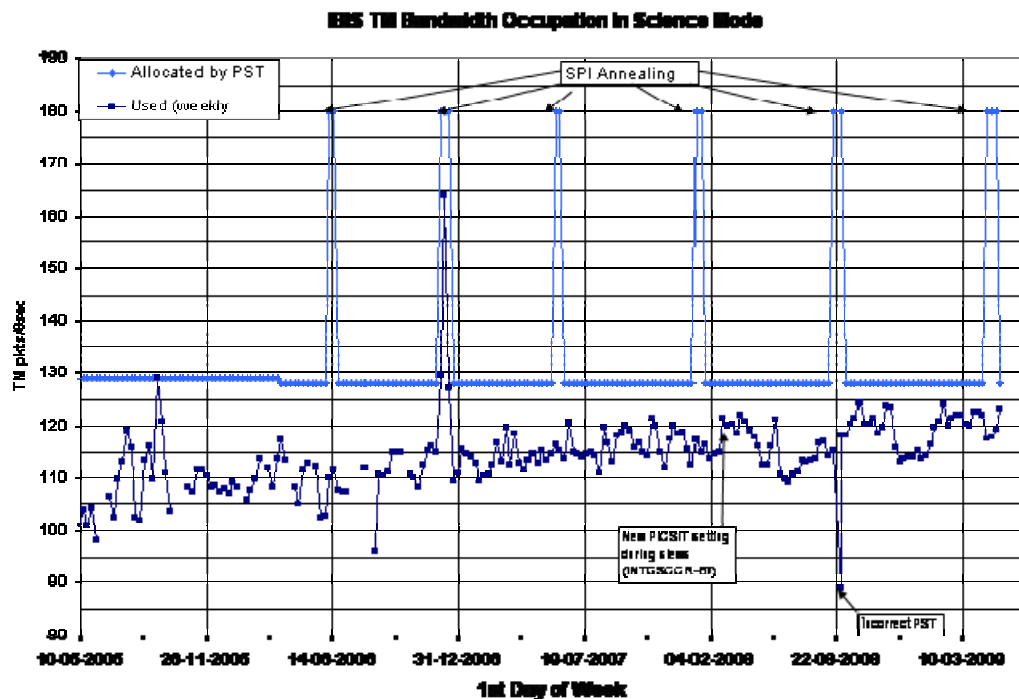
During the reporting period, IBIS was operated in Science Standard mode during science observations. The TM bandwidth statistics were as follows:

- PST allocation to IBIS above radiation belts: 128 packets/cycle
- IBIS mean bandwidth utilisation in science mode: 123.37 packets/cycle (up 4.03 on previous week)
- Percentage of TM cycles for which bandwidth usage was 128 packets/cycle: 42.5%

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



A plot of the IBIS weekly bandwidth utilisation since May 2005 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/cycle.

During this reporting period, 201 of the 208 planned science pointings were executed nominally, 1 was cut short, and 6 were lost.

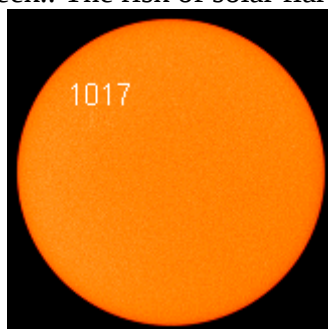
Note: Some more information concerning the OMC operations is provided in the Appendix.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

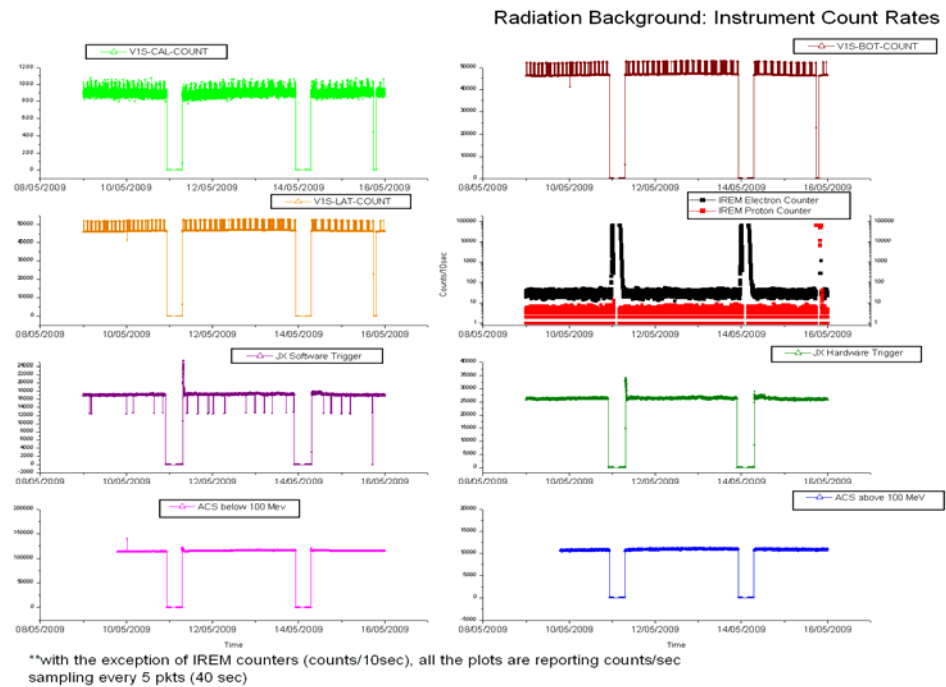
The observation period was characterised by low solar activity. The sun was blank at the start of the week, on the 14th May (Thursday), a new spot appeared, which remained for the rest of the week.. The risk of solar flares was very low.



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

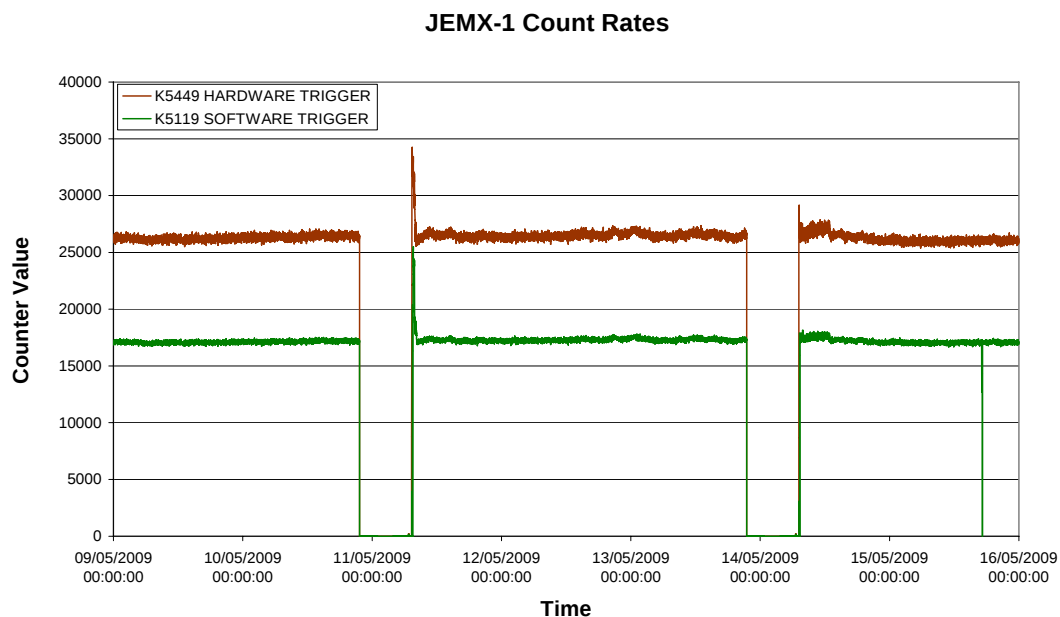
3.2.6 Radiation Background

The background radiation level as measured by the instrument counters was low during the reporting period. The following plots show the SPI ACS, IBIS VETO, JEM-X Triggers and IREM count rates over the week:



