

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 177
Week 06
13.02.06
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 04.02.06 until 10.02.06 (both dates inclusive) and covers the revolutions 405 and 406.

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 were 2 staring Earth Observations (RA 16:41:57.86; DEC -61:02:44.4), SN1006 (RA 15:02:48.40; DEC -41:54:42.0), and the Galactic Bulge region (RA 17:45:36.00; DEC -28:56:00.0), which were raster and hexagonal ditherings respectively.

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 3rd and 4th Earth Observation (EO2) activities were performed on 05-06 and 08-09 February 2006. The activities required special AOCS manual configuration with control loop based on FSS-A and IMU1. During the Earth observation period the STR was disabled from the ACC control loop and the IMU 1 selected for attitude control on Yaw axis. At the end of the activity the ACC was reverted back to FSS control on Roll and STR control on Pitch and Yaw. The AOCS special configuration foresaw an IMU calibration in order to reduce to the minimum the gyroscope drift.

3 slews were missed from the Timeline during this period due the reconfiguration after E04.

The fuel consumption over the period between 02/02/2006 and 09/02/2006 was 0.1639 kg. The remaining propellant is in the order of 156.4197Kg.

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 was identified.

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

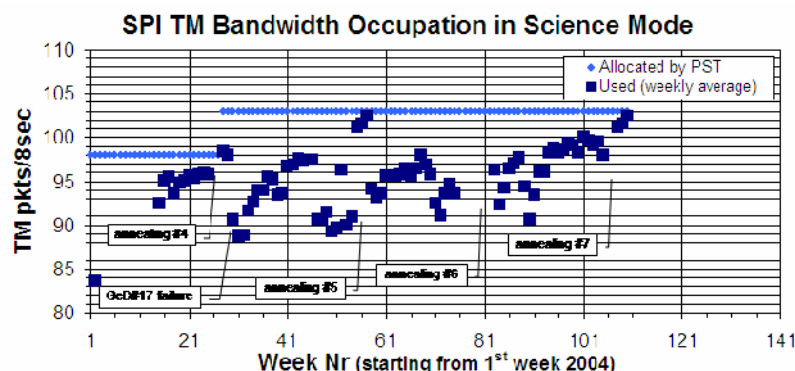
Following the 7th annealing, ended on 24th January, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #15, which is showing an anomalous energy resolution. During the week some troubleshooting activities were performed. Details are reported in the AFEE section of this report.

During science operations, the instrument was kept in photon-by-photon mode, with spectra TM enabled, an assigned TM bandwidth in the science observation windows of 103 pkts/cycle and an average occupation of 102.4 pkts/cycle.

The occupation bandwidth is therefore approaching saturation. In these conditions the instrument is unable to downlink the Spectra telemetry, accumulated during pointings. If the trend does not revert or the bandwidth allocation is not increased, SPI could start also loosing Photon science data in the forthcoming days.

The Stirling compressors work nominally, maintaining the Germanium detectors at 85K +/-1K.

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.

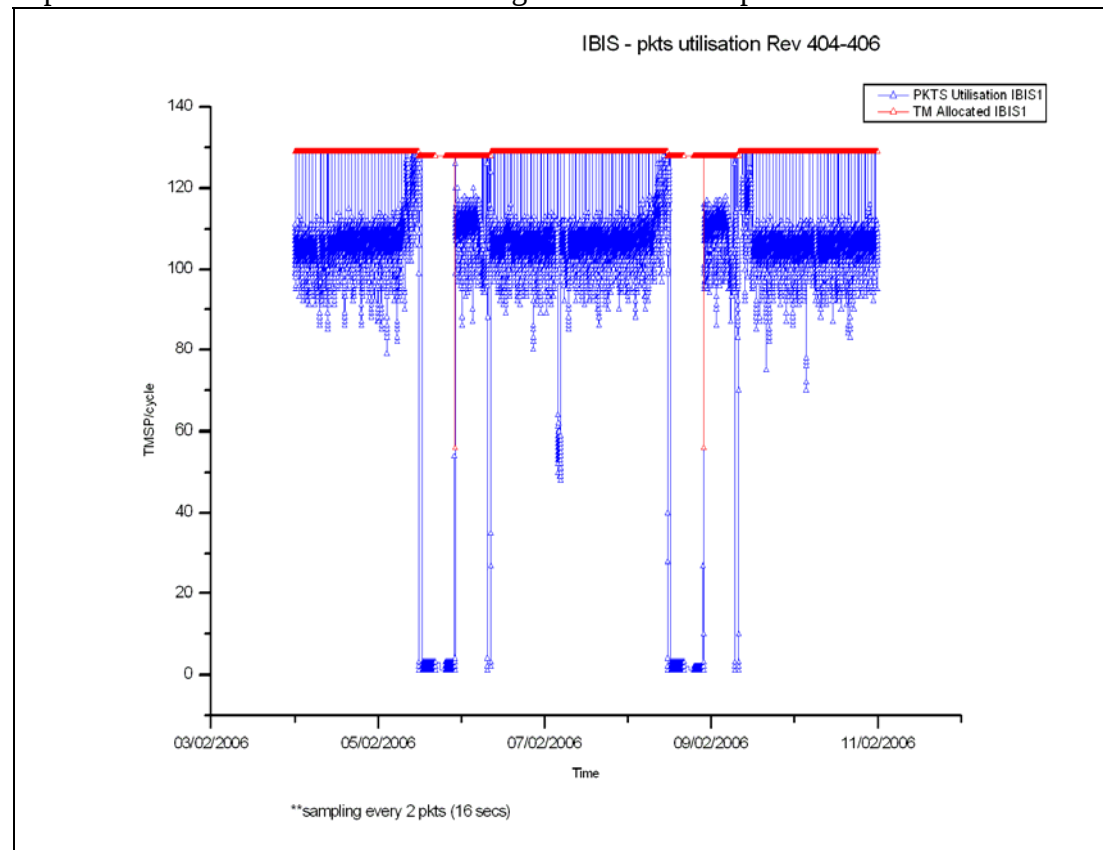
3.2.2 IBIS

The Overall status of the unit is nominal.

At the beginning of revolution 405 and 406, both the third and fourth Earth Observations were performed. These activities were run with IBIS in Scientific Standard mode. No specific configuration was required except for the PST allocation (128 TMPS/cycle). The Observations were completed nominally.

During the reporting period, the PST allocation to IBIS was 129 TMPS/cycle. However, during the Earth Observation (from 05/02/2006 11:45:16Z to 06/02/2006 08:36:28Z and from 08/02/2006 11:31:24Z to 09/02/2006 08:01:24Z), due to the activation of both JEM-X1 and JEM-X2, it was set to 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 107.76 TMPS/cycle, up 1.76 on last week.

A plot of the IBIS TM utilisation during the observation period 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 and JEM-X2 were operated in Data Taking mode during science observations throughout the reporting period. JEM-X1 had a TM allocation of 8 packets/cycle and JEM-X2 had 1 packet/cycle, except during the Earth Observations at the start of revolution 405 (2006-02-05T21:36:39Z - 2006-02-06T08:35:37Z) and 406 (2006-02-08T21:16:16Z - 2006-02-09T08:00:35Z), during which they had a TM allocation of 5 packets/cycle each.

During the periods in which JEM-X2 was in Data Taking with 1 packet/cycle, the JEM-X2 reactions to the Broadcast Packet TM Share information was disabled, such that JEM-X2 believed it had 8packets/cycle, in order to allow the grey filter algorithm to work as desired (ref: OCR-207 and INT_OR_0238).

Starting approximately 1 hour before JEM-X2 was due to be commanded to Safe mode before radiation belt entry of revolutions 404 and 405, Out of Limits were received on L5135 FIFO FULL LOSS, indicating that the DPE buffer was full. The JEM-X2 TC L0021 SW READ INT, uplinked as part of the ED LESAFE02 before radiation belt entry of these revolutions were then rejected on board as the DPE buffer was full.

Further information on the JEM-X operations can be found 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, 129 of the 131 planned science pointings for OMC were executed nominally, 2 were lost.

Note: Some more information concerning the OMC operations is provided in the Appendix Section 8.3.5.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised low solar activity.

The Sun has been blank during the observation period except for 2 very small sunspots that appeared on the 9th and already faded on the 10th. Therefore, the solar activity has remained low for the whole week.

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, 2 pointings were lost during the post Earth Observation manual recovery. There were several minor problems with ground station links and IMCS tasks which had no impact. The overall performance was well above the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was very good this week. Two pointings were lost during the Timeline recovery after the last Earth Observation, but this was not due to any anomaly. The overall performance was nearly 100%.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were several instances though of bad frames and a few TM drops, but these had no impact on the mission. The overall performance though was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Earth observations

The three remaining observations of the Earth have been successfully completed during the week.

2. Mission planning

PSF for revolution 415 has been received. This week the only mission planning activity consists of planning of revolution 414. No replanning activity has been performed and no ToO request has been received. TSFs up to revolution 408 have been received.

3. Observation status

ECS's for revolutions 393 and 394 were received and processed in ISOC this week. No extra time was credited.

4. ISOC science data archive

The internal beta testing of ISDA version 2.5 was completed. Some problems detected have been removed during the week and an updated version is provided to the archive scientist for verification. It is expected to extend the beta testing to an external audience very early next week. The problem related to low availability due to hardware problem is not completely removed. However improved procedures have resulted in a faster recovery after a malfunction.

5. ISOC system

As can be seen from point two above there has been low mission planning activities this week. Therefore the version 12.0 has been kept in use instead of introducing the now ready version 12.1. This version will now be introduced early next week. With the introduction of this version the key programme handling within ISOC is complete. The version also contains quite some minor improvements to the system.

6. AO 4 preparation

This week all documentation under ISOC control has been completed including approval by the Mission Manager. Next week will concentrate on testing the software to support the AO 4. This will in particular concentrate on the tools, Proposal generation tool, observation time estimator and target visibility predictor that are used by the outside science community. It is very important to check the whole chain from generation of proposals to the ingestion into the ISOC data base. This is particularly important since this is the first time proposal submission is performed to ESAC with a different network layout.

7. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 13/02/2006:

- Latest Standard Analysis completed: observation 03200560001 (Cas A /Tycho, Revolutions 386-395) on 05/02/2006
- Latest products archived: observation 03200560001 (Cas A /Tycho, Revolutions 386-395) on 07/02/2006
- Latest observation products sent to the observer: observation 02297000019 (Cas A, Revolutions 352 & 384-385) on 13/02/2006

5 Special Events

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 040, from 06:45 to 10:00, during the post Earth Observation operations, slews 04060006 through to 04060009 inclusive were executed manually. The impact was the loss of science data for the pointings, 04060006 & 04060007.

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

AR id	Date Created	Subject	Segment	Status
INT-2834	13/02/2006	IFRD unstable	IMCS	Pending
INT-2835	13/02/2006	FDS not receiving TM	FDS	Pending
INT-2836	13/02/2006	TM status displayed incorrectly on IMCA	NCTRS	Pending
INT-2837	13/02/2006	CMD verifier crashed on IMCA	IMCS	Pending
INT-2838	14/02/2006	Missing ED for JEM-X2 Activation in Revolution 402	ISOC	Pending
INT-2839	15/02/2006	Error sending data to ISDC	Comms	Pending
INT_SC-141	13/02/2006	IREM Anomaly: jump in the MSW of the block counter	Payload	Open

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7 Future Milestones

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 405

The observations in revolution 405 began with an Earth Observation (RA 16:42:36.91; DEC-61:06:42.1) lasting ~8.1 hours. A raster dithering observation of SN1006 (RA 15:02:48.40; DEC -41:54:42.0) lasting ~48.2 hours was then performed. Finally, a staring observation at the Earth Observation attitude (RA 16:41:57.86; DEC -61:02:44.4) was performed for the remaining ~37 minutes of observation time.

Revolution 406

The observations in revolution 406 began with an Earth Observation (RA 16:41:57.86; DEC-61:02:44.4) lasting ~8.1 hours. A hexagonal dithering observation of Galactic Bulge region (RA 17:45:36.00; DEC -28:56:00.0) lasting ~3.5 hours was then performed. Finally, a raster dithering observation of SN1006 (RA 15:02:48.40; DEC -41:54:42.0) was performed for the remaining ~45.4 hours of observation time.

Throughout these observations SPI, IBIS and both JEM-X units were in their nominal science modes. During the Earth Observations the OMC was in FFCalibration mode and the TM allocation was IBIS 128; SPI 103; JEM-X1 5; JEM-X2 5; OMC 5, otherwise OMC was in Normal science mode and the TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2006-01-21T21:19:41.000Z	156.7708	F	Automatic TM processing.
2006-01-22T04:22:54.000Z	156.7490	F	Automatic TM processing.
2006-01-24T14:23:40.000Z	156.7175	F	Automatic TM processing.
2006-01-25T08:45:34.000Z	156.6832	F	Automatic TM processing.
2006-01-27T15:21:16.000Z	156.6670	F	Automatic TM processing.
2006-01-27T16:36:52.000Z	156.6600	F	Automatic TM processing.
2006-01-27T20:49:48.000Z	156.6390	F	Automatic TM processing.
2006-01-30T20:31:41.000Z	156.6112	F	Automatic TM processing.
2006-02-02T13:20:12.000Z	156.5836	F	Automatic TM processing.
2006-02-03T08:13:02.000Z	156.5489	F	Automatic TM processing.
2006-02-05T13:09:47.000Z	156.5322	F	Automatic TM processing.
2006-02-08T12:54:11.000Z	156.5101	F	Automatic TM processing.
2006-02-09T07:24:21.000Z	156.4493	F	Automatic TM processing.
2006-02-09T08:30:53.000Z	156.4288	F	Automatic TM processing.
2006-02-09T09:22:13.000Z	156.4197	F	Automatic TM processing.

This report was generated Fri Feb 10 08:00:28 GMT 2006

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, 04/02/2006 – 10/02/2006

AOCS operations were executed from the Automatic Timeline with the exception of the special AOCS (manual) configuration foreseen for the Earth Observations on DoY 036-037 and 039-040.

During this period, 41 Open Loop Slews, 100 Closed Loop Slews and 6 Momentum Bias were executed (TL + EO3+EO4 configuration).

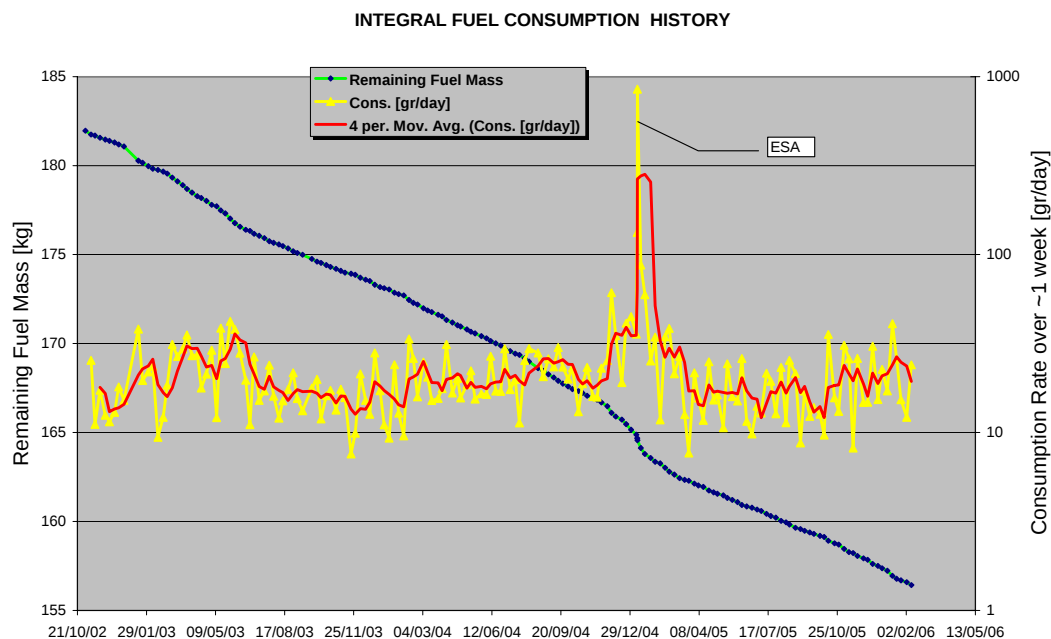
3 (CSL) slews were missed from the Timeline during the reconfiguration after E04.

Orbit Control

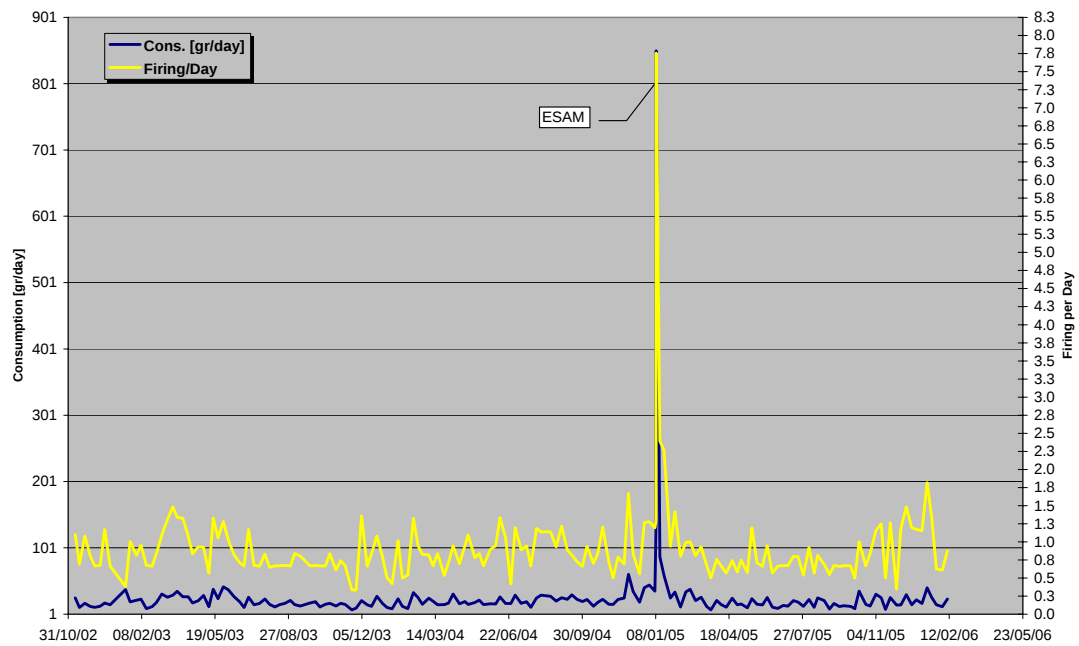
At present time the plan is to reverse the control and to increase the semi-major axis as from mid April 2006 and onwards. The "Redu only" situation could then be reached in the second half of 2006, possibly mid August. The apogee longitude would then be about 32 deg East. Plot provided on monthly basis

Fuel consumption

The fuel consumption (total, grams/day) over the period between 01/11/2002 and 09/02/2006 is reported in the plot below.

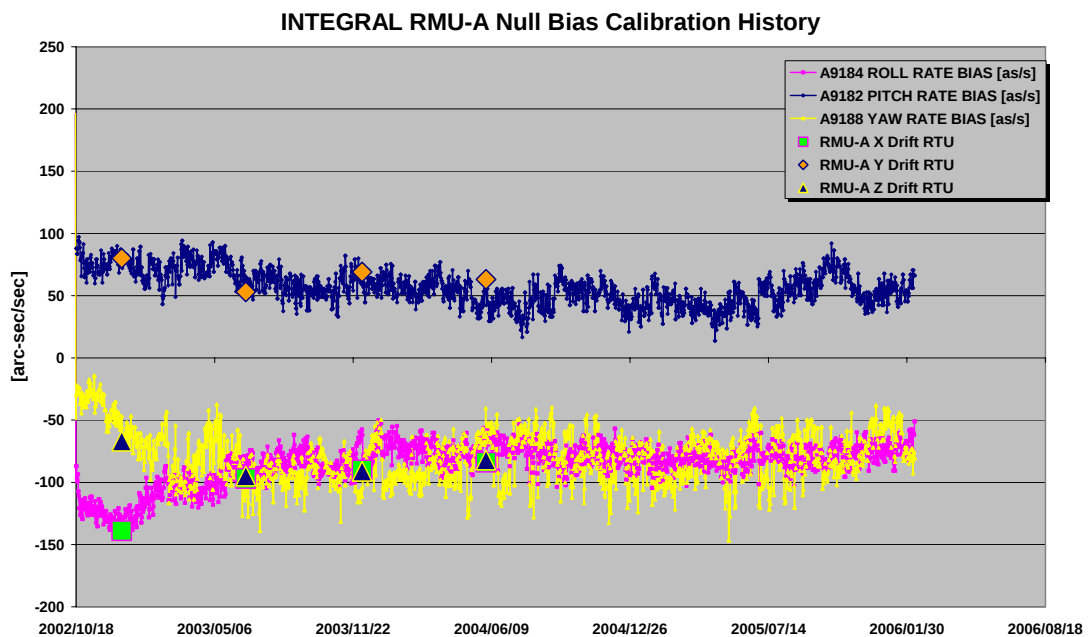


The firing/day over the period between 01/11/2002 and 09/02/2006 is reported in the plot below.

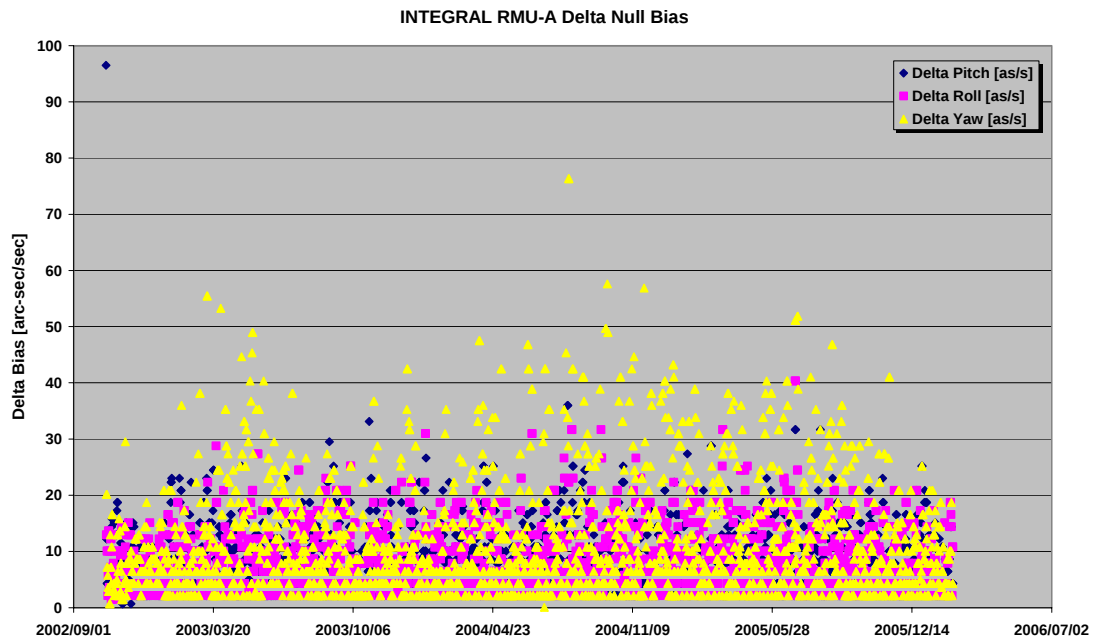


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 10/02/2006 is reported in the plot below.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 10/02/2006 is reported in the plot below.



04/02/06 (Day of Year 035, Revolution 404)

Nothing to report.

05/02/06 (Day of Year 036, Revolution 404-405)

EO3 Third Earth Observation 05-06 February 2006: the aim of the activity was to point towards the centre of the Earth at perigee + 6 hours (i.e. above 40000 Km). Integral reached the 'EO attitude' ~09 hours 55 min before it violated the STR Earth Limb constraint (>15 deg) and the Earth left entering in the STR FOV. The STR use was disabled at 21:03Z and the IMU1(Z) was selected for attitude control on Yaw axis. The IMU1(Yaw channel) was carefully calibrated and the AOCS configured for the Earth observation activity. As soon as the STR use was disabled, the ACC switched control to FSS-A on Roll and Pitch and IMU1 on Yaw.