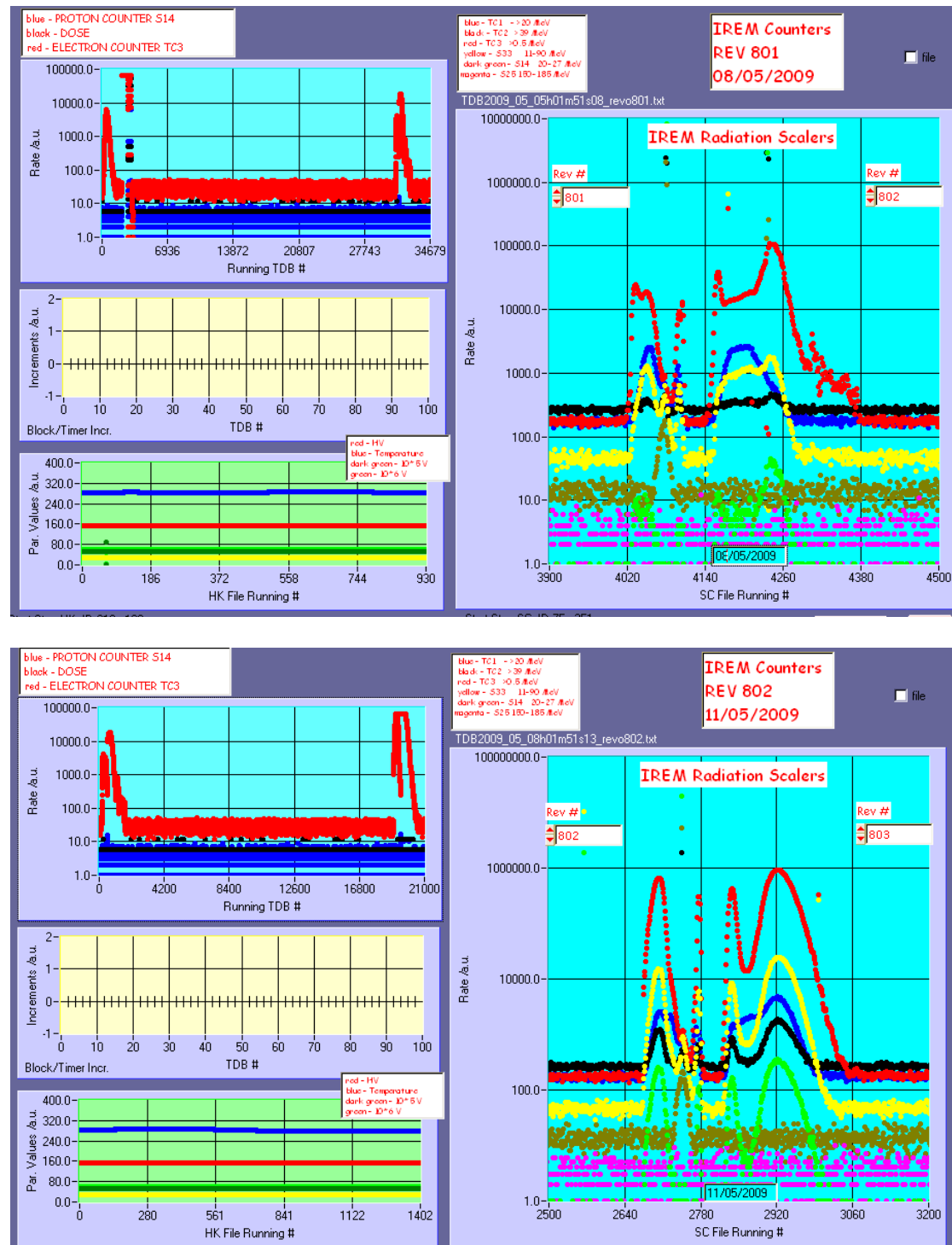
JEM-X Count Rates

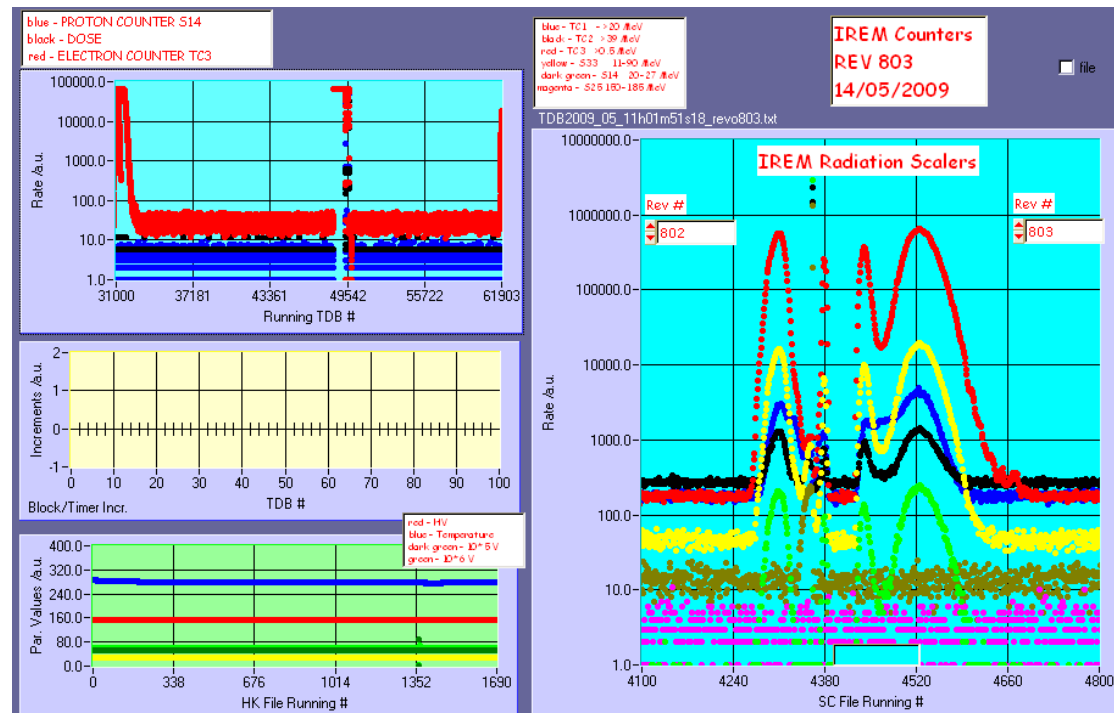
JEM-X count rates over the reporting period are displayed in the following graph¹.



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

IREM radiation counters:





4 Ground Facilities

The Operational ground facilities performance was good this week. The overall performance was over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week, there were 5 occasions when the links with ISDC dropped, necessitating a restart of the isds & ifrd, there was no impact.

4.2 Ground Stations & Network

The performance of the ground stations and Network was better this week, there were around 7 occurrences of bad TM from VIL2 and 1 from DSS27. The impact was the loss of 2 pointings.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSFs have been received for revolutions 808 and 809.

New observations have been planned for revolutions 805 and 806.

New TSFs have been received for revolutions 804 and 805.

2. Observation status

No new ECS files have been received. The last processed is for revolution 794.

3. ISOC Science Data Archive

Some problems in ingesting data have been fixed and data has been ingested up to revolution 779.

4. ISOC system

ISOC system V22 has been tested in-depth and will be installed in the coming week.

5. Problems

No new problems.

5 Special Events

6 Anomalies

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

AR id	Date Created	Subject	Segment	Status
INT_SC-255	2009-05-18	IREM Anomaly: Reset of IREM_CSCI S/W #75, 5/05/2009	Payload	Pending
INT_SC-256	2009-05-20	IREM Anomaly: Reset of IREM_CSCI S/W #76, 15/05/2009	Payload	Pending
INT-3064	2009-05-14	Missing Ranging Data	GFCC	Pending

7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Consumables

8.2 Detailed Satellite Information

This section contains some detailed information concerning the various subsystems of the satellite and instruments.

8.2.1 AOCS SUMMARY OPERATIONS REPORT, 09/05/2009 – 15/05/2009

The AOCS operations were executed from the Automatic Timeline.

During this period, 137 Open Loop Slews, 76 Closed Loop Slews and 6 Momentum Biases were executed (as reported by ACC OEM).

10 (5 OSL, 5 CSL) slews were missed from TL, during the observation period, due to problem at VILSPA station, error during connection to B-chain and problem on selected guide star.

This is equivalent to $\sim 4.6\%$ of the total number of slews planned (217).

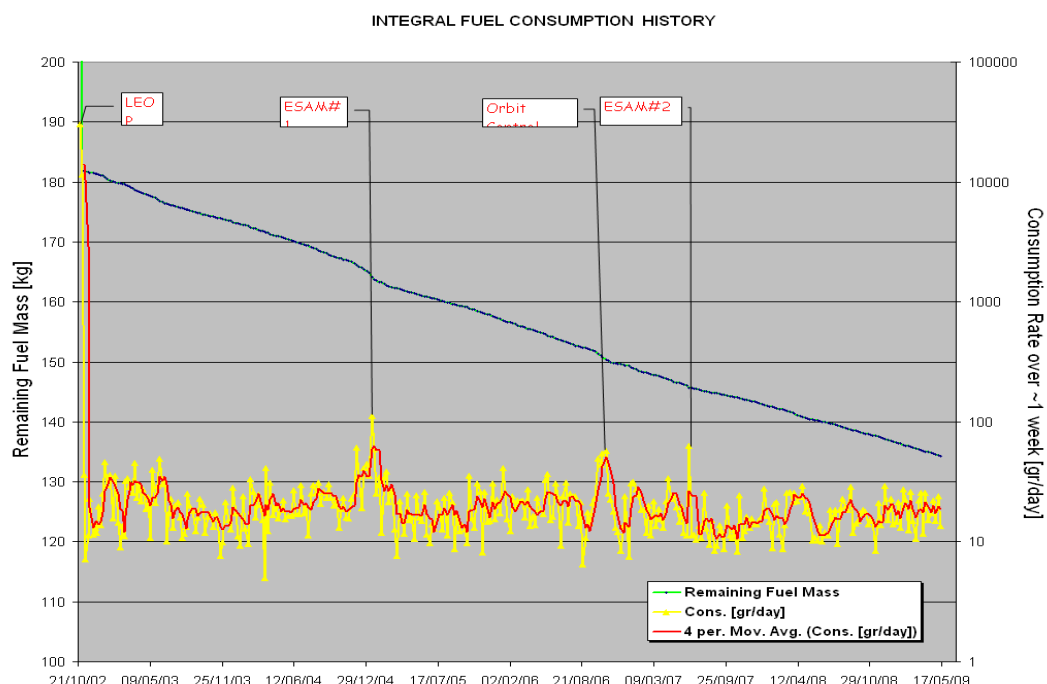
The OTF was not reached during part of PID 08030076.

Orbit Control

No update.

Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 15/05/2009 is reported in the plot below.



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

AOCS Daily Report

09/05/2009 (Day of Year 129, Revolution 802)

Problem at VILSPA station: at 14:23z the last part of the RWB sequence failed release. A TM and TC drop in VILSPA station caused the sequence to fail. After consultation with AOCS SOE, a manual recovery was performed and the second part of the Bias sequence executed.

A manual recovery was performed from attitude of PID 08020030 to the attitude of PID 08020032. The next slew 08020033 was manually updated in TL.

The following slews were missed in TL: 08020031 (CSL) – 32 (OSL)

10/05/2009 (Day of Year 130, Revolution 802)

Nothing to report.

11/05/2009 (Day of Year 131, Revolution 802-803)

FDS failed TPF update: at 07:58z the FDS did not perform the update of the slew ID 08030006. A manual recovery was performed and the next slew updated in TL.

No impact on TL.

12/05/2009 (Day of Year 132, Revolution 803)

Problem during connection to B-chain: at 13:17z when performing a TC connection on B-chain, the Link Test TC was sent erroneously without setting before the V(R). This caused the VC0 link to go in <<LOCKOUT>> and caused several sequences (RWB and CGS) to fail.

A complex manual recovery was performed from attitude of PID 08030054 to the attitude of PID 08030056. The slew 08030056 was manually updated in TL.

The following slews were missed in TL: 08030055 (CSL) – 56 (OSL)

13/05/2009 (Day of Year 133, Revolution 803)

Loss of guide star: at 03:08z a loss of the selected guide star occurred during PID 08030076. 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 08030077 was manually updated in TL.

The OTF was not reached during part of PID 08030076.

14/05/2009 (Day of Year 134, Revolution 803-804)

Nothing to report.

15/05/2009 (Day of Year 135, Revolution 804)

Problem on guide star: at 16:28z the Start Guide Star TC failed when executing slew ID 08040054. The origin of the event is likely due to the guide star not found during the Search/Track process.

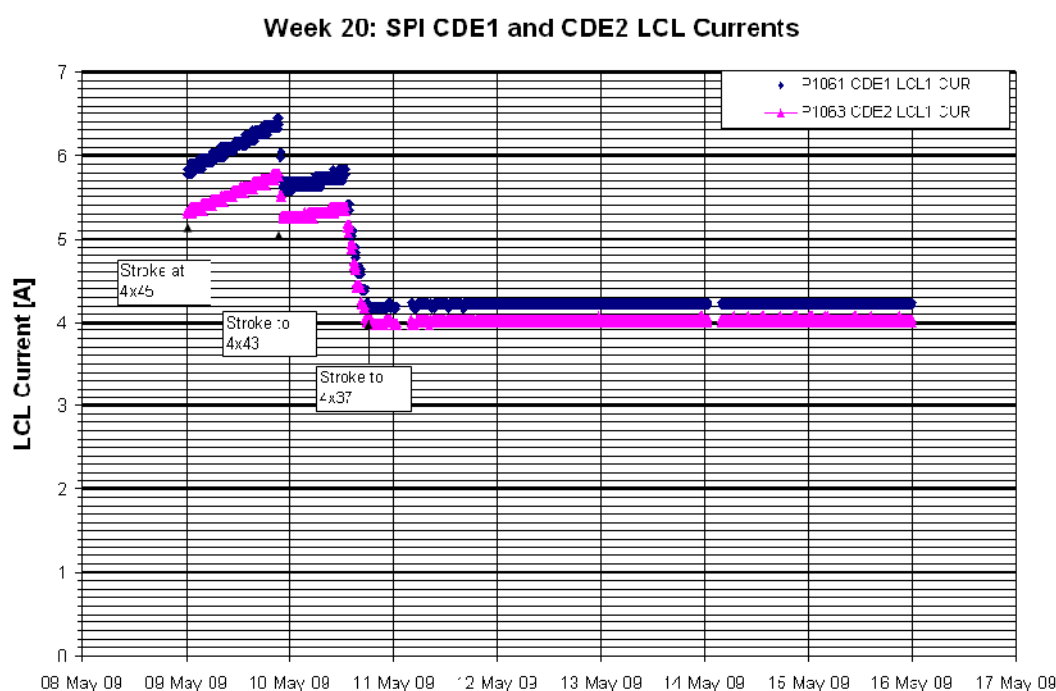
A complex manual recovery was performed from attitude of PID 08040053 to the attitude of PID 08040059. The next slew 08040060 was manually updated in TL.