06/02/06 (Day of Year 037, Revolution 405)

EO3 Third Earth Observation 05-06 February 2006: At 06:12Z the STR use was re- enabled, the ACC switched control to STR on Pitch & Yaw and FSS on Roll. The S/C attitude was not inertial, due to the residual IMU drift on Yaw (not corrected by the calibration) and FSS-A following the apparent motion of the Sun on Roll and Pitch: therefore the attitude at the end of observation was slightly different (~ 7 arcmin difference) wrt the initial 'EO attitude'.

Hereafter is reported a summary of AOCS performances during the EO3

Attitude

Initial EO attitude (at STR disabling,)

RA 16:43:41.89

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DEC -61:04:12.09
POS 075:23:17.06

alpha F=0.313 deg
beta F=-24.224 deg

RW2=+ 2146 rpm
RW3=+ 2011 rpm
RW4=- 2143 rpm

Final EO Attitude (at STR re-enabling)

RA 16:46:02.72
DEC -61:11:05
POS 078:05:33.3

alpha F=0.315 deg
beta F=-24.215 deg

RW2=+ 2322rpm
RW3=+ 2034 rpm
RW4=- 2319rpm

The STR boresight deviation wrt the target was estimated about 6.8 arcmins over the period 2006-02-05 19:54:26 - 2006-02-06 06:14:09.

Inertial Measurement Unit (IMU)

The Drift correction on the IMU-1 Yaw channel, as calculated by FD during a period of 119 minutes was

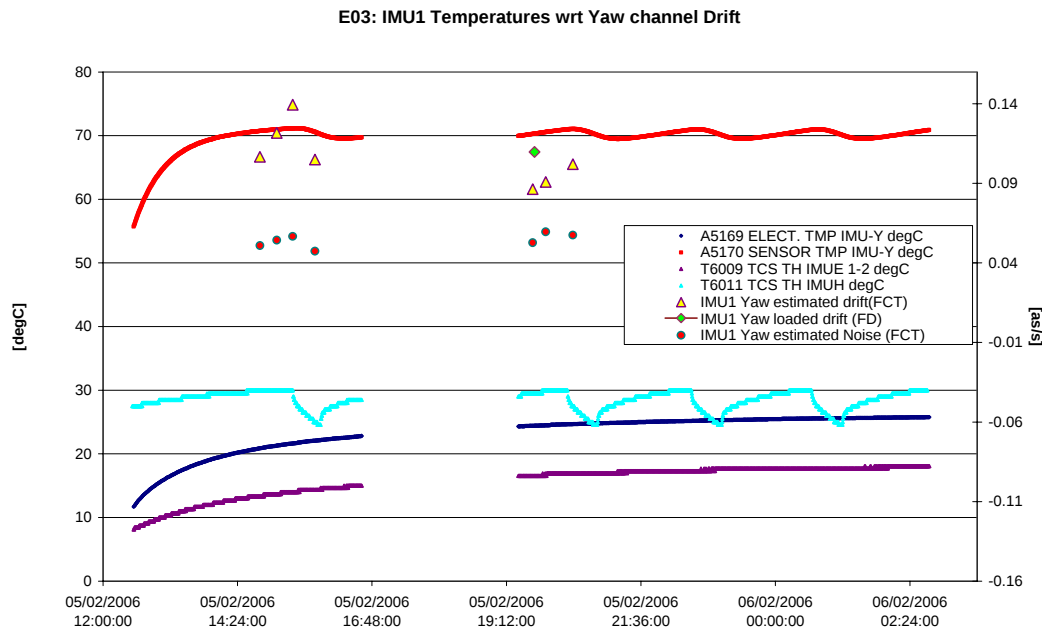
14:21:00Z	Calculated by FCT :	Calculated by FD:	Stable pointing
to	IMU1 Noise Roll = 0.1922 as/s IMU1 Drift Roll = 0.1808 as/s IMU1 Noise Yaw = 0.0523 as/s IMU1 Drift Yaw = 0.1182 as/s	=> 0.1679 as/s => 0.1098 as/s	
16:20:00Z			

The loaded drift correction on-board was = 0.1098 as/s.

Drift in IMU-1 Yaw channel estimated, by FCT, was = 0.1182 as/s

The estimated (FCT) residual drift was ~0.03 as/s (at 04:30Z).

Still observed during on the IMU a small thermal effect induced by heater cycle in the IMU electronic head. The plot below shows the evolution of the IMU1 temperatures during the initial warming-up (~2 hours) and the following calibration period (~2 hours) together with the Yaw drift estimation from FCT and FD.



Star Tracker (STR)

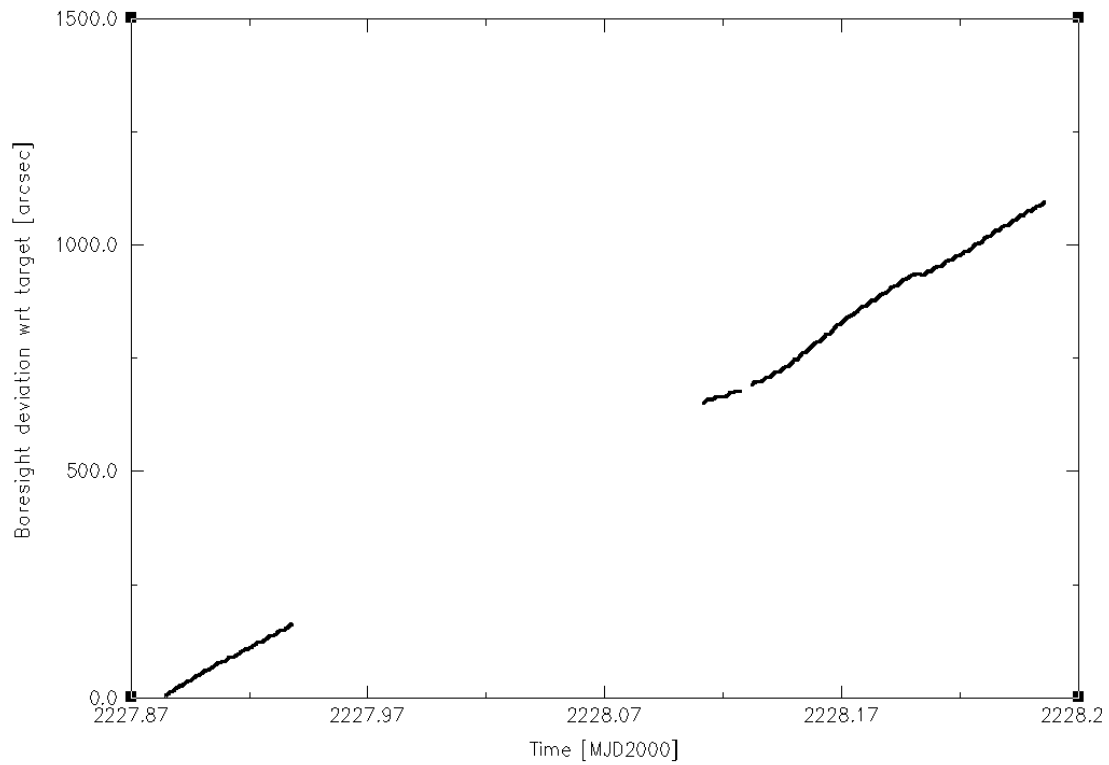
STR reported star lost on 05/02 at 22:30Z with background ~3892 mV

- Earth limb was at ~7.25 deg from the STR boresight.
- Guide star was Mi 6.45 at CCD coordinates [8681, 3205]

STR reported star tracked on the 06/02 at 02:40Z with background ~3333 mV

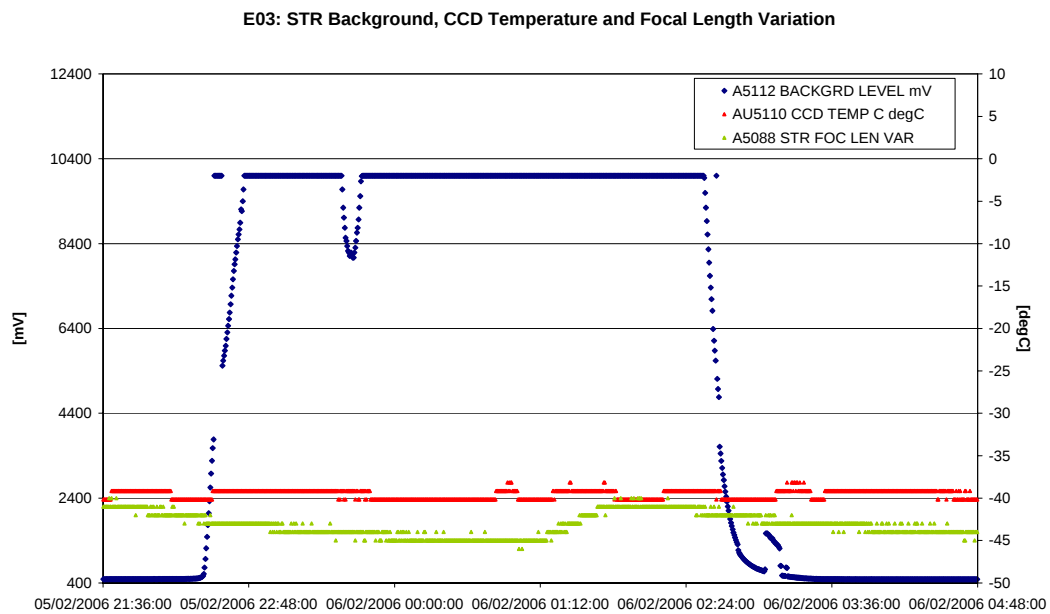
- Earth's Limb was at ~4.5 deg from the STR boresight
- Guide star was Mi 6.05 at CCD coordinates [8030 , -19555]

The plot hereafter shows the evolution of the STR boresight error (w.r.t. the target attitude for the Earth observation) during the period under IMU control to the point where STR control was re-enabled. The gap in the plot is the period where there is no STR data available.



(courtesy M. Tuttlebee, FD Team)

The plot below shows the evolution of the STR background and CCD temperature parameter during the occultation of the STR FOV by the Earth.



07/02/06 (Day of Year 038, Revolution 405)

Nothing to report.

08/02/06 (Day of Year 039, Revolution 405-406)

EO4 Fourth Earth Observation 08-09 February 2006: the aim of the activity was to point towards the centre of the Earth at perigee + 6 hours (i.e. above 40000 Km). Integral reached the 'EO attitude' ~11 hours 46 min before it violated the STR Earth Limb constraint (>15 deg) and the Earth left entering in the STR FOV. The STR use was disabled at 20:45Z and the IMU 1(Z) was selected for attitude control on Yaw axis. The IMU1(Yaw channel) was carefully calibrated and the AOCS configured for the Earth observation activity. As soon as the STR use was disabled, the ACC switched control to FSS-A on Roll and Pitch and IMU1 on Yaw.

09/02/06 (Day of Year 040, Revolution 406)

EO4 Fourth Earth Observation 08-09 February 2006: At 05:58Z the STR use was re-enabled, the ACC switched control to STR on Pitch & Yaw and FSS on Roll. The S/C attitude was not inertial, due to the residual IMU drift on Yaw (not corrected by the calibration) and FSS-A following the apparent motion of the Sun on Roll and Pitch: therefore the attitude at the end of observation was slightly different (~ 27 arcmin difference) wrt the initial 'EO attitude'.