The following slews were missed in TL: 08030054 (CSL) – 55 (OSL) – 56 (OSL) – 57 (CSL) - 58 (CSL) – 59 (OSL)

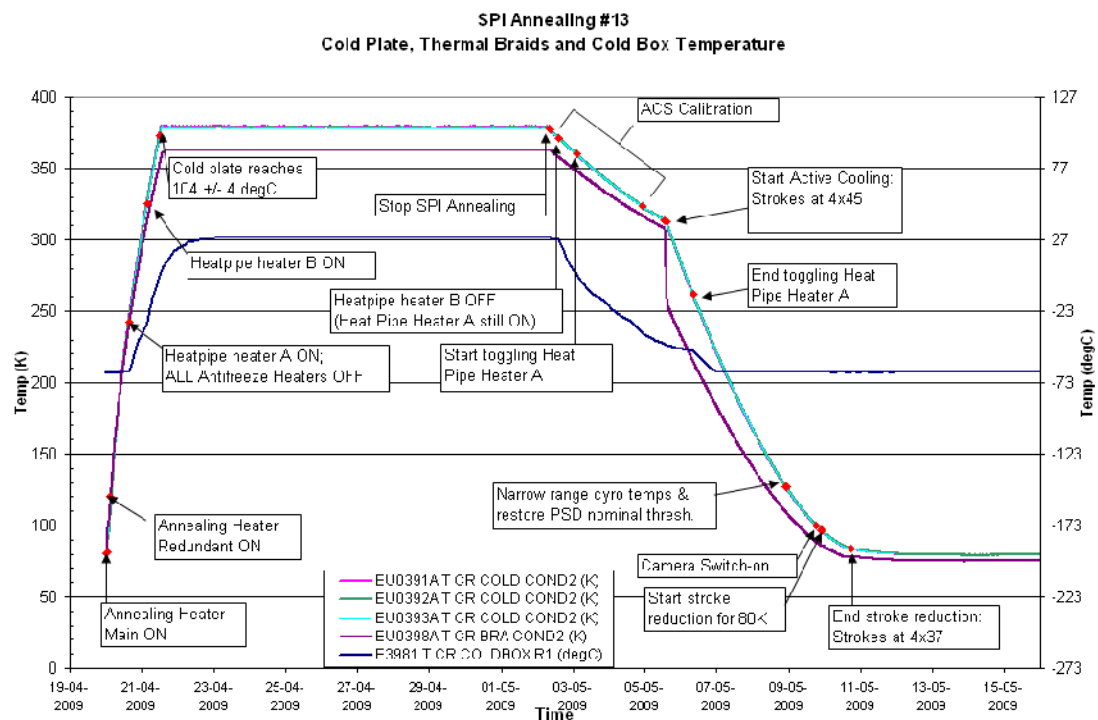
8.2.2 SPI Operations

Unit Temperatures: All the equipment temperatures are inside the operational limits.

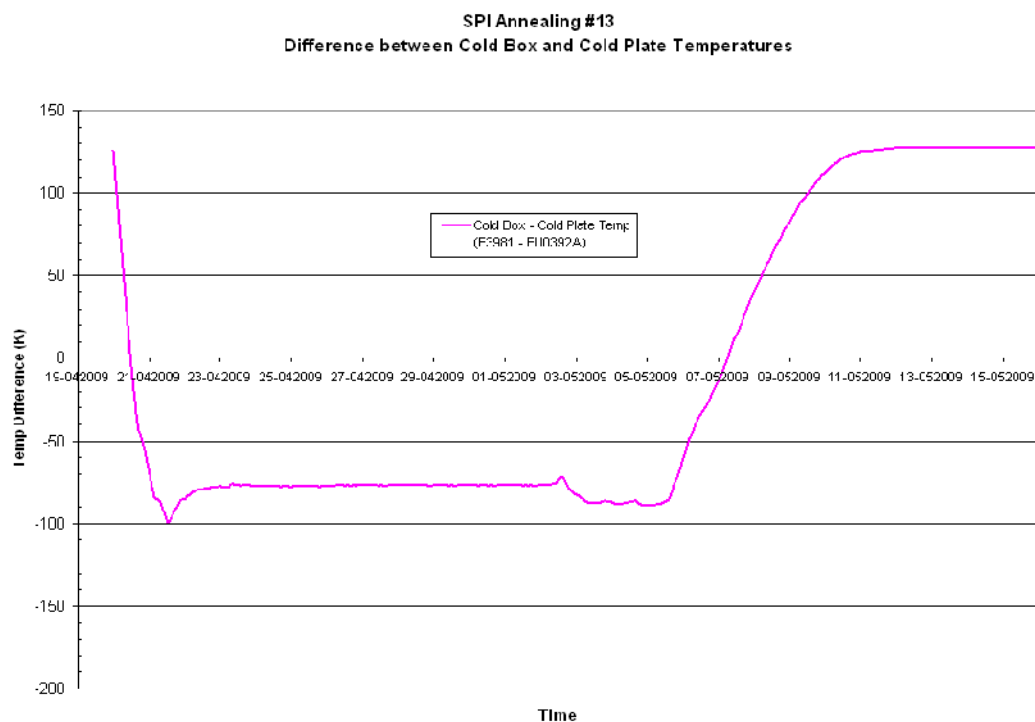
Stirling Compressors and Cryostat: The performance of the compressors is nominal. The following plot shows the CDE LCL currents over the reporting period:



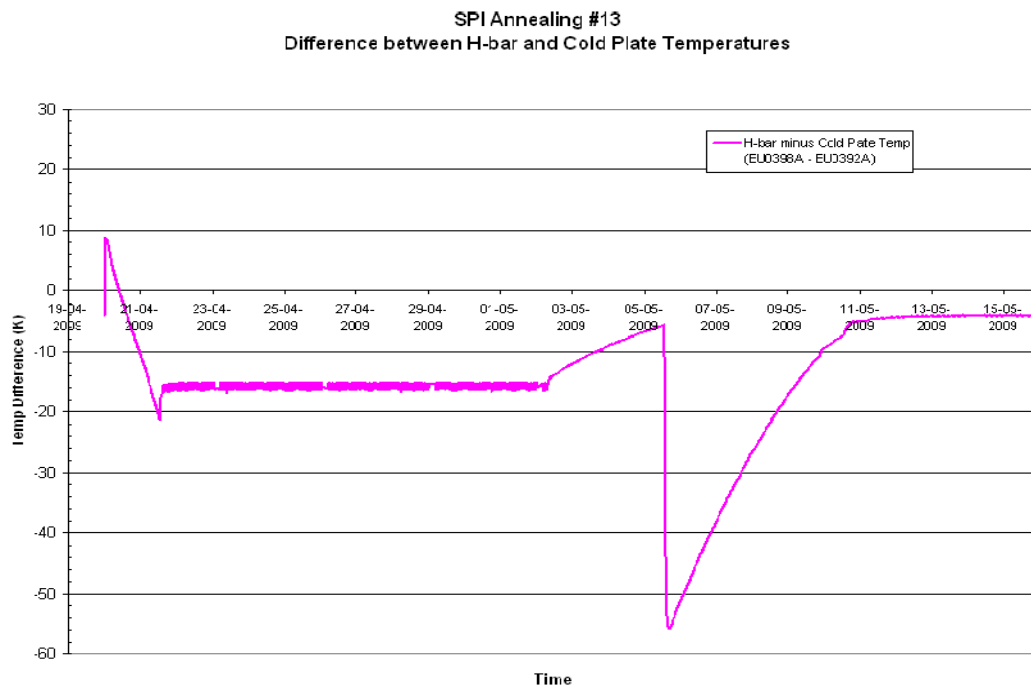
The following plot shows the evolution of the Cold Plate, Thermal Braids and Cold Box temperatures since the start of annealing:



The following plot shows the difference between the Cold Box and Cold Plate temperatures since the start of annealing:



The following plot shows the difference between the H-bar and Cold Plate temperatures since the start of annealing:



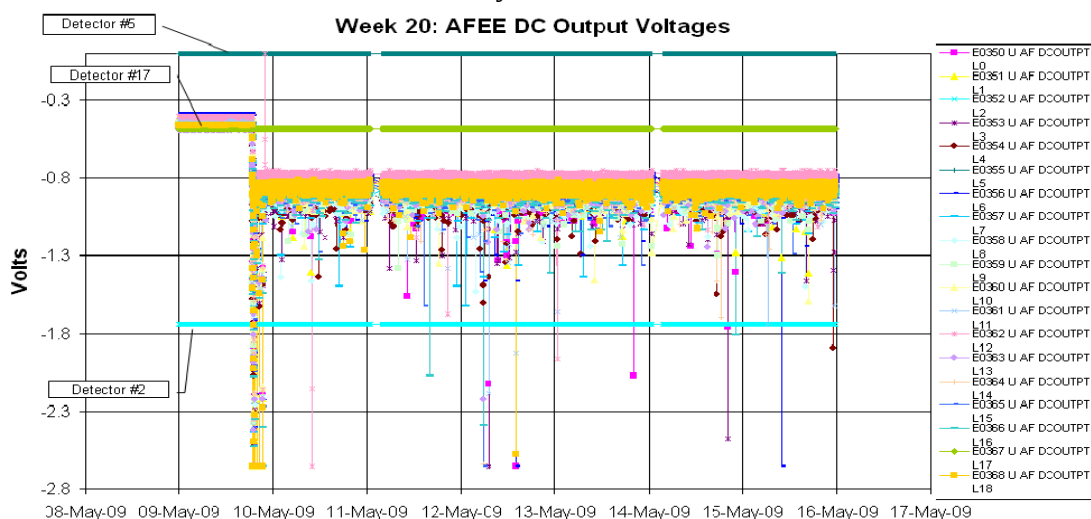
DPE & IASW: The DPE health and IASW performance are nominal. The IASW version installed is v4.3.4 with SE compression only enabled and the spectra scaling factor set to 8/19 SE. The DPE CPU usage was nominal during the reporting period.

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).

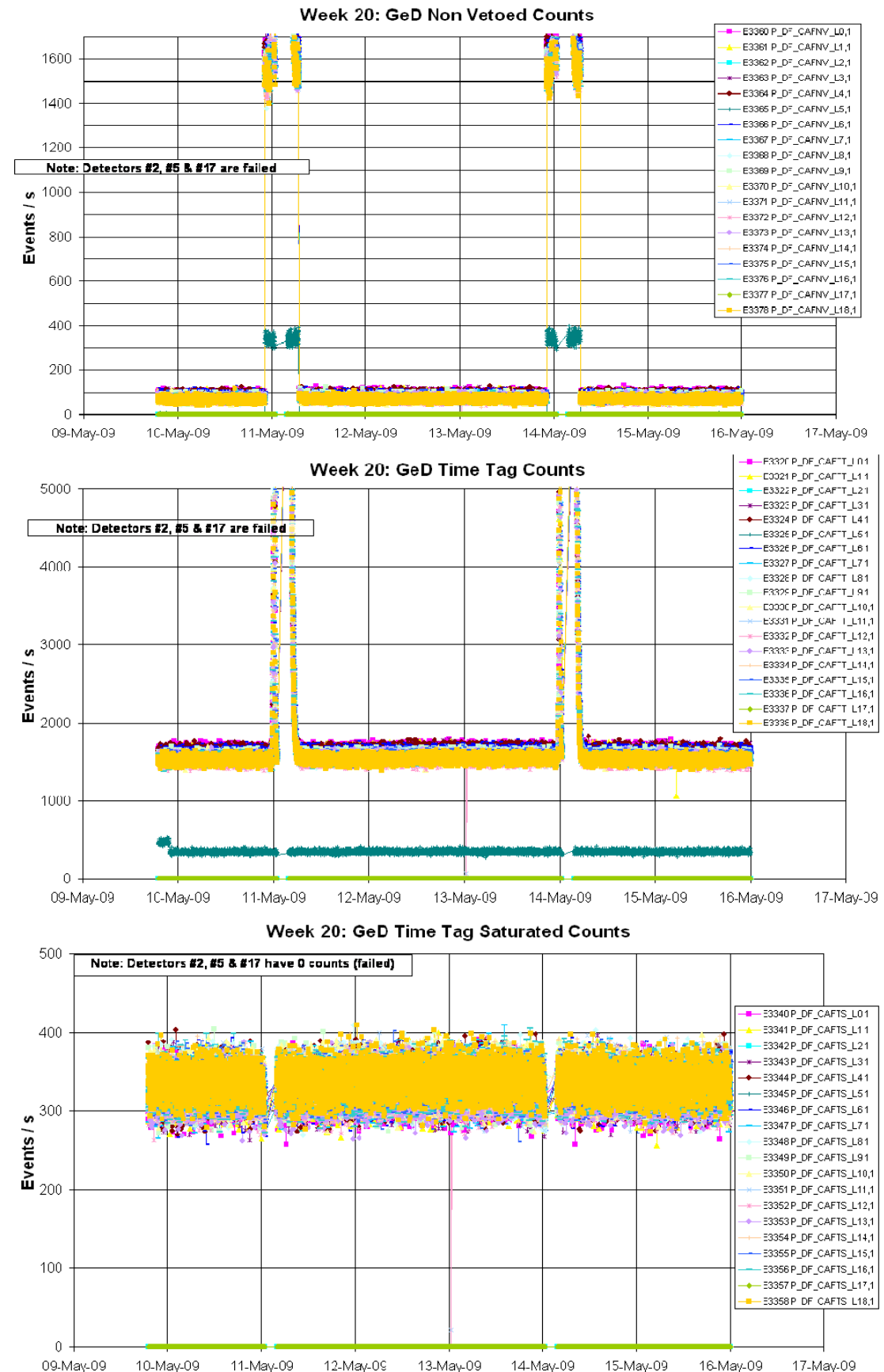
Following the camera switch-on after annealing, the nominal ACS configuration (with failed FEEs #57 and #81 OFF) was restored on 2009-05-09 at 21:52Z.

AFEE: The health of the AFEE is nominal. Detector HVPs were off and only the LVPs were on, with the AFEE in CONF mode, until the start of SPI camera switch-on after annealing, on 2009-05-09 at 18:17:00Z.

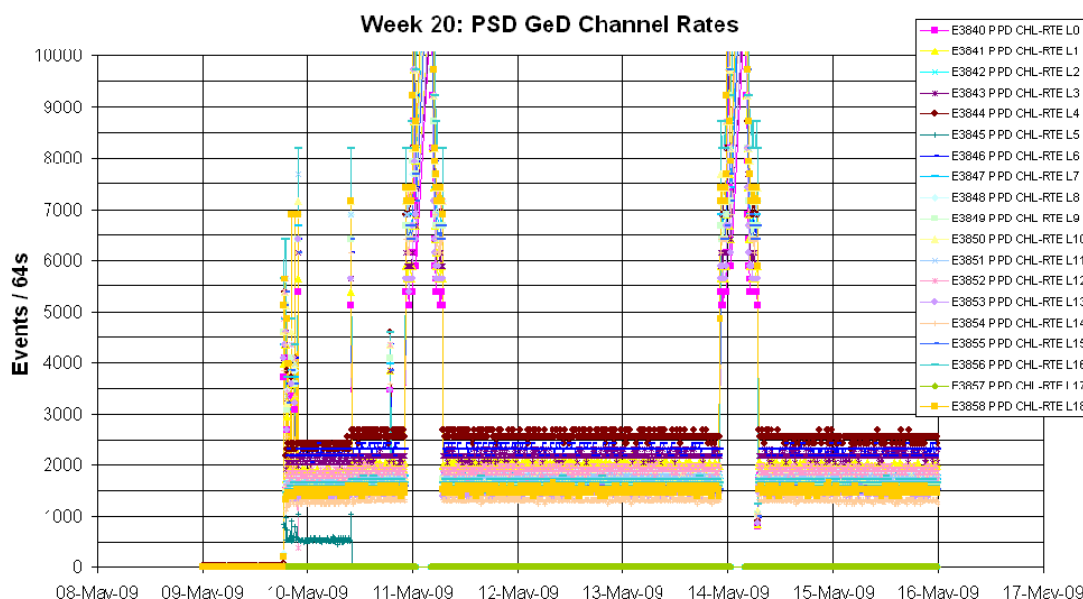
The following plot shows the dc output voltage of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06/12/2003; detector #17 is failed since 17/07/2004 and detector #5 is failed since 19/02/2009. The HV of the failed detectors are nominally set to 0.5kV.