Hereafter is reported a summary of AOCS performances during the EO4

Attitude

Initial EO attitude (at STR disabling)

RA 16:43:03.43
DEC -61:00:32.03
POS 080:46:49.04

alpha F=0.273 deg
beta F=-21.92 deg

RW2=+ 2111rpm
RW3=+ 2006rpm
RW4=- 2163rpm

Final EO Attitude (at STR re-enabling)

RA 16:44:42.57
DEC -60:34:05.06
POS 080:03:52.5

alpha F=0.279 deg
beta F=-21.923 deg

RW2=+ 2284rpm
RW3=+ 2006rpm
RW4=- 2348rpm

The STR boresight deviation wrt the target was estimated about 26.4 arcmins over the period 2006-02-08 19:55:47Z 2006-02-09 06:00:04Z

Inertial Measurement Unit (IMU)

The Drift correction on the IMU-1 Yaw channel, as calculated by FD during a period of 119 minutes was

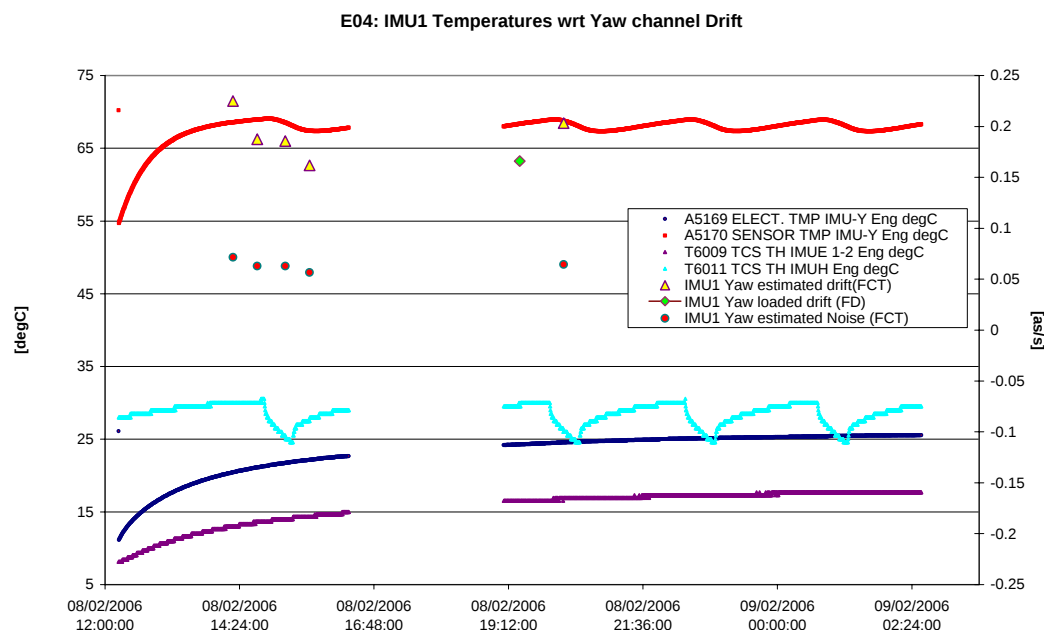
14:22:00Z	Calculated by FCT :	Calculated by FD:	
to	IMU1 Noise Roll = 0.205 as/s	=> 0.237 as/s	Stable pointing
16:21:00Z	IMU1 Drift Roll = 0.245 as/s		
	IMU1 Noise Yaw = 0.063 as/s		
	IMU1 Drift Yaw = 0.190 as/s	=> 0.166 as/s	

The loaded drift correction on-board was = 0.166 as/s, up to 0.06 as/s the value estimated in the previous three EOs.

Drift in IMU-1 Yaw channel estimated, by FCT, was = 0.190 as/s, larger than the value estimated in the previous three EO.

The estimated (FCT) residual drift was ~0.05 as/s (at 05:12Z).

Still observed during on the IMU a small thermal effect induced by heater cycle in the IMU electronic head. The plot below shows the evolution of the IMU1 temperatures during the initial warming-up (~2 hours) and the following observation period together with the Yaw drift & noise estimation from FCT and FD (only drift).



Star Tracker (STR)

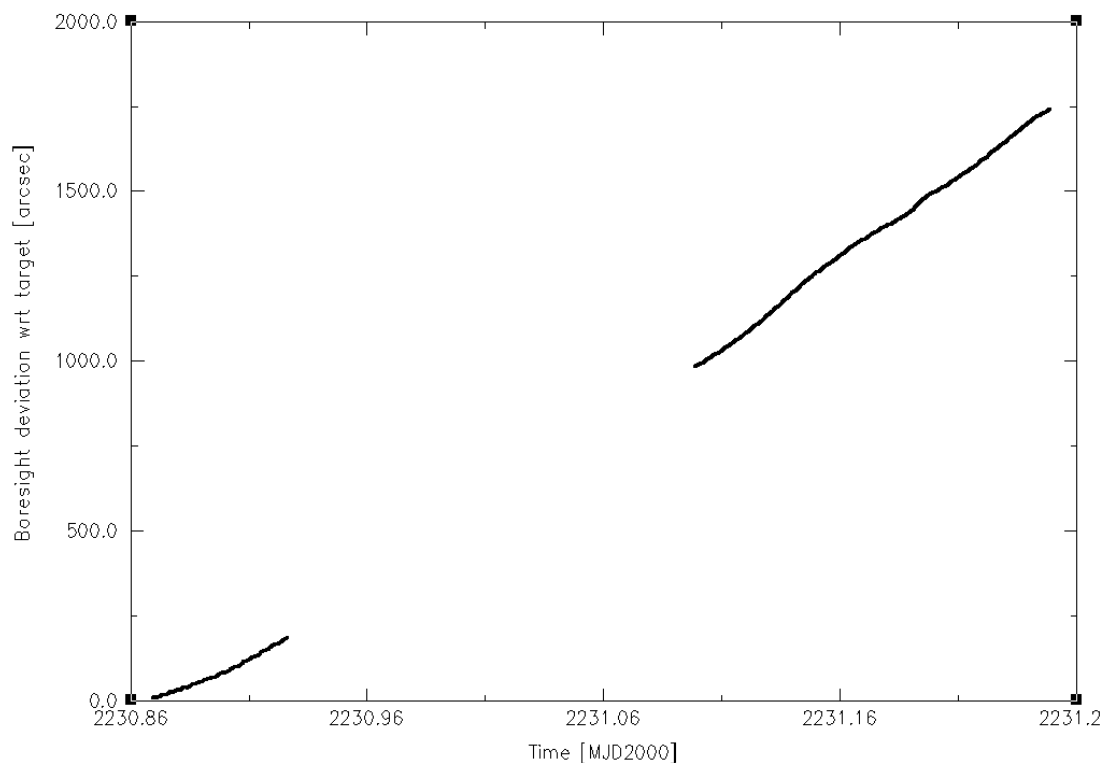
STR reported star lost on 08/02 at 22:21Z with background ~7050 mV

- Earth limb was at ~7.02 deg from the STR boresight.
- Guide star was Mi 6.55 at CCD coordinates [3098, -11617]

STR reported star tracked on the 09/02 at 02:21Z with background ~3448 mV

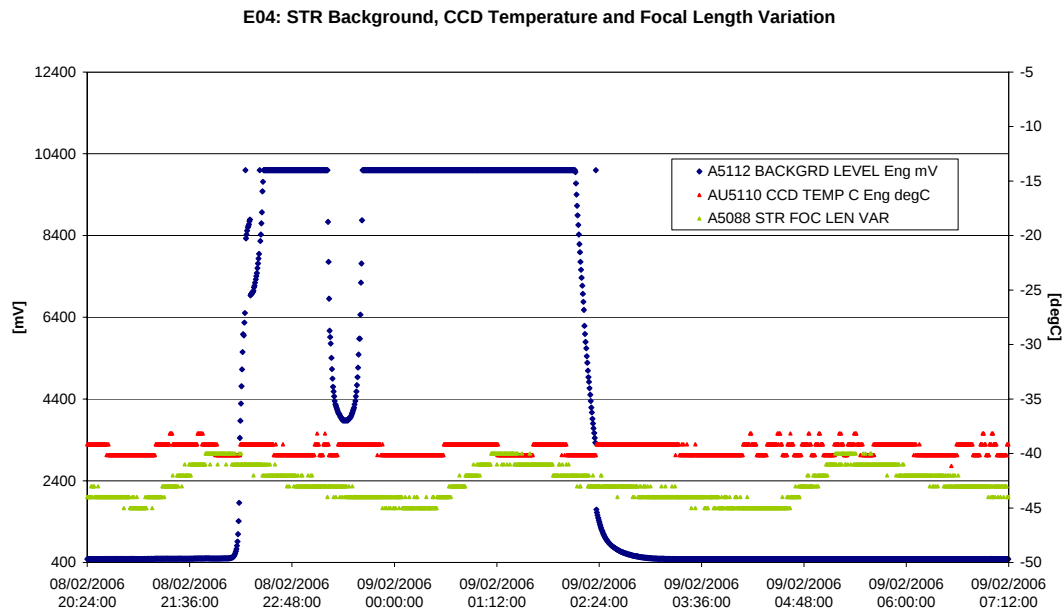
- Earth's Limb was at ~ 4.4 deg from the STR boresight
- Guide star was Mi 7.15 at CCD coordinates [-18617 , -16936]

The plot hereafter shows the evolution of the STR boresight error (w.r.t. the target attitude for the Earth observation) during the period under IMU control to the point where STR control was re-enabled. The gap in the plot is the period where there is no STR data available. It is important to notice the change of drift occurred during the first hours under IMU control. This change caused larger total drift ($\rightarrow$ larger attitude difference) at the end of the observation than observed during the previous EOs.



(courtesy M. Tuttlebee, FD Team)

The plot below shows the evolution of the STR background and CCD temperature parameter during the occultation of the STR FOV by the Earth.



Slew missed from the Timeline: during the AOCS reconfiguration after EO4, due to an unexpected complication on the S\C recovery, the slew ID 04040007 (OSL) to the next scientific pointing after EO4, failed release.

The AOCS s/s was maintained disabled and the manual recovery (EO reconfiguration) continued in order to re-join the TL for PID 04060009. The update for the next slew (ID 04060010) from TL was performed at 10:01Z and the AOCS s/s was re-enabled in TL.

The following slews, 04060007 (CSL)-08(CSL)-09 (CSL) were not executed from the TL.

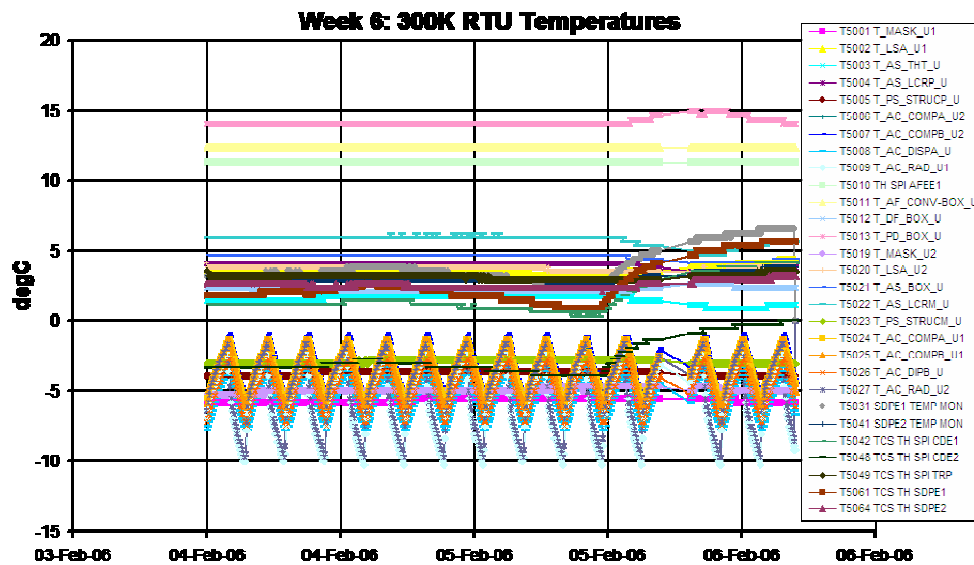
10/02/06 (Day of Year 041, Revolution 406)

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 along the reporting period.

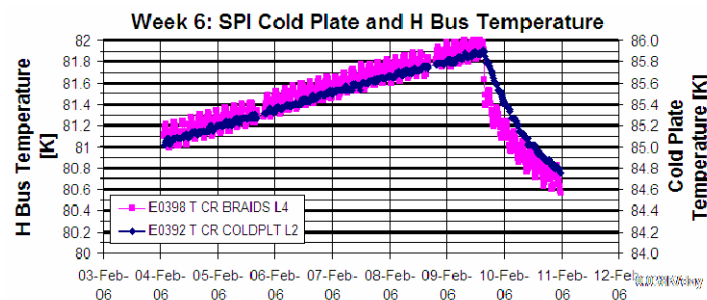


Stirling Compressors and Cryostat:

The performance of the compressors is nominal. The cold plate temperature was maintained at 85K $\pm$ 1K showing the expected positive drift.

The stroke was adjusted from 4x35 to 4x36 to compensate for the drift on 9th February at 15:21z.

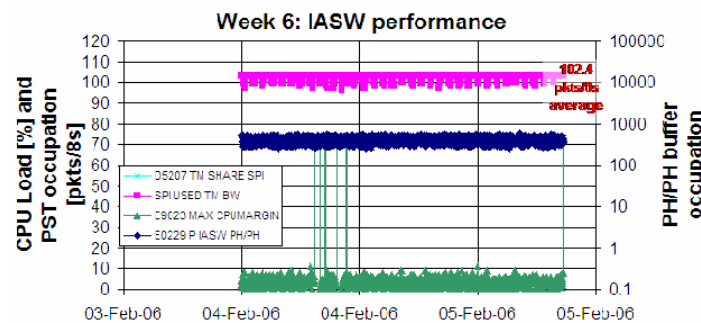
The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



DPE & IASW:

The Iasw performance is nominal. The current Iasw version installed is 432.

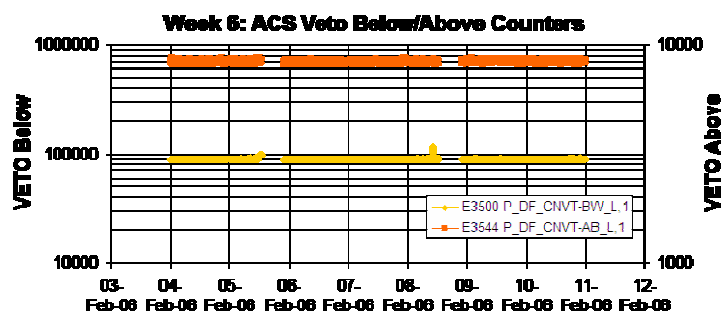
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal.

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



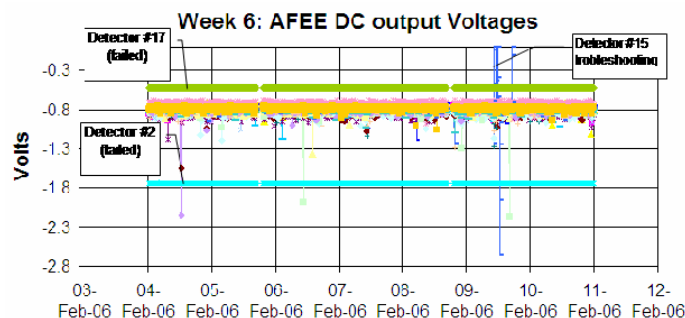
AFEE:

The performance of the AFEE and the detectors is nominal, except for detector #15, which shows a degraded energy resolution. The anomaly has been recorded in the ESOC Anomaly Report and Tracking System (ARTS) with the id. INT_SC-140.

Following the anomaly, some troubleshooting activity was requested by the SPI PI, consisting in performing some Photon acquisition at lower detector voltages (3.5kV, 3 kV and 2.5kV). This was executed on 9th February starting at 10:52z (about half an hour acquisition for each setting).

The result of this troubleshooting was showing a better performance at 3kV and therefore the detector #15 was finally set to work at this level (at 18:00z), while the remaining active detectors were left working at the nominal voltage of 4kV.

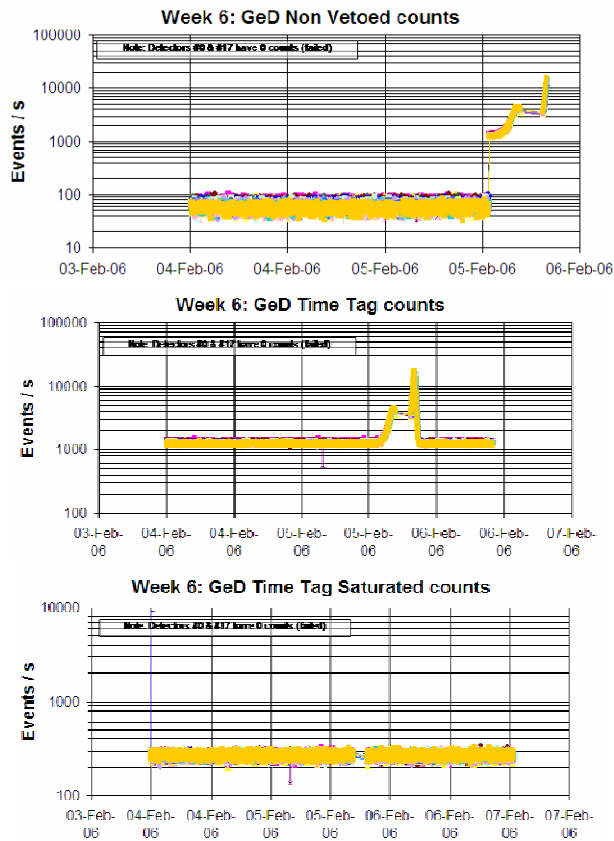
The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.



DFEE:

The performance of the unit is nominal.

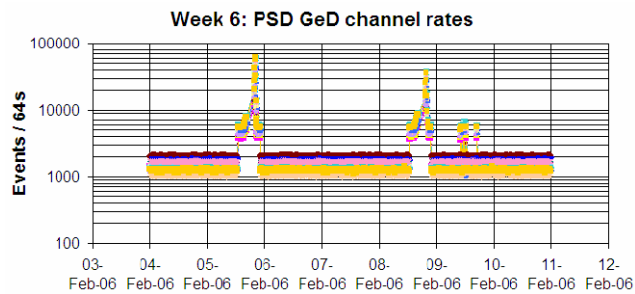
The following plots show the count rates of the detectors during the reporting period (due to problems in the data retrieval tool, some gaps could be present).



PSD:

The performance of the unit is nominal.

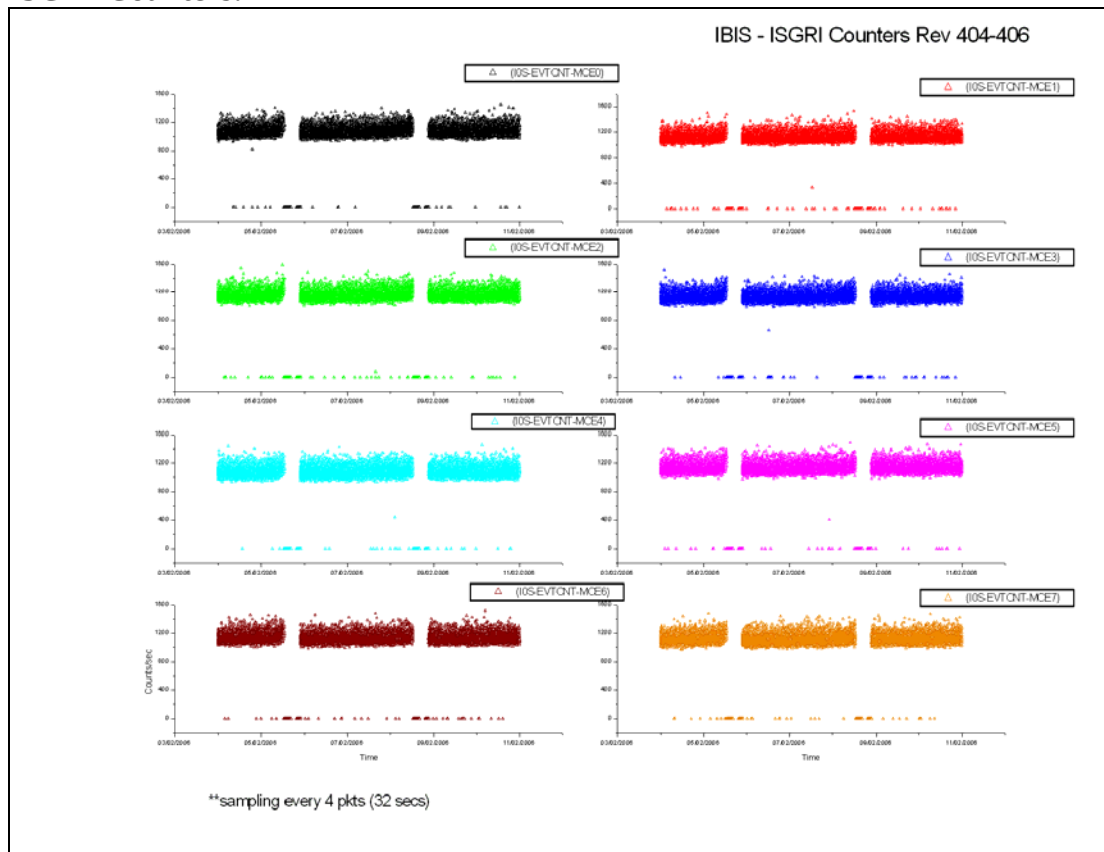
The following plots show the PSD channel rates during the reporting period



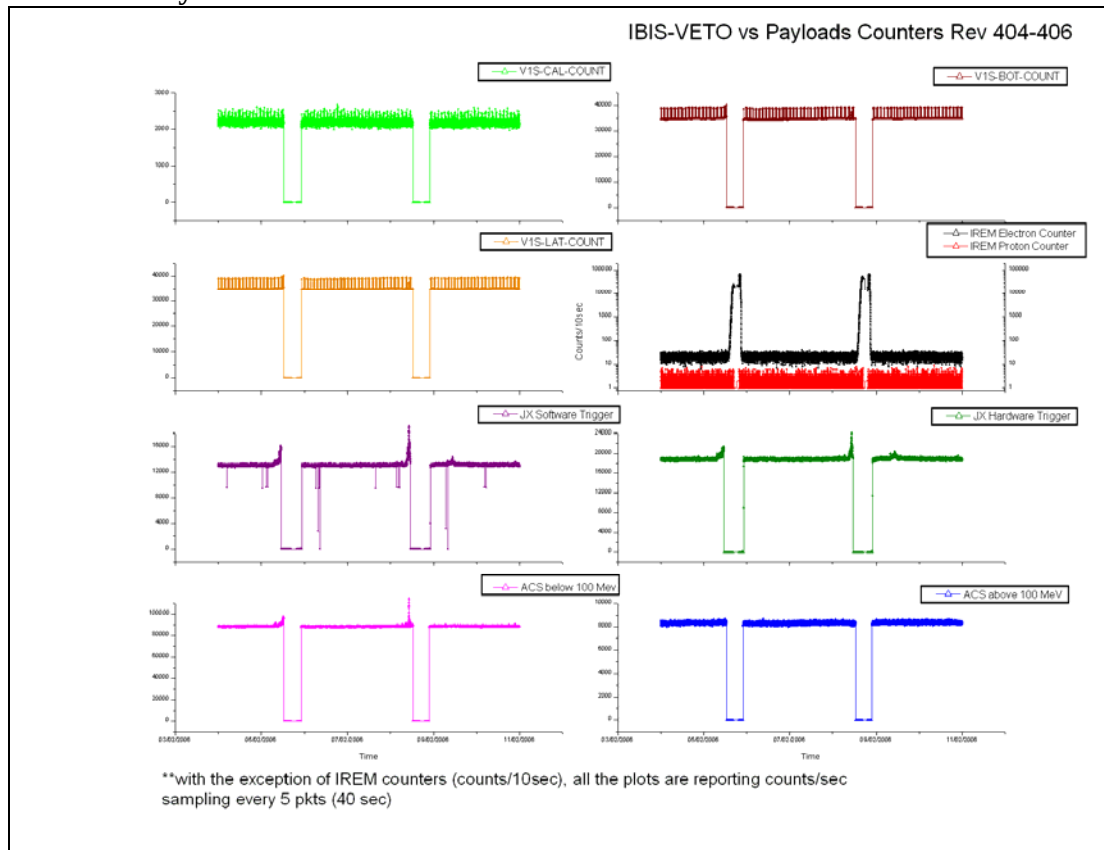
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