DFEE: The health of the unit is nominal. The DFEE was in CONF mode until the start of SPI camera switch-on after annealing, on 2009-05-09 at 18:17:00Z.



PSD: The health of the unit is nominal. The PSD was in CONF mode until the start of SPI camera switch-on after annealing, on 2009-05-09 at 18:17:00Z. The following plot shows the PSD channel rates over the reporting period.



Event Log:

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

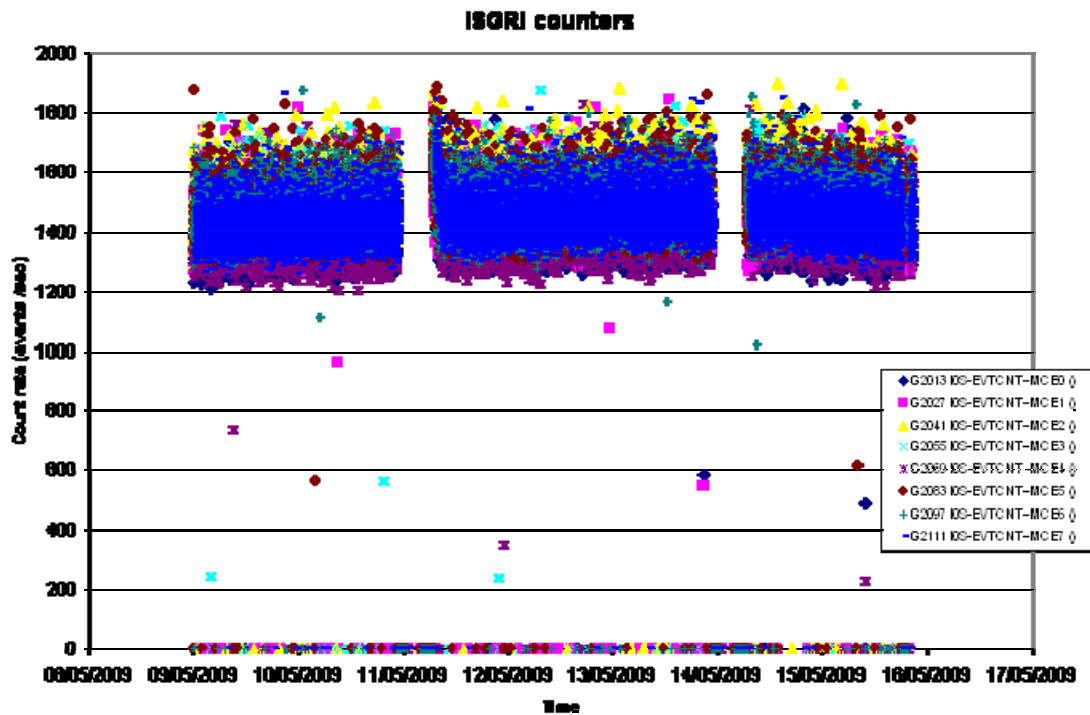
- On 2009-05-10 at 14:36:54Z three occurrences of OEM APID 1024 ID 229 EXCEPTION SPI1 PARTIAL FLAG OVERFLOW and 1 OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED were received. As they stopped of their own accord, no action was taken.
- On 2009-05-10 at 19:02:28Z TM parameter E3268 went OOL (value = PARAM > SPEC). This is the ACS FEE HV status #72. As it returned within limits of its own accord at 19:05:12Z, no action was taken.
- From 2009-05-11 at 07:07Z TM parameter E3500 ACS CntVetoBelow started regularly toggling OOL High. As the increase in value of the ACS counts is a general trend due to the increasing background, the High limit for this parameter was increased from 115000 to 125000 on 2009-05-12 at 13:38Z.
- On 2009-05-12 at 17:12:45Z two occurrences of OEM APID 1024 ID 229 EXCEPTION SPI1 PARTIAL FLAG OVERFLOW and 1 OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED were received. As they stopped of their own accord, no action was taken.

8.2.3 IBIS Operations

Unit Temperatures: All the equipment temperatures were inside the operational limits throughout the week.

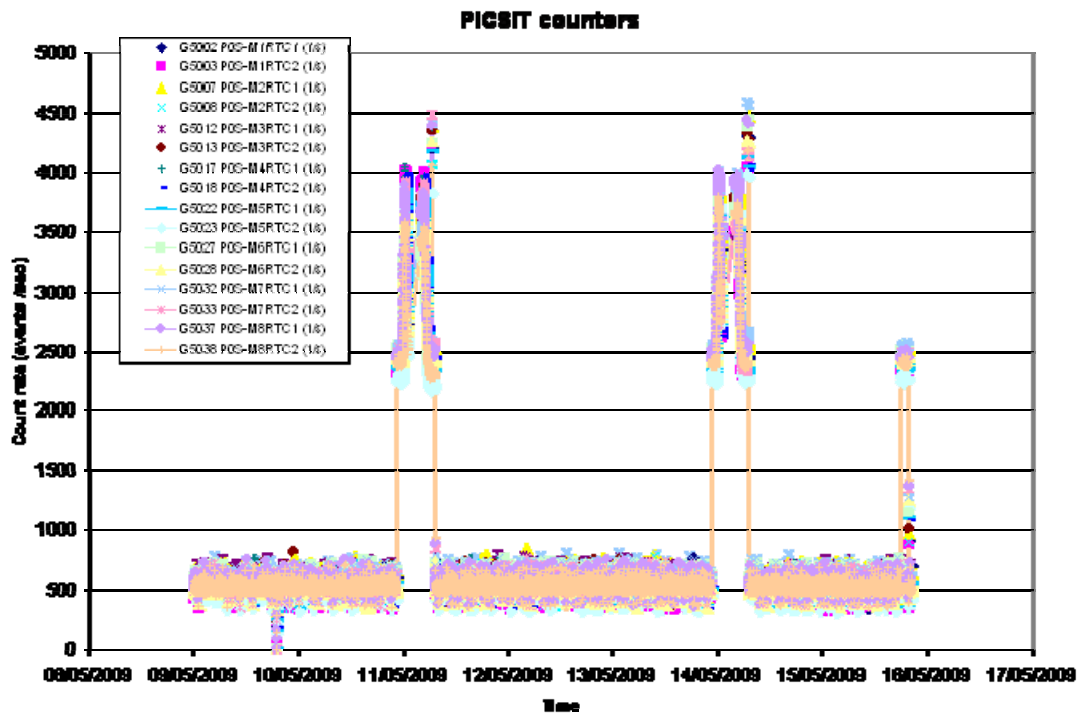
ISGRI

The health and performance of ISGRI was nominal during the reporting period. The following plot shows the ISGRI MCE counters during the week:



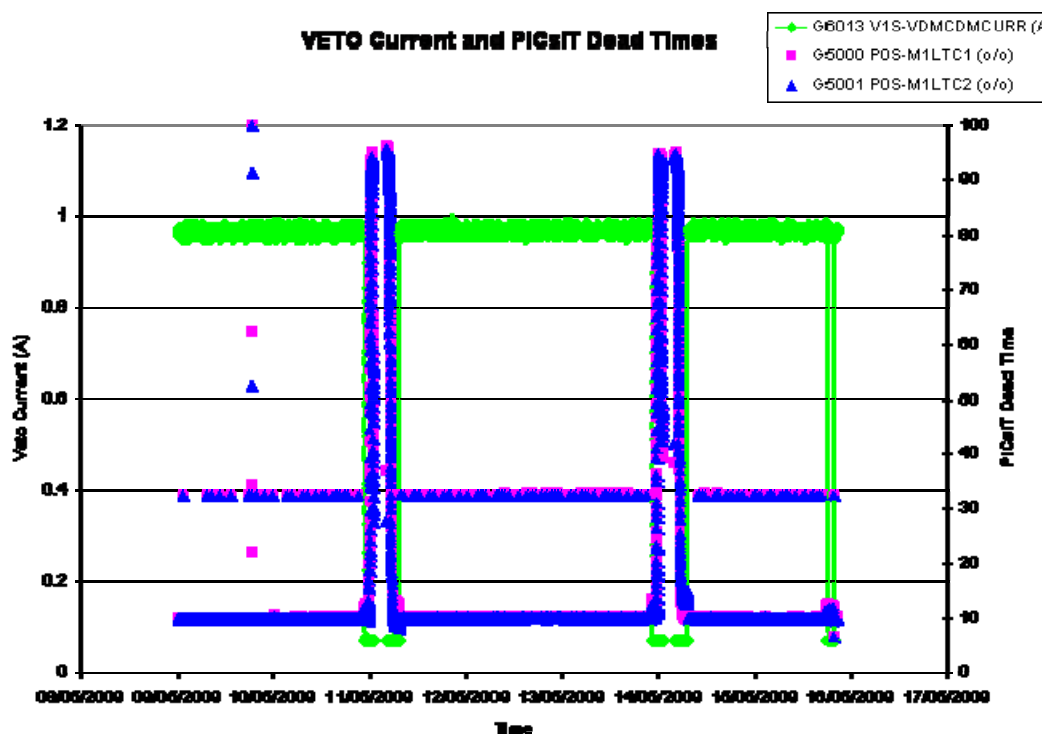
PICsIT

The health and performance of PICsIT was nominal during the reporting period. The following plot shows the PICsIT semi-module counters during the week:



VETO

The health and performance of VETO was nominal during the reporting period. The following plot shows the VETO current and PICsIT dead-times during the week:



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 G6061 went OOL Warning Low several times during the week. This is the VETO calibration counter. As in each case it returned within limits of its own accord at the next TM cycle, no action was taken. These frequent OOLs are due to a reduction in calibration counts as a result of the natural decay of the radioactive calibration source. The lower limit for this parameter will therefore be updated in the next database release.

2009-05-09 (DOY 129, Rev 802)

At 18:48:39Z the TM parameters families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semi-module FIFO error flags. At 18:48:50Z the TM parameter families G5002 and G5003 for the PDM semi-module counters started going OOL Low. As they had all returned within limits of their own accord by 18:49:54Z, no action was taken.

2009-05-10 (DOY 130, Rev 802) to 2009-05-14 (DOY 134, Rev 803-804)

IBIS operations executed nominally.

2009-05-15 (DOY 135, Rev 804)

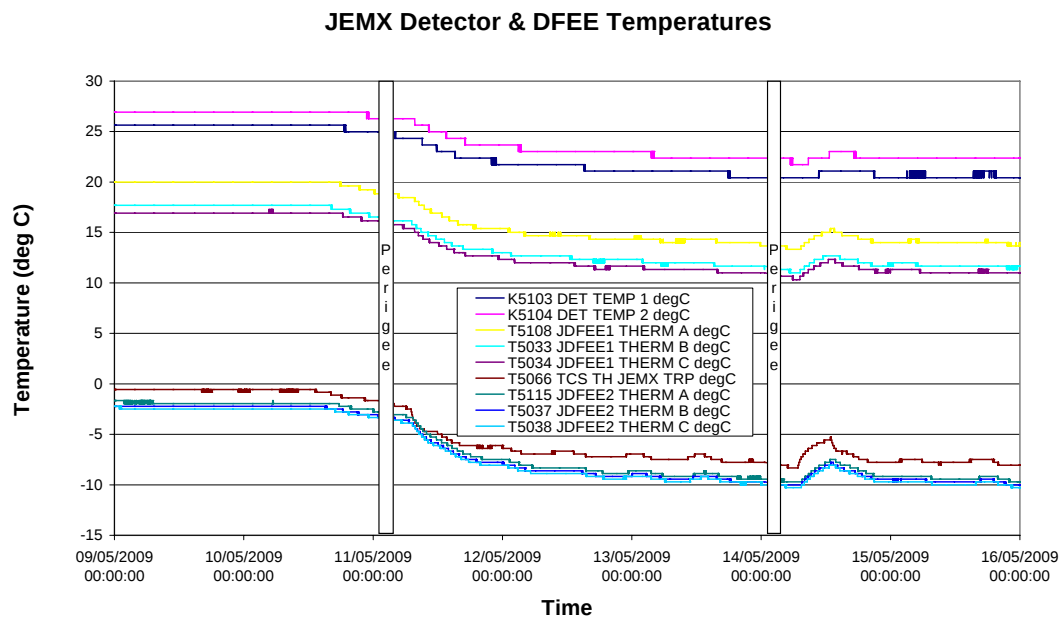
Due to an IREM SEU, IBIS transitioned autonomously to Safe configuration at 17:49:41Z. It was recovered as follows:

- At 19:14:26Z FCP_IBIS1_0803 IBIS EXIT FROM SAFE MODE
- At 19:26:02Z ED GESTAN02 uplinked with the planned observation parameters and commanding to IBIS from the Timeline re-enabled.
 IBIS operations continued nominally.

8.2.4 JEM-X Operations

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

2009-05-09 (DoY 129 Rev 802) to 2009-05-10 (DoY 130 Rev 802)

JEM-X 1 operations executed nominally.

2009-05-11 (DoY 131 Rev 803)

At 07:21:52, 07:46:46 & 07:53:33, TM parameter K5449 briefly exceeded soft limits.
 At 07:24:08, TM parameter K9104 briefly exceeded soft limits.
 At 07:25:49, TM parameter KD5020D briefly had an incorrect status.
 At 07:30:29, TM parameter K5136 briefly exceeded soft limits.
 No action was taken on any of the above events, and there was no impact.

2009-05-12 (DoY 132 Rev 803) to 2009-05-14 (DoY 134 Rev 804)

JEM-X 1 operations executed nominally.

² Data sampled (1 frame in 8)

2009-05-15 (DoY 135 Rev 804)

At 17:50:13 JEMX parameters K5315, K5316 & K5317 went Out-of-Limits due to an IREM SEU (#76). There was no impact as the reaction has been disabled.

8.2.5 OMC Operations

2009-05-09 (DoY 129, Rev 802)

At 14:23:00, a problem with the ground station led to a reaction wheel bias being interrupted. A recovery was performed, and the timeline rejoined at 15:53. The impact was the loss of pointing 08020031.

2009-05-10 (DoY 130, Rev 802) to 2009-05-11 (DoY 131, Rev 803)

Nothing to report.

2009-05-12 (DoY 132, Rev 803)

At 13:18:00, an operator error caused a CLCW VC0 Lockout. This forced a suspension of the timeline. A reaction wheel bias and 2 slews were then missed. A recovery was subsequently performed, and the Timeline rejoined at 14:49:00. The impact was the loss of pointings 08030054 & 08030055. It was at this time the following OEMs were received:

2009.132.13.58.13.149	2009.132.13.58.24.671	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					
2009.132.13.58.19.149	2009.132.13.58.24.821	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 pointing 08030054.

2009-05-13 (DoY 133, Rev 803) to 2009-05-14 (DoY 134, Rev 804)

Nothing to report.