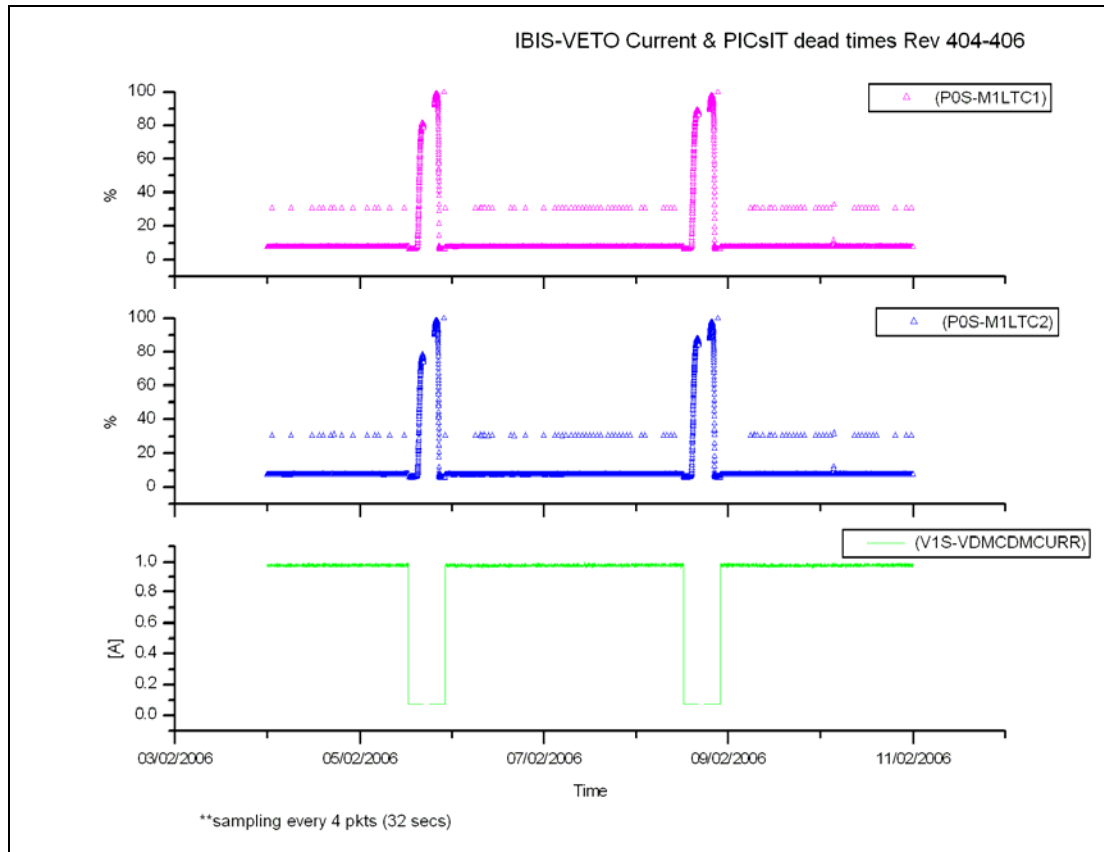


VETO vs Payloads Counters:

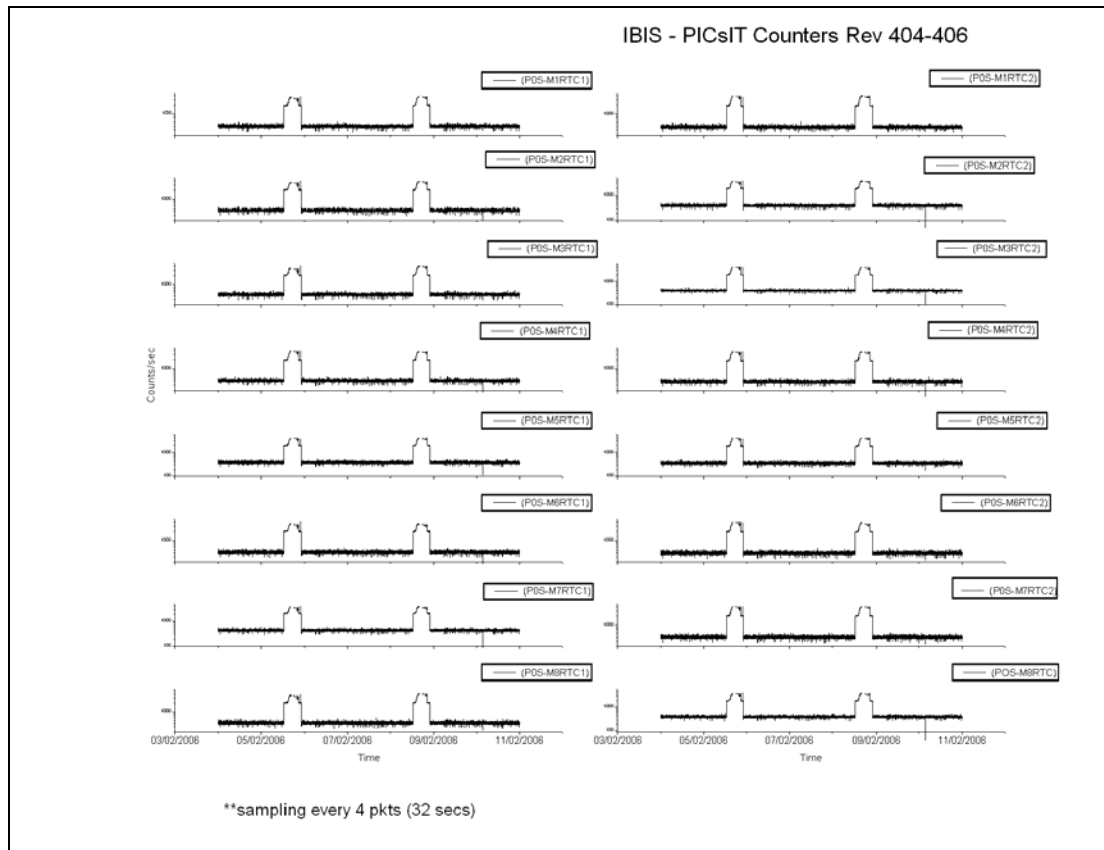


The week was characterised by low radiation.

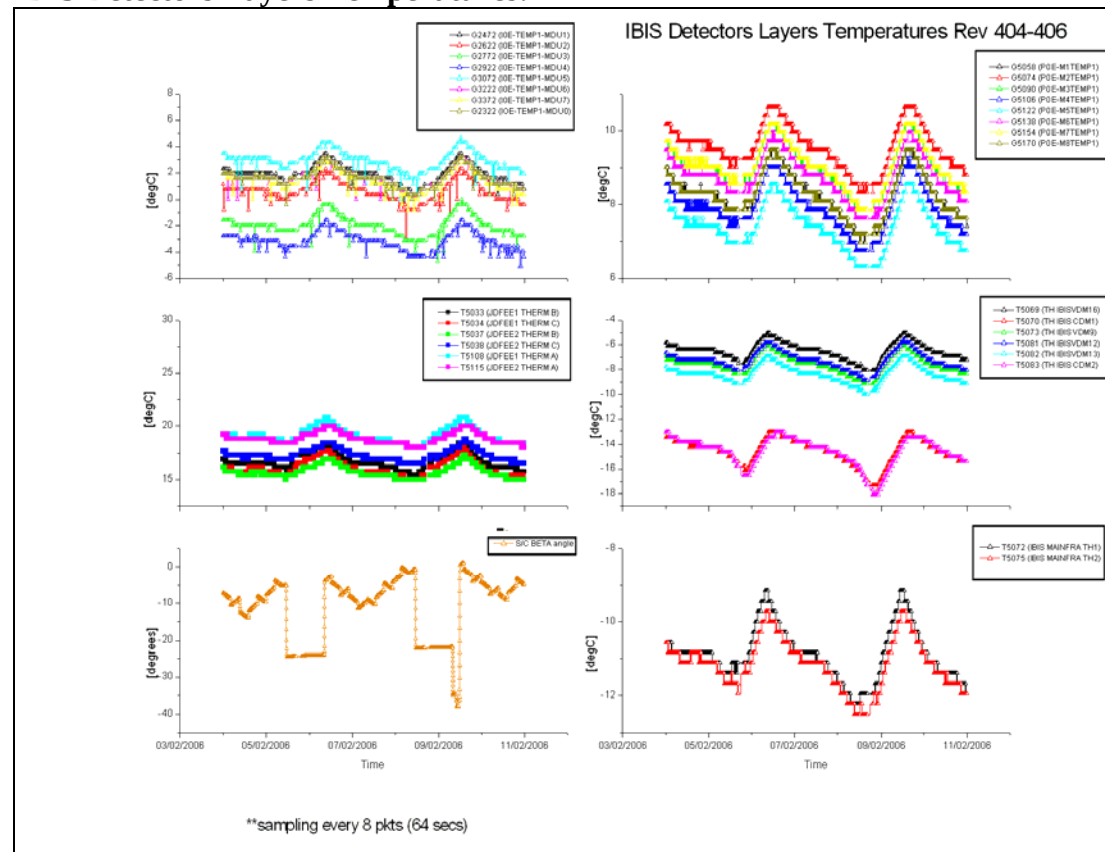
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2006.036 (05/02/2006):

At 12:44Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 22:12Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

Inside the radiation belts, TM parameters G5007 (P0S-M2RTC1), G5012 (P0S-M3RTC1), G5013 (P0S-M3RTC2), G5027 (P0S-M6RTC1), G5028 (P0S-M6RTC2), G5032 (P0S-M7RTC1) and G5033 (P0S-M7RTC2) were toggling OOL high. According to P-CNT-1, no action was taken.

At 21:47Z, TM parameter G2014 (I0E-OVFWPXADD-M1) failed SCC and back. According to I-OVF-1, as this happened inside radiation belts, no action was taken.

DoY 2006.039 (08/02/2006):

At 12:27Z, TM parameter G8015 was reported Out Of Limit high. It went back inside limit at 21:55Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

Inside the radiation belts, TM parameters G5023 (P0S-M5RTC2) and G5037 (P0S-M8RTC1) were toggling OOL high. According to P-CNT-1, no action was taken.

DoY 2006.041 (10/02/2006):

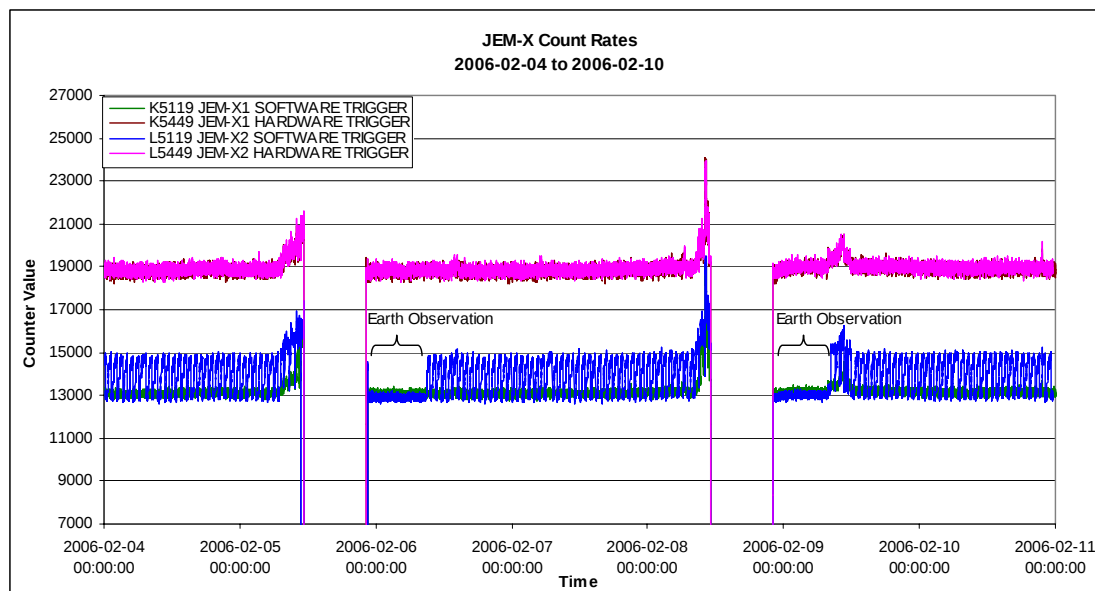
At 03:32Z TM families G5068 (P0S-MiF1ERRF) and G5072 (P0S-MiF2ERRF) failed SCC and back. According to reaction P-FIF-1, as this happened only once, no action was taken.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

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

The high levels of the JEM-X2 Software Trigger are during periods when JEM-X2 is in Data Taking but with a TM allocation of 1 packet/cycle. At the start of each pointing (when the DPE buffer is flushed) the Software Trigger is at a normal value but then builds up as the buffer fills and the grey filter reduces.