2009-05-15 (DoY 135, Rev 804)

At 16:28:00, an AOCS problem forced the suspension of the timeline. A recovery was performed, and at 16:55:00, a manual slew performed to the attitude for pointing 08040055. The impact was the loss of pointing 08040054. It was at this time the following OEMs were received:

2009.135.16.31.16.244	2009.135.16.31.25.331	1792	RealTime	131	TC REJECT
REJECTED TC1			0	0	65535 PR N
E E					
2009.135.16.31.22.057	2009.135.16.31.25.394	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.

At 17:49:33, and IREM SEU (#76) forced OMC to SAFE mode. A recovery was performed, and the unit returned to standby at 19:09:44. The impact was pointing 08040056 was cut short from a planned 2000 to 361 seconds, and pointings 08040057 & 08040058 were lost. It was at this time the following OEMs were received:

2009.135.18.17.10.060	2009.135.18.17.20.681	1792	RealTime	131	TC	REJECT
REJECTED TC1			0	0	65535	PR N
E E						
2009.135.18.17.16.248	2009.135.18.17.26.938	1792	RealTime	131	TC	REJECT
REJECTED TC1			0	0	65535	PR N
E E						

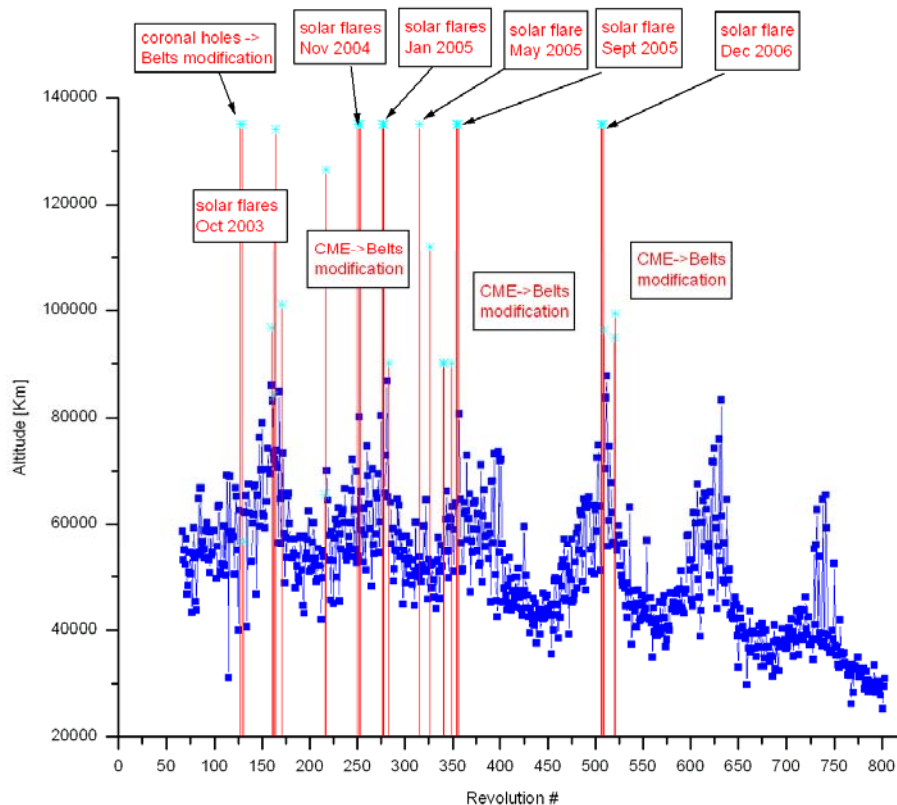
These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for pointing 08040057.

On DoY 130 at 22:24:29 and DoY 133 at 22:14:21 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

8.2.6 IREM Operations

Radiation Belts Entry

Evolution of Radiation Belt Entry 2003-2008



IREM daily report

DoY 2009.135 (15/05/2009):

At 17:49:32Z, a local reset of the IREM CSCI S/W (SEU #76) occurred. The status of the unit, before the local reset of the IREM CSCI S/W, was nominal, here is a summary:

- 1) The temperatures were nominal;

- 2) The LCL current was nominal;
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits;
- 4) The anomaly occurred at 2009.135.17.49:32Z (153450.9 km). The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex); just before the anomaly, radiation counters reported nominal values considering the position of the S/C along the orbit;
- 5) The recovery of the unit started immediately using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of BCC0 HEX = 48320 DEC = 1011110011000000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 21:20:00Z.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the PIs request. OMC was recovered at 19:09:44Z and IBIS at 19:26:00Z.

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]
802	RAD_ENTR R 2009-05-10T22:24:27Z	10/05/2009 23:43:00	29462.5	10-May-2009 23:24:05	32422.47
803	RAD_EXIT R 2009-05-11T06:59:00Z	11/05/2009 06:15:16	50629.9	11-May-2009 05:44:05	46287.6
803	RAD_ENTR R 2009-05-13T22:14:19Z	13/05/2009 23:27:16	30933.1	13-May-2009 23:11:52	32648.11
804	RAD_EXIT R 2009-05-14T06:48:37Z	14/05/2009 06:26:52	>>36152.6	14-May-2009 05:41:52	47618.51

Reference

High radiation

Very small error vs reference (less than 10 minutes)

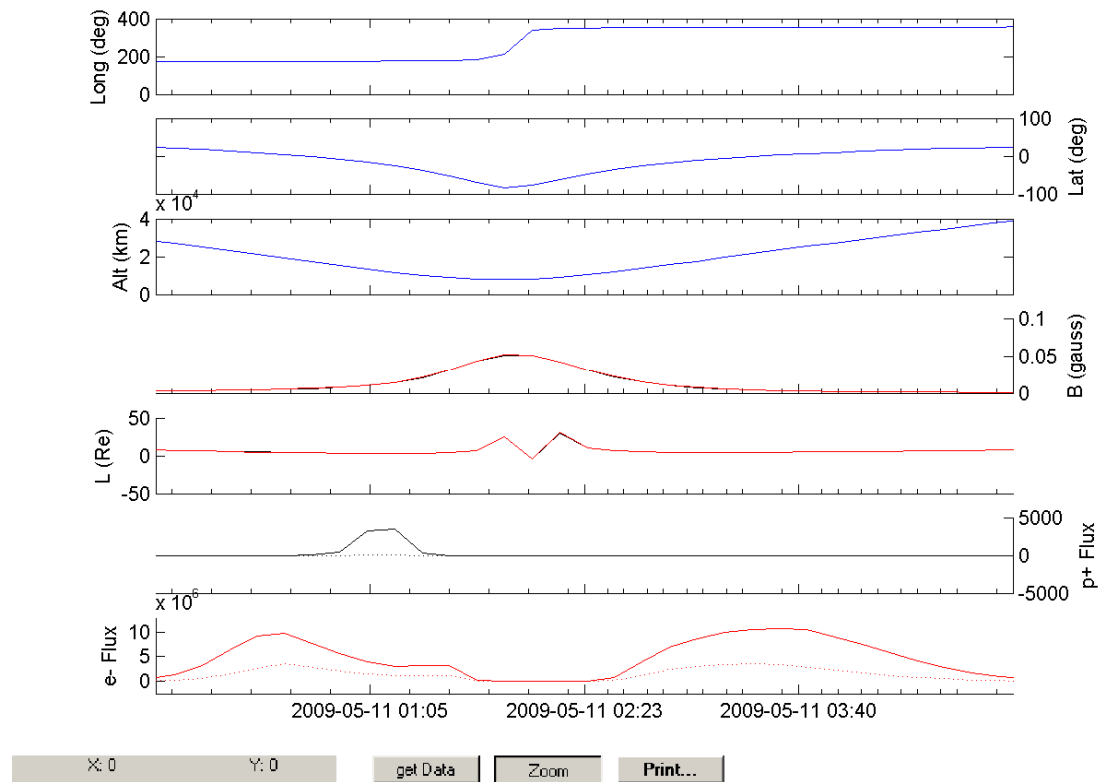
Small error vs reference (between 10 and 30 minutes)

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 Predicted Radiation Belt Passages

Rev 802



Rev 803