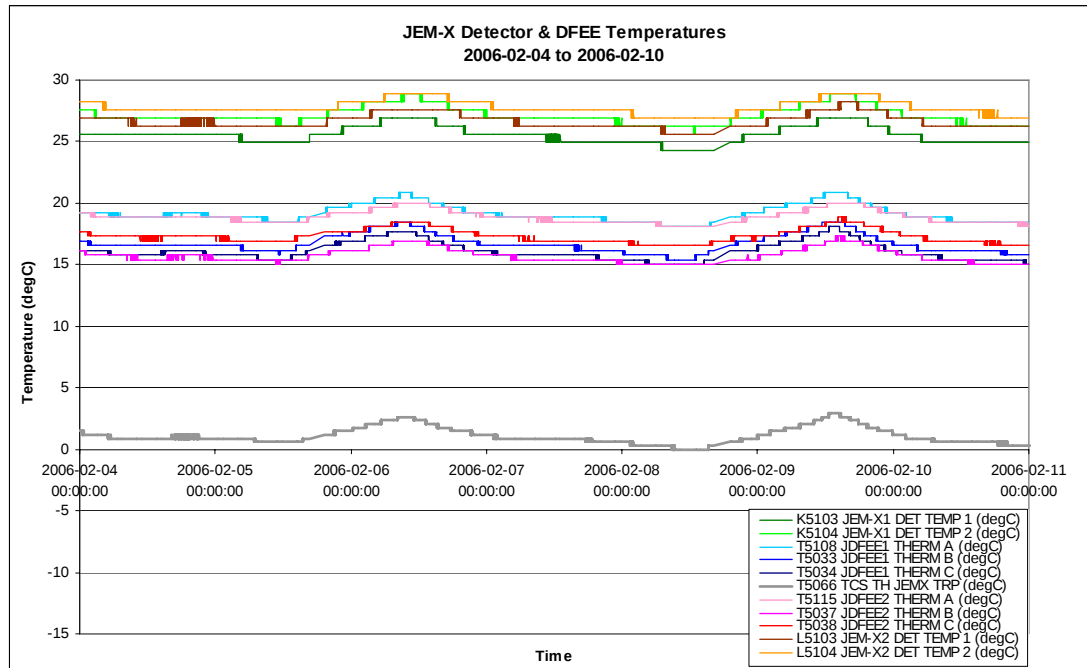


8.3.4.2 JEM-X Temperatures

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)



8.3.4.3 JEM-X Daily Report

2006-02-04 (DOY 035, Rev 404)

Nothing to report

2006-02-05 (DOY 036, Rev 404-405)

At 10:34:12Z the TM parameter L5135 FIFO FULL LOSS went Out of Limits High (value = 507), indicating that the JEM-X2 DPE Buffer was full. According to INT_OR_0236 the following recovery actions were performed:

- At 10:47:40Z JEM-X2 was commanded to Setup mode and back to Data Taking, via the ED LEDATA01, to flush the DPE buffer. L5135 then went back inside limits.
- At 10:48:58Z FCP_JEM2_0090 was executed to set the grey filter manually, setting the parameter of TC L0037 to (L0161 = 5 RAW).

At 11:13:24Z TM parameter L5135 FIFO FULL LOSS went Out of Limits High again (value = 3135). As the grey filter had already been set manually and JEM-X2 was about to be commanded to Safe mode before radiation belt entry, no action was taken.

At 11:21:03Z TC L0021 SW READ INT, uplinked as part of the ED LESAFE02, failed on-board acceptance, with the following OEM being issued:

11:21:11Z OEM 134 JEM-X2 TC REJECTED 7

>> indicating a failed TC due to the DPE being busy (input TC queue full).

As reported for the occurrence on 2006-02-08 (see below), this was due to the fact that the DPE buffer was full.

At 12:07:21Z, in line with INT_OR_0238, FCP_JEM2_0120 was executed to set the JEM-X2 BCP DATA RATE FLAG to ENABLED. At 22:37:06Z, once JEM-X2 was in Data Taking after radiation belt exit of revolution 405, FCP_JEM2_0090 was executed to reset the grey filter back to automatic before the Earth observation.

2006-02-06 (DOY 037, Rev 405)

At 08:36:56Z, FCP_JEM2_0120 was executed to set the JEM-X2 BCP DATA RATE FLAG back to DISABLED following the Earth observation (INT_OR_0238).

2006-02-07 (DOY 038, Rev 405)

Nothing to report

2006-02-08 (DOY 039, Rev 405-406)

At 09:52:36Z the TM parameter L5135 FIFO FULL LOSS went Out of Limits High (value = 515). It returned within limits at the start of the next pointing at 10:00:56Z but then went OOL again at 10:26:28Z. As this was shortly before JEM-X2 was due to be commanded to Safe mode before radiation belt entry, no action was taken. L5135 went back inside limits at 11:04:04Z, when JEM-X2 was commanded to Safe mode.

At 11:04:47Z TC L0021 SW READ INT, uplinked as part of the ED LESAFE02, failed on-board acceptance, with the following OEM being issued:

11:04:55Z OEM 134 JEM-X2 TC REJECTED 7

>> indicating a failed TC due to the DPE being busy (input TC queue full).

JEM-X2 was then commanded back to Setup mode by FCP_JEM2_0041 at 11:13:43Z and then at 11:14:47Z FCP_JEM2_0071 was executed to attempt to report the SW Integer Parameters again. The TC was rejected, with the same OEM as above.

It was then suspected that the IASW was rejecting the report command as the DPE buffer was full. When the PST was changed by the Timeline at 11:30:17Z, JEM-X2 started downlinking the events in the DPE buffer. Once this was complete, another report of the SW Integer Parameters was performed at 11:45:25Z and this was successful. JEM-X2 was then commanded back to Safe mode at 11:52:34Z via FCP_JEM2_0040.

At 11:55:15Z, in line with INT_OR_0238, FCP_JEM2_0120 was executed to set the JEM-X2 BCP DATA RATE FLAG to ENABLED before the upcoming Earth observation.

2006-02-09 (DOY 040, Rev 406)

At 08:16:20Z, following the Earth observation (during PID 04060007, reached early via a manual slew) L5135 FIFO FULL LOSS went Out of Limits High (value = 15249), indicating the DPE buffer was full. At 08:23:56Z FCP_JEM2_0120 was executed to set the JEM-X2 BCP DATA RATE FLAG back to DISABLED (INT_OR_0238) and L5135 returned within limits at the start of the next pointing, at 09:02:36Z (PID 04060008, reached via manual slew).

2006-02-10 (DOY 041, Rev 406)

Nothing to report

8.3.5 OMC Operations

2006-02-04 (DOY 035, Rev 404) to 2006-02-05 (DOY 036, Rev 404)

Nothing to report

2006-02-06 (DOY 037, Rev 405)

The third earth observation proceeded nominally, however as before, the images of the earth were completely saturated.

2006-02-07 (DOY 038, Rev 405) to 2006-02-08 (DOY 039, Rev 405)

Nothing to report

2006-02-09 (DOY 040, Rev 406)

The fourth earth observation proceeded nominally, despite the images still being saturated, good data was obtained on the behaviour of the instrument under the influence of stray light.

Pointings 04060006 & 04060007 were lost due to an ongoing manual Reaction Wheel Bias prior to rejoining the timeline after the Earth Observation.

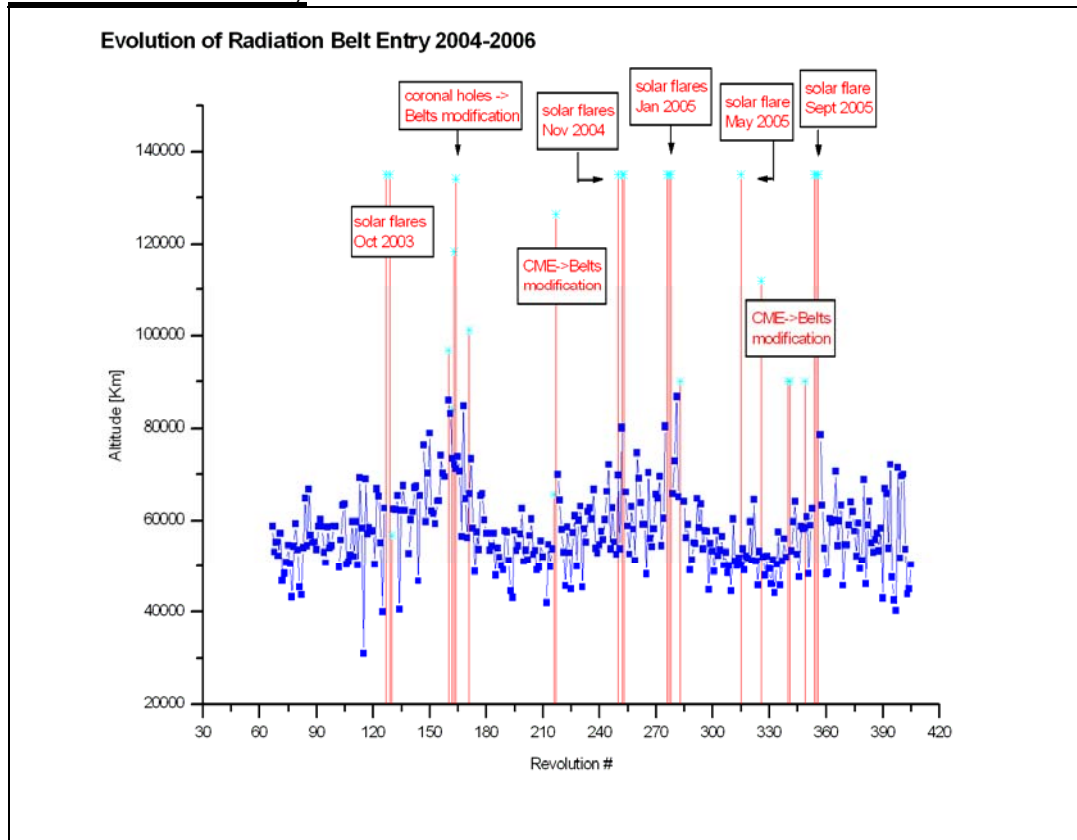
2006-02-10 (DOY 041, Rev 406)

Nothing to report

On DoY 036 at 12:44:06 and DoY 039 at 12:27:50 OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



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]
404	RAD_ENTR R 2006-02-05T12:43:59Z	2006-02-05 14:31:17	44901.6	2006-02-05 14:01:23	49767
405	RAD_EXIT R 2006-02-05T21:59:28Z	2006-02-05 21:05:17	>>23332.1	2006-02-05 21:11:23	32478
405	RAD_ENTR R 2006-02-08T12:27:42Z	2006-02-08 13:38:29	>50261.9	2006-02-08 13:48:37	49276
406	RAD_EXIT R 2006-02-08T21:43:09Z	2006-02-08 20:55:41	>>23331.3	2006-02-08 20:58:37	33070

Reference

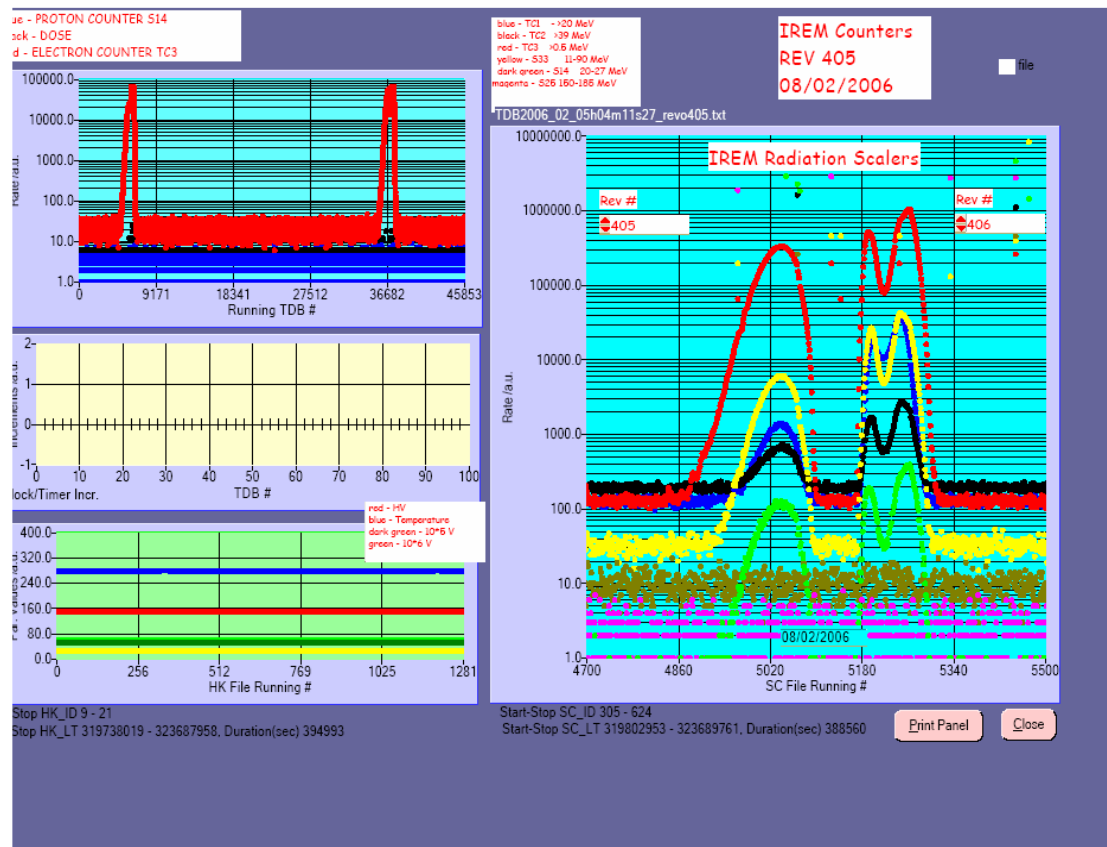
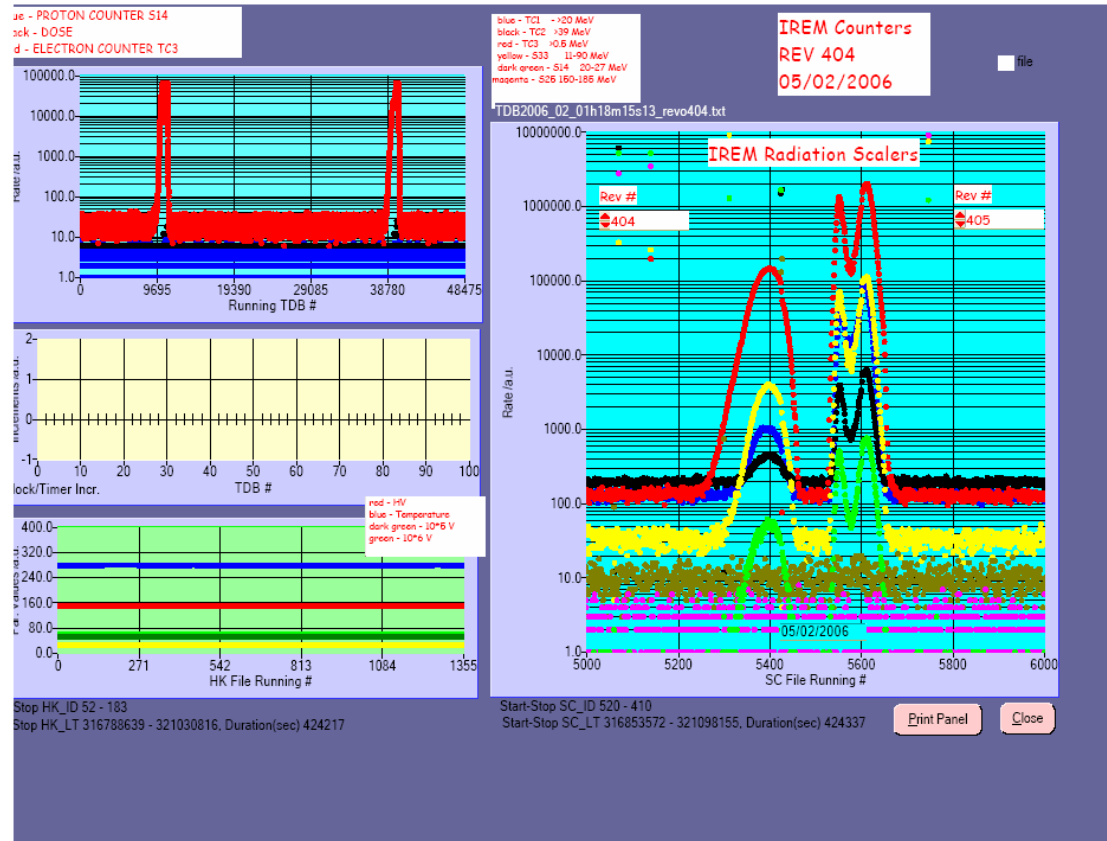
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

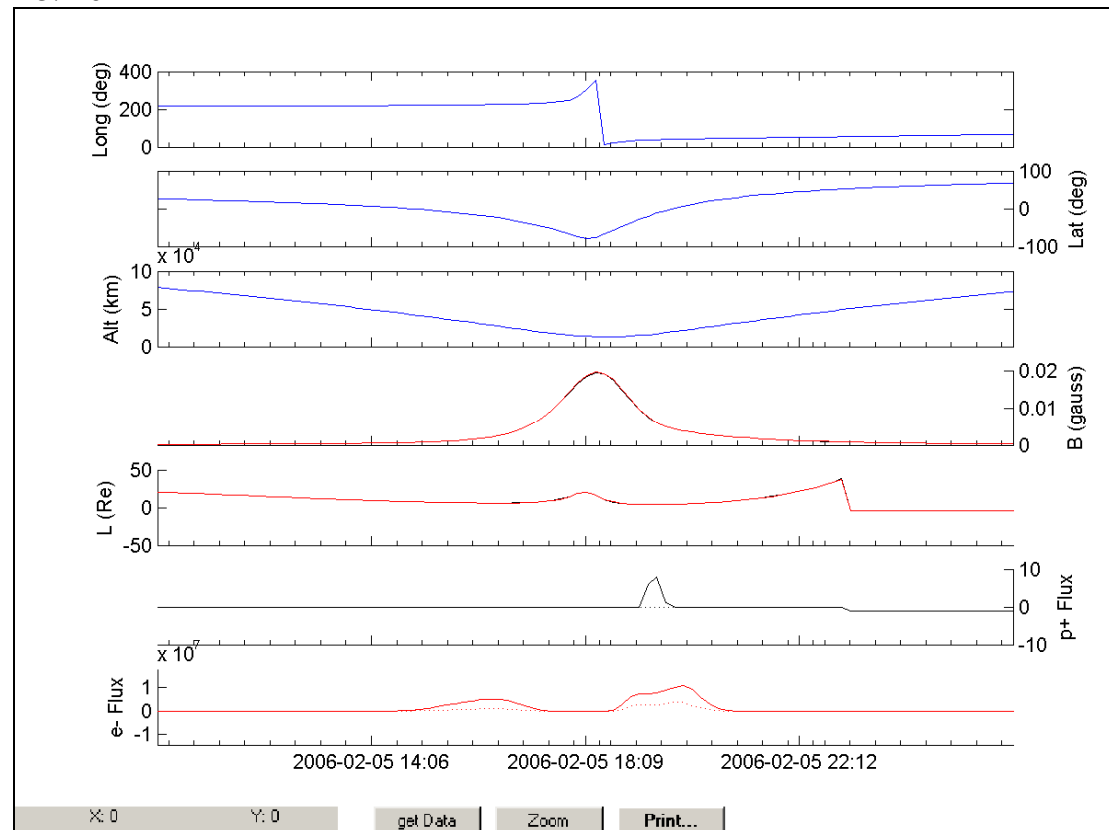
Radiation Spike

IREM radiation counters:

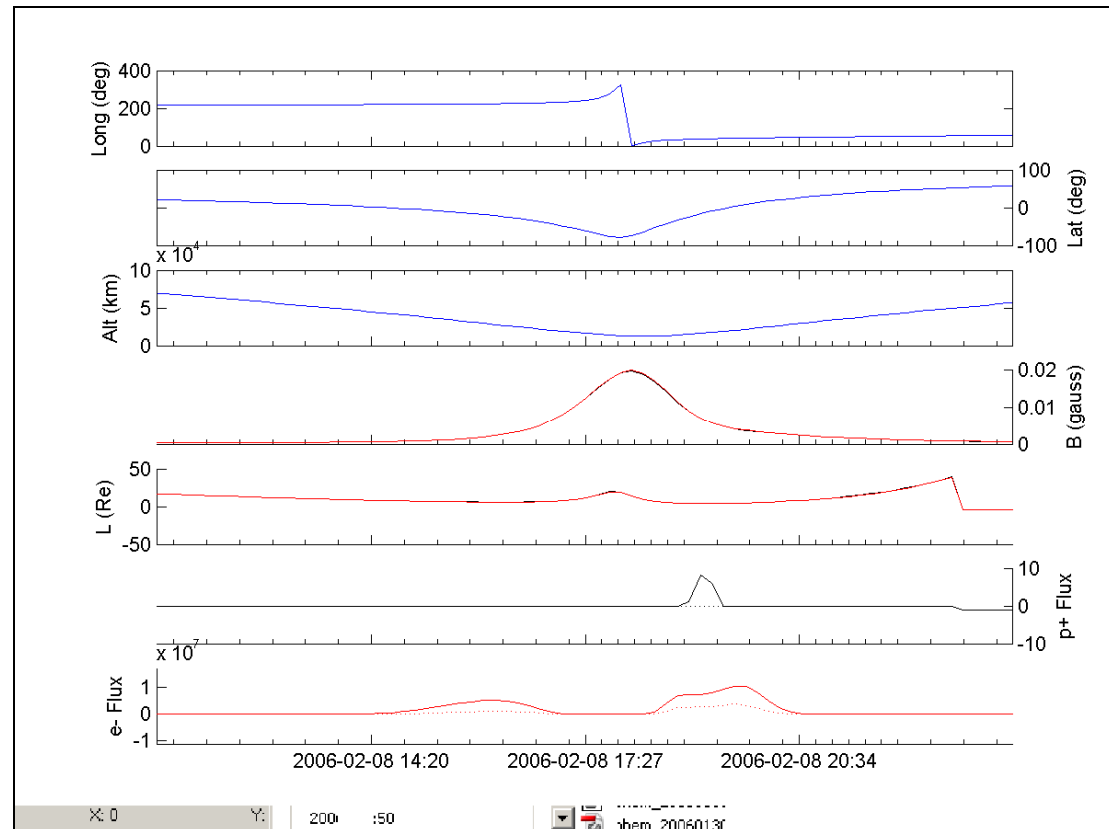


IREM Predicted Radiation Belt Passages:

Rev 404



Rev 405



SEC-GOES Observed Particles Fluxes:

